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## Pastoralist Vulnerability to Climate Change: Implication on Approaches to Community Resilience Building in West Pokot County

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### **Abstract**

*Climate change is a global concern that requires urgent interventions to ensure that it does not jeopardizes community livelihoods, ecosystems and sustainable development. Africa is one of the continents severely affected by impacts of climate change due to inadequacy of resources and capacity problems. In Kenya, ASAL counties like West Pokot are among those adversely affected in adapting to climate extremes, where climate change is modifying the pastoral culture and livelihoods. Increased environmental degradation, deforestation, agricultural activities and other development project that exacerbated emissions toxic gases to the Atmosphere. The study examined vulnerability of pastoralist community to impacts of climate change in West Pokot County, Kenya. Respondents were selected through random, purposive and strata sampling methods, and data collected by the use of questionnaires administered to 384 respondents, key informant interview and focused group discussion. Quantitative data analyzed using SPSS version 25; the study was anchored on vulnerability model. The study found that climate change extremes had increased, impacting negatively on community water sources and pasture. West Pokot pastoralist are exposed to effects of Climate change, with (59.5%), indicating high and low (13.3%) and they are characterized with low adaptive capacity due to low level of education, and poverty. The finding also indicated that livestock body conditions during climate extreme event shows that 71.4% are in deteriorating condition and 1.8% in good condition with poor markets. The frequent drought attributed to climate change is a threat to pastoralist community livelihood and water systems. In order to mitigate livestock disease problem, the study found that 45% and 10% preferred disease surveillance as a strategy. Strengthening pastoralist capacity on climate change adaptation is of important in reducing pastoralist vulnerability to climate shocks, through enhancing adaptation measures that counter negative impacts of climate variability to pastoralist. The study contributes in recommending on various pastoralist adaptation strategies.*

**Keywords:** Pastoral Community, Climate Change and Resilience

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### **INTRODUCTION**

Climate change is one of the greatest challenges that the world is facing today (FAO, 2017). It is noted that the impacts of climate change especially in the horn of Africa is adverse as a consequence of increase desertification, diversity, climate

change impacts depend on the peculiar climate, environmental and socio-economic set-up of particular sub-regions. Vulnerable people in Kenya generally have over the years developed a variety of alternatives to decrease their risk in times of droughts.

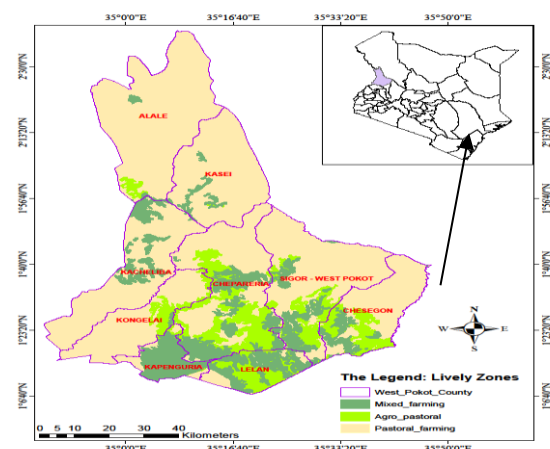
However, new and persistent environmental, political and social pressures often limit choices that have traditionally been available, exacerbating their vulnerability (Victor A. 2015). Kenya's economy is very dependent on climate-sensitive sectors such as agriculture, livestock, water, energy, tourism, wildlife, and health. The increasing intensity and magnitude of weather-related disasters in West Pokot aggravates conflicts, mostly over natural resources, and contributes to security threats (GOK, 2018).

