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Drought Coping Mechanisms among the Turkana Nomadic Pastoral Community of Ilemi Triangle Region of Northern Kenya

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Abstract

Drought has remained a major disaster that has contributed to a higher vulnerability among the mobile pastoral population because of its slow onset and accumulative impact over period. Centre for Research on Epidemiology of Diseases (CRED) has quantitatively provided that Kenya has experienced about 19 droughts from 1989 to 2010.These drought scenarios are mainly in arid and semi-arid areas where Turkana belongs but the Turkana nomadic pastoral population has been surviving in such harsh environment where humanitarian assistance is barely absent. Therefore, the researcher in the objective prompts to ask, and find out how this pastoral community do survive and cope with this repeated drought in such isolated and tough environment. The studies available for this region have concentrated mainly to specific areas of Turkana without touching Ilemi triangle belt in Northern Turkana areas that is more prone to droughts. The study utilises multiple research design and a multistage random, purposive and quota sampling methods. The qualitative and quantitative data were analysed and the findings indicated that migration remain the most common method of coping with drought and it recommended for the supporting of the traditional coping mechanisms and promoting viable programs that support livestock and livelihoods.

Keywords

drought, coping mechanisms, Turkana community, nomadic pastoralist, Ilemi Triangle

1. Introduction

Drought forms a period of months or years that rainfall gets less than the annual average and it results in a severe scarcity of water (Bakker, 2000). Drought according to Opiyo et al. (2014) has remained one of the major disasters that contribute to a higher vulnerability among the mobile pastoral communities who are the endemic population to drought effects, because of slow drought onset and

accumulative impact over a period to their livelihoods. Therefore, it has caused severe economic, social and environmental losses in both developing and developed according to Gupta and Singh (2010).

World Meteorological Organization according to Hounam et al. (1975) classifies droughts as to either being meteorological, hydrological and social economic. In Kenya, drought has been experienced almost every ten years in the 1960/1970s to once in every five years in the 1980s (Nkedianye et al., 2011). However, this trend has increased to every 2-3 years in the 1990s and is getting more unpredictable since the year 2000. CRED (2010) has quantitatively provided that, Kenya has experienced about nineteen droughts from 1989 to 2010, mainly in arid and semi-arid areas where Turkana belongs.

The Arid and Semi-Arid Lands (ASALs) of the world make up over 40% of the earth's surface on which over one billion people depend for their livelihoods according to Nkedianye et al. (2011). Drought is more frequent in ASAL region according to Kirkbride and Grahn (2008), Osano et al. (2013) and Nicholson (2014) that already have dilapidated infrastructure and weak rain pattern (Herrero et al., 2009; Reid et al., 2008).

Wakhungu (2013) further suggests that the high frequency of drought above allows no time to recover between droughts and therefore, populations get more vulnerability to any shock of any nature and intensity. Droughts in Kenya, according to the African Union (2010) affect adversely all sectors of the economy and the population as a whole. Speranza (2010) and African Union (2010) provide some of the impacts of this drought to nomads to include a scarcity of water and pasture for herds, starvation and malnutrition, livestock deaths, altered herd structure, the deterioration of herds condition and a collapse of livestock markets.

Turkana County a high hazard part of Kenya to droughts according to the Kenya interagency Rapid assessment (2014) and Kenya Meteorological Service (2010) do receive annual rain of about 1800mm to 2000mm with an average of 186 mm per year according to Wikipedia (2016). Nevertheless, the nomadic populations of Ilemi Triangle belt (study area) have never left their livestock keeping livelihood option and keep on surviving in such harsh environment where humanitarian assistance is barely absent.

Therefore, this has prompted the researcher to ask and find out how do they survive and cope. What community own exceptional indigenous drought coping mechanisms are in place that promotes survival in such isolated and harsh environment?

Ilemi Triangle region constitutes a four hundred square kilometres triangular disputed area between Kenya, South Sudan, and Ethiopia that has remained a conflict zone between the tribes living in Ilemi both mobile and practice nomadic pastoralism. This complex region according to UCDP (2015) has remained disputed since colonial period with temperatures continually rising, and droughts have occurred with higher frequency and intensity.

During the extended drought of 2009-2010, Turkana nomadic pastoralists according to UNDP (2012)

lost up to 80% of their livestock. Furthermore, poor road infrastructure, poor development, weak land policies governing the contested region, a mobility of this population in search of water, livestock markets, veterinary facilities and poor human health services in this area exacerbated the impacts of drought on pastoralists (Shokri et al., 2008; Haskins, 2010; Wakhungu, 2013). The successive episodes of drought have; therefore, forced the Turkana pastoralists to ensure coping mechanism are in place, though they find themselves in emergency food aid from humanitarian organizations or government at times. This has reinforced the cycle of dependency.

Many recent studies in Turkana related to drought by Masinde Muliro University of Science and technology CDMHA (2007), Khalid (2009), Mureithi (2012), Ouma et al. (2012), Lekapana (2013), Opiyo (2014) and Opiyo et al. (2015) have concentrated on development interventions, conflict management in this pastoral setting, the pastoral livelihood mechanisms, drought occurrences and early warning systems. Drought coping mechanisms by Turkana and understanding traditional own based coping practice has remained unexplored until present. The above studies either were a mixture of qualitative and quantitative or were mainly qualitative in natures that are influenced by researcher biases. Hence, the knowledge produced from such studies cannot be used to generalize other places own drought coping ways. These studies in Turkana moreover, concentrated only on specific areas, in the West divisions, central and South of Turkana without touching areas in the northern Turkana that are more droughts prone and frequently affected. Ilemi triangle belt lies in Northern Turkana and was the most affected Turkana region targeted by Kenya for Kenyan initiatives in 2011 (Kenya Red Cross, 2013).

Little information on the indigenous coping mechanisms among the rural community in Ilemi Triangle in Northern Turkana is known and researched. It will then be important to understand fully how this pastoral community cope with drought to make informed changes to protect these populations from drought risks. This study will then examine and explores issues to address this gap of knowledge to understand these coping mechanisms. The Turkana population of Ilemi Triangle solely practices nomadic pastoralism unlike other parts of Turkana that have irrigation along the rivers, trading, and pastoralism.

Besides other nomadic pastoral setting own coping mechanisms, the results of studies available on coping mechanisms cannot be utilized and generalized to mean it for all Turkana nomadic population who have different structures for coping mechanisms. Therefore, based on the researcher personal humanitarian experience in the context and having worked with humanitarian organizations in other similar settings, there is a need to look more in this complex setting of Ilemi region drought coping mechanisms and this study will aim to comprehend this.

According to Lekapana (2013), drought is considered the most complex but least understood kind of natural hazards, affecting a huge number of people than any other form of disaster. This is mainly because it has a tendency of being slow in onset (Nori & Davies, 2006). A study by Field (2005) highlighted that drought results in serious economic, social and environmental impact that forms the

most common of all natural hazards affecting pastoral communities Therefore, drought results to loss of large numbers of livestock that leads to livelihood crisis among this nomadic population. The 2009-2010 drought according to UNDP (2012) had seen Turkana nomadic pastoralists losing up to 80% of their livestock. The Kenyan president has recently declared drought as a national disaster according to BBC (2017) and it has caused huge impacts to pastoral populations.

According to the Kenyan NDMA (2006), understanding of drought operational definition do not only assists nomadic pastoral populations in identifying and understanding the framework for both the commencement and termination of drought, but also ensures the drought severity degree is known so that it can be well be mitigated. Angassa and Oba (2007) have, however, challenged many publications in the definition of drought operationally that deal with having a water resource indicators, which according to the author the definition is not consistent at all. Hence, Angassa and Oba (2007) have all suggested for an acceptable disciplinary definition and classification of drought to be hydrological drought, meteorological drought, agricultural drought, and socioeconomic drought.

Lekapana (2013) suggests that meteorological drought caused by the deficiency of precipitation from the normal over an extended period. Though this drought classification is thought to be region specific, for the reason that the atmospheric conditions that results in deficiencies of precipitation are highly variable from region to region. Ouma, Obando and Koech (2012) suggests that this drought type presents itself in the forms of dryness (often in comparison to some "normal" rainfall pattern) and the duration of the dry period. Therefore, dry periods come first, then days with no precipitation, second, consecutive days with little precipitation and third, little precipitation during a specific period of time (Field, 2005).

Many other authors have differently defined agricultural type drought. According to Brooks (2006), agricultural drought come when plant response by using degree of departure from the expected yield as an indicator of weather conditions for a given year, on the theory that crops are good indicators of weather and their response presents a reliable tool for measuring drought while Birch and Grahn (2007) discusses the agricultural drought on situations where amount of water in the soil no longer meets the need of a particular crop, which measures drought as a physical phenomenon and finally Birch and Grahn (2007) puts this kind of drought to occur when the soil moisture deficiency affects crop or pasture growth.

Hydrological drought according to Field (2005) is form drought as a result of deficiencies in surface and subsurface water supplies. This drought type is therefore, more concerned with the effects of periods of precipitation shortfalls on surface and subsurface water supply rather than with precipitation shortfalls. However, Randall (2008) associates this drought type to the impacts it brings and further suggests that, this drought expresses the shortages in surface and subsurface water. Hydrological droughts are, therefore, out of phase or lag the occurrence of meteorological and agricultural droughts.

Socioeconomic drought according to Birch and Grahn (2007) is drought that is associated to supply

and demand for goods and services. This drought type therefore, occur when physical water shortages start to affect the community's well-being, their economic livelihoods, quality of life and their health or when drought shocks the supply.

In relation to the nomadic pastoral setting, the above explanation on different type of drought by different authors, and available literature does not provide information on where each category can be applied or rather if all the above can affect the pastoralists or be related to pastoral nomadic population or not. It has also remained unknown the different form of drought and causes in a highly mobile pastoral population around boarders of different countries that are in frequent movement, conflict and warrying. Likewise, a combination of the four drought type in some instances can be found in one given context, thus, confusing of which to adapt and follow. Therefore, the researcher through this study will hence, incline to discover which form of drought is available in Ilemi Triangle region of Turkana County, Kenya.

The nomadic environment where Turkana pastoral community in Ilemi Triangle live is the driest areas in Kenya and according to Birch and Grahn (2007), dry lands regions occupy forty-one percent (41%) of the earth's land surface with over two billion people living in it. A case study by Brooks (2006) on pastoralist's livelihood established that livestock rearing has remained the dominant livelihood method in this dry lands. Arid and Semi-Arid Land has therefore, established itself unconventionally across the world's dry lands for more than 7,000 years ago. Randall, 2008 and Lind and Scoones (2013) quantitative studies on Kenyan population livelihoods put 80% of Kenya's land mass population practice to be practicing nomadic pastoralism.

The physical environment inhabited by the pastoral communities remains an important element of the pastoral system and their livelihood options. Accordingly, Field (2005), the Greater Horn of Africa (GHA) countries are among the thirty-six countries in which most of the lands are characterized as arid and semi-arid. These environments according to Field (2005) are considered extreme variable and receive unreliable rainfall both in space and time. Consequently, these areas are characterized by the scarcity of water and seasonal variability of vegetation, and thus, more prone and vulnerability to drought.

