ASSESSING THE EFFECTIVENESS OF INTERVENTION STRATEGIES FOR MITIGATING DROUGHT EFFECTS IN KENYA'S PASTORAL LIVELIHOOD: CASE OF GARISSA COUNTY.

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DECLARATION

This research project is my original work and has not been presented for any award of a degree in any other university.

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DEDICATION

I dedicate this work as living academic testimony to my wife Kuresham Mohamed and parents Hassan Abdi and Kulay Yarow who endeavoured tirelessly to support my education all through at different levels of my academic career development. It has been a challenge upon life that required endurance, patience and psychosocial support from them.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACK	Anglican Church of Kenya
ALDEF	Arid Lands Development Focus
ASAL	Arid and Semi Arid Lands
CAHSs	Community animal health workers
CCPPI	Contagious Caprine Pleuropneumonia international
DRM	Disaster Risk Management
FCFA	*Fédération des Communautés Francophones et Acadienn*
GoK	Government of Kenya
LMD	Livestock Marketing Division
NGO	Non Governmental Organisation
SPSS	Statistical Package for Social Sciences
UNEP	United Nations Environmental Programme

ABSTRACT

The purpose of this study is to assess the effectiveness of the intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garissa County: so as to document the best mitigation practices which can be employed in other similar climatic livelihood zones. Five research objectives were formulated to guide the study. The study applied descriptive survey research and administered questioners to collect data from the sampled cluster comprising of 20 government officials, 20 NGOs officials and 10 community chairpersons. Data was then analyzed both qualitatively and quantitatively.

The research findings revealed that the drought effects mitigation intervention strategies assessed under this research are effective. Based on the findings of the study, it was concluded that destocking influenced drought mitigation in livestock among the pastoral communities. Destocking is carried out by both the government and NGOs in the area. The destocking carried out was rated as effective by most of the respondents in the study. The destocking benefited the community since it was able to salvage animals.

The study also concluded that veterinary interventions had influence the mitigation of drought on livestock in Garissa County. The community received drugs, vaccination and treatment of animals; they also received Para-Veterinary services to ensure the livestock did not die of diseases. The veterinary and provision of drugs services were rated as effective by the government and NGO officials who are the service providers.

This study also confirms that water provision influenced mitigation of drought on livestock based pastoral livelihood. However, from the research data water provision is inadequate. The community leaders reflected overcrowding in water sources as the major challenge during drought. Supplementary livestock feeding as well influenced mitigation of drought on livestock. From the data for example the government provided financial resources for supplementary feeding during drought. The communities also participate in complementing supplementary feeding through preservation of hay and other alternative feeding approaches.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Global warming and consequential climate changes are contemporary challenges in the world. Drought is a natural part of climate, although it may be erroneously considered as a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. Over 80% of Kenya land mass fall under arid and semi arid lands (ASAL), which are prone to frequent droughts. The variability in rainfall has also affected biomass productivity, as biomass productivity correlates with mean annual rainfall in the country (Evers, 1994).

Pastoralists are people who depend primarily on livestock for subsistence. They inhabit those parts of the world where the potential for crop cultivation is limited due to lack of rainfall and extreme temperatures. There are about 120 million pastoralists in the world, of which about 50 million pastoralists live in sub-Saharan Africa, many of them roaming the dry sub-Saharan belt that stretches from Mauritania to Ethiopia (Rass, 2006). Livestock production (largely through Pastoralism) is a production strategy in which people raise herd animals as a means to earn a livelihood, particularly in ASALs. Pastoralists are people who depend primarily on livestock for subsistence. Livestock production accounts for 26% of total national agricultural production and over 70% of the country's livestock and 75% of wildlife are in the ASALs (GoK, 2005).

In the ASALs of Kenya, drought is the most common hazard encountered by households on a widespread level. Between 1993 and 2009, the government of Kenya has declared five national disasters in 1992-93, 1995-96, 1999-2001, 2004-2006 and 2008-09 due to droughts (Huho & Mugalavai, 2010) , with prevalence becoming more cyclic and frequent . The recurrence of severe drought is a cause of human suffering and a major blockage to pro-poor livestock development in sub-Saharan Africa, particularly in pastoral systems. For example an indirect estimate of the value of livestock that died in Kenya due to the 1999-2001 droughts comes to US$ 77.3 million. Depending on the

precise method of calculation, losses to the valuation of livestock sector in the national accounts of Niger were up to FCFA 61 billion (about US$ 145 million at the then exchange rate) and FCFA 42 billion (about US$ 90 million) in the drought years of 1984 and 1985 respectively (Huho &Mugalavai 2010).

Droughts affect the livestock in several ways. Reduced productivity and mortality are the direct effects. Driven by enhanced livestock pressure due to depletion of forage resources during drought, overgrazing and indiscriminate cutting of vegetation take place leading to land degradation. This is followed by first distress sale of cattle and even small ruminants. Decrease in size of herd was reported due to frequent occurrences of droughts. Recurring droughts bring changes in the nature and extent of the socio-economic values and attitude of the people.

1.2 Statement of the problem

Drought kills millions of animals, and reduces millions of people to destitution and reliance on food relief. But drought also affects the reliability of supply of livestock to markets. Thus, although the drought cycle remains the same, the mitigation strategy to external stresses moderates the level of effect of the drought on pastoral production livelihood.

From common experience during emergency response in pastoral areas diverse livestock-related interventions have been tried in Kenya. However, the relevance and the effectiveness of the mitigation measures remains a question since there is no significant reduction in the effect level of the drought on pastoral livelihoods. Most of the drought intervention initiatives are applied at the disaster level of the drought as response mechanism instead of strategic mitigation intervention to reduce drought risk vulnerabilities.

However, the current study will assess the effectiveness of the drought mitigation intervention strategies and will provide recommendations for effective mitigation of drought effects to minimise risk vulnerabilities and increase livestock production based pastoral livelihood resilience to cyclic droughts in Garissa County.

1.3 Purpose of the study

The purpose of this study was to assess the effectiveness of the intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garrissa County: so as to come to document the best mitigation practices which can be employed in other similar climatic livelihood zones.

1.4 Objectives of the study

The study was guided by the following objectives;

1. To establish how de-stocking influence mitigation of drought on livestock in Garissa county
2. To assess how veterinary interventions influence mitigation of effect of drought on livestock in Garissa county
3. To assess how water provision influence mitigation of drought on livestock in Garissa county
4. To determine how supplementary feeding influence mitigation of drought on livestock in Garissa county
5. To provide recommendations for best intervention strategies for mitigating drought in Kenya's pastoral livelihood.

1.5 Research questions

To achieve the above objectives, the following research questions were formulated:

1. How does de-stocking influence mitigation of drought on livestock in Garissa County?
2. In what ways do veterinary services mitigate the effect of droughts on livestock in Garissa County?
3. How does water provision influence mitigation of drought on livestock in Garissa County?

4. What is the effect of supplementary feeding in mitigation of drought on livestock in Garissa County?

5. What recommendations can be put in place as effective intervention strategies for mitigating drought in Kenya's pastoral livelihood?

1.6 Significance of the study

The findings of this study may be significant in a number of ways. First the local community particularly those that are most vulnerable may be made aware of the effective strategies that can be used in mitigating drought effects. The community may be sensitized on awareness of drought hazards and the related mitigation strategies to which they are exposed and hence be able to take specific actions to minimize the threat of loss or damage. Secondly, the county governments which usually have the direct responsibilities for citizen safety may be sensitized on how it can provide effective drought risk reduction measures in order to be able to advice, instruct, or engage the local population in a manner that increases their safety and reduces the possible loss of resources and livelihoods on which the community depends.

Lastly the national government who may be helped by the findings of this study on facilitating drought mitigation strategies, as well as the technical systems required for drought preparedness and building capacities of local community. National governments might be sensitized in ensuring coordination among different line ministries as well as with bilateral and multilateral partners through national platforms for drought effects mitigation strategies and approaches.

1.7 Limitations of the study

The study is carried out in one administrative county in the North Eastern province. The main limitation of the study is that some of the respondents may give socially acceptable responses to please the researcher and not to expose the negative side of the government's role in drought mitigation. However efforts are made in explaining to the respondents on the importance of the study and requesting the respondents to be sincere and honest. Another limitation was the low literacy levels amongst the pastoral communities which may make it hard for respondents to understand the questions posed,

however effort are made by the researcher to explain questions in the local language. Movement and migration by the pastoralist may also hinder some of the target group's locations when required. The researcher however used the local elders to reach the respondents.

1.8 Delimitations of the study

The study is conducted in one administrative county which is practically rural set up, the findings may be generalized to other rural areas with caution. The study also delimited to government officials and local community.

1.9 Assumptions of the study

The following assumptions were made in this study:

It is assumed that the recurrent drought in Garrissa has effects on livestock sector, food security, human relations, and pastoralist settlements among the pastoralists in Garissa County. It is also assumed that there are drought strategies carried out by the pastoralist to mitigate the effects of drought on pastoralists' livelihood among the pastoralists in Garissa County. The methodologies and instruments that will be employed for the collection of data will be appropriate and relevant for the purpose and objective of this research. The study also assumes that the respondents would be honest in responding to the data collection instruments.

1.10 Definition of terms

Agricultural drought is defined more commonly by the lack of availability of soil water to support crop and forage growth than by the departure of normal precipitation over some specified period of time.

Drought refers to a natural part of climate, although it may be erroneously considered as a rare and random event.

Food insecurity refers to a situation where there is no availability, stability and accessibility of food supplies in the district as a result of drought.

Food security refers to ensuring that there is availability, stability and accessibility of food supplies in the district.

Hydrological drought is normally defined as deficiencies in surface and subsurface water supplies relative to average conditions at various points in time through the seasons.

Mitigation refers to measures that are taken to minimize the effect of drought on livestock production based pastoral livelihood

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of literature on the effect of droughts on pastoral livelihood. The review focuses on the effects of drought on livestock sector among the pastoralists, the drought mitigation strategies employed in livestock production in pastoral livelihood. The chapter also presents the theoretical and conceptual framework for the study.

2.2 Effects of drought on livestock sector among the pastoralists

In parts of North Africa and the Southwest Asia, rangelands have been reduced in size, in part because the widespread use of irrigation technologies, both in traditional and more recently in hi-tech forms, has allowed agriculture to colonise much larger regions of the rangelands. As a result, what rangelands remain is considerably more arid than those exploited by pastoralists in Sub-Saharan Africa. Indeed, 'drought' conditions may be said to prevail most of the year. Responses to this have long since been developed, both in terms of species and the movement of resources.

Pastoralism has traditionally been oriented around camels and shoats, with shoats becoming predominant in recent times due to their greater marketability. The movement of water and feed resources to arid areas has been practiced since before ethnographers began to describe pastoral nomads (notably through the carriage of large water-skins on camel-back). Today pastoralists throughout the North Africa and Southwest Asia have relatively sophisticated trucking systems (of water, feed resources and the animals themselves) that allow them to exploit areas that in Sub- Saharan Africa would be unavailable (Blench, 1998). This is less true for pastoralists in the High Atlas and desert steppes in Morocco, where constraints are similar to those in Sub-Saharan Africa.

Nomadic and transhumant pastoralism is the most efficient form of land use for parts of arid and semi-arid lands, where crop production is very risky due to high climatic

variability (Kilby, 1993; Scoones, 1995). For Africa it is estimated that there were 147 million cattle, and 230 million sheep and goats in the early 1980s. The annual output as a whole for livestock in Africa was estimated in 1984 to be worth US$10 billion, compared with total cereal production, valued at US$8.4 billion (Kilby, 1993:92). Despite the important contribution that pastoralism makes to African economies, it must be said that it has survived more in spite of, than as a result of , various development policies implemented over the last fifty years, which have often undermined the traditional management of pastoralists.

In the ASALs of Kenya, pastoral economy accounts for 90 percent of employment opportunities and 95 percent of family incomes and livelihood security (Huho, et. al., 2009; USAID, 2010). Pastoralism provides a major contribution to many economies in arid and semi-arid lands. Pastoralists in northern Kenya keep different types of livestock which include cattle, shoats, donkeys and camels. However, the dominant stock varies from one ethnic community to the other depending on cultural values attached to specific livestock types and also due to climatic conditions. For example, camels are the most dominant livestock type among the Turkana and Rendile while cattle dominate the Maasai, the Samburu and the Kalenjin pastoralists' herds. Pastoralism is largely practiced by the Turkana (2.56% of the Kenya population), the Maasai (2.18%), the Rendile (0.16%), the Samburu (0.61%), the Gabra (0.23%), the Borana (0.42%), the Orma (0.17%) and the Kalenjin (12.87%),(GoK, 2005). Pastoralism in this region is nomadic in nature, where herders adapt to spatial-temporal variability in pasture and water availability through herd migration.

