Environmental Drought Effects On Human Vulnerability To The Turkana Nomadic Pastoral Population Of Ilemi Triangle Region, Turkana County In The 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 nineteen 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. The study employed multiple research design and a multistage random, purposive and quota sampling methods. Instruments of data collection used for this study were interview schedule, observation, and questionnaires and focus group discussions. Descriptive statistics using mean, standard deviation, frequency and percentages were used for data analysis for this study. 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. The findings has indicated that there is excessive loss of water for both human and livestock usage; excessive migration leading to conflicts and cattle rustling between the Turkana nomadic population with other neighbouring ethnic groups in Ilemi triangle. The study has recommended for a comprehensive framework for drought management in Ilemi triangle, preparing population for eventual drought and development of adequate water resources and implementation of viable programs that promote livelihoods and supporting traditional coping strategies.

Keywords: Drought, Human Vulnerability, Ilemi Triangle, Early warning methods, Turkana community, nomadic pastoralist, Ilemi Triangle.

ABBREVIATION

ASAL Arid and Semi-Arid Landscapes
AU Africa Union
CRED Centre for Research on Epidemiology of Diseases
GAM Global Acute Malnutrition
GHA The Greater Horn of Africa
FAO Food Agricultural Organization
FARMD Forum for Agriculture Risk Management
FGD Focussed Group Discussion
ILRI International Livestock Research Institute
NDMA National Drought Management Authority
OCHA Office for Co-ordination of Humanitarian Affairs
UNDP United Nations Development Program
WHO World Health Organization

I. 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. Drought 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 livelihood (Opiyo et al. 2014). Therefore, environmental drought has caused severe economic, social and environmental losses in both developing and developed nations. Mureithi (2012) 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 ASAL areas where Turkana belongs. Arid and Semi Arid Landscapes (ASAL) 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 have already dilapidated infrastructure and weak rain pattern (Herrero et al., 2009; Osano et al. 2013, 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 vulnerable to any shock of any nature and intensity. Droughts in Kenya, according to the AU (2010) affect adversely all sectors of the economy and the population as a whole. Speranza (2010) and Africa Union (2010) provide some of the impact 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. 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 the main drought impacts do this population and what evidence based can be practical and applied, to lessen vulnerability to these drought effects in such populations in order to ensure continued survival in such 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. The physical environment inhabited by the pastoral communities remains an important element of the pastoral system and their livelihood options. Accordingly, the Greater Horn of Africa (GHA) countries according to Randall (2008) are among the thirty-six countries in which most of the lands are characterized as arid and semi-arid. These environments according to Opiyo (2013) 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°C to 38°C according to Mureithi (2012) 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 (Lind and Scoones, 2013).

A qualitative study in Turkana County by Obi 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 Opiyo (2013). The author agrees with these findings and suggests its adaptation and consideration as it portrays exactly characteristics of the research setting. These 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 has been massively vulnerable to constant drought intensity. This severity, intensity and frequencies of these droughts according to Angassa and Obi (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). The level of the humanitarian needs in nomadic pastoral environment has of recent increased dramatically and been in ominous critical need according to Mureithi (2012). It is therefore, for the opinion that the pastoral system due to recurrent drought impacts 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. A study by Blackwell (2010) on a dry environment and regions of ASAL lamented that pastoralist has been side-lined in all decision-making processes that touches their livelihoods since the colonial period. This side-lining has resulted to chronic under-investment in these pastoralist population areas and hastened their vulnerability to different hazards. Basic services provision such as water within ASAL region according to Blackwell (2010) is inadequately provided or adapted to the pastoralist community way of life.
Water is an important element in the pastoral living and pastoralists do settle in areas and environment where water is present and 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 livestock these pastoralists can accommodate. Hence, water has remained an essential commodity in the pastoral population to have for their livelihood sustainability. It is consequently lack of this commodity that migration and drought that conflicts between different pastoral ethnic groups in Ilemi Triangle arise and increase. Hence, water shortages in the pastoral environment and during drought play a crucial role in determining how this conflict will be according to Blackwell (2010) and Kablilt and Lokwei (2012). Study findings by Wabwoba and Wakhungu (2013) 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). Wabwoba and Wakhungu (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 Wabwoba and Wakhungu (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. These adduces to the fact that this 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.