Nevertheless, droughts have become part of this nomadic pastoral population natural cycle, with temperature continuously ranging between 24℃ to 38℃ according to Blackwell (2010) and the rainfall ranges between 120mm and 500mm per year. Field (2005) suggests that even with such extreme weather and climate, pastoralists have accepted and coped with such extreme difficult pattern of life. This aridity in the pastoral environment makes other livelihood option like crop production unsupportable. Hence, the livestock productions remain to be the only viable and rational option under the existing technologies and environment to be practiced. Moreover, together with a lack of enough water and pasture in pastoralist environment, certain constraints on pastoralist settlement patterns and livestock production occur (Blackwell, 2010).

A qualitative study in Turkana County by Oba and Ebei (2007) indicated that Turkana County has

experienced drought in almost every ten years and their nomadic pastoral environment has been experiencing high temperatures, strong winds, and low relative humidity according to Blackwell (2010). The author agrees with these findings and suggests its adaptation and consideration as it portrays exactly characteristics of the research setting.

The above Oba and Ebei (2007) findings corresponds to another case study by Nkedianye et al. (2011) that found out that Kenya arid and semi-arid area where Turkana belongs since 1960's have been massively vulnerable to constant drought intensity. This severity, intensity and frequencies of these droughts according to Angassa and Oba (2007) have hindered the recovery because the recurrent droughts disrupt the livestock growth before the recovery phase is completed.

Together with the experiences of these recurrent droughts in this pastoral environment, the Turkana pastoralists like any other nomads are usually forced to migrate in and around Ilemi Triangle region, in search of water and pasture for livestock. This movement often trigger conflicts with the neighbouring communities of South Sudan and Ethiopia (UNDP, 2011).

Table 1. Major Drought Events in Turkana District and Mean Mortality Rates Associated with These Droughts at Household Level for the Period 1952 to 2003

Drought Local names in Turkana Language	Year	Morality Rate of animals
Lotiira	1952	61%
Namotor	1960	55%
Kimududu/Kibekbek	1970	54%
Kiyoto atangaa/Lopiar	1980	65%
Lokwakoyo/Akalkal	1990	53%
Logara/Epompom	2000	63%

Source: Oba and Ebei (2007).

The above Table 1 shows that drought in Turkana County occurs almost every ten years with increasing intensity of effects. Therefore, the researcher will find out if such drought is experienced in Ilemi Triangle and what effect it has put to the nomadic population of Ilemi Triangle, Turkana County in Kenya.

The level of the humanitarian needs on nomadic pastoral system and the environment caused by drought has therefore, been in ominous critical need, for the reason that the pastoral system due to drought impact can no longer support the basic needs of this pastoral population. Therefore, a huge outcry has been heard and reported recently in the media during the Kenyan for Kenya initiatives in 2011 and in 2017 on drought effects in Turkana County and most affected areas in the County were in the Ilemi Triangle belt. However, the pastoralists in the region have never left their livestock livelihood option with over 85% of arid and semi-arid areas population engaging in livestock production.

A recent quantitative study by Blackwell (2010) on a dry environment and regions of ASAL lamented

that pastoralist has been side-lined in decision-making processes since the colonial period. This has side-lining has therefore resulted to chronic under-investment in these pastoralist population areas. Consequently, this has increased their vulnerability to different hazards. Basic services provision such as water within ASAL region according to Blackwell (2010) is not adequately provided nor adapted to the pastoralist community way of life. The researcher will look at this service within Ilemi Triangle belt how it is managed.

Pastoralists therefore, settle in areas and environment where water is present and or relocate to areas closer to water sources (Leaky, 2011) and the availability of water according to Haskins (2011) determine the amount of pasture and number of cattle these pastoralists can have. Hence, water has remained an essential commodity in the pastoral population to have for their livelihood sustainability. It is consequently during these times of migration and drought that conflicts between different pastoral tribes in Ilemi Triangle arise and increases. Hence, water shortages in the pastoral environment and during drought play a crucial role in determining how this conflict will be, since it enhances pastoral livelihood productivity (Blackwell, 2010; Kablit & Lokwei, 2012).

Study findings by Wakhungu and Wabwoba (2013) and United Nations Organization for Humanitarian Aid (OCHA) (2007) have both proposed a holistic approach to be taken in water management and provision in the pastoral environment and communities towards a reduction of such conflicts. Water for livestock needs to be prioritized and be integrated into domestic water projects installations. The government and humanitarian organizations need to assure this must happen in order to alleviate the suffering (OCHA, 2007).

Wakhungu and Wabwoba (2013) study on factors affecting the sustainability of community food security projects in Kiambu County further suggested of encouraging communities own initiatives and interventions in such harsh environment. Coping strategies according to Wakhungu and Wabwoba (2013) are solid approaches that last, sustained and hence, need to be encouraged. Tapping of pastoral community experiences and approaches will not only assist in planning and manage predictable disasters, but also support own community solutions to drought management thus a great empowerment and ownership to community initiatives that promote resilience activities to curb drought effects.

What is known from the above literature is the characteristic of a typical pastoral environment and behaviour of pastoral population in relation to drought is dealt with, however, as many similar pastoral environment is managed differently, and diverse governments manage pastoral affairs differently, it will be sound to understand fully how Ilemi Triangle belt pastoral environment affairs is managed because no much specific information on Ilemi Triangle region on drought related environment has been documented and researched.

Kivaria (2007) suggests that coping with drought remain the final piece of a holistic drought risk management strategy, alongside the pre-drought activities of risk mitigation and risk transfer. Living in such difficult environment and continuing maintaining of livestock will require coping with

recurrent droughts. Eriksen et al. (2005) and Kivaria (2007) further put coping mechanisms as short term strategies adopted in response to a crisis and involves actions and activities that do usually take place within existing structures and form kinds of responses individuals and communities do to different challenging hazards and in other words, they form immediate measures or strategies instituted to minimize risks.

Kivaria (2007) has grouped coping strategies to be either community or managerial strategies. The managerial strategies according to Kivaria (2007) include movement and migration, livestock management aspects, supplementation of grazing with other feeds, changes in herding labour with intensification of stress, management of diseases (both human and livestock) and changes in human diet while Community strategies includes sharing of livestock, loaning and giving of livestock as gifts and institution of legal restriction necessary because the rangelands resources (forage and water) are shared by parties with conflicting and varied interests.

Pastoralists in many parts of the globe depending on different stages of drought practice different coping strategies (Huho et al., 2011); these survival and preservation mechanisms assist in safeguarding the continuity of livelihoods. UNDP (2011) study suggests that some of the common mechanisms utilized by local population in assessing own drought do include reduction in number of animals, frequent animal sell for food purchase, decline in water production from the wells, Imbalance between livestock numbers and available wells, livestock numbers dwindle through mortalities with conditions of livestock becoming worse.

An Ethiopian context-based study by ILRI (2006) endorsed slaughtering livestock and preserving the meat, preservation of grazing areas for times of extreme drought, division of large herds of smaller units and species, livestock loans among relatives and friends, collection of wild fruits and bartered cereals, and begging for food as their coping strategies to droughts, these recommendations above formed a credible base and information that is needed in order to understand other context based coping strategies utilized by nomadic population. However, as the context is different, the generalization of these coping strategies cannot be arguably recommended to mean for all the nomadic populations.

Other qualitative studies by little (2003) and McCabe (2006) to be considered, have all discussed and recommended the pastoral communities to utilize own traditional initiatives to counter drought effects. These studies have further advocated the change of policies for management of drought within the nomadic settings. The study results were firm without any flaws and provided a concrete recommendation that applies to the research setting.

Other recent studies by Notenbaert et al. (2007), Below et al. (2010), Thornton and Gerber (2010), Nicholson (2014) and Opiyo (2014) have all discussed qualitatively on coping strategies and how nomadic population has progressed through harsh and challenging conditions due to drought. These study findings and recommendations are convincing and practical given the environment and drought effects the nomads do pass through.

In a more recent and Turkana nomadic pastoral context-specific studies by Khaled (2009), Ouma (2009), Murithi (2012) and Opiyo et al. (2015), though they were all in either qualitative or mixed methodology in nature, called for strengthening the autonomous drought adaptation processes of the Turkana pastoralists to improve their own capacity to cope with and recover from drought. The above studies recommended for a joint hand investment by the government of Kenya and humanitarian organizations towards improving infrastructure and range management techniques within the nomadic pastoral belts that will aim at reducing pastoral community drought vulnerability.

The main objectives of coping strategies to drought according to McCabe (2006) is to maintain households, including livelihood security, consumption, health and status and therefore, guaranteeing wellbeing of individuals. However, Kivaria (2007) has based all the above coping strategies on the view livestock herd's numbers.

Moreover, Below et al. (2010) and Kivaria (2007) have classified the above coping strategies to be either managerial and community strategies. These managerial strategies according to Kivaria (2007) includes movement and migration, various aspects of herd management, supplementation of grazing with other feeds, changes in herding labour with the intensification of stress, management of diseases (both human and livestock) and changes in human diet. Community strategies, on the other hand, include herd's sharing, loaning and giving of livestock as gifts and institution of legal restriction necessary because the rangelands resources (forage and water) are shared by parties with conflicting and varied interests. The results of the study, therefore, are firm because the study was without major flaws.

A recent case study on resource based conflicts on traditional adaptation to climate variability and change amongst pastoral communities in Wajir County, Kenya by Omar (2014) submitted to Masinde Muliro University CDMHA argues that the traditional ways of coping to climatic change conditions are at play and causes excessive emerging conflicts such as borrowing from distant relatives and friends. The author agrees with Omar (2014) suggestion that modern ways of coping with drought are being initiated by NGOs and government institutions such as water conservation and alternative livelihoods and they are typically similar in the researcher setting. The results are convincing and further identified the exact coping strategies to drought in a nomadic pastoral setting (similar to the research setting of Ilemi Triangle in Turkana County). However, the time, security and nature or rather the dynamism of the nomadic pastoral movement limitations of author Wajir study means that further investigation is still essential.

A joint quantitative study by Mworia and Kinyamario (2008) and Huho et al. (2011) have summarized and provided major coping strategies (described below) used by pastoral communities do include livestock sales, mobility, livestock splitting, and diversification, maximizing livestock density and livelihood diversification.

Mobility: Mworia and Kinyamario (2008) and Huho et al. (2011) study provided that many of the

African nomadic pastoralists communities have managed risks associated with drought through livestock mobility according to and for this nomadic population to survive this pressure of drought; unreliable rainfall and pasture distribution, this pastoralist must move (Mworia & Kinyamario, 2008). Mworia and Kinyamario (2008) have described two forms of mobility commonly used be pastoralist to be either resources exploitation mobility and escape mobility. Escape mobility involves long distance migration to escape drought conditions while resource exploitation mobility responds to unpredictable pasture and water resources availability. All these forms are used to ensure livestock-keeping livelihood is maintained.

Long distance movement of pastoralists and their livestock across districts and international borders according to Lekapana (2013) is one of the key drought response strategies used by many nomads across Africa. Internal movement within same the region according to Lekapana (2013) is carried out in close grazing areas and/or next to permanent water points. Agreements and negotiations are vital preconditions if this pastoral community seeks access to a grazing land and water outside their territory.

Movement of these pastoralists in search of water and grass for livestock, Lekapana (2013) suggests is usually organized and do follow a predictable pattern that usually starts from local dry season areas on the periphery of water sources, through to safe refuge grazing zones and finally ending mobility cycle in distant places. Mobility ensures that these nomads use forage and water resources; to include moving to minimize the effects of droughts, and being able to use underused distant pastures from settlements (Mworia & Kinyamario, 2008).