Climate change has caused extreme weather events in Kenya that have led to loss of lives, diminished livelihoods, reduced crop and livestock production, and damaged infrastructure. High levels of vulnerability and low adaptive capacity have been linked to factors such as a high reliance on natural resources, limited ability to adapt financially and institutionally, high poverty rates and a lack of safety nets (Thomas and Twyman, 2005). The very nature of the pastoralist lifestyle in West Pokot County is highly dependent on natural resources, such as availability and accessibility of water and pasture for their animals. According to Ebei *et al.* (2007) the severity of droughts and their impact on livestock production translates into reduced purchasing power of pastoral households' food security. The poverty index of West Pokot stands at 57.3% (CRA, 2016), this indicates that West Pokot is among the poorest counties in Kenya. The vulnerabilities include loss of livelihoods through increased extreme events; food insecurity due to changes in temperature, rainfall patterns and reduce livestock production, increased morbidity and mortality associated with a rise in water- and vector-borne diseases for livestock; and a deepening poverty cycle associated with diversion of livelihood assets towards recovery and coping mechanism.

## MATERIALS AND METHODS

The study was carried out in West Pokot County, Kenya that is one of the 14 Counties in the Rift Valley region of the country. It is situated in the North Rift along Kenya's

Western boundary with Uganda. It borders Turkana County to the North and North East, Trans Nzoia County to the South; Elgeyo Marakwet County and Baringo County to the South East and East respectively. The County lies within Longitudes 34° 47' and 35° 49' East and Latitude 10° and 20° North. The County covers an area of approximately 9,169.4 km<sup>2</sup> stretching a distance of 132 km from North to South (Figure 1). The county has four constituencies namely: Kapenguria, Kacheliba, Sigor and Pokot South and a total of twenty county wards. Kapenguria and Kacheliba constituencies have six wards, while Sigor and Pokot South have four wards each. The population of the county is estimated at 621,240 persons, this population consists of 307,013 (49.7%) males and 314,213 (50.3%) females, (KNBS, 2019). The County has four Sub-Counties namely Pokot North, Pokot Central, West Pokot and Pokot South (CIPD, 2018-2022).



**Figure 1: Location of West Pokot County in Kenya.** Source: Researcher 2021

**Research Design:** The study used mixed research approach. In this study, the qualitative method focused on in-depth data on examining existing factors that exacerbated pastoralist vulnerability to climate change, its effect on livestock production system and diseases outbreak. The quantitative method dealt mainly with the pastoralists' perceptions on climate situation and its effect on the livestock system, water and pasture availability.

Triangulation data collection method and analysis was applied to increase the validity and reliability of the results. The study also utilized stratified random sampling in determining the sample size for different Wards, simple random sampling for departmental representatives and purposive sampling for key informants.

**Target Population:** The study population consists of the local community in the area, Department Of Agriculture and Livestock at the County level, National Drought Management Authority (NDMA) branch office in West Pokot County, Regional Resilience Programme, County Meteorological Department, Kenya Smart Agriculture West Pokot County, Non-governmental organizations that operate within West Pokot County, UN agencies that work in West Pokot County and some selected key informants in West Pokot County.

**Sampling Strategy:** The sample size of study was 384, and this was determined using the formula of Fisher *et al* (1991).

$$n = \frac{z^2 pq}{d^2}$$

Where:

**n** - The desired sample size (assuming the population is greater than 10,000)

**z** - The standard normal deviation, set at 1.96, which corresponds to 95% confidence level

**p** - The proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, then use 50 percent (the study used 0.50).

**q** = 1.0 - p

**d** = the degree of accuracy desired, here set at 0.05 corresponding to the 1.96.

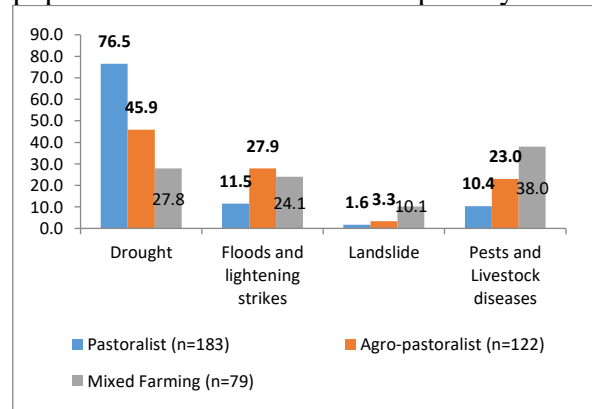
In substitution,  $n = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} = 384$

## RESULTS AND DISCUSSION

The study evaluated the exposure of pastoralist to climate change shocks and existing factors that catalyze pastoralist susceptibility to climate extremes, implication of climate change on key sector that support pastoralist livelihood, common

causes of livestock death and temporal trends of rainfall and temperature.