According to ILRI (2006), drought impact will entirely depend on the recent history of drought events, underlying coping strategies in place, the resilience of the pastoral system and severity of drought in the meteorological form. The first phase occurs when there is a decline in forage production, with an imbalance between livestock numbers and available forage and livestock numbers dwindling through mortalities and sales. The conditions of livestock become worse, grains harvest fails grains prices raise, and livestock prices reduce. The second phase happens when the herd’s numbers continue to fall as deaths and sales continue, shortage of grains continue to keep food prices high and continued pressure on herders to further sell livestock in order to purchase food. The final third phase is involved with livestock numbers remaining below the level, which could make effective use of the available pasture with the poorer still be under pressure to sell livestock due to food shortage while the richer households may be able to reconstitute herds and some pastoral households become totally destitute and must receive food aid.

This is further corroborated by other quantitative studies by Coleen et al. (2006) and UNISDR (2009) have both classified these impacts into social, economic and environment impacts. The above authors provided some of the drought impact of drought to nomads to include some livestock deaths, water shortages, soil degradation, acute food shortage and increased migration by pastoralist communities due to depletion of pasture and water for livestock have been reported. The prolonged dry spell was also leading to increases in food prices, which were further compromising the food security for vulnerable populations in Kenya. Omar (2014) has elaborated three main phases of drought that affect the nomadic population. The first phase is concerned with the decline in forage production Imbalance between livestock numbers and available forage, livestock numbers dwindle through mortalities, sales Conditions of livestock become worse and prices rise with livestock prices reducing. The second phase occur when their severe reduction and shortage of grains that will continue to enable prices is increased, number of livestock falling as sell and death of this animals continue and nomads having pressure to carry on selling their livestock to purchase food and the final phase involves and arises when pastoralists get totally desperate for food aid with poor pastoralists having pressure to sell remaining animals due to shortage of food and richer families reconstituting herds.

With different definitions and sectors of drought above, Wu and Willhite (2004) suggest that it is difficult to assess drought impact because these impacts can be local or just regional specific. Moreover, drought can last shorter or longer with these different terms having a huge impact on the agriculture or other different livelihoods options. The impact of drought moreover spread gradually from agricultural sector to other sectors and finally to a shortage of stored water resources becomes noticeable in many pastoral populations (Lekapana, 2013). Impacts of drought (Table 1 and Table 2) can extend beyond the areas physically affected by drought after the event has ended according to Coleen et al. (2006). These effects can be diverse and classified broadly as economic, environmental and social. (Table 1 and Table 3).

<table>
<thead>
<tr>
<th>Type of Drought</th>
<th>Impact of Drought</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social impacts of drought</td>
<td>Lack or poor distribution of resources (Food and water) leading to Migration, resettlement, conflict between water users</td>
</tr>
<tr>
<td></td>
<td>Increased quest for water leading to Increased conflict among water users</td>
</tr>
<tr>
<td></td>
<td>Marginal lands become unstable therefore, Poverty and unemployment</td>
</tr>
<tr>
<td></td>
<td>Reduced grazing quality and crop yield thus overstocking; reduced quality of living</td>
</tr>
<tr>
<td></td>
<td>Employment layoffs leading to Reduced or no income in the house holds</td>
</tr>
<tr>
<td></td>
<td>Food insecurity and therefore, Malnutrition and farming; civil strikes and conflict</td>
</tr>
<tr>
<td></td>
<td>Increased pollutant concentration ensuring Public health risks</td>
</tr>
<tr>
<td></td>
<td>Inequitable drought relief therefore, Social unrest and distrust</td>
</tr>
<tr>
<td></td>
<td>Increased forest and range fires that results in increased threat to human and animal life</td>
</tr>
<tr>
<td></td>
<td>Urbanization leading to Social pressure and reduced safety</td>
</tr>
<tr>
<td>Economic impacts</td>
<td>Reduced business with retailers leading to Increased prices for farming commodities</td>
</tr>
</tbody>
</table>
Food and energy shortages leading to drastic price increase; expensive import/subsidies
Loss of crops for food and income leading to increased expense of buying foods from shops
Reduction of livestock quality enabling sale of livestock at reduced market price.
Water scarcity leading increased transport cost and mobility.
Loss of jobs, income and property thus deepening the poverty and unemployment.
Less income from tourism and Recreation leading to increased capital shortfall.
Forced financial loans increased debt thus increasing the credits for financial institution.