In Turkana County, the Turkana nomads of Northern Turkana do migrate towards the fringes of Loriontom and Lokwanamor mountains ranges or highlands during the dry season and to the plains of Ilemi Triangle during rainy season. They move progressively following systematic routes during drought and rain season to the valleys to the hills with their livestock. They migrate back to the valley of Ilemi Triangle when rains start and the process. It is during this rainy season that the Turkana do many feasts, dancing, and marriage ceremonies. The detailed description of Turkana mobility type has been adapted from a study by Schrepfer (2014).

Table 2. Pastoralist Mobility Types in Turkana

Type of Movement	Internal or Cross boarder	Action
Traditional nomadic	Internal	Right to freedom of movement and choice of residence as contained in Kenya's constitution, regional and international human rights law provides protection.
	Cross-border	Need for national and regional pastoral mobility policy in line with the AU Policy Framework for Pastoralism in Africa.
Coping strategy movement	Internal	Right to freedom of movement and choice of residence as contained in Kenya's constitution, regional and international human rights law provides limited protection to those who migrate as a form of adaptation. Need for migration management through the strengthening of pastoral governance and in particular rangeland management.
	Cross-border	Need for national and regional pastoral mobility policy in line with the AU Policy Framework for Pastoralism in Africa.

Source: On the margin: Kenya's pastoralists. Adapted from Schrepfer (March, 2014).

Livestock sales: According to Mworia and Kinyamario (2008) and Lekapana (2013) studies, pastoralists do sell their livestock to cope with drought. These practices could be to breed more females than male as male livestock are the ones usually sold. However, common practices during drought period according to Lekapana (2013) are that animal's prices do get low and are bad body conditions or emaciated and nomads try selling more male animals.

Herd splitting: During the dry season, nomads do divide their herds to smaller and smaller groups to find pasture Mworia and Kinyamario (2008). Families too are separated; other animals with families remain along the rivers in the plains especially with camels, sheep and goats because they do not move to further mountains while cows with other family's members move far towards the mountainous region of Ilemi Triangle. Herd splitting is done by nomads to maximizing use of scarce range resources. According to Lekapana (2013), if there is plenty of browse and no grass, these areas are reserved for browser's animals to include camels and goats, but where there is only grass without browse pastoralists will choose such areas for grazing of cattle and sheep. They do the separate these animals and graze them separately.

Moreover, having clannish and kinship lineage in many nomadic pastoral settings do help a lot; Mworia and Kinyamario (2008) elaborates that these practices do promote animals sharing between families for the purpose of subsistence and reproduction. This shields the poorer households from effects of droughts while the wealthier ones spread the risk during the dry period. This practices though cuts across all the nomadic population. Lekapana (2013) suggests it is widely practiced in Samburu, Rendille, and Turkana and Gabra pastoralists.

Livelihood Diversification: The nomadic population has embraced livelihood diversification in order to cope with drought stresses. This according to Huho et al. (2011) includes a wide variety of alternative income generating activities; the collection of firewood, charcoal burning, and collection of gum Arabic among other activities. Like other Pastoralists, Pastoralists in the Western part of Turkana County according to Ouma (2011) and Lekapana (2013) do engage in different livelihood diversification choices to include aloe production, wage employment, retail trade, farming along River Turkwel and Tarach and fishing in Lake Turkana.

Livestock Diversification: Herd diversification is a common adaptation strategy practiced by most pastoralists in Africa. Kenya pastoralists who practice according to Ouma (2011) include the Turkana, Somali, and Rendille and Gabra communities. Therefore, sheep and cattle those are more sensitive to drought, whereas goats, donkeys, and camels that are more resistant to drought-induced stresses (Ouma, 2011) are diversified and reared together (Mworia & Kinyamario, 2008) Although numerous studies on nomadic pastoralist's drought coping strategies were conducted in Kenya, scanty information is available on the same for pastoralists of Ilemi Triangle. Moreover, barely any research on drought coping strategies has ever been conducted amongst the Turkana pastoralists of Ilemi Triangle belt in Turkana County. To bridge this gap of knowledge, the study explored the community drought coping strategies employed by this pastoral group in Ilemi Triangle both in the present and in

the past times.

The literature review therefore strongly supports the recommendation from a recent case study on resource based conflicts on traditional adaptation to climate variability and change amongst pastoral communities in Wajir County, Kenya by Omar (2014) submitted to Masinde Muliro University CDMHA recommends for the drought recovery instruments, security measures, market development, income diversification and rural development, livestock health and marketing in order to promote the livelihoods of the pastoral populations.

Table 3. Coping Behaviour of Pastoralists during Drought

Coping behavior used by pastoralists	Description
Herd management	Transport of animals to areas where forage is available; sales and Slaughter of animals; diversification or switching of species composition within the family herd
Generation of food stores	Cereal stores to made to prevent needless distress, sales of livestock; Stores of milk, meat, fat, wild fruits, grass and others
Forage supplementation	Preparation of hay, lopping of trees (leaves, fruits, and branches), and supply of commercial forage supplements, others
Supplementing and diversifying of income	Hunting, food gathering, fishing, trade, working in urban areas
Distribution of resources and demand	Herd and family splitting, temporary migration, transfer of animals within social networks (whether with kinship basis, or with stock associates) on which individuals have legitimate claims, resource sharing (e.g., circulation of milking animals)
Migration to urban areas and within same setting in search of grass and water for livestock	Migration within Ilemi triangle for the research setting and to the urban areas mainly in search of white scholar jobs and in the setting it is mainly as watch men

Source: Adapted for the study from UN (2000). Strategy of the Assistance Community in Response to the Drought in Afghanistan (June 2000 to May 2001).

The secondary data above in Table 3 by a study done by the UN in Afghanistan in the year 2000 showed typically what is observed in nomadic settings which could similar to researcher context. The same coping behaviour employed by the pastoralists in Afghanistan has been seen in the in many settings pastoralist in Kenya live. Kenya Television KTN (2016) news has mentioned of the Turkana residents being forced to migrate to the neighbouring Countries as drought continues to ravage.

From the above literature, little is known, researched, evaluated and documented on the drought coping strategies concept in Ilemi Triangle in the northern Kenya and because no single one indicator can be used to generalise for all the settings even in similar environment, this study findings will fill the gap of knowledge on the best practices utilized by the Turkana nomadic population of Ilemi Triangle in coping with drought because this drought according to the above literature is not only recurrent but have a great impact on the preferred livelihood options of most of the pastoral populations.

The objective of the study is to establish the Turkana nomadic pastoral community drought coping strategies. This study will not only contribute to an informed scientific knowledge of the Turkana indigenous population coping strategies to drought within the Ilemi Triangle belt that can be utilized

for academic purposes but also motivates individuals and humanitarian organisations to look more in to Ilemi region, direct default responses where need is essential and provide a clear direction on investing more on nomadic pastoral populations livelihoods protection, an eye opener opportunity for realizing the need for the policy, opportunity for national and regional planning and implementation of viable livelihood protection programs that target pastoral populations. Thus, alleviating community suffering and poverty, reducing vulnerability and support Vision 2030 (MoP, 2007).

The Barton et al. (2001) model is applied in the study conceptual framework for the coping strategies utilized by Turkana nomadic pastoralists in Ilemi Triangle, Turkana County, Kenya. Barton et al. (2001) model elaborates that given constant levels of drought hazard over time, coping strategies will allow a system to reduce the risk associated with these hazards by reducing its social vulnerability. With increased and recurrent droughts, a system may, therefore, maintain current levels of risk through the use of such coping strategies. If hazards increase dramatically in frequency and or severity, a human system may face greater risk despite the reduction in social vulnerability achieved through the implementation of these coping strategies. However, if these hazards reduce in frequency, then risks to vulnerability to such hazards reduce too.

Conceptually, the direct application and effects of these coping strategies will, therefore, enable the reduction of the social vulnerability. However, if no direct effects of coping strategies are experienced, then the vulnerability will be so high to the nomadic population against the drought disasters.

Moreover, pressures on resources in arid and semi-arid areas according to Barton et al. (2001) have been growing in recent years because of human and livestock population growth and at the same time loss of land and water resources to other uses like agriculture, forestry, and wildlife reserves. In general, land-use systems increasingly make use of more of the available natural resources in non-drought times, leaving fewer resources to cope with drought conditions.

The herding of livestock in a highly variable and uncertain environment depicts how vulnerability and change in climate remain linked. The local livelihoods in pastoralist communities depend entirely on the productivity of the herds. Any factor negatively affecting livestock growth and production in such context of the nomadic population translates to a loss of livelihood and vulnerability of the pastoralists to the extreme weather events.

Any further slight variation in the availability of both pasture and water directly affects the livestock economy of the pastoralists. Though pastoralists' coping strategies to drought effect are constrained by various socio-economic, cultural, political and ecological factors, the consequences of drought according to Barton et al. (2001) can enable the pastoralists to engage in other alternative livelihood options to complement a shrinking livestock. Hence, they will have to adapt with other livelihood options.

Nomadism and coping strategies from the model can also change with a changing climate. Overall, increased exposure to climate change risks affects the nomads coping strategies forcing pastoralists to create 'new' coping strategies to cope with and recover from the change.

Moreover, as the Traditional Indigenous Knowledge (ITK) exists on the various coping strategies, a lack of information dissemination mechanism to different stakeholders constrains the uptake and utilization of knowledge on drought disaster management within this nomadic population. This gap in knowledge within stakeholders translates to a weak policy framework at both national and county levels to mainstream coping strategies to developmental concerns. Hence, need for understanding indigenous coping strategies within regions where nomadism is practiced. This will not only help in tapping and utilizing community own initiatives and experiences to cope with drought effects but also the contribution in a policy change that is community empowered.

An essential model of a drought management system adapted to a pastoral context will, therefore, include a distinction between mitigation activities to minimize the impact of drought on production systems and livelihoods, and relief activities for the welfare of those rendered destitute. Often, early warning and contingency planning during the onset of drought, while relief is more appropriate at a later stage can trigger mitigation activities. Longer-term policies for resilience are necessary for, specific mitigation measures. Thus, plans to guarantee drought-time access to specific grazing reserves must be developed in this nomadic context.

According to Barton et al. (2001), there remains evidence of linkages among different components of drought management model. Policies required for resilience are not only required for specific drought mitigation measures but also for any other closely related to mitigation. Similarly, plans and strategies adapted to access pastoral grazing land during dry spell need to be developed in general policy on pastoral land tenure.

Moreover, these components in the model interact closely, that is between early warning system, contingency planning, mitigation measures, relief, and rehabilitation. Barton et al. (2001) argue that relief activities need to focus on the vulnerable group of the population that cannot be reached by mitigation measures and that restocking for example after drought, will make livestock acquisition as a mitigation measure easier to do.

Drought early warning: Early Warning System (EWS) according to Morton (2001) is a method of collecting information and monitoring drought in order to provide timely and necessary notice to the population when drought threatens and therefore take an appropriate response. Early warning further provides a framework for the governments, donors, and humanitarian organizations to intervene promptly and avoid humanitarian crises (Barton et al., 2001).

Early warning system in Kenya has been initiated and decentralized to the county levels in order to decrease threats caused by droughts in most of the ASAL according to Barton et al. (2001). The Kenyan EWS model is efficient and effective in terms of identifying various stages leading to emergency though the implementation of its contingency plan has been less effective because of lack of funding (Barton et al., 2001).

According to Barton et al. (2001), some of the major components and indicators of an early warning system include animal production and mortality, human health, weather system, vegetation coverage,

agricultural production, local market basket prices, movements of nomadic population and nutritional status.