**Common Climate Extreme Events in West Pokot:** The findings show that 56.8% of the respondents indicated drought is the most common hazard in West Pokot, 20.1% of the respondents indicated pest and livestock disease, 17.2% indicated floods, 3.9% indicated landslides and 2.1% indicated lightning strikes according to the Fig. 2. These results therefore confirm that drought and livestock diseases are the most devastating hazards to livelihoods of pastoralist. This finding also shows that West Pokot is drought prone county with increasing frequency of drought occurrences. This finding is consistent with (ILRA, 2007) which states that inhabitants of the arid and semi-arid lands (ASAL) of Kenya are among the poorest and most vulnerable populations to effects of climate change. They suffer from an increasing array of both natural and human-made shocks that serve as effective barriers to productive and sustainable livelihoods and relegate a majority of the population to a state of chronic poverty.

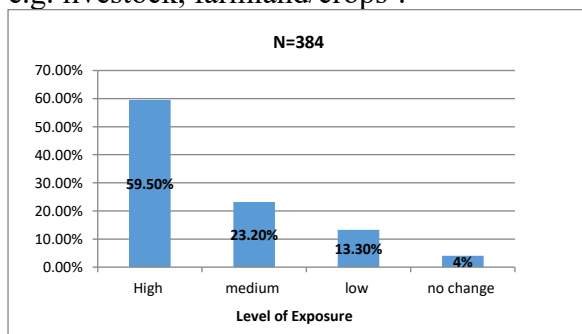


**Figure 2: Common climate extreme events in West Pokot County.** Source: Researcher, 2020

### Pastoralist Exposure to Climate Change:

The study assessed level of pastoralist exposure to climate change, the respondents indicated that high (59.5%), medium (23.2%), low (13.3%) and (4%) no change, it was noted that when the community exposure is high, then the community is adversely affected or more vulnerable to climate change. Exposure of pastoralist to effects of climate change increases their vulnerability

to climate extreme events. Pastoralists who are predominantly in arid and semi-arid area are seriously exposure to impacts of natural disasters, Fig. 3. As indicated by respondents' reviews on exposure to climate change it was noted that pastoralists are highly exposed to effects of climate extreme events, such as drought, floods and landslides, IIRR & Cord Aid (2013) found that degree of exposure varied for the different elements at risk of climate change impacts (human and non-human economic assets, institutions, and critical service which provide facilities, example productive assets e.g. livestock, farmland/crops'.

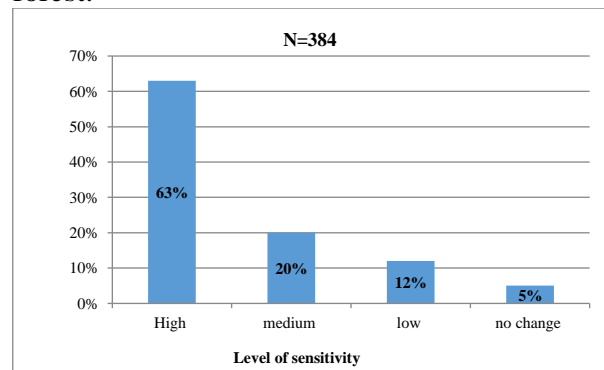


**Figure 3: Exposure to climate change.** Source: Researcher, 2020

The study found that exposure to climate change involve climate variation and chronic climate extreme events that impacts negatively on critical natural resource such as pasture, water, forest and vegetation cover. Key informants reported that poor land use, population pressure and human settlements have exposed pastoralists to adverse effects of climate change. This finding was supported by narratives from the focus group discussion which revealed that recent landslides and flood disasters in West Pokot County was as result of poor farming methods, settlement on hazardous area and high level deforestation that expose community to impacts of natural disasters. Furthermore, environmental degradation compromises community susceptibility to climate variability. The finding is similar to reported by Orindi *et al.*, (2008), who noted that natural disasters have resulted in immense losses of resources that affect livelihoods of many people who depend on

the ecosystem for survival, particularly the pastoralists. This affects forage quality and quantity, the time it takes to grow and it also affects water quality and quantity. As a result of this, livestock productivity goes down and sometimes the livestock die.