Water and Forage are the most important resources for pastoralism and changes in their availability greatly influence pastoralists' livelihood security. Livestock is the most important asset for pastoralists and livestock productivity is directly dependent on access to forage and water resources. Access to forage and water resources tends to decrease during a large scale drought with the result that pastoralists lose assets. Drought is by far the greatest cause of livestock mortality. About 2 billion US dollar worth of livestock is lost annually to mortality, poor quarantines, diseases and missed trade opportunities, resulting in increased food insecurity in the drought-prone ASALs (USAID, 2010).

(Kilby, 1993) points out that Climatic variability is very high in arid and semi arid lands and people often have to cope with long periods without rainfall (Evers, 1994). The experience of major droughts during the last decades shows that pastoralists have been the major victims of such natural events. The most direct impact of a shortage in rainfall on pastoralists' livelihoods is the drying up of water sources and declining forage resources for livestock (OFSG, 1990).

During drought, livestock numbers start to fall, through sales and deaths among the most vulnerable animals. As drought hits harder, the condition of animals becomes worse and cereal harvests fail. As a consequence, grain prices rise and livestock prices decline (Toulmin, 1995). Furthermore, (Toulmin, 1995) points out that these relative price movements provide an increasingly tight squeeze on herders' ability to raise cash to buy the food needed by their families. Thus, herders may be forced to sell animals in excess of those required to bring animal numbers into balance with fodder availability. This may compromise their ability to reconstitute a viable pastoral existence in the post-drought period.

Livestock numbers remain well below the level which could make effective use of the available grazing as in the pre-drought period. Poorer households still may be under pressure to sell stock, due to food shortages. Richer ones may be able to reconstitute herds. Some pastoral households become totally destitute and must receive food relief. (Toulmin ,1995) states that as pasture conditions improve and post-drought harvests start coming in, a rapid inversion of relative grain prices to livestock prices takes place, cereal prices fall, while the price of animals starts to rise rapidly, due to the shortage of animals and the intention of herders to reconstitute their herd. Most notably the demand for young breeding stock is very high (Toulmin, 1987; Grandin & Lembuya, 1987).

2.3 Drought Mitigation strategies

Mitigation activities are aimed at preserving livelihoods, and typically planned for the early stages or onset of drought. However, mitigation activities are generally still practiced only on a pilot scale, and largely by NGOs, because of high transaction costs that the careful planning and in-depth knowledge of local conditions requires (Scoones,

2001). If mitigation activities are successful, they are preferable to food relief, because they are more cost-effective, strategically provide inputs to livelihoods and let people feed themselves, and take place early in the drought cycle before people are totally destitute. In principle, mitigation activities should involve low levels of subsidy, at least of explicit subsidy, per benefiting household. They provide a better basis for sustainable livelihoods post-drought, and they are generally regarded as preferable, morally and in terms of human dignity, to mass distribution of free food (Heath, 2001).

2.3.1 Effects of destocking on drought mitigation

The most important drought mitigation intervention tested so far is emergency livestock purchase (Hogg, 1997). One form of this is where the implementing agency directly buys weak animals at above the market price. Animals are usually slaughtered and the meat distributed locally to schools, hospitals, orphanages or poor households. Alternatively, transport subsidies are offered to traders to encourage them to purchase stock thereby strengthening livestock markets (Shibru, 2001).

Destocking has several purposes. It allows pastoral households to liquidate some of their capital assets (livestock) before they are lost and increases the purchasing power of these households. Some value is therefore salvaged from animals, which may otherwise have died and meat or stock can be redistributed to needy households. In theory protecting herders' purchasing power by buying animals where markets are absent creates two categories of beneficiaries: those who sell animals to the intervention/project at subsidised prices, and those who benefit from the general rise in prices on local markets caused by the extra demand created by the intervention/project (Morton, & Barton, 2002).

Destocking can also create a market for weaker animals, thereby enabling herders to keep stronger animals in their herd, preserving a key household capital asset for post-drought recovery, impact on the nutritional status of poor households and contribute to school and other feeding programmes, support the trading activities of women's groups and also reduce overstocking around village settlements (Morton, & Barton, 2002).

De-stocking involves the purchase of animals from pastoralists during the onset of drought and the distribution of the meat to those or neighbouring poor communities as relief food. A smaller number of experiences have involved subsidising private traders to buy livestock in areas where normal market linkages were not functioning, for various reasons (Toulmin, 2005). Both forms therefore salvage value from animals that might otherwise die, and boost pastoralist purchasing power; de-stocking to redistribute also has important nutritional benefits. Both forms of intervention can be highly successful given their objectives, although it is crucial to be clear about what those objectives are (Oxfam, 2002).

It is widely recognised that recurrent drought has a major impact on the vulnerability of pastoralists in Kenya. While opinions vary on the severity and frequency of drought over the past 20 years or so, few would argue that it continues to result in excessive loss of pastoral livestock, cause severe hardship to pastoralists, and lead to repeated bouts of humanitarian assistance. Boran and Somali pastoralists reportedly expect a widespread failure every four or five years and a major drought every ten years (Hogg, 1997).

More than 20 years ago, an analysis of the humanitarian response to the 1984–85 famine in Darfur, Sudan, showed how most people affected by famine survived not because of aid, but due to their own resourcefulness and survival skills (de Waal, 1989). Food aid may have played a part in reducing impoverishment, but it was suggested that other relief interventions would have been more effective in preventing destitution. On recognising the importance of livestock to farmers and pastoralists, it was proposed that the early purchase of animals and the use of 'fodder aid' rather than food aid would have helped people to protect better their primary resources and way of life. Around the same time, the drought-related purchase of livestock and the distribution of dried meat occurred in pastoral areas of Mali (Oxby, 1989); over the past 15 years, the concept of destocking has often been presented as an appropriate drought response in pastoral areas (Toulmin, 1995). Specific information on experiences of destocking can be gleaned from areas such as northern Kenya (Aklilu & Wekesa, 2002; Morton & Barton, 2002).

In Ethiopia, for example, the importance of safeguarding livestock assets in pastoral areas during drought was recognised in the National Policy for Disaster Prevention, Preparedness and Management, prepared soon after the fall of the regime of Mengistu Haile Mariam (Transitional Government of Ethiopia, 1993 (Shibru, 2001). In the policy, each district was required to respond to drought by preparing an action plan describing interventions to save livestock, including the supply of feed and water, veterinary inputs, livestock purchase centers, and mobile abattoirs. However, these types of emergency livestock-related intervention were not widely applied and food aid has remained the dominant response in pastoral areas since emergency interventions began in the 1970s. Similarly, despite the apparent rationale for destocking as a drought response in pastoral areas of Ethiopia its application in Ethiopia was limited up to 2006 (Hogg, 1997).

As animal condition declines during drought, livestock traders become reluctant to risk purchasing animals for which there may be limited demand in terminal markets (for example, Nairobi). A transport subsidy had been successfully used in Isiolo District during an earlier drought to assist pastoral households' market stock and resulted in increased off take as traders risks were reduced (Barton & Morton, 2001). It also increased pastoral household purchasing power as many of the beneficiaries inhabited remote areas and would not have been able to market stock without this intervention (it was not possible to trek animals to market as water and pasture were scarece on stock routes).

It is clear that the *modus operandi* for transport subsidies should be carefully planned to avoid fraud. A transport subsidy might however be more cost effective than a destocking/animal purchase programme in very remote locations. The end result from the pastoral household point of view is the same (i.e. improved purchasing power and salvaging of some capital). A subsidy should therefore be targeted at those locations not normally visited by traders. Under these conditions it is much easier to assess impact, where marketing normally takes place a subsidy may not be required as many of the animals purchased may have been bought and sold without the subsidy (Swift, 2002).

2.3.2 Animal Health Interventions on drought mitigation

During drought as animals weaken in the face of pasture and water shortages they become more susceptible to disease and parasitic loads. The objective of veterinary interventions is therefore to assist pastoral communities combat these diseases, particularly in their most valuable animals (breeding stock and loading camels). Improved survival of breeding stock will allow post drought rapid recovery of herds and livelihoods. The provision of veterinary services during drought or other disasters is an important strategy for assisting pastoralists to protect their livestock and maintain the benefits of livestock ownership or access (Heath, 2001).

Veterinary interventions, involving emergency provision of free or subsidized veterinary drugs and vaccination services can be extremely cost-effective in terms of livestock losses prevented. However, it is also important that such measures do not erode the sustainability of emerging community-based animal health schemes which practice cost-recovery through a mark-up on drugs sold (Hendy, 2001). Disaster related animal health interventions require a cost-effective, broad based animal health system for effective delivery.

Past experience indicates that this cannot be achieved by government alone, although public veterinary services continue to have a pivotal role in setting policies for sustainable animal health services, coordinating training programs, monitoring disease epidemiology, planning intervention strategies and in monitoring their implementation and outcomes (Hendy, 2001). It is the private sector, however, in a variety of configurations that should ultimately deliver the clinical/preventative service to livestock owners. While a number of makeshift arrangements have supported community animal health services (CAHSs) development and veterinary service delivery over the recent droughts in East Africa, they are unlikely to be sustainable under most existing veterinary policy/legislative environments. Substantial long term investment is required to protect livestock health in future disasters (Hendy, 2001).

In pastoral communities where livestock are highly regarded as a capital asset, veterinary care can help to prevent sudden loss of livestock due to acute diseases which cause high

mortality. In situations where high livestock mortality occurs, it can take many years for communities to rebuild their livestock assets (Oxfam, 2002). Veterinary care can also reduce the impact of chronic diseases which may affect benefits such as milk production, fertility or the use of livestock as pack animals. In general, veterinary vaccines and medicines are inexpensive items relative to the economic value of livestock. In pastoral areas of Ethiopia the trend in recent years has been towards the privatisation of clinical veterinary services, with increasing use of private veterinary pharmacies to supply and support primary-level workers such as community-based animal health workers (CAHWs) (Oxfam, 2002).

Experiences and policy in Kenya indicates that the provision of primary clinical veterinary services during drought in Kenya should be based on approaches such as: Support to, or rapid establishment of Para-veterinary systems with overall supervision by veterinarians Immediate attention to payment for services, with use of voucher schemes for the most vulnerable livestock keepers and rapid resumption to full payment for services for other livestock keepers The principle of choice, in which livestock keepers are able to select the type of preventive or curative service they require for all diseases other than those covered by official disease control policies (Stockwatch, 2002).

2.3.3 Influence of provision of water on drought effects mitigation

Water provision, involving emergency drilling of boreholes, repair and maintenance of existing boreholes appear to be highly cost-effective in preventing livestock losses as well as mitigating the hidden costs of the labour, particularly women's labour, used in water collection. There is an issue of financial sustainability, but the institution of cost recovery arrangements up to and including contributions to depreciation has been successful. There is also an issue of environmental sustainability, of preventing boreholes becoming perennial and contributing to localised overgrazing, but there is evidence that local management arrangements, linked to use of grazing resources, and including the capacity to shut boreholes in "normal" years, can work (Macodras, Nthusi & Mwikya, 1989).

The provision of water for animals in an emergency focuses on the survival of livestock assets through and beyond any disaster. In the absence of sufficient water supplies, animals (with the exception of camels) cannot survive for more than a few days. Therefore, in emergency situations where water sources have been seriously compromised, the provision of alternatives is of the highest priority. Even where water is currently available, relief programmes need to assess, and if necessary, implement appropriate responses to potential and future threats to water sources to ensure that other relief efforts are not undermined by water shortages. Whilst water for livestock must meet some basic quality requirements, the quality standard is not as high as that for human consumption, and therefore livestock can make use of water sources otherwise unfit for humans. The practical implications of providing water to livestock should be considered carefully and in parallel with the need for animal feed and veterinary care. Proper cost-benefit analyses will be critical in deciding whether various interventions are sensible and effective in the long-term (Macodras, Nthusi & Mwikya, 1989).

The primary concern of drought is water shortage, most of the planned activities aim at reducing the effect of such shortage, through measures that are taken before, during and after drought. Assistance with the provision of water for humans and livestock includes borehole maintenance as well as the drilling of emergency and contingency boreholes. An example is given by the drilling of the emergency borehole at Harakhotkhot in Wajir in 2000 by Oxfam. (Oxfam, 2002). The emergency borehole enabled fifty families, previously using another borehole 70 km away, to water their animals locally. Estimated reduced mortality from the reduction in watering stress was valued at $US 64,300, compared to a construction cost of the borehole of $US 38,000. This does not take into account considerable additional benefits, including reduced animal mortality in later years, and reduction in women's time spent fetching domestic water while provision of boreholes approximates to a public good. (Oxfam, 2002).