In Turkana, early warning system does exist but the applicability and canalization of information received remain a big issue and decision to make. Mkutu (2000) suggests that in ASAL region, the dissemination of early warning information to grassroots is usually affected by community reluctance to utilize the information and change their livelihood behaviour, financial constraints and interpretive capacity of the nomadic population. Therefore, an early warning system will comprise data collection, information development, dissemination and development of action triggering mechanisms.

Contingency Planning: Coping strategy to drought has a major positive impact to safeguarding the livelihood of the nomadic population and goes in line to the contribution of the UNICEF Poverty Reduction Strategy (PRS) for Food security Strategy objectives (UNICEF, 2009).

Planning in drought management is vital for both mitigation and action taking. It further helps in In Turkana, the research context, Lekapana (2013) suggests that a drought contingency plan has been developed containing emergency preparedness actions and different tasks of different groups and level to include the donor, government ministries, infrastructures involved and populations.

The rationale behind planning is to ensure that live is saved maximally and the damage is minimized by preparing to respond appropriately when drought is imminent Lekapana (2013). Moreover, planning according to ISDR (2007) do include the development of overall drought preparedness strategy and policy, institutional structures, forecasting capabilities and early warning framework and plans that express measures geared towards helping communities that are at vulnerable and get safeguard with their livelihoods by being alerted on the imminent hazards and assisted to take actions against the threat. However, according to Lekapana (2013), Kenya does not have specific drought management policies planned and instead many are crosscutting that is scattered in various sector policies that do exist and manage drought-related emergencies. These drought policies according to Lekapana (2013) require regular review and adaptation according to the changing drought stresses in Turkana nomadic pastoral populations.

Mitigation: This component in the model assists in reducing drought impact to the population through the use of different interventions measures. Mitigation measures according to Wilhite (2000) and ISDR (2007) can both be structured or even none structured and in the structured measures, issues like water development infrastructure for the nomadic population and market for livestock are implemented while non-stricture measures could be utilization of policies, knowledge development, and awareness of the population, public empowerment, and commitment.

Relief: Involves the activities carried out in an event of drought and immediately after according to ISDR (2007). Relief food provision has been a common relief activity together with emergency primary health care and cancellation of debts in countries experiencing recurrent disasters.

Rehabilitation: Reconstruction is required to restore systems that collapsed due to drought effect. Lekapana (2013) suggest that this process is vital as it restores vital systems and full relieves from

drought-stricken areas. Examples of rehabilitations done in nomadic settings include restocking, livelihood diversification, distribution of seeds, agricultural credit offer and sedentarization policy change and resilience to drought.

Pastoral institution building establishment and support of home grown pastoral institutions is one of the prerequisites to help in mitigation of drought according to Barton et al. (2001). It is therefore, in this context that traditional institutions are essential in supporting traditional coping strategies and pastoral associations need to have a role to play in minimizing drought vulnerability and support coping strategies through conflict resolution, negotiated tenure regimes for dry-season and drought-time grazing, communal management of water resources, the protection of grazing rights, access to and management of the natural resources, the delivery of human/livestock health services, revenue collection by charging for grazing rights and water use and collective livestock trade and marketing (Barton et al., 2001).

2. Methods

2.1 Research Context

The study was conducted in two places within the Ilemi triangle region of Turkana County. Turkana County in North West part of Kenya, with a mobile nomadic pastoral population, has a population estimated to be 939,080 people (Kenya Bureau of Statistics, 2009) of whom 90% of their population lives in the remote rural areas that lack infrastructure. The county is bordered by Uganda to the west, South Sudan to the north, Ethiopia to the northeast, West Pokot County to the south, Baringo and Samburu counties to the east.

The Turkana County is mainly made of pastoralist communities with deeply rooted traditional customs and value systems. Customs and traditions include frequent migration, livestock borrowing and cattle rustling that often expose the vulnerable members of the community like women and children to armed conflicts with the neighbouring community's. This regular conflicts do prevent them from accessing other basic services like formal education, health care or practice other livelihood options. The Turkana County do experience high volatile levels of insecurity with frequent attacks from neighbouring Counties and countries, such as the Pokot, Uganda, Ethiopia and South Sudan. Most of the places of these countries lie inside Ilemi Triangle (Figure 1).

Ilemi Triangle region (Figure 1) is triangular part in the extreme North of Turkana County, disputed between Kenya, South Sudan, and Ethiopia. The area measures between 10,320 and 14,000 square kilometres according to Collins (2004), Haskins (2010) and Shokri et al. (2008) suggests that this Ilemi Triangle region has witnessed intensive ethnic and inter-boarder conflicts emanating from recurrent drought effects to include the shortage of water, loss of livestock and disruption of the vegetation pattern. Kenya has remained the de facto controller of this Ilemi Triangle. The Ilemi Triangle region according to Collins (2004) has remained disputed land since colonial period with temperatures continually rising and successive drought episodes occurring with higher frequency and

intensity. The region is further characterized by the poor road network, inadequate commitment of the veterinary services, health infrastructure, and an inadequate livestock market. These conditions heighten the impacts of drought on pastoralists that live in the Ilemi Triangle region.

Accordingly, Collins (2004) has named the nomadic pastoral communities neighbouring each other inside Ilemi Triangle to include Turkana of Northern Kenya, Jie, Dodos and Karamojong of Uganda on the West of Turkana, Toposa of South Sudan and Nyangatom of Southern Ethiopia. All these neighbouring tribes inside Ilemi Triangle according to ILRI (2006) and the Kenyan Ministry of livestock (2016) form part of what is commonly known as "Ateger" who speak a similar language, rear livestock as their livelihood option, do often migrate within Ilemi Triangle in search of grass and water for their livestock and have similar social-economic and cultural background. Their economy, therefore, revolves around livestock keeping according to Notenbaert et al. (2007). These livestock include camels, cattle, sheep, goats, and donkeys.

The purposively chosen areas in Ilemi Triangle region of Turkana County for the study Loruth in Kaaleng division towards the West of Ilemi Triangle, in the direction of South Sudan and Napak in Kibish division towards the North of Ilemi Triangle in the direction of Ethiopia. The Kenya bureau of statistics (2010) puts the total demographic information for the two divisions to be 57,647 people while the two study areas at 9667 people; for Loruth (7787) and Napak (1880) with a total of 1600 households. The area is characterized by dry and hot landscapes and ranges with the temperatures ranging between 23 and 38 degrees centigrade average of 216 mm rains usually received during long rains. Kaikor was picked as a pilot area for the study. The choice of the setting was preferred because the nomadic population has lived in the areas for a longer period to easily identify own coping strategies with recurrent droughts, yet these population has never abandoned their livelihood strategy to change to another means of survival. It is to the interest of the researcher to discover how these Turkana communities have been able to cope with recurrent droughts.

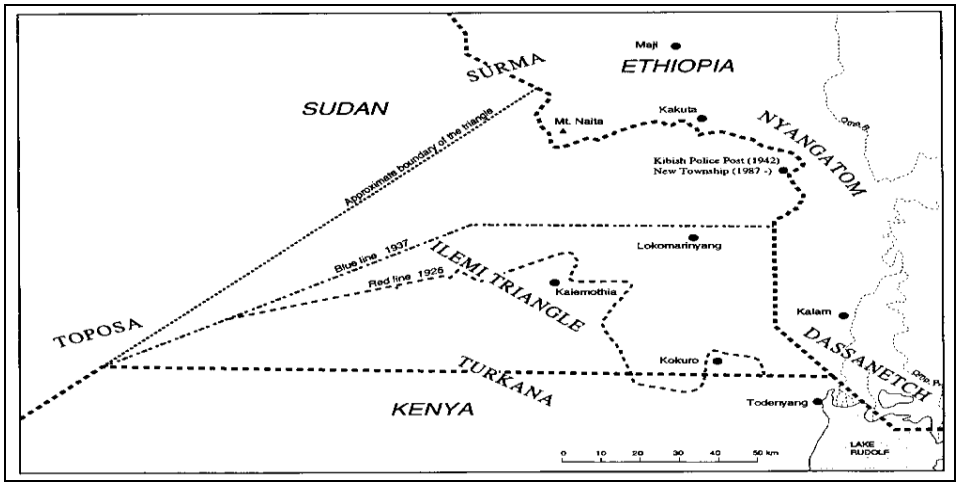

Figure 1. Map of Ilemi Triangle and Tribes around It

Source: http://www.conservationrefugees.org/images/Ilemicarte

The study population are pastoralists living in the selected villages (drought prone areas of Ilemi Triangle), the key informants from the ministry of livestock and water, County officers for disaster management, the member of the County assembly of study area, the community administrator (Chief), local community leader, sub-county administrator in Ilemi Triangle, Turkana metrological station officers, Chief county executive dealing with disasters management and Turkana County disaster management director. Institutions like humanitarian Organizations working in Ilemi Triangle program managers.

The inclusion criteria for data collection were the participants only being the head of the household, adult (>18 years), a Turkana by ethnic group, permanent resident of the area and practice pastoralism. The FDG were for the leaders of various groups and community leaders while the interview guide was done only for the heads of institutions and departments or their deputies and or assistants when the head was not available. The participants were provided with full information about the research to receive his or her consent. Outside these inclusion brackets were excluded.

2.2 Sample and the Designs

A mixed research design of both qualitative and quantitative method was preferred because it outweighed a single research design because it is helpful in designing and validating study instruments according to Biddix (2016). The four hundred households were randomly selected and interviewed to represent the study population. Key informants from the community, ministries and Turkana County were purposively chosen.

2.3 Measures

With the researcher being a disaster mitigation expert, the research team composed of the researcher, eight research assistants who were mainly university graduates from the Turkana community and two local security staffs. These research assistants were trained to assist with data collection. The questionnaires were pretested to 50 households in Kaikor village and slight adjustments were made accordingly prior to data collection.

The data collection process involved in the operational procedures for both quantitative and qualitative approaches. The indigenous coping strategies were captured using both primary data collection methods. This was with the help of the household questionnaire, interview guides, key informants interviews, focus group discussions and Observation checklist as study instruments. Two hundred questionnaires for each location. These instruments collected data on the household social demographic characteristics like education levels, age, gender, religion and other relevant characteristics; data on factors causing vulnerability to drought, how drought get detected by nomads, impacts of drought on nomadic population and data on community own drought coping strategies.

Key informant interviews were conducted with representatives of relevant departments and or institutions. Exposure of the interviewees and their respective level of education were considered in determining the interviews numbers. These self-administered interview guides on officials were closed ended questions. The purpose of opting to self-administer the interview guide questionnaire

was to achieve a maximum and an increased response and reduce the time of processing. The explanation to the officials was provided first before providing the questionnaire. They were informed not only about the study objectives, an importance of their own opinion on survey results but also on confidentiality of the information they provide.

Focus group discussions were used to capture other qualitative information that is not captured in the questionnaire and affirm some of the information from a questionnaire, key informants, interviews, and observations. Two Focal Group Discussions (FGDs) from each study place had questions for discussions. The Focal Group Discussion consisted of local elders, chiefs and assistant chiefs, water point caretakers, food monitors, social workers, community health workers, community focal persons, Community opinions leaders, women group leaders, Youth group leaders and community volunteer's leaders. Their size was 8-12 members.

Observations checklist was used to collect data on general characteristics of the area, economic activities available, and activities by nomads, a general problem seen, solutions and options available and how nomadic pastoralists relate to outsiders. Photography was utilized to capture data observed. Observation sheets will be used to collect general and related information not captured in the other instruments.