Environmental Impacts
Damage to natural habitats leading to Loss of Biodiversity
Reduced forests, crop, and rangeland productivity thus reduced income and food shortages.
Reduced water levels therefore, lower accessibility to water.
Reduced cloud cover making the Plant scorch Increased day time temperature thus Increased the chances of fire hazards and dryness of land
Increased evapotranspiration making Crop wither and dry
More dust and sand storms ensuring an increased soil erosion and increased air pollution
Decreased soil productivity thus Desertification and soil degradation (top soil erosion)
Decreased water resources leading to shortage of water for livestock, domestic use
Reduced water quality thus More water borne disease and increased salt concentration
Increased incidences of animal diseases and mortality and therefore, Loss of income and food; reduced breeding stock.
Soil desertification making soil more vulnerable to be blown or rather Increased soil blow activities
Degradation of landscape quality therefore, Permanent loss of biological productivity of the landscape
Species concentration near water thus Increased vulnerability to predation

Source: Adapted from Coleen et al. (2006).

Table 1: Diverse and global classifications of drought impacts

<table>
<thead>
<tr>
<th>Sector</th>
<th>Effects of drought</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture and rangeland</td>
<td>Reduced production of forage in range land</td>
<td>Increased hay prices/high fodder prices</td>
</tr>
<tr>
<td></td>
<td>Development of sabulous and desert areas</td>
<td>Increased hay feeding prices</td>
</tr>
<tr>
<td></td>
<td>Reduced utilization of rangeland and forest products</td>
<td>Unavailability of fodder for livestock</td>
</tr>
<tr>
<td></td>
<td>Changes in vegetation composition of range lands</td>
<td>Desertiﬁcation</td>
</tr>
<tr>
<td></td>
<td>Reduced productivity of range lands</td>
<td>Increased dust storms for livestock poisoning</td>
</tr>
<tr>
<td></td>
<td>Reduced regeneration of desert species</td>
<td>Increased due to grazing</td>
</tr>
</tbody>
</table>

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 communities. These 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 nearby counties and countries, such as the Pokot, Uganda, Ethiopia and South Sudan. Most of the places of these countries lie inside Ilemi Triangle.

Ilemi Triangle region 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 to 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.

**SAMPLING PROCEDURE, DATA COLLECTION INSTRUMENTS AND DATA ANALYSIS**

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. The purposively sampling was employed in choosing 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 (1787) and Napak (1880) with a total of 1600 households. The area was 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. 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. The study population were 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, 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. 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 informant’s interviews, focus group discussions and Observation checklist as study instruments and 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. For data analysis, inferential and descriptive statistics were employed for this study. 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.

III. RESULTS AND DISCUSSIONS

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.

A. RESULTS

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

Table 3: Demographic and Other Characteristics of the Sample in Each Location (N = 200)

Almost all respondents had no basic education in Loruth (98%, 196) and 84.5% (169) in Napak while majority of the Ilemi triangle household remain temporary (68.5%, 137) for Napak and 62% (132) for Napak.

Figure 1: Impacts of drought in Ilemi triangle, Turkana County, Kenya Identified in the Household Questionnaire

Figure 1 indicates that loss of livestock (66%, 132 in Napak and 48% ,96 in Loruth), loss of pasture (24.5%,49 in Loruth and 12%,24 in Napak) livestock diseases, increased conflicts with the neighbouring tribes, poverty, loss of income and human diseases are top impacts to droughts in that order.
Figure 2: Annual precipitation of Turkana, Kenya from the year 1950 to 2016 Source: Researcher compilation using SPSS 21 (2016)

Figure 2 indicates fluctuation of rains and period of severe drought since the year 1950 when the amount of rain was very little and this lack of enough rains accordingly makes the pastoralists and their livestock vulnerable.