**Pastoralist Sensitivity to Climate Change:** The study assessed sensitivity of pastoral livelihood to climate change by seeking the opinion of the respondents on the community vulnerability to climate, the sensitivity of pastoralist livelihood to effects of climate variability. Respondents indicated as follows (63%), high (20%), low (12%) and (5%) No change. When the sensitivity to climate change is high, then the community is more vulnerable to the impacts of climate change and natural disasters. Basing on this finding, it was indicated that pastoralist livelihood in West Pokot County is more sensitive to climate change and this increases community susceptibility to effects of climate variability, as illustrated by the Fig. 4. It was further observed that natural resources that support pastoralist in arid and semi-arid lands are highly sensitive to climate variation, example water, pasture and forest.

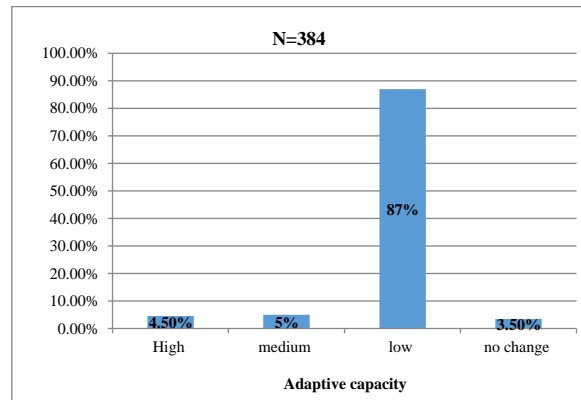


**Figure 4: Sensitivity to climate change.** Source: Researcher, 2020

The key informants revealed that sensitivity to climate change depends on main livelihood activities of community, the key livelihood resources, and the effect of climate hazards on these activities.

**Pastoralist Adaptive Capacity to Climate Change:** The study assessed level of pastoralist adaptive capacity to climate change, the respondents' indicated (4.5%),

high, (5%) medium, (87%) low and (3.5%) no change as indicated by the Fig. 5. It was therefore noted that, when the adaptive capacity to climate change is low, then the pastoralists are highly susceptible to the impacts of climate change. Adaptive capacity of pastoralist community support climate resilience livelihood and strengthen the ability of vulnerable community to climate change impacts. Lack or low adaptive capacity of pastoralist community increases their susceptibility to effects of climate variability. Based on the respondents' views, it was noted that pastoralist in West Pokot County have low adaptive capacity to climate change and this therefore indicated that communities in this area are vulnerable to climate extreme events. From focus group discussion and key informants, it was shown that majority of the residence of West Pokot County have low adaptive capacity to climate change adaptation, this was attributed to low level of understanding of climate variability and inadequate capacity to build resilience. Climate change was reported to be new phenomena among the pastoralists of the study area and therefore, there is need to build community-based climate knowledge, education and training to facilitate effective adaptation, innovation and lessons learn. This finding is supported by Nderitu, (2018) who noted that if adaptive capacity is high then the community internal response mechanisms are enough to address the climate change impact. It was further noted that the capacity accessed to allow individuals and communities to shape their future by reducing climate change risk and capacity assessment was to identify the existing capacities, the required capacities to cope in the face of the climate change impact and the gaps.