2.3.4 Effects of livestock supplementary feeding on drought effect mitigation

Supplementary feeding livestock, particularly selected breeding stock, has some appeal to pastoralists, and there is some evidence of its cost-effectiveness. However, to import feed

on large scale is a massive logistical task, unless there are specially favoured areas that can be set aside as "cow-calf camps", and this is likely to depend on the availability, formal or informal, of commercial ranch land or protected areas (Blench and Marriage, 1998). Options for supplementary feeding of livestock during drought are discussed by (Coppock, 1994, Sandford & Habatu, 2001 & Aklilu & Wekesa 2001) and include the transportation of livestock to areas not affected by drought and having surplus fodder, the periodic set-aside of rangeland by communities as a drought reserve, the fencing of rangeland for calf enclosures, the collection of locally available feeds including hay and acacia pods, the production of fodder including various forms of legume banks and miscellaneous fodders including, *inter alia, Opuntia spp* (prickly pear) and *Atriplex spp.* (saltbush);, the importation of hay, grain or green feed and molasses/urea supplements in liquid or block form.

Coppock (1994) reports on the expansion of the calf enclosure (*kalo)* in the Boran pastoral system over the last 20-30 years, sometimes associated with the collection and feeding of selected grasses, which reflects the priority many pastoral systems place on calf mortality mitigation. He further notes the logic of intensifying calf management, which is largely under the pastoralist's control, through animal health, supplementary feeding and improved water access activities that would also improve women's labour efficiency. In periods of drought, strategic feeding of female calves would reduce mortality, extend dam lactation and accelerate post-drought recovery. Given the calves require fewer resources, many of which can be collected locally calf mortality reduction is a logical target for drought intervention (Coppock, 1994).

Even fewer pastoralists grow fodder plants for animal feed or drought proofing and there is little positive evidence to date in Africa to support such action, with common property, labour and management constraints contributing to this outcome. Attempts to introduce herbaceous legumes into rangeland have been generally disappointing, the competition from native grasses being a major constraint. Most programs to establish other forages including *Opuntia* (spineless cactus*), Atriplex* (saltbush), *Leucaena* and *Sesbania spp.* have been equally disappointing, although all of these species are used by pastoralists in environments where they occur naturally. The introduction of *Prosopis spp.* has generally

been disastrous, where there is insufficient labour to control its spread. Despite these failures, continuing work on species introduction, particularly for dry season protein supply is justified as a breakthrough with just a single species could dramatically alter pastoral livestock productivity. That work should particularly focus on management practices as under grazing of potential legumes and overgrazing of exotic woody plants is likely to have contributed significantly to past failures (Coppock, 1994).

Feed supplementation has not been widely used during emergencies in pastoral areas of Kenya, due largely to a lack of knowledge regarding the implementation of this intervention. However, the current situation in the country means that this intervention is now worth serious consideration due to the erosion of traditional coping mechanisms and other changes. Drought fallback areas in the rangelands have been reduced substantially due to encroachment of cropping into the traditional grazing reserves and human population growth, accompanied by unplanned settlement patterns (Morton, 2001). Even in areas where forage reserves are relatively abundant, mobility is often restricted due to local conflicts. The confinement of grazing animals in conflict-free zones, has led to serious degradation of the rangelands. As a result, even a single seasonal rainfall failure can lead to serious loss of livestock.

If pastoral households lose valuable breeding stock during drought it can take many years for their herd to recover. There is a danger that poorer households will never be able to rebuild their herds and as a consequence fall out of pastoral production. It is also important for pastoral households to maintain some stock to be able to take advantage of the, often good, grazing conditions which follow a drought. There is widespread anecdotal evidence that pastoralists sometimes use relief grain intended for human consumption to feed their herds (Morton, 2001).

2.4 Theoretical Framework

The study employed disaster management theories. Disaster risk management (DRM) takes challenges for this interdisciplinary science which requires an appropriate combination of various approaches such as systems engineering, micro economics, sociology and behavioral science, as well as providing a holistic framework for the

promotion of the science. In its methodological development efforts, DRM gives greater importance to proactive countermeasures such as mitigation policies, disaster insurance or fund, risk communication and social preparedness. Reactive strategies are, however, studied as important ways to recover from disaster damage.

In ideal risk management, a prioritization process is followed whereby the risks with the greatest loss and the greatest probability of occurring are handled first, and risks with lower probability of occurrence and lower loss are handled in descending order. In practice the process can be very difficult, and balancing between risks with a high probability of occurrence but lower loss versus a risk with high loss but lower probability of occurrence can often be mishandled.

Intangible risk management identifies a new type of risk - a risk that has a 100% probability of occurring but is ignored by the organization due to a lack of identification ability. For example, when deficient knowledge is applied to a situation, a knowledge risk materializes. Relationship risk appears when ineffective collaboration occurs. Process-engagement risk may be an issue when ineffective operational procedures are applied. These risks directly reduce the productivity of knowledge workers, decrease cost effectiveness, profitability, service, quality, reputation, brand value, and earnings. Intangible risk management allows risk management to create immediate value from the identification and reduction of risks that reduce productivity.

2.5 Conceptual framework

Figure 2.1 Conceptual Framework

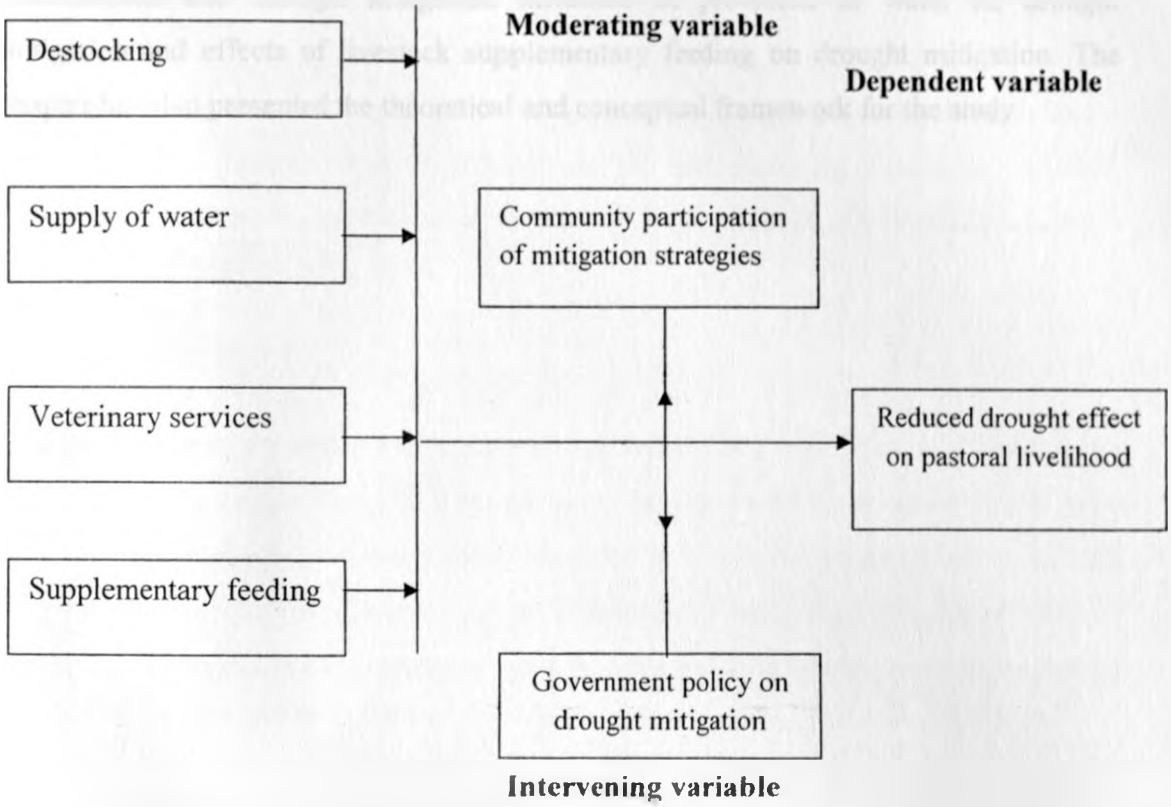

Figure 2.1 Conceptual framework

The conceptual framework for the study illustrates the mitigation strategies by the pastoralists. The framework shows that there are several drought mitigation interventions that can be employed so as to reduce the effect of drought on livestock. These include destocking, provision of water, supplementary feeding, and veterinary services. Once these mitigation interventions are put in place, it is expected that there would be reduced negative effect of drought on livestock and the pastoral livelihood.

2.6 Literature review summary

This chapter presents the review of literature on the effect of droughts on pastoral livelihood. The review focuses on the effects of drought on livestock sector among the

pastoralists, the drought mitigation strategies employed in pastoral areas. Specifically the study has focused on effects of drought on livestock sector among the pastoralists, drought mitigation strategies effects of destocking on drought mitigation, animal health interventions and drought mitigation influence of provision of water on drought mitigation and effects of livestock supplementary feeding on drought mitigation. The chapter has also presented the theoretical and conceptual framework for the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the procedure the researcher used in the study. The chapter covers research design, target population, sample and sampling procedures, research instruments, pilot study, validity and reliability of instruments, data collection procedures and data analysis procedures.

3.2 Research Design

The study employed descriptive survey design using both qualitative and quantitative approaches. Using this design the investigator did not control any variables but only describes the situation as it is at a particular point in time. This design therefore enabled the researcher to explore the intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garrissa County by administering questionnaire to mitigation services providers and the community members who are the mitigation beneficiaries.

3.3 Target population

(Mugenda and Mugenda, (1999) define population as an entire group of individuals, events or objects having common observable characteristics. In this study the researcher selected the stakeholders involved in drought intervention which included GoK line departments, NGOs and the pastoral community members.

3.4 Sample size and sampling Technique

The study employed cluster sampling. Cluster sampling is a sampling technique in which the entire population of interest is divided into subgroups otherwise called clusters from which random sampling is done in each subgroup. In this research through purposive sampling the clusters were selected, then all units within the clusters were involved since they were few for further selection. In this study the researcher selected 3 clusters which included 20 government officials from relevant departments including water, livestock,

drought management, provincial administration among others, 20 NGOs officials who worked in the county in last sequence of droughts including CARE Kenya, Kenya Red Cross, veterinary san froneras, African development solutions, Danish refugee council,Norwagian refugee council among others and 10 community chairpersons from different sampled districts in the county who are directly involved in mitigation of drought.

3.5 Research Instruments

The study used questionnaires. The questionnaires were used for the line officers, NGOs officers representing different organisations and the community chairpersons. All the questionnaires had two major sections, demographic or personal data of the respondents and then a section on effectiveness of intervention strategies for mitigating drought effects in Kenya's pastoral livelihood. The latter were divided into sections according to the research objectives. The questionnaire for the government officers had 36 items, which of the NGO officials had 36 items while that of the community relief chairpersons had 17 items. The items were closed and open ended while some were rating scales.

3.6 Pilot study

A pilot is a small experiment designed to test logistics and gather information prior to a larger study, in order to improve the latter's quality and efficiency Fowler, (1993). A pilot study is carried out in another area that has the same characteristics with Garrisa County. For example after piloting, some items which were open ended were changed to close ended to solicit more quantitative data.

3.6.1 Validity of the instruments

Validity is defined as the accuracy and meaningfulness of inferences, which are based on the research result Mugenda & Mugenda, (1999). The pilot study helped to improve content of the instruments. The internal validity was done by checking whether the items in the research instruments focused on the objectives of the study. It also involved identifying whether all the research objectives were represented in the research instruments.

3.6.2 Reliability of the instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials Mugenda & Mugenda, (1999). To enhance reliability of the instruments the researcher conducted test retest in a pre-identified location where the tools were administered to 10 same category respondents in an interval of a week. All respondents were available for both tests. The results obtained were compared by calculating correlation coefficient. A correlation coefficient of 0.8 was obtained. According to Mugenda and Mugenda,(1999) a correlation coefficient of 0.8 is reliable. The researcher further did necessary corrections before administering the tools for data collection.

3.7 Data collection procedures

Subject to gaining permission to conduct the research from the National Council for Science and Technology (NCST). The researcher then booked appointments with the relevant authorities and administered the questionnaires to them. The researcher made arrangements with the leaders of the community for administering the questionnaire to them at the agreed time who voluntarily filled returned the questioners.