Secondary data were received and reviewed from Ministry of livestock, Ministry of water, National Disaster Management Authority (NDMA) and meteorological department all located in Lodwar. This data was collected to compare, validate and strengthen the above collected primary data. Supplementary relevant literature in scientific and peer-reviewed journals in the Internet and virtual library were further reviewed.

To ensure validity of the study data instruments, the content were analysed by the expert judgments. The questionnaires, observation sheet, and participant information sheet were thoroughly checked by the Masinde Muliro University supervisors and improved, organized consistently with the research objective and expected data. Their feedback was put into consideration. The reliability was ensured by piloting the instruments in Kaikor village to ensure the instrument can be replicated, relied upon and free of errors.

No statistician was involved, and data was collected from the data instruments. This included interview guide, observation, questionnaire and focus group discussions that were edited, coded and arranged, tabulated and entered into an Excel spread sheet in a standard format to allow for analysis of both descriptive and inferential statistics where Statistical Package for Social Sciences (SPPS, version 21) computer software was used. Some information on some variables was collapsed because they were in excess of the study requirements.

In addition to proposal approval from the University of Masinde Muliro, research permit was sought and obtained from the Kenyan National Commission of Science, Technology and Innovation (NACOSTI). All study participants were respected, appreciated and informed of their participation being voluntary with an informed consent sought from all participants before is data collected. There

was no citation of participant's identity to ensure involvement and confidentiality.

2.4 Data Analysis

For the demographic and socio-economic characteristics of the sample, descriptive statistics was utilized to analyses data such as Standard Deviation (SD), frequency and percentage, mean and median. Bivariate analyses (Chi-square tests) were used to examine the relationship between the independent variables like age, marital status, gender and income and the coping strategies. In the analysis, a Chi-square P-value of less than $p < 0.05$ (the significance level, 0.05) indicates a no statistically significant relationship between the measured variables. Pearson Correlation test will be undertaken for continuous variables (Porta, 2008) to assess the linear associations between different coping strategies and variables. Pearson's correlation coefficient is a statistical measure of the strength of a linear relationship between paired data. In a sample it is denoted by r and is by design constrained as $-1 < r < 1$. Positive values in the analysis denote positive linear correlation while Negative values denote negative linear correlation and a value of zero denotes no linear correlation. The closer the value is to 1 or -1, the stronger the linear correlation between the measured variables. Frequency tables generated from the above variables, pie charts, and bar graphs were utilized to assist in the visual appreciation of social, demographic characteristics and different adaptability mechanisms used by the nomadic population.

3. Result

About ninety one percent of Loruth respondents and fifty two percent in Napak were female. More than eighty percent of these respondents were married in both locations with more than ninety percent of them not having any basic education. More than fifty percent of the household types were not permanent in both places.

3.1 General Characteristics

Table 4. Demographic and Other Characteristics of the Sample in Each Location (N = 200)

Characteristics	Categories	Loruth (N and %)	Napak (N and %)
Gender of Respondent	Male	19 (9.5)	96 (48)
	Female	181 (90.5)	104 (52)
Age in years of Respondent	18-50 years	186 (93)	177 (88.5)
	>51 years	14 (7)	23 (11.5)
Marital Status of Respondent	Single	2 (1)	8 (4)
	Married	166 (83)	174 (87)
	Divorced	2 (1)	8 (4)
	Widowed	30 (15)	10 (5)
Are you the head of household?	Yes	32 (16)	45 (22.5)
	No	168 (84)	155 (77.5)
Head of the household	Male headed	176 (88)	170 (85)
	Female Headed	24 (12)	30 (15)
Level of education of Respondent	None	196 (98)	189 (94.5)
	Primary	4 (2)	10 (5)

	Secondary	0 (0)	0 (0)
	College and University	0 (0)	1 (0.5)
Type of household	Temporary	137 (68.5)	124 (62)
	Permanent	63 (31.5)	76 (38)
House hold religion	Traditionalist	1 (0.5)	25 (12.5)
	Christian	198 (99)	165 (82.5)
	Muslim	1 (1)	1 (0.5)
	None	0 (0)	9 (4.5)
What is the main source of water for the livestock? Tick where appropriate	River/spring/stream	8 (4)	92 (46)
	Water pans and dams	189 (94.5)	5 (2.5)
	Rock catchment	2 (1)	0 (0)
	Piped water	1 (0.5)	0 (0)
	Wells and Boreholes	0 (0)	103 (51.5)

Almost all respondents were Christians in Loruth (99%, 198) while a bigger margin of eighty two percent in Napak were Christians. About ninety five percent of nomads in Loruth receive water for their livestock from water pans and dams while in Napak a greater part of population use water from wells and boreholes.

Figure 2. Observed Migration of Pastoralists in Napak, Ilemi Triangle, Turkana County, Kenya during Data Collection Period

Source: Researcher, 2017.

Figure 2 shows the Turkana pastoralists migrating. This was observed during the collection of data by the researcher.

3.2 Indigenous Drought Coping Mechanism of the Turkana Nomadic Pastoralists of Ilemi Triangle, Kenya

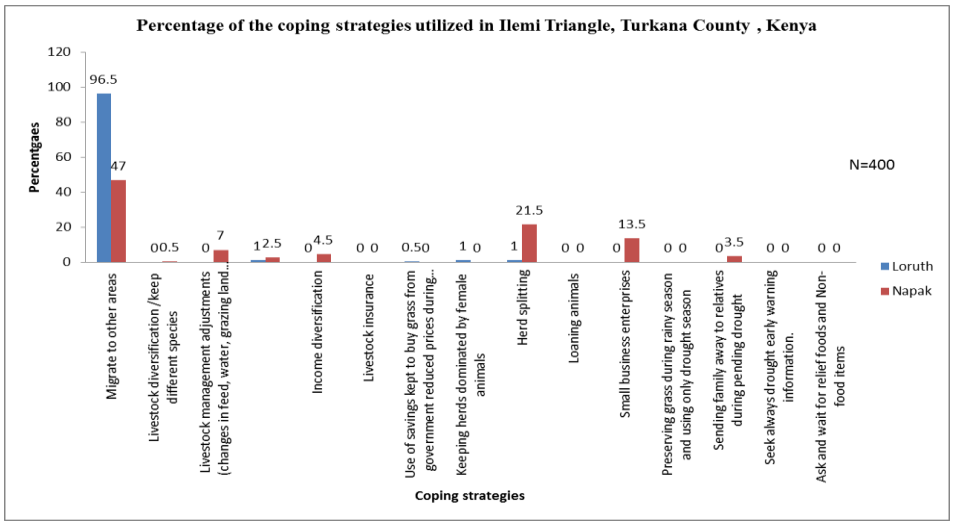

Figure 3. The Coping Mechanisms Employed in the Two Study Areas of Ilemi Triangle, Turkana County, Kenya

Figure 3 above indicates the main coping mechanisms identified in the household questionnaire.

In Loruth 96.5% (193) of the population identified migration as their main coping strategy followed by rearing herds that are dominated by females 1% (2); splitting animals at 1% (2); access to livestock extension services for knowledge of livestock farming during droughts at 1% (2) and finally using the saving kept to buy grass from the government reduced prices 0.5% (1).

Similarly, to Loruth, Napak nomadic population mentioned of migration as their main method of coping with drought (47%, 94). Herd splitting (21.5%, 43), and then small business enterprises (13.5%, 27), livestock management adjustment involving the change in feeding that was at (7%, 14), followed this. Other options and strategies utilized by nomads in Napak involved livestock diversification (4.5%, 9), sending family members away to relatives (3.5%, 7), and having access to livestock extension services for knowledge of livestock farming during droughts (2.5%, 5) and income diversification (0.5%, 1).

One member of the FGD group of Napak mentioned of milk preservation named “Edodo” during rainy season when animal produce a lot of milk and meat preservation called “Ngamorumoru” used only in dry season. This group in Napak explained that drying preserved milk. This process involved storage of milk in a guard for about a week to ferment and coagulate. The milky water after the process will be separated from the coagulant then the coagulant put on goat’s skin and or on a sack on the sun to dry. The dried coagulant is then put on a flat stone known as “Akiries” in Turkana language to be pounded using a fist-sized spherical stone to make it powder milk. Other dry coagulant is stored in form of granules and then stored in traditional bags made from goat’s skin. This powder milk is mostly given to small children while adults consume the one granular form during the drought period. Meanwhile, either meat preservation is done by drying in the sun or dipping already dried or fried meat into sheep’s fat.

Just before the onset of drought, FGD group in Napak mentioned that if the household have accumulated some wealth, a number of sheep and goats are slaughtered by households, then all flesh are removed from the bones, some part of flesh will be made into stripes kind and dried in the sun and wrapped on a goat skin for storage to be used during dry season or difficult period while others will be cut into pieces, fried, cooled and preserved by dipping it into a traditional guard of sheep's fat. The FGD in Loruth further mentioned of large animals (Cows and camels) being slaughtered also and meat preserved in a similar method but mainly by rich families.

These two are prepared during the wet season when milk is available and many livestock have reproduced. The community leaders in the two areas mentioned that this practice is no longer observed because of climate changes and the severe effect of recurrent drought. Ajele (2005) and UNDP (2008) mentioned of sale of the skins and hides by Turkana pastoralists as a way of increasing family income. However, the author thinks this is done mainly during the severe drought when many animals are dead and skin is plenty because it was not observed in the research areas during the study period.

The interviewed government ministry of Livestock, water and respondent from the Turkana County Disaster Management Authority (NDMA) mentioned that migration, provision of purchased grass to the nomads, collection and sell of firewood, wild fruits collection to increase food in the household, skipping some meals in the day and sending of families to other relatives, sharing of animals and foods among families and clans, together with reserving meat and milk to be used during dry period is used in Ilemi triangle to cope with drought. On probing and discussing further on preserving food for dry periods, the political leaders in Ilemi triangle region interviewed mentioned that during drought periods, they ask for more support from the government and the County disaster department support the region with the food kept in the stores in Lodwar.

The humanitarian organisation interviewed to include Turkana Pastoral Development Organisation (TUPADO) and Lotus Kenya Development Organisation (LOKADO) discussed some of the coping strategies in Ilemi triangle nomadic population to include engaging in increasing dependence on natural resources such as search of wild foods, firewood collection especially by women, burning of charcoal, gravel and sand harvesting and stone collection in the quarry, observed also in Napak, one of the research area.

4. Discussion

Coping with drought is vital in enabling the pastoralist to lessen drought impacts. The drought for many years has remained known among the Turkana nomadic pastoralists population of Ilemi triangle, this is not only because of its recurrence but also for the huge impacts it has made this population and their livelihoods and therefore, the description of drought by the Turkana nomadic pastoral community of Ilemi triangle is largely consistent with past studies on drought coping mechanisms. They refer to drought as a natural phenomenon which results in the deficiency of rainfall for one or

more than one season.

According to UNDP (2010), disasters tend to hit the poorest and the most marginalized demographics groups in the communities the hardest. Women and girls in particular fall in to such drought risky category of and get more exposed to disaster risk and they are likely to suffer higher rates of mortality, morbidity and economic damage to their preferred livelihoods options. Moreover, the risks get more embroidered because of cultural issues to include women having to borrow permission from their relatives or husbands before initiating any coping mechanisms to drought. In the study, many women were found in the households and they are further likely to be left behind at homes when the husband or male genders move in search of food according to Griffins (2016). Women do bring exceptional experiences and skills to deal and cope with disasters, although there skills and or other awareness drivers and opportunities are often not recognized in mobile nomadic pastoral population mainly because of cultural hindrances. Hence the study reveals the banishment of women capacities in Turkana nomadic population in Ilemi Triangle in making key decisions even at the household level.