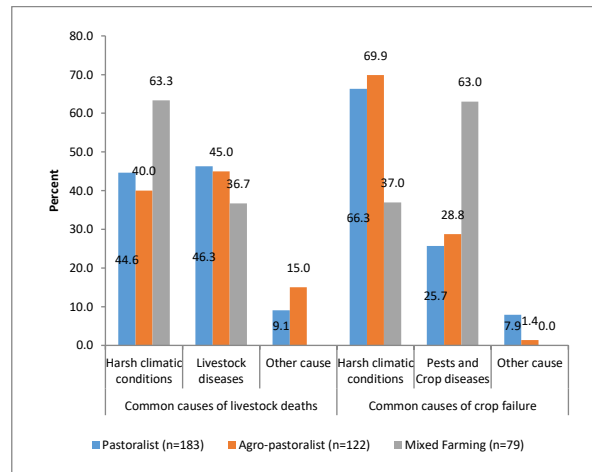
**Figure 5: Adaptive Capacity to climate change.** Source: Researcher, 2020

During key informant interview, it was noted that, access to information on climate help strengthen community adaptive capacity. Climate change risk reduction measure enhances community understanding of new approaches of addressing effect of climate variability that pose a threat to livestock keepers, although adaptive capacity is a combination of various factor example technology, infrastructure, natural resources, financial, knowledge and skills. The study noted that social and economic disparities include poverty, illiteracy, poor governance and weak institutions are the underlying drivers of low adaptive capacity to impacts of climate change in West Pokot County. The study also indicated that adaptive capacity of a household was based on pastoral livelihood assets. The expression of adaptive capacity as actions that lead to adaptation can serve to enhance a system's coping capacity and increase its coping range (4 and 5) – thereby reducing its vulnerability to climate hazards. The adaptive capacity inherent in a system represents the set of resources available for adaptation, as well as the ability or capacity of that system to use these resources effectively in the pursuit of adaptation. Such resources may be natural, financial, institutional or human, and might include access to ecosystems, information, expertise, and social networks. The key informant from

NDMA noted that examination of vegetation condition, which is greenest of the area, is one of the key indicators of drought monitoring indicator; this includes pasture, forage and vegetation condition of an area. During focus group discussion it was noted that pastoralist depend mainly on three natural resources for their livestock survival namely, water, pasture and forage.

**Common Causes of Livestock Deaths in West Pokot County:**

The finding assessed common causes of the livestock deaths. The findings reveal that, mixed farming is more affected by harsh climatic condition (63.3%), for livestock disease pastoral livelihood was noted to be more affected (46.3%) and for pest and crop diseases mixed farming reported the highest (63.0%), Figure 6, These findings show that livelihood zone is threatened by specific climate extreme events, Figure 6. For example, pastoral zone is exposed to livestock disease, agro-pastoral zone is threatened by harsh climatic condition and mixed farming is at risk of pest and crop disease. During the focus group discussion, it was noted that mains source of water for livestock are water pans, water from these sources are stagnant and during dry season large herds of livestock concentrate on theses water points, which increased livestock vulnerability to highly infectious livestock diseases. It was further indicated that during drought episode all the livestock from West Pokot normally migrate to Uganda in search for pasture and because animals interact from different area, thus enhance spread of most threatening livestock diseases. It was also noted that livestock stolen from the neighbouring communities transmit diseases from one area to another, this because stolen animals could have been infected already and when it interacts with other animals they get infected.



**Figure 6: Common causes of livestock deaths in West Pokot.** Source: Researcher, 2020

**Livestock Diseases:** As indicated in Figure 6, livestock disease was reported highly in pastoralist area compared to other ecological zones. This informs how a livestock disease is great threat to pastoralist livelihood in ASAL. Abdela and Jilo (2016) stated that climate change, in particular global warming, likely affects animal health by influencing the host-pathogen-environment system both directly and indirectly. The direct effects are more likely to influence diseases that are associated with vector transmission, water or flood, soil, rodents, or air temperature and humidity. During focus group discussion it was reported that, livestock disease has increased recently with new emerging diseases that never use to exist. This study was supported by Nejash and Kula (2016) who found that distribution of infectious diseases (human, animal and plant) and the timing and intensity of disease outbreaks are often closely linked to climate. The study was further supported Thornton *et al.* (2008). Who found that expansion of vector populations into cooler areas into more temperate zones and the changes in rainfall pattern may also influence expansion of vectors during wetter years, leading to large outbreaks of disease (Rift Valley Fever virus in East Africa). The study also illustrated that there are livestock disease associated with seasons, example CBPP, PPR and FMD is associated with rain season, while east coast fever was associated with dry season.