3.8 Data analysis Techniques

Data obtained from the entire field were cleaned. This aimed at identifying and eliminating errors made by respondents. Coding was then done to translate question responses into specific categories. The coded items were analysed with the aid of Statistical Package for Social Sciences (SPSS) software. Data was then analysed both qualitatively and quantitatively. Quantitative data were analysed by use of descriptive statistics such as frequency distribution (f) and percentages (%) while qualitative data were analysed by the use of content analysis which is the categorizing and indexing of responses and other field notes into common themes. Conclusions on specific research question were done based on the responses from the quantitative and qualitative data.

3.9 Ethical considerations

The researcher explained to the respondents the purpose of the study before involving them. He also explained how the result of the study was important to them. The researcher also assured the respondents that the information they provide was for the purpose of the study and their identity was treated with confidentiality.

3.10 Operational definition of variables

Indicators were derived from the main independent variables of the study and a presented as measurable.

Variable	Variable type	Indicators	Measure	Scale of measurement	Tool of analysis
Destocking	Independent	No. or proportion of total population	count	ratio	Descriptive
Veterinary services	Independent	No. or proportion of total population	count	ratio	Descriptive
Water provision	Independent	No. or proportion of total population	count	ratio	Descriptive
Supplementary feeding	Independent	No. or proportion of total population	count	ratio	Descriptive

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter addresses the results and findings of the study. The findings are outlined according to specific objectives of the study and are based on the responses from the questionnaires filled and information gathered on the research questions.

4.2 Response rate

Completion rate is the proportion of the sample that participated as intended in all the research procedures. In this study, out of the 20 government line department officers issued with the questionnaires, 17 (85.0%) returned their questionnaires. Out of the 20 NGO officials issued with the questionnaires, 18 (90%) returned their questionnaires. All the 10 community chairpersons, all of them, (100%) returned the questionnaires. These response rates were therefore deemed as adequate for the study.

4.3.1 Demographic Information of the NGO Officers

The demographic information of the NGO Officers was based on gender, age, position in the organization and duration in the organization. Data indicating their gender is presented in table 4.1.

Table 4.1: Distribution of the NGO Officers according to gender

Gender	f	%
Male	14	77.8
Female	4	22.2
Total	**18**	**100.0**

Table 4.1 shows that majority of the NGO Officers 14(77.8%) were male while 4(22.2%) of the officers were female. The data implies that there was male dominance in the NGO management. Data on the aged distribution of the NGO is presented in 4.2.

Table 4.2 Age distribution of the NGO officers

Age	f	%
25 – 34 years	13	72.2
35 – 44 years	5	27.8
45 – 54	0	00.0
Total	**18**	**100.0**

Data shows that majority of the NGO Officers 13(72.2%) were aged between 25 and 34 years while 5(27.8%) of the NGO Officers were aged between 35 and 44 years. The data shows that most of the NGO officers were relatively young. Distribution of the officers according to the position they had is tabulated in Table 4.3.

Table 4.3: Position held by the NGO officer in the organization

Position	f	%
Community Mobilization Officer	3	16.7
Programme Manager	2	11.1
Water Engineer- Sources and Quality manager	2	11.1
Project Officer	3	16.7
Livelihood Coordinator	2	11.1
Nutrition co- coordinator	3	16.7
Administrator	1	5.6
Assistant project Manager	2	11.1
Total	**18**	**100.0**

The findings shows that 3(16.7%) of the officer were community mobilization officers, the same number of the officer were project officers and nutrition co- coordinator, 2(11.1%) of the officers were programme managers, the same number were water

Engineer- Sources and Quality manager, Livelihood Coordinator and Assistant project Manager while 1(5.6%) of the officers were administrators. The data shows that the respondents were drawn from various departments which will present varied information on drought mitigation on livestock based pastoral livelihood.

The study further sought to establish the duration of the NGO officer in the organization. Findings shows that majority of the officers 12(66.7%) had been in the organization for below 1 year while 6(33.3%) of the officer said they had been there for between 1 and 5 years. When asked to indicate the specific years they had been working in the current organization, half of the officer 9(50.0%) said they worked for below 1 year.

4.3.2 Demographic Information of the Government line officers

The demographic information of the Government Line Officers was based on gender, age, name of the department, duration in the department and the experience in years on matters of mitigation of drought effects. Data indicating their gender shows that all of the Government line officers 17(100.0%) was males. These data shows that there was no gender balance in the Government line officers. The government officers were asked to indicate the department or the ministry they work for. Data on the name of the Government line Officers department is tabulated in table 4.4.

Table 4.4: Name of the department of the Government Line Officers

Name of the department	F	%
Livestock production	8	47.1
Water services	1	5.9
Regional Ground Water	2	11.8
District Veterinary office	1	5.9
Northern Water services Board	1	5.9
Veterinary	1	5.9

Arid lands resource management project	1	5.9
Agriculture	1	5.9
Provincial administration	1	5.9
Total	**17**	**100.0**

Table 4.4 shows that 8(47.1%) of the Government Line Officers were working in Livestock production department, 2(11.8%) of the line officer in the regional ground Water department while 1(5.9%) were working in water service, District Veterinary office, Northern Water services Board, Veterinary, arid lands resource management project, agriculture and Provincial administration departments. The data shows that the government line officers were drawn from various department which gives value to their responses since information is drawn from various departments.

The Government line officers were asked to indicate their age. Their responses are presented in table 4.5

Table 4.5: Distribution of the Government Line officers according to age

Age	F	%
25 – 34 years	4	23.5
35 – 44 years	9	52.9
45 – 54 years	4	23.5
Total	**17**	**100**

Table 4.5 shows that majority of the government line officers 9(52.9%) were aged between 35 and 44 years while 4(23.5%) of the line officers were aged between 25 and 34 years while the same number were aged between 45 and 54 years. The data implies that slightly more than half were aged between 35 and 44 years which imply that these

officers were relatively young. When the government line officers were asked to indicate their position in the department, they responded as indicated in table 4.6

Table 4.6: Position held by the Government line officers

Position	F	Percent
District livestock production officers	2	11.8
Water officer	1	5.9
Extension Officer	1	5.9
Head of Department	1	5.9
District Veterinary office	2	11.8
Water Engineer	1	5.9
Monitoring and evaluation officer	1	5.9
Range officer	1	5.9
Leather development officer	1	5.9
Community Development Officer	1	5.9
Data analyst	1	5.9
District veterinary officer	1	5.9
Deputy District Agriculture Officer	1	5.9
Administrative Officer	1	5.9
Total	**17**	**100.0**

Data shows that 2(11.8%) of the government line officers were working as district livestock production officers and the same number was District Veterinary office while 1(5.9%) of the government line officers were working as water extension officers, head

of departments, community, development officer, data analyst, district veterinary officer, deputy district agriculture officer, and the same number was working as the administrative officers. The data shows that there was equal distribution of the respondents from various government departments. This provides a wide range of information hence enriching the study.

Table 4.7 shows the Government officers experience in years in matters of drought and mitigation.

Table 4.7: Government officers experience in matters of drought effects mitigation

Experience	F	%
Below 1 year	1	5.9
1 - 5 years	5	29.4
6 -10 years	2	11.8
11 - 15 years	5	29.4
Over 20 years	4	23.5
Total	17	**100.0**

Table 4.7 shows that 5(29.4%) of the officers had been in drought effects mitigation. Matters for between 1 and 5 years, the same number had been there for between 11 and 15 years, 4(23.5%) of the officers for over 20 years, 2(11.8%) of the officers for 6 and 10 years while 1(5.9%) of the officers had been in the matters for below 1 year. The data shows that majority of the government officers had a wide experience in matters of drought effects mitigation and hence provided valid and reliable information on the study.

4.3.3 Demographic Information of the community chairpersons

The demographic information of the chairpersons was based on gender, age, and role in the community Data indicating their gender shows that majority 8(80.0%) of the chairpersons were male while only a significant number 2(20.0%) of the chairpersons were female. The data shows gender imbalance in the community leadership. This could however be interpreted in terms of the culture of the area where women are not allowed to hold leadership positions. Data on the chairpersons' age is tabulated in table 4.8

Table 4.8: Distribution of the community chairpersons according to age

Age	F	%
25- 34 years	1	10.0
35 - 44 years	5	50.0
45 - 54 years	4	40.0
Total	**10**	**100.0**

Data shows that majority 5(50.0%) of the chairpersons were aged between 35 and 44 years, 4(40.0%) of the chairperson were aged between 45 and 54 years while 1(10.0%) of the chairperson were aged between 25 and 34 years. When the community relief chairperson were asked to indicate their role in the community, majority 5(50.0%0 of the chairpersons said that they were relief chairmen, 3(30.0%) of the chairmen said that they were village leader/elder while 2(20.0%) of the chairperson said they were water user association chairmen. The data shows that majority of the chairpersons were above 35 years which implies that they could provide information concerning drought mitigation on livestock in the area.

4.4 Analysis of responses on effectiveness of the intervention strategies for mitigating drought effect in Kenya's pastoral livelihood, a case of Garissa County.

4.4.1 Influence of de-stocking on mitigation of drought effect on livestock in Garissa County

To establish how de-stocking influenced mitigation of drought on livestock in Garissa county, the government line officers were asked to indicate what pastoral drought mitigation activity was their Ministry/ department involved during drought. Data shows that 8(47.1%) of the government line officers said that they were involved in water supply, 7(41.2%) of the government line officers were involved in destocking while 1(5.9%) of the government line officers said that they were involved in veterinary intervention, the same number said that they were involved in provision livestock supplementary feeding. This data is presented in table 4.9.

Table 4.9: Government line officers responses on the pastoral drought mitigation activity the ministry/ department involved during drought

Intervention activity	f	%
Destocking	7	41.2
Water supply	8	47.1
Veterinary intervention	1	5.9
Provision livestock supplementary feeding	1	5.9
Total	**17**	**100.0**

The data shows that government line officers in various departments participated in the draught effects mitigation in the area. The data further reflects that drought mitigation is done using various avenues which include destocking, water supply, veterinary intervention and provision of supplementary feeding.

The government line officers were asked whether the pastoral drought mitigation intervention was administered at the most effective time. Majority of the Government line officers 11(64.7%) said that it was not. This shows that mitigation could fail to achieve its goals due to wrong timing. However, majority of the chairperson 5(50.0%) said that the destocking as a mitigation strategy was not carried at the right time of the drought cycle in the last presiding droughts. Majority of the government line officers 12(70.6%) rated the capacity of destocking as inadequate. This data shows that mitigation procedures could present a challenge due to improper timings.

The study further sought to establish from NGO officers whether their organization carried out destocking and whether it was effective. Data showed that majority of the NGO officers 10(55.6%) said that they carried out and it was effective in mitigation livestock salvaging. The researcher asked the chairperson whether the community in their locations benefited from destocking in the previous five years. Data shows that majority of the chairperson 7(70.0%) said that the community benefited. Though the destocking had benefited the community in the last five years, a significant number of the respondents 3 (30%) were of different opinion which implies that the destocking was not perfect. These findings concur with the community chairpersons whom majority 7(70.0%) indicated that the community did not appreciate the destocking intervention. Contradicting results were however presented by the Government officers who indicated that as the community appreciates the destocking methods as a drought mitigation strategy. Majority of the Government officers said that the community appreciated.

Data on community chairpersons' responses on how effective is destocking in salvaging livestock during drought is tabulated in table 4.10.

Table 4.10: Chairpersons responses on how effective is destocking in salvaging livestock during drought

Effectiveness	f	%
Very effective	1	10.0
Effective	5	50.0
Undecided	2	20.0
Very ineffective	2	20.0
Total	**10**	**100.0**

Table 4.10 shows that majority 5(50.0%) of the chairperson said that the process was effective, 2(20.0%) of the chairperson said that it was very ineffective while 1(10.0%) of the chairperson said that it was very effective. The study was also interested in establishing the government officers' rating of destocking. Data is tabulated in table 4.11.

Table 4.11: Government officers' rating of destocking strategy

Rate	f	%
Very effective	1	5.9
Effective	10	58.8
Not effective	6	35.3
Total	**17**	**100.0**

Findings shows that majority 10(58.8%) of the government officers rated destocking as being effective. 6(35.3%) of the government officers rated it as not effective while 1(5.9%) of the government officers said that it was very effective. The data shows that

government officials were of the opinion that the drought mitigation process through destocking was effective. The government officials were also asked to rate the market for animals. Their responses are presented in table.