Moreover, women do bear high burden of stigmatization according to Chani (2010), descriptive studies in Nepal by Mathema et al. (2001) and Yamasaki-Nakagawa et al. (2001) indicated that fear of social isolation, and stigmatization from community among females is a key factor contributing to delay in seeking drought coping methods. However, a descriptive study in Peru discusses that men are more proactively employed than women (Chani, 2010) therefore; women will likely be found home.

Additionally, the fact that the Turkana cultures allow the male to search for the food and greatly involved in migration with animals to other areas in search of the water and grass has played this number of males being less in the households. A cross-sectional study by Karima et al. (2008) indicated that women must acquire permission from their husbands in order to move anywhere and so you would always expect mothers to remain at home when men move out in Turkana cultures. Gender does play a key role in Turkana community in general as it determines how strong that household is in pastoral populations (KVRT, 2009). If a man heads the household, it is considered a complete house. Males do perform a key role as overall decision makers and remain as heads of almost all households. This has a great effect and discrepancy in decision making in households since women hardly make any important decisions in the households. Therefore, this makes females more vulnerable even to poverty especially those women who are not married because unmarried women in Turkana pastoral communities according to Brody et al. (2008) cannot own livestock and have to consult for any issue and decisions that could be effective to any coping strategy. These decisions have to be made by a man of the household or a male relative for the unmarried woman. There is a great need to recognize the capacity of women and girls in pastoral communities especially in identifying and challenging factors that bring vulnerability to such pastoral populations.

According to Karima et al. (2008), age is a factor in disaster risk reduction issues and older and younger group of people remain the most vulnerable group in any given society. The age findings of this study matches the UNISDR (2007) Asian study that mentioned the need not to ignore young

people as they remain potentials for change and to nurture effective local action by involving adolescent girls, boys and youth in the decisions about disaster risk reduction and management that will affect their future.

FGD group mentioned of divorced, widowed and women headed families as the most vulnerable to drought shocks and not easy to cope with drought. This corresponds to a study by Karima et al. (2008) that mentioned that marriage families manifests as a strength among married couples during disasters while the widows, widowers, divorced and single families are hard hit by disaster shocks and losses. Divorce and widowed parents have to struggle to contribute to disaster preparedness especially in area of environmental conservation in Africa according to Eriksen and Lind (2005). Marital status; more married than other Category. This corresponds to the Turkana cultures that encourage women to get married. The marital status factor in Turkana culture plays an important role affecting fertility behaviour of the community. According to Eriksen and Lind (2005), the social relation of the Turkana is expressed partly through marriage relations within and outside of the community.

Education levels of a given population affect their drought coping behaviour to disasters. This level of education according to Karima et al. (2008) and Lekapana (2013) affects the development of disaster preparedness and management activities. Among the key respondents, the results, the level of education among the household heads that showed a very low literacy level among the pastoral communities. This low level of literacy has a definite implication on development and change of drought coping strategies and elaboration of livelihood options, as it means that the majority of the community still cannot be able to cope with many modern coping technological advances. Therefore, such communities, the author argues will entirely dependent on their local knowledge coping mechanisms and resource management which may not be sufficient, elaborate and efficient enough in coping with the rapidly diminishing resource base with huge climatic changes. These findings correspond to a study by Muttarak et al. (2013) that mentioned that proper disaster-related training and there applicability is most effective only for individuals with high educational attainment than those without any formal education seen in the research area. The author besides agreeing with the above point further thinks that tapping and improving the domestic knowledge can support improve and reduce the drought shocks of such unfortunate populations that roam around boarders of different countries.

Furthermore, United Nations (2000) suggests that basic primary education is the least level of education required for the nomadic populations to move towards modernity and achieving United Nations Millennium Development Goals (UN MDGs) of universal Primary Education. The Kenyan government since 2001 according to United Nations (2000) has been having an ambitious program of expanding the enrolment in school especially in pastoral areas that have lagged behind and are usually geographically isolated and often lacks awareness, a factor that affects their coping strategies know how (Melaku et al., 2013) and Cohen (2005).

Drought is not a new event to the nomadic pastoral population in Kenya and horn of Africa in general

because such population has suffered numerous droughts that have not only affected their livelihood option but also retards their development plans. The nomadic population survival in such difficult environment is, therefore, attributed to the coping strategies they implement in order to maintain their livestock livelihood and alleviate themselves from drought effects. Understanding and tapping community own experiences on coping strategies they do apply during drought will not only assist in planning and managing predictable disasters but also support community own solution to drought management and traditional coping strategies.

Depending on the severity of the drought whether severe, mild or medium, nomads have to cope with drought. Fasil et al. (2001) study supports the idea of empowering different indigenous drought coping strategies according because they builds resilience to different forms of recurrent drought, and ensure survival of vulnerable populations and their livestock.

According to Melaku et al. (2013), government and humanitarian organisations need to comprehend nomadic population because it is worthwhile to understand why a previous functioning system in the absence of outside intervention is suffered ecological and economic pressures; coping strategies that have been left by populations need to be preserved for the future generations for the reason that improvement of food security is more likely to result from strengthening the indigenous coping strategies than from introducing new ones that cannot be owned and appreciated by the community; coping strategies its self-form a vital component in the survival of nomadic population, therefore, drought management tactics employed that ignore such plans according to Cohen (2005), will undoubtedly be maintained. Therefore, the above factors inform the need for understanding the root cause suffering through recurrent droughts, a framework for understanding how the nomadic population of Ilemi triangle, Turkana in Kenya cope with drought and what experience the research can bring.

During this period according to Fasil et al. (2001), the milk and the observable presence of food in the households decline, suffering then start. The above findings resemble to the study findings by Nassif (2008) in Morocco that found out that livestock farmers reduce the drought effects during developing drought by the purchase of animal feeds, timely destocking and sell part of livestock to save money. Rass (2006) also suggest that mobility is a prominent coping strategy employed by pastoralists in anticipation of drought eminence and therefore, they frequently move to different areas in search of pasture and water

Waiting for long without immediate response according to Morton (2001) is very dangerous to the nomadic population and their livestock livelihood preferred option. According to Lekapana (2013), the drought of 1971-1973 in Kenya was not taken well by Borana nomadic population because they waited for long to adjust and therefore they lost over 60% of their livestock.

The above Ilemi Triangle region findings that form part of quick and immediate adjustment on getting drought information contradicts the findings of a study by Ouma (2011) in Central district part of Turkana County assessing the post drought recovery strategies among Pastoralists in Turkana central

district that elaborated that most pastoralists in the part of Turkana have taken in sedentarization option and commonly adopt farming as a temporary measure, with crops providing a source of subsistence and a possible source of surplus to build their livestock. Ouma (2011) further suggests that it is the poor people who entirely depend on relief food aid that practice this sedentarization; hence, they conglomerate so as to be easily accessible to the food aid.

The above immediate adjustment corresponds to a report in Kenya Daily Nation newspaper (2016) and Kenya Daily Nation newspaper (2017) on drought immediate measures in Kilifi and Lamu that mentioned that when drought strikes, animals are usually slaughtered and meat given back mostly the vulnerable locals to include widows, the elderly and those living with disabilities. However, the animal feeds that are secured and distributed to livestock farmers in Kilifi and Lamu when water sources dry up and pasture get exhausted are not practiced in Ilemi Triangle according to key informants interviewed in Loruth. The author thinks NDMA of Turkana need to adapt these measures to reduce the vulnerability of the population of Ilemi Triangle belt.

Splitting animals though was at 21% in Napak and 1% in Loruth remain one of the coping strategies together with practicing merging of animals mentioned by one of the FGD members in Loruth. The study observed a huge number of animals together but when the herders were asked of the owner of the large animals they said they belonged to a group of people and not for one person that are brought together to graze. This finding matches with a study finding by Rass (2006) who revealed that the nomads have encouraged herd's merging and diversifying by splitting their livestock species in order to minimize drought effects. Moreover, as shown above, poorer families merge their livestock for collective grazing. The main reason for this is to enhance accretion and survival of livestock through breeding and reproduction. This livestock merging permits members particularly of the poor households to engage in other productive and income generating activities as their livestock is taken care by other people or rather staying together of other people livestock.

Sharing of livestock among families and clan members, friends and relatives during drought is much common in pastoral population according to Morton (2001), and it is done to spread the risks among families and ensure a supply of herding labour. Livestock is borrowed for reproduction and for survival reasons according to Rass (2006). This was affirmed by the FDG group in Loruth that mentioned of sharing as one of their main drought coping method that they do apply.

Dry periods remain the most demanding and challenging times for the pastoralists in arid and semi-arid areas and the shortage of forage and grass for livestock will automatically make the nomadic pastoralists move in order to minimise livestock losses. Equally, drought coping strategies used by nomadic pastoralists are highly variable depending on the past drought history, available resources and the kinds of livestock raised, and the study findings of migration as the main method of coping drought by the Ilemi Triangle population was evident in the study area as the researcher observed some pastoralists migrating with their animals during data collection period.

However, International boundaries created during the colonial period and kept by independent African

nations according to Morton (2001), are not usually respected by migrating pastoralist communities though, in conflicts, community leaders need to negotiate peacefully on common grazing zones (Ruto et al., 2006). Ruto study corresponds to the above discussion that the need for a strong County Steering Group (DSG) to advocate and negotiate peace, grazing the land and carry out advocacy has encouraged the coping of the nomadic pastoral population during emergency times.

The above livestock mobility enables pastoralists to take advantage of the ever-changing diversity of dry land ecology and therefore, restricting movement of nomadic population will have negative implications for the viability of their herds and increase vulnerability. This movement of pastoralists according to Ruto et al. (2006) study usually depends on environmental conditions, the state of resources, livestock species managed and a number of livestock owned by pastoralist at the time of need for migration. Moreover, the distance covered a pattern of movement and the routes plus the degree of flexibility employed by these pastoralists according to Rass (2006) vary. The mobility pattern of the similar contexts of dry lands of north Sudan according to Sidahmed and Koong (1984) do follow a cycle of transhumance where during rainy season pastoralists move their cows towards the ephemeral ranges where surface water are exhausted and annual plant decline in nutritive quality and they move back to dry season. During rainy season camels, sheep and goats move toward the fringes of the Sahara desert while cattle as early-described follow by occupying those zones left by camel nomads but in late rainfall season these livestock go back and remain in the short grass savannah zone while cattle move south to fly infested range by the early dry season.

This form of movement, which is like defined annually, is not same as the one described by the FGD in Napak that mentioned that they do follow a kind of epicyclical movement that is mainly not well defined and does not follow any season pattern. The decision of such type of movement to move according to Omolo (2010) is based on context few fixed parameters to include the conflicts and distance of the water and grass resources, proximity to volatile pastoral neighbours and degree of drought.