During the discussion with the FGD in Loruth, the group highlighted that droughts have brought a lot suffering to the population especially when water and grass for livestock diminishes. This loss of grass and water in the excessive sun heat lead to emaciation of livestock (Figure 6.5) that was not bought in the market and no one willing to buy them and will definitely die. A similar trend of emaciation was seen in Napak where the researcher observed some fam...
1997 Etop Serious but short drought, 80%
1998 Itaok ka Akimet and aksikinet Small drought as milk was available, minimal rain, 50%
2000 Logara / Eponpo Very serious with a lot of animal death, 85%
2001 Kidrik Drought making people move to a less affected area, 65%
2004 Kanyangiro Migration to Kanyangiro in Uganda after drought, 60%
2005 Kumando Drought and bad hunger, Drought, which terminated everything, 60%
2006 Lomoo Named after animal disease PPR in Turkana, 65%
2007 Ngasaja Donkey with harness, People migrating with donkey for looking for grass and water for livestock after drought effect, 70%
2008 Napak by FGD, Ilemi Triangle, Turkana County Kenya Fall in Fodder availability, Fall in efficiency of herds, 75%
2009 Lopiar, Epoo Lokwarasmoe Skins everywhere, many livestock death, dry grass of animals, 75%


Table 5: Drought Occurrences in the two Study areas presented by the respondents since 1925

<table>
<thead>
<tr>
<th>Number</th>
<th>Identified impacts by 10 people in Loruth</th>
<th>Total Score</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fall in Fodder availability</td>
<td>272</td>
<td>27.2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Fall in herd’s productivity, Fertility of the herd falls, Milk output falls, Weight of animal’s falls and Death rate rises</td>
<td>265</td>
<td>26.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Long distance Movement Conflicts with other neighbouring headers and ethnic groups, Increased death due to change in diet and exposure to diseases</td>
<td>265</td>
<td>26.5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Increased demands for grains and Sale of stock and livestock in and out of Ilemi Triangle belt</td>
<td>248</td>
<td>24.8</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Change in wealth distribution</td>
<td>212</td>
<td>21.2</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Out migration of Labour and Fall in efficiency of herds management</td>
<td>80</td>
<td>8.0</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Researcher compilation (2017)

Table 6: Ranking of the effects of Drought on Pasture in Loruth by FGD, Ilemi Triangle, Turkana County Kenya

<table>
<thead>
<tr>
<th>Number</th>
<th>Identified impacts by 12 people in Napak</th>
<th>Total Score</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fall in Fodder availability</td>
<td>285</td>
<td>23.75</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Long distance Movement Conflicts with other neighbouring headers and ethnic groups, Increased death due to change in diet and exposure to diseases</td>
<td>270</td>
<td>22.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Fall in herd’s productivity, Fertility of the herd falls, Milk output falls, Weight of animal’s falls and Death rate rises</td>
<td>268</td>
<td>22.3</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Researcher compilation (2017)

Table 7: Ranking of the effects of Drought on Pasture in Napak by FGD, Ilemi Triangle, Turkana County Kenya