Table 4.12: Government officers' responses on the market for the animals

Responses	f	%
Animals are bought at a loss	8	47.1
Animals are bought at a good price	2	11.8
The market depends on the prevailing conditions	7	41.2
Total	**17**	**100.0**

Data shows that 8(47.1%) of the government line officers said that the animals are bought at a loss, 7(41.2%) of the government officers said that the market depended on the prevailing conditions. This could be the reason why the community chairpersons had negative attitude towards destocking. Majority 10(58.8%) of the government line officers said that the livestock keepers did not get value of their animals during destocking.

The study further sought to investigate whether there were other organizations that were involved in the destocking process. The government line officers were asked to respond to the same. Data shows that majority of the government line officers 16(94.1%) said that there were other organizations involved.

4.4.2 Influence of veterinary interventions on mitigation of drought effects on livestock in Garissa County

The study assessed how veterinary interventions influenced mitigation of effect of drought on livestock in Garissa County. Data is presented in the following section. To establish what veterinary interventions to mitigate effects of drought on livestock

production livelihood were put in place by the government during drought. Respondents data is tabulated in table 4.13.

Table 4.13: Government line officers' responses on veterinary interventions measure put in place by the government during drought mitigation

Measures	f	%
Para veterinary services	3	17.6
Provision of drugs and treatment	11	64.7
Examination and vaccination of animals	3	17.6
Total	**17**	**100.0**

Findings shows that majority of the government officers 11(64.7%) said that the government provided drugs and treatment of animals, 3(17.6%) government officer said that it gave para veterinary services while the same number said that it examined and vaccinated the animals. The data shows that there is various veterinary intervention measures put in place for draught mitigation. The community chairpersons were asked to indicate where the community got veterinary drugs. Data is presented in table 4.14.

Table 4.14 Sources of veterinary drugs for pastoralists during drought

Source of veterinary drugs	f	%
Purchase by the community	8	80.0
Provided by the government	1	10.0
Provided by the NGOs	1	10.0
Total	**10**	**100.0**

Table 4.14 shows that majority of the chairperson 8(80.0%) said that the community purchased the drugs from agro- vet shops, 1(10.0%) of the chairpersons said that they got it from the government while the same number said that the community obtained from the NGOs. The data shows that the government and the NGO officials provide minimal drugs to the community. The government officers were asked whether there were community based para-veterinary services in pastoral communities to mitigate drought on livestock. Majority 9 (52.9%) said that there were not there. The data shows that the government did not provide Para veterinary services in pastoral communities.

The researcher was interested in examining how NGO officers and government line officers would rate the veterinary intervention strategies in drought mitigation. Data shows that majority of the government line officers 11(64.7%) would have rated it effective while majority of the NGO officers 11(61.1%) also said that it was effective in drought effect mitigation for livestock among the pastoral communities. To establish the veterinary services are carried out during drought to ensure the livestock do not die of diseases, the NGO officer were asked to mention the same. Data is tabulated in table 4.15.

Table 4.15: NGO officers' responses on the veterinary services carried out during drought to ensure the livestock do not die of diseases

Services	f	%
Para-Veterinary services	7	38.9
Provision of drugs	3	16.7
Treatment and vaccination of animals	8	44.4
Total	**18**	**100.0**

Data shows that 8(44.4%) of the NGO officers said that there was treatment and vaccination of animals. 7(38.9%) of the NGO officers said that there was Para-Veterinary services while 3(16.7%) of the NGO officers said that there was provision of drugs to ensure the livestock do not die of diseases. The NGO officers were asked whether the

para- veterinary and provision of drugs services were effective. Data shows that majority 9(50.0%) of the NGO officers said that they were effective while 7(38.9%) of the NGO officers said that they were not effective. Majority of the NGO officers 9(50.0%) said that the treatment and vaccination of animals services was effective. However 9(50.0%) of the NGO officers said that it was very effective. The data suggests that para veterinary services provided by the NGOs were effective in drought mitigation in livestock.

The NGO officers were asked to rate the challenges of veterinary interventions on the mitigation of effect of drought on livestock in Garissa County ass presented in table 4.16.

Table 4.16: NGO officers rating on challenges of veterinary interventions

Veterinary interventions	A very major challenge		Not a very major challenge		Little challenge	
	f	%	f	%	f	%
The unwillingness of the community to participate	2	11	8	44.4	8	44.4
The inadequate resources	12	66.7	3	16.7	3	16.7
The migration of animals during drought	13	72.2	4	22.2	1	5.6

Table 4.16 shows that 8(44.4%) of the NGO officers said the unwillingness of the community to participate was not a very major challenge, the same number said that it was a little challenge. Majority 12(66.7%) of the NGO officers said that the inadequate resources was a very major challenge. Majority 13(72.2%) of the NGO officers said that the migration of animals during drought was a very major challenge. The data shows that though the veterinary services were provided for livestock mitigation, there were such challenges such as inadequate resources and migration of animals. To further asses how veterinary interventions influence mitigation of effect of drought on livestock, the NGO

officers were asked to indicate how they rated the direct livestock purchase. Their responses are presented in table 4.17

Table 4.17 NGO officials' responses on rating of direct livestock purchase destocking approach

Rating	f	%
Very effective	5	27.8
Effective	9	50.0
Not effective	1	5.6
Undecided	3	16.7
Total	**18**	**100.0**

Their responses showed that majority of them rated direct livestock purchase as effective as 5 (27.8%) rated it very effective and 9 (50%) rated it effective. They were further asked to rate the transport subsidy of livestock traders where they responded as indicated in table 4.18.

Table 4.18 Rating of transport subsidy destocking approach for livestock traders

Rating	f	%
Very effective	2	11.1
Effective	9	50.0
Not effective	4	22.2
Undecided	3	16.7
Total	**18**	**100.0**

Data indicated that transport subsidy was rated as effective by 11 (61%). Asked to indicate how they rated the micro financing livestock traders, as shown in 4.19.

Table 4.19 NGO officers rating of micro financing livestock traders destocking approach

Rating	f	%
Very effective	2	11.1
Effective	7	38.9
Not effective	4	22.2
Undecided	5	27.8
Total	**18**	**100.0**

Data on the rating of micro financing of livestock officers showed that majority rated it as effective as shown by 9 (50%). This shows that the micro financing livestock traders was rated as effective. The NGO officers were further asked to indicate whether the communities appreciated the destocking method as a drought mitigation strategy. Their responses indicated that half 9 (50%) were of the opinion that the community appreciate the destocking method as a drought mitigation strategy.

Table 4.20 NGO officers rating of market price of animals during drought

Rating	f	%
Very Good	2	11.1
Good	7	38.9
Undecided	3	16.7
Poor	6	33.3
Total	**18**	**100.0**

Data showed that half of the respondents indicated that the market was good as shown by 2 (11.1%) who indicated it was very good and 7 (38.9%) who felt that it was just good. Further responses indicated that most of the livestock keepers did not get value for their animals a shown by 13 (72.2%). However, there were organisations that were involved in the destocking process as it was shown by 12 (66/7%). Majority of the NGO officers indicated that the whole process of destocking as a drought mitigation strategy was effective as shown by 12 (66.7%).Majority 11 (61.1%) of the NGO officers indicated that their organisations provided veterinary services to the pastoralists. Their responses showed that NGOs provided Para-Veterinary services, drugs treatment and vaccination of animals. Majority indicated that the Para-veterinary services provided were effective as indicated in table 4.21.

Table 4.21 Responses on the effectiveness of Para veterinary services

Rating of effectiveness of Para veterinary services	f	%
Very effective	7	38.9
Effective	9	50.0
Undecided	2	11.1
Total	**18**	**100.0**

Though the government line officers rated the Para veterinary services as effective, the community was of different opinion that it was not effective as the government did not provide drugs. The respondents in this category were also asked to indicate the effectiveness of the drug services their responses are presented in table 4.22.

Table 4.22 NGO officers' responses on effectiveness of drug services

Rating of effectiveness of drug services	f	%
Very effective	4	22.2
Effective	9	50.0
Undecided	4	22.2
Ineffective	1	5.6
Total	**18**	**100.0**

Data indicated that drug services were rated as effective as shown by 13 (72.2%). The data does not agree with the responses on the community chairpersons that they provided drugs to the pastoralists. The officers were also asked to indicate the effectiveness of treatment and vaccination of animals' services. The data is presented in table 4.23.

Table 4.23 Effectiveness of treatment and vaccination of animals' services

Rating of effectiveness of treatment and vaccination of animals' services	f	%
Very effective	6	33.3
Effective	9	50.0
Undecided	3	16.7
Total	**18**	**100.0**

Data showed that majority of the NGO officers were of the opinion that treatment and vaccination of animals services were effective as shown by 15 (83.3%). The data shows that vaccination and treatment was a strong mitigation aspect in draught mitigation in livestock. Asked to indicate the key partners in the provision of veterinary services to the

pastoralists, the government was rated as a key player by 12 (66.7%), other NGOs were rated as key players by 5 (27.8%) while only 1 (5.6%) rated religious organisation as key players. This data is presented in table 4.24.

Table 4.24 Rating of key players in the provision of veterinary services

Key players in provision of veterinary services	f	%
The government	12	66.7
Other NGOs	5	27.8
Religious organizations	1	5.6
Total	**18**	**100.0**

Asked to rate the community participation in provision of veterinary services during droughts, data showed that majority 13 (72.3%) rated it as good. The data shows that other parties participated in veterinary services in livestock mitigation which included other NGOs and other religious organisations. In a bid to establish the community participation findings of the community participation in veterinary services indicated that it was good as shown by 13 (72.3%) with only 2 (11.1%) who rated it as poor. The respondents were asked to rate the veterinary intervention strategies in drought effects mitigation. The responses are presented in table 4.25.

Table 4.25 Rating of veterinary intervention strategies in drought mitigation

Rating of veterinary intervention	f	%
Very effective	5	27.8
Effective	11	61.1
Undecided	2	11.1
Total	**18**	**100.0**

Veterinary intervention strategies were rated as effective by 11 (61.1%) while 5 (27.8%) rated it as very effective. On the overall, it was rated as effective. The respondents were also asked what in their opinion they suggested for effective provision of veterinary interventions the data is presented in table 4.26.

Table 4.26 Suggestions for effective veterinary interventions on drought effect mitigation

Suggestions for effective provision of veterinary interventions	f	%
Proper and timely community sensitization to be conducted.	1	5.6
Routine Vaccination	2	11.1
Conduct community empowerment and training	1	5.6
Involve more stakeholders.	1	5.6
Provision of drugs to pastoralists	5	27.8
Mobile veterinary Interventions	2	11.1
Training of livestock owners and provision of drugs.	2	11.1
Veterinary officers to ensure that they travel deed.	3	16.7
Provision of adequate resources	1	5.6
Total	**18**	**100.0**

Data showed that the respondents suggested a proper and timely community sensitization be conducted, conducting proper and timely community sensitization, conducting proper and timely community sensitization, conducting community empowerment, involvement of more stakeholders , provision of drugs to pastoralists, mobile veterinary interventions, training of livestock owners and provision of drugs, veterinary officers to ensure that they had travel deed, and provision of adequate resources.

Inferences to indicate some of the challenges faced in the provision of veterinary services, data showed that there was unwillingness of the community to participate, inadequate resources and migration of animals during drought.

NGO officers responded to Rate the community participation in the provision of veterinary services, they responded as indicated in table 4.27.

Table 4.27 Rating of community participation in provision of veterinary services

Rating of community participation in veterinary services	f	%
Very good	3	16.7
Good	10	55.6
Undecided	3	16.7
Poor	2	11.1
Total	**18**	**100.0**

Data showed that community participation in provision of veterinary services was rated as good where 3 (16.7%) rated it very good while 10 (55.6%) rated it as good.

Asked to indicate some of the challenges faced in the provision of veterinary services, the government line officers responded as indicated in table4.28.

Table 4.28 Government line officers responses on challenges faced in the provision of veterinary services

Challenge	f	%
Unwillingness of the community to participate	3	17.6
Inadequate resources	9	52.9
Migration of animals during drought	5	29.4
Total	**17**	**100.0**

Some of the challenges indicated by the respondents included inadequate resources as shown by 9 (52.9%), migration of animals during drought as shown by 5 (29.95) and unwillingness of the community to participate in the process as shown by 3 (17.6%). Asked to indicate the key players in the process, 16 (94.1%) rated the NGOs as the key players in the process while donor agencies were rated by 1 (5.9%).

4.4.3 To assess how provision of water influence mitigation of drought effect on livestock in Garissa county

The study sought to establish how water mitigation influenced drought on livestock in the county. The respondents were therefore asked to respond to several statements to establish how effective provision of water influenced livestock drought effect mitigation. The chairpersons were therefore asked to indicate the major challenges of water supply during drought. Their responses indicated that overcrowding was the major challenge as it was indicated by all the respondents.