A study by Field (2005) found out that mobility by the pastoral Rendille population assisted in managing forage resources through dividing household stock into home-based and satellite herds. This has been widely practiced in the research setting according to the community leaders interviewed in Loruth. It was also noted in the past that Turkana pastoralists in the study area could move to distances as far as in the Karamojong areas of Uganda and Omo Delta within Ilemi Triangle but in Southern Ethiopia for not only accessing pastures but also explore trade opportunities with other pastoral groups because most of the tribes speak similar language and come from what is traditionally known as “Ateger” community meaning people brought together by same parents and using similar wooden calabash to water their livestock. However, this migration by pastoralists I carefully managed by relying on social networks and gathering of information on the areas habited by other tribes, areas concentrated by high-quality grass and areas where enough water are available (SOS Sahel UK, 2010). Turkana in Ilemi triangle according to the community leaders interviewed and FGD group rely mainly

on “Ngirototin and ngisowa” meaning people sent to investigate, look over other neighbouring communities grazing methodology and places they move to and discover other areas of potential settlements.

However, it will be advisable the County government of Turkana and Kenyan government enable these nomadic households within their area even without migrating to cope with the projected drought shock so as to prevent the deterioration of livelihoods and food consumption. An example of early action funding and or loans can support to implement food security and livelihoods before the projected shock occur according to humanitarian organisation interviewed. Moreover, in order to reduce frequent movement to the neighbouring dangerous areas, the key informants have asked for the government support in the livestock feeds provision until the forecasted rains improves the pasture conditions in the Turkana Ilemi triangle side, support in animal vaccination campaigns to prevent the spread of disease once the rains begin and implement the cash-for-work activities to enable households purchase food before prices peak in the difficult months. This support can definitely improve the coping strategies employed by the Turkana nomads and thus, reduce the drought shock.

Additionally, the Turkana nomadic population in Ilemi triangle according to the leading humanitarian organisations interviewed (mentioned above) follow instructions of the traditional, religious leaders and observations of animal intestines before migrating this even with severe drought remain a major factor to consider before moving. The above coping strategy findings of following instructions from the traditional systems of traditional leaders and religious leaders according to Grandin and Omolo (2010) have been able to sustain the majority of herders till present in the position where they could easily return to herding even after a severe drought period.

One other major coping strategy mentioned by Ilemi triangle population was on livestock diversification. Though Birch and Grahn (2007) think that keeping always small stock enhances maximum survival chances during drought, this hypothesis is challenged by a study by Eriksen and Lind (2005) who mentioned that nomads with large numbers of stock, nomads get through the drought years because they are considered as insurance against drought losses and because most pastoralists are largely isolated from another form of cash economy, then more livestock is required to meet the basic food requirements. Surplus stock during drought according to Eriksen and Lind (2005) can be sold to buy food grains to supplement animal products like milk and meat. One of the FGD respondents mentioned that they do keep a large number of stocks as a sign of prestige and building strong social associations and friendship, especially when transferring livestock to friends and kin as loans. According to Franke et al. (1980), different livestock species have both ecological and economic implications and diversification assist much and because each kind of animal species prefers to graze to certain plant species and certain types of topography then the diversification will be good for ecological niches. Franke et al. (1980) suggest that camels and goats are considered browsers, although they may be grazers at certain times. Cattle and sheep, however, are largely grazers. An area especially in Ilemi triangle, that contains both grasses and shrubs, may be utilised

best with a combination of different ruminant species employing different grazing habits.

The above finding of diversification corresponds to KVRT preliminary findings (KVRT, 2009) that indicate that charcoal burning is more prominent in dry areas with few or no other alternative sustainable livelihoods options. Eriksen and Lind (2005) also suggests that the high prevalence of diversification as a livelihood coping strategy signals efforts by the Turkana to actively manage vulnerability by increasing the reliability of livelihood assets. However, pastoralist involvement in many coping strategies is also a sign of distress in Turkana livelihood systems. There is a risk of misinterpreting diversification and market activity for a thriving local economy and robust community and household livelihoods according to Omolo (2010). A high level of livestock sales in pastoral populations indicates distress. Due to the effects of drought, the Turkana according to the studies by Birch and Grahn (2007) and Galvin et al. (2004) have to diversify their livelihoods. However, the process has been hastened not only by the conflicts from neighbouring tribes but also from livestock raids.

Saved money used to buy grass from the neighbouring tribes in Pokot, Uganda or Ethiopia by the Turkana nomadic population has been mention as one method of coping with drought in Napak. The researcher through the humanitarian experience in similar context observed in Niger where nomadic population stored harvested surplus food, grass, collected wild fruits and stored in to food stores only to be used in the dry season. This grass is collected by households during the wet season and stored for drought. The government of Niger through researcher observation when worked in Niger bought this grass from larger farms and distribute freely to the nomadic population through the ministry of livestock. The practice Turkana NDMA has mentioned is being practiced only to specific areas in Turkana County but was not observed in the research areas.

Though it is mentioned in the what the government and the humanitarian organisation does whenever disaster happens to the Turkana nomadic population, Turkana pastoralists for according to Speranza (2010) have considered receiving relief food from humanitarian organisations and government a new means of economic activity. Relief foods to drought-affected pastoralists have come to be treated as a form of economic diversification. These relief foods in the pastoral population according to Ruto et al. (2006) relieving hunger have enabled herd owners to minimise livestock sell and search for wild fruits from the bushes. Relief foods have been argued to make people more dependent and only support immediate coping instead of long-term program for alleviating huge effects of drought.

During the focus group discussion, respondents mentioned that they sale livestock to get money and buy other foodstuffs to include grains, cereals, legumes, tealeaves and sugar, and non-food stuff like blankets and tobacco. This sell diversifies the income that pastoralist in the study areas mentioned that they do in order to cope with drought. When probed on other coping strategies employed by other neighbouring tribes, the FGD discussed of stored harvested grains by Nyangatom and Dasanach tribes of Ethiopia, they store enough food because government support diversification of livelihood and they have strong policies of livestock and drought management according to the FGD in both areas.

Turkana community social system on the other hand is built on friendship, family relations and clanship network systems according to Speranza (2010). This relation ensures strong and cemented survival strategies during a hard time. Therefore, the Turkana nomadic population use this network to accumulate lost livestock during and after drought.

Food sharing within families is a concept that has been practiced by the Turkana pastoral community for a long time and the focal group discussion in the two areas mentioned it as it has reduced the burden of drought effects. The concept is thought that, if the other households share food, the drought affect risks is spread to the whole families who can collectively work towards alleviating suffering therein. This food sharing enhances not only cohesion in the community values and social unity, but also promotes belongingness and unison. It is through long experience of environmental uncertainty in Turkana according to Omolo (2010) that makes the pastoralists to develop a highly flexible social system and an elaborate set of both individual and collective-based clan's survival strategies. This is practiced widely in Turkana and observed by the researcher in the research villages.

Napak households interviewed mentioned of sending family members to live with other relatives as a coping strategy (3.5%). This coping reduces the food being eaten in the household. Therefore, food the family consumes the small portion of food, skip meals, give only most vulnerable like small children and those working in watering livestock and eat only one type of meal. In many pastoral populations, Huho, Ngaira and Ogindo (2011) suggest that reduced food production is compensated by mainly shifting diet composition for other age groups to include more cereals, meat and blood or even milk mixed with blood what the FGD called "Echarakan" to accommodate the needs of children; and giving priority to young children to receive milk, sending members of family to other relatives and finally reducing the size and frequency of meals to adults and older youths. Women in the FGD group in Napak explained that when food is scarce, they distribute it first to children and productive members of the family who mostly undertake heavy tasks to include taking the animal to the mountainous grazing zones for the whole day and animal watering. Most women in the community the FGD informed were skipping meals entirely so that their children can eat. As a result, women remain the group that remains vulnerable when drought comes.Gabra and Borana according to Coppock (1994) also eat wild fruits, roots, and plant tubers. During the drought periods of the 1930s, 1940s, and even 1950s, people who fed on wild fruits, roots, and plant tubers survived according to the author.

The start of small business, use of the modern technology and proper livestock management through access to livestock extension services have been mentioned by the household of the two areas as a coping strategy on drought. The start of small business increases an income opportunity for the nomadic population and can easily be practiced in sedentary type of pastoral population (Speranza, 2010). In sedentary, pastoral households populations commonly adopt farming as a temporary measure, with crops providing another source of subsistence and a possible source of income or a kind of business that is surplus with which the pastoral rebuild their herd. Sedentarization is not

practiced in the research and the research opinion corresponds to Speranza (2010) who pointed out that sedentarization does have very negative effect on pastoralism and animal productivity.

This urge and theory of stocking larger number of livestock even in greater drought intensity is contrary to a study finding in Namibia by Sweet (1998) that lamented that during the Namibia drought in early 1998, direct livestock mortalities and indirect loss of animals through distress sales were evidenced and the government encouraged and motivated nomadic populations to reduce larger stocks to minimize the risks and the nomads heeded to the government directive by reducing livestock. According to Sweet (1998), eighty percent of livestock owners in Namibian pastoral community that refused to accept the recommendation suffered huge livestock.

This choice for preference to change and diversify to self-trade in Loruth corresponds to study findings by Huho, Ngaira and Ogindo (2011) who have shown that although opportunities may be limited in Turkana, some pastoralists of northwest part of Kenya diversify their income-earning activities and become involved in the collection of firewood and charcoal burning. This shows the urge by the pastoralists in the Loruth study area to shift to other livelihood options either as supplementation of pastoralism or even permanent shift from pastoralism. Pastoral women in the study areas also diversify their income in response to drought by involving in petty trade activities and in small-scale handicrafts according to Huho, Ngaira and Ogindo (2011).

Supporting pastoralists cope and recover from drought has been a focus of County government of Turkana and Government of Kenya, and they do intervene either directly or indirectly. According to Huho, Ngaira and Ogindo (2011), some form of direct support includes relief food to save lives and relieve pressure on livestock; subsidizing animals market prices to mitigate the drought-induced and call for support of humanitarian organisation intervention by triggering alerts for interventions. The indirect support by the government comprises of developing an effective early warning system, channelling huge budgets to hard-hit areas in arid and semi-arid to improve people living, improving infrastructure to increase off-take, and designing asset diversification mechanisms that can be used by pastoralists. The researcher observes that the common support from the government is direct form through relief food delivery in Turkana but indirect are weak, this could be attributed to the weak implementation of recommendations and policies for drought management.

One of the key Kenyan governments structure and framework for the drought management in ASALs and in Turkana is the NDMA, that provides as discussed above grass for livestock in the drought most affected risky areas and emergency water supply; the main components of the water assistance offered under the drought relief program includes rehabilitation of faulty boreholes and provision of new boreholes to the population. Together with excessive needs with limited funding plus security constraint, this government body has not reach the huge population in Ilemi Triangle; therefore, humanitarian appeal for support has continuously been asked for this population. Other respondents stated that the government support is not useful and inadequate since it is not provided always in time of need and prolongs a culture of over-dependence. Most respondents in both areas concurred that;

more interventions to support and improve their livelihood are the most required than concentrating on relief foods.

Omolo (2010) argues that the outcome of droughts can be devastating for traditional economies if the above coping strategies are disrupted and particularly when raids on livestock and disruption of land use patterns happen. Moreover, whenever these extreme droughts occur, they greatly influence negatively the pastoralists' livelihoods, hence, loss of human lives and livestock, starvation and destruction of property.

The research was done in Ilemi Triangle region of Turkana northern Kenya and the author agrees with some study findings by Omolo (2010) in the West part of Turkana that summarized that the coping mechanism by having mobility, practising herd splitting, redistribution of surplus livestock within social networks, diversification of livestock and formation of complex social security networks based on kinship and friendship, reliance on relief food, farming along the rivers, gathering wild fruits, remittances from relatives and engaging in businesses like selling firewood and charcoal as well as weaving baskets.