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Animal Rain (mm)</th>
<th>Standard Deviation (σ)</th>
<th>Drought severity index (SPI)</th>
<th>Standardized Precipitation Index (SPI)</th>
<th>Drought Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>143.1</td>
<td>24.7</td>
<td>-2.86</td>
<td>-2.96</td>
<td>Extreme</td>
</tr>
<tr>
<td>1955</td>
<td>183.3</td>
<td>20.2</td>
<td>-1.94</td>
<td>-1.99</td>
<td>Severe</td>
</tr>
<tr>
<td>1960</td>
<td>249.7</td>
<td>15.4</td>
<td>-3.37</td>
<td>-3.24</td>
<td>Extreme</td>
</tr>
<tr>
<td>1985</td>
<td>184.2</td>
<td>31.0</td>
<td>-1.16</td>
<td>-1.66</td>
<td>Moderate</td>
</tr>
<tr>
<td>1990</td>
<td>182.7</td>
<td>26.2</td>
<td>-1.22</td>
<td>-1.22</td>
<td>Moderate</td>
</tr>
<tr>
<td>1995</td>
<td>206.6</td>
<td>33.9</td>
<td>-2.82</td>
<td>-2.80</td>
<td>Extreme</td>
</tr>
<tr>
<td>1998</td>
<td>178.2</td>
<td>32.0</td>
<td>-3.19</td>
<td>-3.19</td>
<td>Extreme</td>
</tr>
<tr>
<td>1999</td>
<td>192.5</td>
<td>8.10</td>
<td>-5.05</td>
<td>-5.05</td>
<td>Extreme</td>
</tr>
<tr>
<td>1995</td>
<td>74.1</td>
<td>8.60</td>
<td>-5.24</td>
<td>-5.24</td>
<td>Extreme</td>
</tr>
<tr>
<td>2000</td>
<td>75.9</td>
<td>22.7</td>
<td>-5.12</td>
<td>-5.12</td>
<td>Extreme</td>
</tr>
<tr>
<td>2001</td>
<td>176.6</td>
<td>24.3</td>
<td>-5.18</td>
<td>-5.18</td>
<td>Extreme</td>
</tr>
<tr>
<td>2002</td>
<td>143.8</td>
<td>44.0</td>
<td>-5.70</td>
<td>-5.70</td>
<td>Normal</td>
</tr>
<tr>
<td>2003</td>
<td>209.7</td>
<td>31.1</td>
<td>6.35</td>
<td>6.35</td>
<td>Normal</td>
</tr>
<tr>
<td>2004</td>
<td>130.2</td>
<td>16.7</td>
<td>-3.16</td>
<td>-3.16</td>
<td>Extreme</td>
</tr>
<tr>
<td>2005</td>
<td>160.8</td>
<td>31.5</td>
<td>-2.03</td>
<td>-2.03</td>
<td>Extreme</td>
</tr>
<tr>
<td>2006</td>
<td>201.9</td>
<td>20.0</td>
<td>1.68</td>
<td>1.68</td>
<td>Normal</td>
</tr>
<tr>
<td>2007</td>
<td>273.7</td>
<td>13.8</td>
<td>-1.00</td>
<td>-1.00</td>
<td>Moderate</td>
</tr>
<tr>
<td>2008</td>
<td>420.8</td>
<td>38.2</td>
<td>6.70</td>
<td>6.70</td>
<td>Normal</td>
</tr>
<tr>
<td>2009</td>
<td>219.1</td>
<td>38.9</td>
<td>-2.52</td>
<td>-2.52</td>
<td>Normal</td>
</tr>
<tr>
<td>2010</td>
<td>277.2</td>
<td>17.8</td>
<td>-0.64</td>
<td>-0.64</td>
<td>Mild</td>
</tr>
<tr>
<td>2011</td>
<td>178</td>
<td>26.6</td>
<td>-0.28</td>
<td>-0.28</td>
<td>Mild</td>
</tr>
<tr>
<td>2012</td>
<td>239</td>
<td>44.2</td>
<td>1.12</td>
<td>1.12</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Source: Researcher compilation (2016)

Table 8: Drought Severity in Turkana between 1950 and 2016 and calculation using Standardized precipitation index

From table 8, it is evident that drought was frequent and severe in the period 1950 to 1960 and from 1990 to 2000 and period between 2008 to 2009. These periods were characterized by excessive livestock loss and the category of drought was generally severe and extreme.

B. DISCUSSIONS OF THE FINDINGS

Drought survival among pastoralists in Africa is increasingly becoming arduous. Each drought episode when it happens, results in excessive disruption of the poor survival strategies even in areas where massive handouts of famine relief by governments and donors is present. The negative effects of drought are threatening to inverse the development gains in many parts of the world especially in sub-Saharan Africa according to Davidson et. al. (2003) and is undermine efforts to protect livelihoods in Africa (Simatela, 2012). Oberg and Holmgren (2006) suggests that the rainfall patterns in Sub-Saharan Africa region where Kenya and Ilemi Triangle belong is becoming unpredictable and the precipitation has decreased tremendously with the temperatures rising. This increase in temperature and reduced rain precipitation due to drought effect has reduced the livestock production in many parts of Sub-Saharan African Countries (Biggs et al.2008). As the Turkana nomadic community in Ilemi triangle have to survive and the researcher wished to understand what major droughts impacts are realized by the Turkana nomadic pastoralists of Ilemi Triangle region. Impacts of drought on the pastoral system according to Wabwooba and Wakhungu.
According to Mekanne (2006), drought is one of the main causes of conflict in nomadic groups. Therefore, having drought and conflicts together, according to Mekanne (2006) intensifies the suffering and the vulnerability this nomadic pastoral population is exposure to. From the researcher observation in Loruth, the common basic household’s products and food price were too far expensive and generally triple than those in bigger town like Lodwar (the capital of Turkana County) and Kakuma. This increased market products prices cannot be afforded by many nomadic pastoral families that are poor hence, increased poverty.