Although the study indicated that during dry season infection, outbreak of livestock diseases is rampant, this is because during this season animals' main source of water is water pan, Dams and designated watering point, animals from different area share one water point, thus increase chances of disease spreading due to interaction and sharing of one water point. The study was further supported by Huho, *et al* (2011) who found that, livestock diseases prevalence was reported during dry periods, due to reduce or completely drying up of pasture and water scarcity. Harvell *et al.* (2002) also indicated that climate change brings about substantial shifts in disease distribution, higher temperatures increase the rate of development of pathogens or parasites that spend some of their life cycle outside their animal host, which may lead to larger populations.

**Animals Feeding on Poisons Plant:** The study found that due to frequent climate extremes such as drought episode, animals are exposed to feed on poisonous plants that pose serious threat to pastoralist livelihood. This study was confirmed by key informant who noted that, *“every year we loss many animals due to feeding on poisonous plants , especially during dry spell and onset of the long rain when all pasture and dry matter are swept way my first rain runoff”*. During FGD it was revealed that Cocklebur plants is the most common dangerous poisonous plant that have killed many animals, this was well reported in Pokot North and Riwo Ward of West Pokot Sub-County (Plate 1). It was further noted that these plants grow along the river banks, more so crops land. The study found that among the factors that expose the livestock to the poisonous plants is shortage of feed. Feed shortage force animals to browse perennial shrubs and bushes while most of these perennial plants have been known to contain toxic secondary metabolites. These plant poisonings cause health problems in livestock with huge economic loss to the pastoralists due to production loss, morbidity and mortality of their animals.

Taffese and Samson, (2009) found that during times of pasture abundance, animals avoid eating poisonous grass species, however, during drought, due to scarcity of pasture, animals are forced to consume poisonous plants, exposing themselves to Phyto-poison, plate 3.2. Moreover, due to the increasingly deteriorating conditions of the rangeland, grazing on degraded pasture can expose the animals to the risk of soil-borne bacterial diseases. The key informants narrated that during drought, due to scarcity of pasture, animals are forced to consume poisonous plants, exposing themselves to phyto-poison.



**Plate 1: Death cows at Nakuapuo, Pokot North after feeding on poisonous plant, April, 2021**

Source: Researcher2020



**Plate 2: Cocklebur plant that killed 90 cows in Pokot North, April, 2020**

Source: Researcher 2020

## CONCLUSION

The study indicated that pastoralists are adversely affected by climate variability; these impacts are exacerbated by numerous anthropogenic activities such as deforestation due to settlement environmental degradation and destruction. livestock diseases was found to be catalyzed by drought hazard that trigger migration of animals thus causing livestock concentration in one area that was noted to have enough pasture and water. Water structure such as water pans and Dam were noted to be the main source of livestock disease spread(super spreader) because during dry period all animals concentrate on such water source thus increasing livestock exposure to

disease outbreak. The poisonous plants, natural hazards such as drought are some of the pastoralists' vulnerability to climate extreme events. The findings confirm that pastoralist are the most vulnerable group people to effects of climate change and their livelihood is the most sensitive to climate extremes. The adaptive strategies for pastoralist to embrace tick control, diseases surveillance, embrace seasonal grazing areas and diversification of livestock breeds. Livestock breed diversification and embracing seasonal grazing area are some of the strategies need to be adapted by pastoralist to reduce drought risk.

## RECOMMENDATION

The pastoralist to be trained on seasonal grazing area and embrace pasture establishment to counter effects of droughts. The water pan and dams should be designed to allow animals access water from outlet trough, this help reduce infection of disease from main source water. There is need to train pastoralist community on participatory disease surveillance and more knowledge on disease observation for early vaccination and Treatment. The pastoralists to be sensitized on identification of the poisonous plants to reduce their animals' expose them to risk of feeding on poisonous plants. As a measure of reducing pastoralist vulnerability to shock of natural hazards, the pastoralist community should be sensitized to embraced, livestock off-take, livelihood and breed diversification to help enhance their adaptive capacity to climate variability.

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