4.1 Constraints Hindering the Implementation of the Drought Coping Strategies in Ilemi Triangle Region

The desired coping strategies among the Turkana nomadic population of Ilemi triangle proposed by majority of respondents included by migrating; heard splitting to include sharing livestock with relatives; income; ensuring livestock management adjustment practices like change in feeding diversification during drought, adapting water and grazing land adjustment practices; putting up small business enterprises: having access to extension services for knowledge of livestock farming during drought mainly from government agriculture ministry that supports nomads during drought: sending part of the family to the relatives and use of savings kept to buy grass and other animal feeding especially for Loruth and not Napak because the latter is in the extreme north of the Ilemi triangle. The FGD discussed of conserving animal products like milk and meat and looking for wild fruits and hunting.

Probing on challenges hindering the above coping strategies, the FGDs participants in both areas revealed a number of constraints. To include poor infrastructure, insecurity and conflicts associated to frequent attacks and livestock rustling from neighbouring tribes, social-economic and poverty brought by the drought effects, lack of available credit facilities options, inadequate markets for livestock and poor literacy levels and technology knowledge. This has further weakened the Ilemi Triangle nomadic pastoral population capacity in coping with recurrent drought. The FGD participants suggested of development of adequate water resources for them and their livestock and greater support and call from both County government and the national government in strengthening livestock livelihood option and markets provision, peace building and t infrastructure investment.

Other major coping strategies mentioned by one of the local humanitarian organisation interviewed working in Ilemi Triangle included collection and storage of wild fruits, borrowing from

well-connected relatives and families, Planting and harvesting of traditional cereals and food crops, sun drying, smoking, salt preservation and storage of livestock meat, milk, blood, skins and hides, Migration to mountainous, river and lake side's areas in search for water and pasture and exchange of male castrated –bulls/camels with heifers for families feeding.

Table 5. Summary of the Effects of Drought on Key Coping Mechanisms Provided and Discussed by the FGD Groups in the Research Area with the Options for Addressing the Constraints in Ilemi Triangle, Turkana County, Kenya

Ilemi Triangle Coping strategies	Effects of Drought to Ilemi Triangle Turkana Population	Constraints to Cope with drought	Options of dealing with constraints
Mobility	Water and pasture resources scarcity	Conflicts with neighbouring tribes	Peace building among mobile population, border demarcation and strengthening institution and government presence in Ilemi Triangle
Diversification of livelihoods	Rangeland degradation, disruption by extreme events	Weak asset base, lack of financial resources and technological know how	Credit transfers and provision of other livelihood options to vulnerable populations and strengthening livestock livelihood and opting for sedentarization for those who do not move with livestock
Livestock off-take, splitting and sharing	Heat stress, and low productivity	Poor market infrastructures, low livestock prices	Develop livestock infrastructure-markets, Routine mole and regular veterinary services in mobile population plus provision of pre-bought hay to livestock to nomads by Government services etc.
Diversification of herd composition and species	Shift of rangeland herbaceous biomass to woody vegetation	Decrease in cattle, high financial inputs	Government to Invest in livestock species heterogeneity in Turkana populations

Source: Researcher compilation, 2016.

This study findings rhymes with a study by FARMD (2014) that provided major drought coping strategies to include general food aid and supplementary feeding directed at the vulnerable people, emergency water supplies for both people and animals, assistance in destocking livestock through purchasing or facilitating the sale of livestock to traders through subsidies at the beginning of a drought and government subsidy and loan programs.

The author agrees with Yohe et al. (2007) who has provided that public interventions in the implementation of coping mechanisms and implemented measures need to ensure information and advice on drought is provided, guidance and training to be ensured to the nomadic population, promoting indigenous coping strategies, mandating coping measures and further institutionalizing coping capacities and drought policies.

4.2 Strength and Weakness of Identified Coping Mechanisms

The drought coping strategies are well established and known to the Turkana Nomadic pastoral populations, however, if these strategies are supported and promoted by the government to protect livelihoods, they can contribute to empowerment and reduce vulnerable of such communities. Moreover, these coping mechanisms have ensured a retained social cultural cohesion within the Turkana community that continue practising strong families ties. This is because relatives have to

come together to support each other during times of problems. These traditional coping mechanisms have further promoted peace building among the warrying neighbouring tribes as all migrating communities in Ilemi Triangle have to negotiate to share these unavailable resources of water and grass. The strategies of borrowing livestock from relatives have relatively led to accumulation of wealth during difficult drought periods.

However, as people get adapted to traditional coping mechanisms, recurrent drought effects have severely eroded many of these traditional coping strategies that are not adapted to the changing climatically patterns and not promoted by government. There is therefore, a huge outcry due to increased vulnerability of these mobile populations as a result of non-sustained and outdated coping strategies that are not supported by the government and available humanitarian organisations in Ilemi Triangle. These traditional coping strategies have been left redundant because of the long term investments it requires, chronic under investments, poor infrastructure and consideration in pastoral population areas. Therefore, fewer actors have supported livelihood promotion of such vulnerable mobile populations.

Additionally, major traditional coping strategies get winded up not only because of recurrent droughts but also resources management which may not be sufficient, elaborate and efficient enough in coping with the rapidly diminishing resource base with huge climatic changes. Therefore, there is a need for all partners and government in the Ilemi triangle to develop a robust sustainable approach in increasing coping capacity and resilience among the Turkana nomadic pastoralists of Ilemi Triangle by enabling pastoralists to understand and analyse the current situation in their own areas and come up with adapted approaches on drought coping mechanisms and management.

4.3 Implication of the Paper to the Health Aspects

One of the most important components of reducing vulnerability, managing drought and protecting communities from disasters impacts is supporting their traditional coping mechanisms that have been neglected and protecting the community's livelihoods from climatic changes. These indigenous coping mechanisms are not well adequately supported by government and available humanitarian organisations thus making these populations more vulnerable. Drought disaster and its effects have contributed not only to public health and social community problems but also a huge outcry especially when the strong drought coping mechanisms get diminished and are not supported by governments. Moreover, having frequent droughts in such already vulnerable and neglected community enable such pastoral populations to move constantly in search of water and grass. In addition to the above, other essential services like human and livestock health care is compromised across the insecure boarders where these pastoralists move because no health services are available in these boarders and they get easily vulnerable to any hazard. The community is the patient in public health thus needs treatment and the findings support the need to improve access of health care to such risky populations in the remote setting and target this mobile population.

According to WHO (2017), drought often results in mass displacements of population, leads to water

and food shortages and therefore, likely to have a long-term environmental, economic and health impact on the population. The main reasons for mortality and morbidity during drought are the reduced food intake and lack of varied diet that leads to micronutrient deficiency and Protein-energy malnutrition. Vitamin A deficiency according to WHO (2017) increases the risk of death from measles while severe iron-deficiency anaemia increases the risk of child and maternal mortality. According to Noji (1997), migration of population in search of water and grass, loss of buying power and erosion of traditional coping mechanisms and caring capacities limit people's access to health services and can contribute to an overall increase in morbidity and mortality.

There is further association between the communicable diseases increase with drought lack of water. Lack of water supply and sanitation services, malnutrition, displacement and higher vulnerability of the nomadic pastoral population, all increase the risk of infectious diseases such as cholera, typhoid fever, diarrhoea, acute respiratory infections and measles according to WHO (2017).

The strength and the weakness seen in the research findings need to govern the development of guidelines and polices for further interventions that are channelled in improving the health care of mobile population within the national and county strategic frameworks.

5. Summary, Conclusions and Recommendations

5.1 Summary of the Findings

With immediate adjustment above, the Turkana nomadic pastoralists of Ilemi triangle cope with drought by migrating; heard splitting to include sharing livestock with relatives; income diversification; ensuring livestock management adjustment practices like change in feeding during drought, adapting water and grazing land adjustment practices; putting up small business enterprises: having access to extension services for knowledge of livestock farming during drought mainly from government agriculture ministry that supports nomads during drought: sending part of the family to the relatives and use of savings kept to buy grass and the other animal feeding especially for Loruth and not Napak because the latter is in the extreme north of the Ilemi triangle. The FGD discussed of conserving animal products like milk and meat and looking for wild fruits and hunting. However, with the presence of some coping strategies employed by the pastoralists in Ilemi triangle, some of the above past coping strategies because of recurrent drought and exacerbating impacts remain non-viable and unpractical. This included animal products reservation, wild fruits, and hunting of wild animals that have also diminished in Ilemi triangle.

5.2 Conclusion

It is generally important to consider all general characteristics of the populations Community drought coping strategies in Ilemi Triangle comprised of mainly migration to other areas, livestock management adjustment, livestock splitting, starting small business enterprises, relying on the relief food handouts and support from both the government and humanitarian organisations, borrowing from relatives and sending part of families to relatives. In addition to these, once the information of

drought has been provided, the Turkana nomadic pastoralists of Ilemi Triangle immediately migrate, sell part of animals, send families to relatives and wait and rely on the relief handouts. However, some other old traditional coping strategies like meat and milk preservation have all declined because of recurrent droughts.

5.3 Recommendation

According to the study findings and the key informant's interviewed, major traditional coping mechanisms get winded up because of recurrent droughts and therefore, there is a need for all partners and government in the Ilemi triangle to develop a sustainable approach to increasing coping capacity and resilience among pastoralists by enabling pastoralists to understand and analyse the current situation in their own areas. This will assist not only in creating an enabling environment for them to make decisions on how to manage their resources during drought, but also bring and encourages different stakeholders into decision making that encourages knowledge exchange, customary institutions, information and skills between communities, and formal sectors.

Natural resources conservation in the County: As indicated in other settings and practical in some parts of Kenya, the County government has to encourage proper community natural resource management strategy implementation through development of zones of conservation sites, buying and preserving hay, dry land ecosystem restoration, and soil and water conservation structures in arid lands of Ilemi triangle, pasture management and agroforestry. This will ensure the pastoralists will not be more vulnerable to drought effects even with the severe drought.

One of the other issues to be addressed is a change of policy on management of natural resources within the nomadic population. The researcher recommends for the formulation of a policy that governs the management of nomadic natural resources conservation across borders and drought management within the migratory population. This policy can not only act as a perfect catalyst in motivating the nomadic population to remove taboos and cultural practices that hinder the development of introduced new coping strategies but also ensure the community ownership in managing of own drought-related problems.

Advocacy on Pastoral livelihood strengthening: The government and humanitarian organization must work to strengthen the pastoralist's livelihood by advocating and significantly investing in human and livestock capital. Ilemi triangle infrastructure problem and range management techniques in pastoral areas in order to improve range management and reduce pastoralist's vulnerability to drought. Advocacy needs to be ensured in order to promote the livelihood of this population and guard the loss against drought impacts.

5.4 Recommendation for Further Studies

In order to understand fully the social science behind the drought coping strategies and causes of vulnerability to the pastoralists in Ilemi triangle, the researcher has the following suggestions that may need further research;

1) Further research to ascertain the underlying factors influencing the climate of Turkana, causes for

the differences in monthly mean temperature, actual effects of ENSO on rainfall totals and the influence of Indian Ocean over northern Kenya.

2) More research to investigate the relationship between the nomadic pastoral population activities, the climatic factors, the current vulnerability and resilience of pastoralist livelihood.

3) Need to investigate and identify the grass species that can be drought resistant to be utilized in arid and Semi-arid zones of Kenya.

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