The study finding corresponds further to the observed livestock condition in research area and those from the discussions with the humanitarian organisation interviewed, working in Ilemi Triangle that mentioned that the major drought impacts included lack of water and pasture for livestock, emaciation for livestock and people that mainly lead to loss and death of live. A study by Mekanne (2006) highlighted that with drought, there is a drop in water levels from the traditional water wells and water acquirers, the loss and drop of milk production from livestock and sudden migration of pastoralist before the next cycle of rain is received while study findings by Adan and Pkalya (2008) confirms these findings by elaborating that when drought intensifies, livestock is lost, hunger spreads and conflict over waters and pasture surges between different warring nomadic pastoral communities.

Additionally, Mekanne (2006) have both elaborated that the common settings where conflict is derived by drought remain the arid and semi-arid regions. These regions according to UNDP (2003) are characterised by inadequate capacities, resources and are usually under significant ecological pressure. Therefore, in already depleted resource setting like Ilemi Triangle, when drought strikes, the living conditions of these nomads and their livelihoods become very difficult. According to UNDP (2003), drought and other natural disasters do disrupt people’s lives through affecting displacements, destruction of livestock livelihoods options and property and bringing in deaths. These disasters do subsequently retard years of development thus posing a major challenge to the achievement of the Millennium Development Goals especially the target of halving extreme poverty by 2015. The cyclic nature of natural disasters in Kenya especially recurrent droughts in Ilemi triangle has constantly eroded the recovery capacity of communities especially in the ASAL region, thus, affecting the economic development year in year out. Below et al. (2007) suggests that these frequent droughts destroy property, brings misery to the populations and loss of livestock. Moreover, failure to have the expected amount of rainfall according to OCHA, (2010) has led to several droughts in Kenya during the last 25 years mainly 1975, 1977, 1978, 1984, 1992, 1997, 2005 and lately 2008; 2009. Accordingly, OCHA (2010) suggests that these droughts have been countrywide although some areas in the arid and semi-arid areas have been more severely affected than other parts of Kenya. These periods of reduced rainfall have been followed by widespread famine leading to loss of livestock and evidently loss of lives. The severity of these disasters have gradually increased ranging from estimates of 20,000 in 1977; 10 million in 2009 affected and the trend increases with coming drought disasters which translate to need for more relief (OCHA, 2010). However, if no subsequent vigorous attention and planning to mitigate the effects exist then vulnerability hastens. However, according to Mekanne (2006), people’s lack of capacity to respond to natural disasters and lack of early warning systems deteriorates the drought effects.

The above findings further resemble the Huho et al. (2010) study findings in 2009 that showed that drought has resulted in the loss of Maasai livestock in Mukogondo Division of Laikipia District from starvation. Therefore, since livestock is the main source of livelihood to pastoralists, their decimation disrupts pastoral socioeconomic existence. Lekapana (2013) study on the “socioeconomic impacts of drought on pastoralists, their coping strategies and government interventions in Marsabit County, Kenya” findings correspond to study findings when he mentioned that drought leads to poor health of pastoral households and their livestock. Cases of malnutrition in Ilemi triangle have increased due to drought and a recent nutrition survey conducted in June 2016 by KIRA and the survey clusters of Turkana reported a very critical nutrition situation in Turkana north where Ilemi belong to have Global Acute Malnutrition (GAM) rate of 23.4% which is >20% rate in the WHO classification rates of being in the critical condition. This malnutrition according to Lekapana (2013) does affect mostly children of under 5 years, whereby over 200 of the under five years old children have suffered from acute malnutrition following the year 2011 drought, and there are increased drought episodes owing to food insecurity. ILRI (2006) study in Ethiopia described the Ethiopian disaster of the year 1983-1984 in Borana that it reduced the cattle density to about 60% and death of 42% of all the Borana livestock. This drought according to FAO (2006) and ILRI (2006) reduced 92% of milk production, subsequently reduced the livestock market prices, and increased cereals prices. Thereby, it had forced many Ethiopian households in Borana...
according to the author to ILRI (2006) to change their diet composition from more milk to more grain and daily food consumption ratios. However, as Lind and Scoones (2013) argues, meteorological type of drought cannot be avoided, nevertheless, its impact to include famines and poverty, can greatly be prejudiced by a timely and effective intervention of institutions and both national governments and humanitarian organisations.