They were also asked to indicate whether the community water user associations managed rural pastoral water supplies effectively. Data indicated that majority 9 (90%) responding to the negative as poorly managed. The government officials were asked to indicate how they rated the capacity of water provision. The data is presented in table4.29.

Table4.29 Government officials' responses on their rating of capacity of provision of water

Rating	f	%
Very adequate	1	5.9
Adequate	3	17.6
Not adequate	13	76.5
Total	**17**	**100.0**

Data indicated that majority of the government officials rated the capacity of provision of water as inadequate as shown by 13 (76.5%). Asked what the government had done to cater for provision of water, they responded as presented in table 4.30.

Table4.30 Government officials' responses on what the government had done for water provision

Response	f	%
Drilling boreholes	10	58.8
Excavating dams	3	17.6
Water trucking	4	23.5
Total	**17**	**100.0**

Data showed that 10 (58.8%) said the government had drilled boreholes, 3 (17.6%) indicated that the government had excavated dams while 4 (23.5%) indicated that the government had water tracked. The data shows that the government had done some activities to ensure that there was provision of water. The government officials were further asked to indicate whether the government allocated adequate funds for water provision during drought. Data showed they it had not as shown by majority 12 (70.6%).

Asked to rate the management of rural water supply sources by the community water association committees, the government officials responded as shown in table4.31.

Table 4.31 Rating of management of rural water supply by the community

Rating	f	%
Very effective	1	5.9
Effective	3	17.6
Very ineffective	7	41.2
Ineffective	6	35.3
Total	**17**	**100.0**

Responses indicated that majority felt that the management of water resources was ineffective as 7 (41.2%) indicated it as very ineffective as 6 (35.3%) rated it as ineffective. Asked to provide suggestions on how management of rural water resources could be improved, they indicated that there was need for accountability for the income generated activity, they also indicated that there was need to capacity building community on better management, Administer legal action for those who manage the resources, The management committee to be trained on financial management, they also suggested the need divert larger volume of water from the permanent river Tana, need for training and audits on accounts Compliance to water Act 2000. Putting in place accountability and auditing of community water services.

Asked the major interventions in the water sector during drought in pastoral areas, the government suggested drilling of emergency boreholes, rehabilitating existing water sources and water trucking. To make sure that the pastoralists had adequate water during drought, the government officials suggested that there was need for proper planning of carrying capacities of the available resources, rehabilitation and expansion of the existing water supplies, provision of fuel to boreholes, equipping and maintenance of boreholes,

water trucking for livestock for specific areas. Furthermore Government officers suggested rehabilitation of old boreholes, excavation larger capacity dams/ pans.

Asked to suggestions for improving water provision on drought mitigation, they suggested that the government should ensure construction of water pans with protection facilities, need to put resources together and direct to proper use, improved water facility management, team work of all stakeholders to ensure water access during droughts.

Further asses how water provision influence mitigation of drought on livestock, the NGO officers were asked to indicate what their organisations had done to cater for provision of water for the pastoralists. Their responses are presented in table4.32

Table 4.32 NGO officers' responses on what their organisations had done to cater for water provision

Responses	**f**	**%**
Water trucking for animals and human populations	8	44.4
Provision of 5000 liters water tanks.	3	16.7
Rehabilitation of water sources	7	38.9
Total	**18**	**100.0**

Data showed that 8 (44.4%) of the respondents showed that the NGOs had provided Water trucking for animals and human populations, 3 (16.7%) had provided 5000 liters water tanks while 7 (38.9%) indicated that they had provided rehabilitation of water resources. The data shows that the NGOs had provided some initiatives to cater for water provision. Further data indicated that the NGOs has sunk boreholes as shown by 8 (44.4%), 7 (38.9%) indicated that they had provided water trucking while 3 (16.7%) provided rehabilitation of water sources. This data is presented in table 4.33

Table 4.33 Activities by the NGOs in catering for water provision

Activities	f	%
Sinking boreholes	8	44.4
Water trucking	7	38.9
Rehabilitation of water sources	3	16.7
Total	**18**	**100.0**

Data indicated that the NGOs had sunk boreholes as shown by 8 (44.4%), 7 (38.9%) indicated that they had sunk boreholes while 3 (16.7%) indicated that they had rehabilitated water resources. The NGO officers were further asked to indicate what intervention approaches that they had started and how effective they were. Data is presented in table 4.36.

Table 4.34 Water intervention approaches during drought

Intervention approaches	f	%
Drilling emergency boreholes	8	44.4
Rehabilitation of water resources	4	22.2
Water trucking/ Relief water	3	16.7
Fuel subsidy	3	16.7
Total	**18**	**100.0**

Data showed that drilling of boreholes was the greatest intervention approach as recorded by 8 (44.4%), followed by rehabilitation of water resources as indicated by 4 (22.2%) while water trucking, relief water and fuel subsidy were recorded by 3 (16.7%) as the intervention approaches by the NGOs. The most rated intervention approach was rated as

very effective by 5 (27.7%) and effective was rated by 9 (50%). Their further responses indicate that other agencies that were involved in the provision of water to the pastoralists showed that other NGOs were involved as indicated by 15 (83.35). The government and charitable organisations were rated by 2 (11.1%) and 1 (5.6%) respectively. Asked whether the community water users management managed water effectively, data showed that they did as indicated by 10 (55.6%). Asked to give suggestions for improvement of water management, they responded as indicated in table 4.35.

Table 4.35 Suggestions to improve management of rural water supply

Suggestions for improvement	f	%
Carry out needs assessment before drought onset	5	27.8
Management skills	3	16.7
Re- organize the community by educating youths	1	5.6
Trained on water user management and also proper accounting	3	16.7
Eradicate corruption	3	16.7
Capacity building to improve accountability and transparency	3	16.7
Total	**18**	**100.0**

Data showed that there was need to carry out needs assessment before drought onset as suggested by 5 (27.8%), enhancing management skills as indicated by 3 (16.7%), training on water user management and on proper accounting as shown by 3 (16.7%) while the same number suggested eradication of corruption and capacity building, accountability and transparency in dealing with water management.

4.4.4 To determine how supplementary feeding influence mitigation of drought effect on livestock in Garissa County

The study also sought to establish how supplementary feeding influences mitigation of drought on livestock in Garissa County. The respondents were asked to respond to several items that sought to establish how supplementary feeding influenced the mitigation of drought in livestock. For example, the government line officers were asked to indicate whether the government was involved in supplementary feeding during drought. Their responses indicated that the government did so as indicated by 16 (94.1%) of the government line officers with only 1 (5.9%) indicating otherwise.

They were also asked to indicate whether the government provided adequate financial resources for supplementary feeding during drought. The responses indicated that the government did not provide adequate resources for the same as it was indicate by 15 (88.2%). Asked to rate the effectiveness of the supplementary feeding, they responded as indicated in table 4.36.

Table 4.36 Government officers' responses on the effectiveness of supplementary feeding

Response	f	%
Very effective	1	5.9
Effective	10	58.8
Very ineffective	2	11.8
Ineffective	4	23.5
Total	**17**	**100.0**

Responses of the government officers indicated that the supplementary feeding was effective as shown by 11 (64.7%) who either indicated that it was effective. The data showed that it supplementary feeding was effective. They were also asked to indicate the

role of the community in supplementary feeding. Data showed that the community was involved in preserving fodder for animals, alternative feeding of animals and controlled grazing.

The NGO officials were also supposed to respond to several items that sought to establish the influence of supplementary feeding. For example they were asked to indicate whether their organization supported the supplementary feeding during drought. Data showed that majority did not as shown by 11 (61.1%) with 7 (38.9%) indicating otherwise. Asked to indicate the capacity of supplementary feeding services relative to the need during drought. Their responses are presented in table 4.37.

Table 4.37 NGO officials' responses on the capacity of supplementary feeding during drought

Rating	f	%
Very high	3	16.7
High	5	27.8
Undecided	7	38.9
Low	2	11.1
Very low	1	5.6
Total	**18**	**100.0**

Data on the capacity of supplementary feeding indicated that 8 (44.5%) indicated that it was high with a relatively few 2 (11.1%) indicating that it was low. They were also asked to rate how supplementary livestock feeding was effective in mitigation of drought. The responses are presented in table 4.38.

Table 4.38 Rating of the effectiveness of supplementary feeding

Rating	f	%
Very effective	1	5.6
Effective	11	61.1
Undecided	3	16.7
Ineffective	2	11.1
Very ineffective	1	5.6
Total	**18**	**100.0**

The responses of the NGO officers indicated that supplementary livestock feeding was effective as it was revealed by 12 (66.7%) who either indicated it as very effective of effective. Asked to indicate the role of the community on supplementary feeding, responses indicated that the community was involved in preserving fodder for animals, alternative feeding of animals and in controlled grazing. The NGO officials were also asked to indicate the effectiveness of preservation of fodder for animals, alternative feeding of animals and controlled grazing. The responses are presented in table 4.39.

Table 4.39 Responses on the effectiveness of feed supplement provision approaches

Item	Very effective		Effective		Undecided		Ineffective		Very ineffective	
	f	%	f	%	f	%	f	%	f	%
Preserving Fodder	3	16.7	6	33.3	4	22.2	5	27.8	0	00
Alternative feeding	5	27.8	7	38.9	4	22.2	2	11.1	0	00
Controlled grazing	1	5.6	10	55.6	4	22.2	2	11.1	1	5.6

Data indicated that preservation of fodder for animals was rated as effective by 9 (51.0%) Data further indicted that majority of the respondents were of the opinion that that alternative feeding of animals is effective as shown by 12 (66.7%).

The chairpersons were also asked to indicate whether the community received livestock supplementary feeds during the previous drought. Data indicated that they had received livestock supplementary feeds during previous drought as reflected by 6(60%) of the respondents. They further indicated that supplementary was provided by the government. They were also asked to indicate the role of the community in supplementary livestock feeding. They response showed that the community was involved in preservation of fodder for animals and in alternative feeding of animals.

4.4.5 To provide recommendations for best intervention strategies for mitigating drought in Kenya's pastoral livelihood.

The study also sought to provide recommendations for the best interventions in mitigating drought in the livestock sector to minimize risks on pastoral livelihood. Respondents suggested that intervention programmes should be done within sector budgeting estimates to provide adequate resources for the interventions, create awareness early enough.

The government line officers were asked to give suggestions for effective supplementary on mitigation of drought. The data indicated that there was need for provision of adequate resources, proper targeting, and community contribution to reduce dependence on government supplies. It is further suggested that community should set aside some areas for grazing during drought. There should be provision of transport subsidies to take more animals to ranches during drought. There should be establishment of calf camps. The pastoral communities should be trained on local feed formulations and should ensure there is ready hay set aside due to drought season. Promotion of ranch preservation should also be enhanced.

The government line officers were further asked to provide suggestions to improve livestock destocking intervention on mitigation of drought effects. Their responses in

indicated that destocking should be administered on onset; there should be adequate resources allocation, the government should ensure that funds are allocated are on time. There should be community sensitization on drought and the same community should be funded to enhance destocking. They also suggested provision of more technical staff and provision of more logistics to enhance mitigation.

Suggestions for better provision of veterinary services in mitigating drought, the government line officers suggested the need to proper planning and timely interventions of onset of drought Increased resource allocation involve other stakeholders to ensure sufficient funds available; provision of vitamins, provision of wormicides and antibiotics and vaccination. There should be early stocking of drugs and vaccines. The government should send more post response veterinary officers to rural divisions to train the community. There should be massive vaccination across all boarders as animal migrate and provide for follow up extension services.

The NGO officials were also asked to provide suggestions on how timeliness of destocking could be enhanced. Their responses suggested the need to funding of all the mitigation activities; enhance preparedness strategies before onset of the drought. The community should also be sensitized on best practices of livestock drought mitigation. Suggestions for provision of water indicated the need to sink more boreholes and rehabilitation of old ones. There should also be fuel subsidy, water tracking and provision of more water storage facilities.

CHAPTER FIVE

SUMMARY, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study, discusses the findings of the study and presents conclusions, recommendations and suggestions for further research.

5.5 Summary of the study

The purpose of this study was to assess the effectiveness of the intervention strategies for mitigating drought effects in Kenya's pastoral livelihood, case of Garissa County: so as to document the best mitigation strategies and approaches which can be employed in other similar climatic livelihood zones.