The above findings correspond to a study conclusion by Griffins (2016) that suggested that because of drought, water shortage and depletion of boreholes led to a mass migration of pastoralist families from Somalia to Ethiopia, loss of water and increase in staple food prices. In addition to that, mass migration of pastoralists with their livestock according to the key respondents interviewed in Napak have led to a shortage of animals in local available markets, triggering a price increase of basic commodities and a loss of income for those whose livelihoods depend on the trade. This migration consequently triggers their vulnerability. Moreover, the above drought impacts correspond to study findings by according to Ebei, Oba and Akuja (2007) who suggested that drought brought increased livestock mortality, poverty, urban migration and weakened social security institutions and over dependency on food relief.

The drought impacts causes populations in Ilemi triangle to migrate, get exposed to volatile neighbouring ethnic groups and lack of sustainable approaches to drought management in Ilemi forms a backbone of problems this mobile population receive as drought keeps on recurring and huge impacts remain unmanaged. Weaker coordinated drought management information in Turkana County have worsened the effects of drought. One of the most important components of reducing effects of drought, managing drought and protecting communities from disasters impacts is supporting and making their traditional coping mechanisms strong to counter drought impacts. 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.

This has study revealed that the huge impacts drought has brought to the Turkana nomadic population of the Ilemi triangle with impacts ranging from loss of water for both human and livestock usage; excessive migration leading to conflicts and cattle rustling between the Turkana nomadic population with other neighbouring tribes in Ilemi triangle to include Toposa, Dasanach, and Nyangatom because these pastoralists have to frequently move in search of these commodities and replace the lost livestock through rustling; loss of pasture and ensuring land is dry; reduction of forage; food insecurity; livestock diseases and poverty. Pastoralists have to depend then on relief food assistance provided by the government, humanitarian organisation, and the County government. Increase cattle rustling in Ilemi triangle in other way leave the households impoverished. However, the Ilemi triangle mobile population immediately with information on impending drought migrate immediately to other areas, sell livestock especially in Loruth that is not far from other major centres outside Ilemi triangle, population wait and rely on humanitarian relief aid or hand-outs, sending part of the family to other relatives to reduce food consumption in the household; liquidity the assists and livestock and livestock products and start small business in order to earn more money to counteract drought effect. Therefore, drought affects pastoral livestock systems essentially by reducing the amount of forage available and thereby leading to the death of livestock because of starvation.

IV. CONCLUSIONS

The study findings showed that the reduction of forage and water for human and livestock usage, excessive migration leading to increased cattle rustling, loss of pasture, food insecurity, livestock diseases and poverty remained the top most impacts of drought seen in Ilemi triangle. There is an urgent need to provide a proactive functioning approach that will reenergise the disaster management system in pastoral environment.
V. RECOMMENDATION

To lessen drought impacts, the pastoralist’s need to be supported in reducing the causes of vulnerability and roll out programs that target the prevention of drought impacts to include provision of relief pasture, contingency funding and obligating hay mitigation stocks that can used in critical periods, endorsement of adequate water supply mechanisms in Ilemi Triangle and around migratory routes. This water can further be used to germinate drought resistant pasture species to be utilized during drought. There is need not only to invest on research to explore other suitable and sustainable economic empowerment options for mobile but also support in encouraging destocking of larger livestock before drought begins, provide preventative livestock health measures and vaccination, cash for work programs initiation, support to markets and livestock traders, and scale up safety net programming and a well-coordinated multi-purpose cash transfers to the nomadic pastoralists.

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