Five research objectives were formulated to guide the study. Research objective one sought to establish how de-stocking influence mitigation of drought on livestock in Garissa county; research objective two sought to assess how veterinary interventions influence mitigation of effect of drought on livestock, three aimed at assessing how water provision influence mitigation of drought on livestock; four aimed at determining how supplementary feeding influence mitigation of drought on livestock, while research objective five sought to provide recommendations for best intervention strategies and practices for mitigating drought in Kenya's pastoral livelihood.

The study employed descriptive survey method using both qualitative and quantitative approach. In this study the researcher selected 3 clusters which included 20 government officials from relevant departments including water, livestock, drought management, provincial administration among others, 20 NGOs officials who worked in the county in last sequence of droughts and 10 community chairpersons from different locations who are directly involved in mitigation of drought effects in the county. The study used questionnaires to collect data from the respondents. Data was then analysed both qualitatively and quantitatively.

5.3 Summary of findings

Findings revealed that destocking influenced drought mitigation in livestock among the pastoral communities. For example, majority of the NGO officers 10(55.6%) indicated that they carried out destocking and it was effective in mitigation livestock salvaging. One of the destocking interventions is emergency livestock purchase. The findings agree with Hogg, (1997) who states that the most important drought mitigation intervention tested so far is emergency livestock purchase. Majority 7 (70.0%) of the community chairpersons in the location indicated that they had benefited from destocking in the previous five years. However, majority 7(70.0%) of the chairperson said that the community did not appreciate the destocking intervention. It was also revealed that half 5(50.0%) of the community chairpersons said that the process of destocking was effective. According to Toulmin, (1995) salvage value from animals that might otherwise die, and boost pastoralist purchasing power; de-stocking to redistribute also has important nutritional benefits. Both forms of the intervention can be highly successful given their objectives, although it is crucial to be clear about what those objectives are.

It was further revealed by majority 10(58.8%) of the government officers that destocking was effective. The study findings further indicated that 8(47.1%) of the government line officers said that the animals were bought at a loss while 7(41.2%) of the government officers said that the market depended on the prevailing conditions. Majority 10(58.8%) of the government line officers said that the livestock keepers did not get value for their animals during destocking. This is further reflected by earlier study by Barton & Morton, (2001) who argued that as animal condition declines during drought, livestock traders become reluctant to risk purchasing animals for which there may be limited demand in terminal markets.

Findings on whether veterinary interventions had influence on the mitigation of drought effects on livestock in Garissa County revealed that the interventions had significant effect on the mitigation of drought on animals. For example majority of the government officers 11(64.7%) indicated that the government provided drugs to animals. However, majority 6(60.0%) of the community chairpersons also indicated that the government did

not provide Para- Veterinary training to community hence the community purchased the drugs from agro- vet shops. It was also revealed that majority of the government line officers 11(64.7%) rated veterinary intervention as effective. Responses from the NGO officers indicated that the community received treatment and vaccination of animals, they also indicated that there was para-Veterinary services and provision of drugs to ensure the livestock did not die of diseases. The veterinary and provision of drugs services were rated as effective by the government line officers and the NGO officials. These findings agree with Hendy, (2001) who postulates that disaster related animal health interventions require a cost-effective, broad based animal health system for effective delivery.

Findings on some of the challenges that were experienced in the provision of veterinary interventions were such as community unwillingness to participate in the process as it was revealed by 8(44.4%) of the NGO officers. This was rated as a major challenge. Majority 12(66.7%) of the NGO officers also indicated that the inadequate resources was a major challenge. Majority 13(72.2%) of the NGO officers said that the migration of animals during drought was also a major challenge. However, majority of the NGO officers were of the opinion that treatment and vaccination of animals services were effective as shown by 15 (83.3%). These findings agree with Oxfam, (2002) which stated in pastoral communities where livestock are highly regarded as a capital asset, veterinary care can help to prevent sudden loss of livestock due to acute diseases which cause high mortality

Findings on the influence of water provision on mitigation of drought on livestock indicated that provision of water influenced drought mitigation. For example, Majority of the NGO officers 8 (44.4%) indicated that the NGOs had provided water trucking for animals which was deemed as effective in mitigating the effects of the drought. The NGOs also sunk boreholes as shown by 8 (44.4%), and also provided water trucking. They also rehabilitated the available water resources. Drilling of boreholes was the greatest intervention approach. Majority of the government officials rated the capacity of provision of water as inadequate as indicated by 13 (76.5%). Majority 12 (70.6%).of the government officials indicated that the government did not allocate adequate funds for water provision during drought. However the community chairpersons indicated that

overcrowding in the water sources as the major challenge in the water sector as it its indicated by all the respondents. As stated by Macodras et al (1989) the practical implications of providing water to livestock should be considered carefully and in parallel with the need for animal feed and veterinary care. Proper cost-benefit analyses will be critical in deciding whether various interventions are sensible and effective in the long-term.

Findings also indicted that supplementary feeding influenced mitigation of drought on livestock in Garissa County. The findings of the study showed that the government provided supplementary feeding to the animals as indicated by 16 (94.1%) of the government line officers. It was also revealed that government provided adequate financial resources for supplementary feeding during drought. Supplementary feeding was effective as shown by 11 (64.7%) who either indicated that it was effective or very effective. The capacity of supplementary feeding was rated as high. NGO officers indicated that supplementary livestock feeding was effective as it was revealed by 12 (66.7%) who either indicated it as very effective or effective.

Preservation of fodder for animals which was another supplementary feeding intervention approach was rated as effective by 9 (51.0%).This findings concur with Morton (2001) who argued that feed supplementation has not been widely used during emergencies in pastoral areas of Kenya, due largely to a lack of knowledge regarding the implementation of this intervention. However, the current situation in the country means that this intervention is now worth serious consideration due to the erosion of traditional coping mechanisms and other changes

5.4 Conclusions

Based on the findings of the study, it was concluded that destocking influenced drought mitigation in livestock among the pastoral communities. The destocking intervention is rated as effective by most of the respondents in the study. The destocking benefited the community since it was able to salvage animals. However, animals were bought at a loss depending on the prevailing market prices.

The study also concluded that veterinary interventions are effective strategy in the mitigation of drought on livestock in Garissa County. The community received drugs vaccination and treatment of animals; they also received para-Veterinary services to ensure the livestock did not die of diseases. The veterinary interventions during drought are rated as effective by the government line officers and the NGO officials. Some of the challenges experienced in the provision of veterinary interventions were such as community unwillingness to participate in the process. It was also noted that there were inadequate resources; while migration of animals during drought was also a major challenge.

The study also concluded that water provision influenced mitigation of drought on livestock. Data indicated that the major water sector intervention approaches to mitigate the effects of drought by NGO respondents are drilling of boreholes, rehabilitation of existing water sources as well as water trucking in hard to reach areas with no access of permanent water sources. Majority of the government officials rated the capacity of provision of water as inadequate. Furthermore it is indicated that the government did not allocated adequate funds for water provision during drought. Moreover, community chairperson's data revealed that overcrowding was the major challenge as it was indicated by all the respondents. Hence water sector gaps are still wide and remain ideal and effective intervention to minimise drought effects on pastoralists.

The study also concluded that supplementary feeding has major effect on mitigation of drought on livestock. Supplementary feeding was deemed as effective in mitigating drought among the pastoralists. The capacity of supplementary feeding was rated as high. Data further revealed that preservation of fodder and alternative feeding for animals which are other supplementary feeding approaches are rated as effective in drought mitigation.

5.4 Recommendations

For better process of destocking there is need for provision of adequate resources to enhance the process, there should be, proper and timely targeting of animals for destocking and target communities participation should be enhanced. Destocking should be administered on onset before wastage of animals body condition; there should be adequate resources allocation for a wider effect and coverage and the government should ensure that funds are allocated timely. Emergency livestock purchase and transport subsidy for livestock traders are effective alternative destocking approaches depending on the situation.

For better provision of veterinary services in mitigating drought there is need for proper planning and timely interventions on onset of the drought. There should be increased resource allocation for the process. . The intervention actor's government and partner NGOs should enhance capacity building communities through Para-veterinary training provision for effective service access, delivery and increased scope of coverage of veterinary interventions. Massive vaccination should be carried out across all boarders as animals migrate.

Suggestions for provision of water indicated the need to sink more boreholes and rehabilitation of old ones. There should also be fuel subsidy, water tracking and provision of more water storage facilities. Furthermore communities' water user associations who manage the rural water supplies in pastoral areas should be capacity built in resource management and financial accountability to enhance sustainability in the long run.

For an effective supplementary feeding practice. The community should set aside some areas for grazing during drought. There should be provision of transport subsidies for more animals to ranches during drought. There should be establishment of calf camps, the government to invest more on fodder production instead of hay. The pastoral communities should be trained on local feed formulations and should ensure there is ready hay set aside due to drought season. Promotion of ranch preservation should also be enhanced.

5.5 Suggestions for further research

Taking the limitations and delimitations of the study the flowing were suggested for further study:

1. Effectiveness of traditional mitigation strategies among pastoral communities in Kenya.
2. An examination of relationship between nomadic pastoralist and traditional drought mitigations strategies
3. Impact of weather pattern prediction and early warning on drought effect mitigation Kenyan pastoral areas.

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APPENDICES

APPENDIX A: TRANSMITTAL LETTER

Sahal Hassan Abdi

University of Nairobi

Department of Extra Mural Studies

Garissa.

15th May 2012

Dear respondent

RE: ASSESSING THE EFFECTIVENESS OF INTERVENTION STRATEGIES FOR MITIGATING DROUGHT EFFECTS IN KENYA'S PASTORAL LIVELIHOOD: CASE OF GARISSA COUNTY

I am a post graduate student in Masters of Arts in Project Planning and Management of University of Nairobi. As part of my course requirement I am currently writing a research project on assessing the effectiveness of intervention strategies for mitigating drought in Kenya's pastoral livelihood; case of Garrissa County.

Attached herewith is a copy of the questionnaire that I kindly request you to take some time and complete. The information you will provide in the questionnaire is for academic purpose and the results will lead to providing recommendations that will lead to drought mitigation. I will be grateful for your cooperation and active participation to this academic effort.

Thank you

Mr. Sahal Hassan Abdi

APPENDIX B

QUESTIONNAIRE FOR GOVERNMENT LINE OFFICERS

This questionnaire is designed to find a research project to assess the effectiveness of the intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garrissa County. The information you give will be treated with absolute confidentiality. Your name shall not appear anywhere therefore, please respond to all items in the questionnaire as honestly and correctly as possible.

Instructions

Kindly respond to all items by marking a tick in appropriate bracket or filling in the spaces provided

Section A: Demographic data

1. What is the name of your department _____
2. Please indicate your gender

   Male [ ] Female [ ]

3. What is your age bracket?

   Below 25 years [ ] 25 – 34 years [ ]

   35 – 44 years [ ] 45 – 54 years [ ]

   Over 54 years [ ]

4. What is your position in your Department_____?
5. How long have you been working in this department

   Below 1 year [ ] 1 -5years [ ]

   6 – 10 years [ ] 11 – 15 years [ ]

   16 – 20 years [ ] Over 20 years [ ]

6. What is your experience in years in matters of drought mitigation?

Below 1 year [ ] 1 -5years [ ]

6 – 10 years [ ] 11 – 15 years [ ]

16 – 20 years [ ] Over 20 years [ ]

Section B: Assess the effectiveness of intervention strategies for mitigating drought in Kenya's pastoral livelihood: case of Garissa County

Effectiveness of livestock de-stocking on mitigation of drought effect

7. What pastoral drought mitigation activity is your ministry/Department involved during drought?

   Destocking [ ]

   Water supply [ ]

   Veterinary intervention [ ]

   Provision livestock Supplementary feeding [ ]

   Any other (Please specify) _____

8. Is pastoral drought mitigation interventions administered at the most effective time? Yes [ ] No [ ]

9. How do you rate the capacity of the interventions?

Intervention	**Very adequate**	**Adequate**	**Not adequate**	**Undecided**
Destocking				
Provision of water				
Supplementary livestock feeding				
Veterinary interventions				

10. How do you rate the effectiveness of intervention strategies used?

Intervention	Very Effective	Effective	Not effective	Undecided
Destocking				
Provision of water				
Supplementary livestock feeding				
Veterinary interventions				

11. Do you carry out destocking during the dry periods?

Yes [ ] No [ ]

12. If yes, how effective is it in mitigation livestock salvaging?

Very effective [ ] Effective [ ]

ineffective [ ] Very ineffective [ ]

Undecided [ ]

13. Does the community appreciate the destocking method as a drought mitigation strategy?

Yes [ ] No [ ]

14. How is the market for these animals?

Animals are bought at a loss [ ]

Animals are bought at a good price [ ]

The market depends on the prevailing conditions [ ]

15. Do the livestock keepers get value of their animals during destocking?

Yes [ ] No [ ]

16. Are there other organizations that involved in the destocking process?

Yes [ ] No [ ]

17. How would you rate the whole process of destocking as a drought mitigation strategy?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

18. In your opinion what suggestion can you provide to improve livestock de-stocking as drought mitigation strategy.

_____

_____

Effectiveness of veterinary interventions on drought mitigation

19. What veterinary interventions are in place by the government during drought mitigation?

Para veterinary services [ ]

Provision of drugs to animals [ ]

Examination and vaccination of animals [ ]

Any other (Please specify) _____

20. Are there community based para-veterinary services in pastoral communities to mitigate drought?

Yes [ ] No [ ]

21. How would you rate the veterinary intervention strategies in drought mitigation?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

22. Does the government provide free veterinary services to the pastoralists during drought?

Yes [ ] No [ ]

23. What are some of the challenges faced in the provision of veterinary services?

Unwillingness of the community to participate [ ]

Inadequate resources [ ]

Migration of animals during drought [ ]

Any other (Please specify) .....

24. Who are other key partners in the provision of veterinary services?

NGOs [ ]

Religious organizations [ ]

Donors agencies [ ]

Any other (Please specify) .....

25. In your opinion what suggestion can you provide to improve livestock veterinary services provision during droughts?

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26. Effectiveness of water provision on drought mitigation of drought

27. What has the government done to cater for water provision in the pastoral areas of Garissa County?

Drilling boreholes [ ]

Excavating dams [ ]

Water trucking [ ]

Any other (Please specify) .....

28. Does the government allocate adequate funds **for water provision during drought?**

Yes [ ] **No** [ ]

29. **How do you** rate the management of rural pastoral water sources by the community water User association committees?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

If not effective what do you suggest to improve the management of the rural water sources?

_____

_____

What is major intervention in the water sector during drought in pastoral areas?

Drilling emergency boreholes [ ]

Rehabilitating existing water sources [ ]

Water trucking [ ]

Others specify _____

30. What suggestions would you give to ensure that the pastoralists have adequate water during drought?

31. In your opinion what suggestion can you provide to improve water provision and or drought effect mitigation?

_____

_____

Effectiveness of supplementary feeding on mitigation of drought effects

32. Is the government involved in supplementary feeding during drought?

Yes [ ] No [ ]

33. Does the government adequate financial resources for supplementary feeding during drought?

Yes [ ] No [ ]

34. How effective is livestock supplementary feeding in drought mitigation?

Very effective [ ] Effective [ ]

Ineffective [ ] Very Ineffective [ ]

Undecided [ ]

35. Has the government established calf camp to ensure supplementary feeding?

Yes [ ] No [ ]

36. What is the role of the community in supplementary feeding?

Preserving fodder for animals [ ]

Alternative feeding of animals [ ]

Control grazing [ ]

APPENDIX C

QUESTIONNAIRE FOR NGO OFFICERS

This questionnaire is designed for a research project to assess the effectiveness of intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garrissa County. The information you give will be treated with absolute confidentiality. Your name will not be recorded anywhere in this questionaire therefore, Please respond to all items in the questionnaire as honestly and correctly as possible.

Instructions

Kindly respond to all items

Section A: Demographic data

1. What is the name of your organization _____
2. Please indicate your gender

   Male [ ]

   Female [ ]

3. What is your age bracket?

   a. Below 25 years [ ]

   b. 25 – 34 years [ ]

   c. 35 – 44 years [ ]

   d. 45 – 54 years [ ]

   e. Over 54 years [ ]

4. . What is your position _____

5. How long have you worked in this organisation/

Below 1 year [ ] 1 – 5 years [ ]

6 – 10 years [ ] 11 – 15 years [ ]

16 – 20 years [ ] Over 20 years [ ]

How long have you worked in the current position?

Below 1 year [ ] 1 – 5 years [ ]

6 – 10 years [ ] 11 – 15 years [ ]

16 – 20 years [ ] Over 20 years [ ]

Section B: Assess the effectiveness of Intervention strategies for mitigating drought effects in Kenya's pastoral livelihood; case Garissa County

Effectiveness of livestock de-stocking on mitigation of drought

6. Does you organization carry out destocking during drought?

Yes [ ] No [ ]

7. If yes, how effective is it in mitigation livestock salvaging?

Very effective [ ] Effective [ ]

Ineffective [ ] Very Ineffective [ ]

Undecided [ ]

8. Is destocking as a mitigation strategy carried at the right time of the drought cycle?

Yes [ ] No [ ]

9. If NO what do you suggest to improve the timeliness of the intervention?

_____

_____

10. How do you rate the effectiveness of the following destocking approaches?

Intervention	**Very Effective**	**Effective**	**Not effective**	**Undeci ded**
Direct livestock purchase				
Transport subsidy for livestock traders				
Micro financing livestock traders				

11. Does the community appreciate the destocking method as a drought mitigation strategy?

Yes [ ] No [ ]

12. How is the market for these animals?

Very Good [ ] Good [ ]

Poor [ ] Very poor [ ] .

Undecided [ ]

13. Do the livestock keepers get value of their animals during destocking?

Yes [ ] No [ ]

14. Are there other organizations that involved in the destocking process?

Yes [ ] No [ ]

15. How would you rate the whole process of destocking as a drought mitigation strategy?

Very effective	[ ]	Effective	[ ]
Ineffective	[ ]	Very Ineffective	[ ]
Undecided	[ ]		

Effectiveness of veterinary interventions on drought effect mitigation

16. Does your organisation provide veterinary services to the pastoralists during drought?

Yes [ ] No [ ]

17. What veterinary services are carried out during drought to ensure the livestock do not die of diseases?

Para-veterinary services [ ]

Provision of drugs [ ]

Treatment and vaccination of animals [ ]

18. Rate the effectiveness of the following services?

Very effective	[ ]	Effective	[ ]
Ineffective	[ ]	Very Ineffective	[ ]
Undecided	[ ]		

Para-veterinary services

Very effective	[ ]	Effective	[ ]
Ineffective	[ ]	Very Ineffective	[ ]
Undecided	[ ]		

Provision of drugs

Very effective [ ] Effective [ ]
Ineffective [ ] Very Ineffective [ ]
Undecided [ ]

Treatment and vaccination of animals

Very effective [ ] Effective [ ]
Ineffective [ ] Very Ineffective [ ]
Undecided [ ]

19. What are some of the challenges faced in the provision of veterinary services?

Unwillingness of the community to participate [ ]

Inadequate resources [ ]

Migration of animals during drought [ ]

Any Others (please specify) _____\

20. Rate the following in terms of levels' of challenges?

Unwillingness of the community to participate

A very major challenge [ ]

Not a very major challenge [ ]

Little challenge [ ]

Inadequate resources

A very major challenge [ ]

major challenge [ ]

minor challenge [ ]

Migration of animals during drought

A very major challenge [ ]

major challenge [ ]

monor challenge [ ]

21. Who are other key partners in the provision of veterinary services to the pastoralists?

The government [ ]

Other NGOs [ ]

Religious organizations [ ]

Any Others (please specify) _____

22. How do you rate community participation in provision of veterinary services during droughts?

Very good [ ] Good [ ]

Poor [ ] Very Poor [ ]

Undecided [ ]

23. How would you rate the veterinary intervention strategies in drought mitigation?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

24. In your opinion what suggestions would you offer for effective veterinary interventions on drought mitigation

_____

_____

Effectiveness of water provision on t mitigation of drought effects

25. What has your organization done to cater for water provision for pastoralists?

Sinking boreholes [ ]

Water trucking [ ]

Rehabilitation of water sources [ ]

Any Others (please specify) _____

26. Which of these intervention approaches is the most effective in reducing water related risk during drought?

Drilling emergency boreholes [ ]

Rehabilitation of old boreholes [ ]

Water trucking/Relief water [ ]

Fuel subsidy [ ]

27. How do you rate the effectiveness of the above interventions approaches

Drilling emergency boreholes

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

Rehabilitation of old boreholes

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

Water trucking/Relief water

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

Fuel subsidy

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

28. What other agencies work with you in water provision to the pastoralists?

Other NGOs [ ] Government [ ]

Charitable organizations [ ]

Others (please specify) _____

29. Do the community water user associations manage rural pastoral water facilities effectively?

Yes [ ] No [ ]

30. If NO what do you suggest to improve their management?

_____

_____

_____

31. . What suggestions would you give to ensure that the pastoralists have adequate water during drought?

_____

_____

Effectiveness of supplementary feeding on mitigation of drought

32. Does your organissation support supplementary livestock feeding during drought?

Yes [ ] No [ ]

33. What is the capacity of supplementary feeding services relative to the need during droughts

Veryu high [ ] High [ ]

Low [ ] Very low [ ]

Undecided [ ]

34. How do you rate supplementary livestock feeding as mitigation of drought against pastoral livelihood?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

35. What is the role of the community in supplementary livestock feeding?

Preserving fodder for animals [ ]

Alternative feeding of animals [ ]

Controlled grazing [ ]

36. Rate the effectiveness of the above community interventions

Preserving fodder for animals

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

Alternative feeding of animals

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

Controlled grazing

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

APPENDIX D

QUESTIONNAIRE FOR COMMUNITY CHAIRPERSONS

This questionnaire is designed for a research project to assess the effectiveness of intervention strategies for mitigating drought in Kenya's pastoral livelihood, case of Garrissa County. The information you give will be treated with absolute confidentiality. Your name will not be recorded anywhere in this questionnaire therefore, Please respond to all items in the questionnaire as honestly and correctly as possible.

Instructions

Kindly respond to all items

Section A: Demographic data

1. What is the name of your location _____
2. Please indicate your gender

   Male [ ]

   Female [ ]

3. What is your age bracket?

   Below 25 years [ ] 25 – 34 years [ ]

   35 – 44 years [ ] 45 – 54 years [ ]

   Over 54 years [ ]

4. What is your role in the community?

   Relief chairman [ ]

   Water user association chairman [ ]

   Village leader/elder [ ]

Section B: Effectiveness of intervention strategies for mitigating drought in Kenya's pastoral livelihood; case of Garissa County

Effectiveness of livestock de-stocking on mitigation of drought

1. Did the community in your location benefited from Destocking in the last five years?

Yes [ ] No [ ]

2. If yes, how effective is it salvaging livestock during drought?

Very effective [ ] Effective [ ]

Ineffective [ ] Very ineffective [ ]

Undecided [ ]

3. Was destocking as a mitigation strategy carried at the right time of the drought cycle in the last preceding droughts?

Yes [ ] No [ ]

4. Does the community appreciate the destocking intervention as a drought mitigation strategy?

Yes [ ] No [ ]

Effectiveness of veterinary interventions on drought mitigation

5. Did the community in your location receive veterinary services in the past five drought seasons?

Yes [ ] No [ ]

6. Do the government and other partner organisation provide Para- veterinary training to community?

Yes [ ] No [ ]

7. Where does community get veterinary drugs?

Purchase from agro-vet shops [ ]

Government [ ]

NGOs [ ]

Others (Please specify) _____

8. Who are other key partners in the provision of veterinary services to the pastoralists?

The government [ ]

Other NGOs [ ]

Religious organizations [ ]

Others (Please specify)_____

9. How do you rate veterinary interventions support during droughts?

Very adequate [ ] Adequate [ ]

Inadequate [ ] Very inadequate [ ]

Undecided [ ]

Effectiveness of water provision on mitigation of drought

10. Who manages the community rural water sources?

Government [ ]

Private companies [ ]

Community self committees [ ]

Others Specify _____

11. Which of these intervention approaches is the most effective in reducing water related risk during drought?

Drilling emergency boreholes [ ]

Rehabilitation of old boreholes [ ]

Water trucking/Relief water [ ]

Fuel subsidy [ ]

Others specify_____

12. What is the major challenge of water supply during drought?

Lack fuel [ ]

Maintenance of borehole breakdown [ ]

Overcrowding in the boreholes [ ]

Others (Please specify) _____

13. Do the community water user associations manage rural pastoral water facilities effectively?

Yes [ ] No [ ]

14. If NO what do you suggest to improve their management?

_____

_____

_____

Effectiveness of supplementary feeding on mitigation of drought

15. Did your community received livestock supplementary feeds during last drought?

Yes [ ] No [ ]

16. If Yes who supported livestock supplementary feeding initiative?

GOK [ ]

NGOs [ ]

Community [ ]

17. What is role of community in supplementary livestock feeding?

Preserving fodder for animals [ ]

Alternative feeding of animals [ ]

Controlled grazing [ ]