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Original Article

Evaluation of Drought Management Strategies for Enhanced Food Security in West Pokot County, Kenya

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ABSTRACT

Drought risk reduction is the main strategy that is considered as part of initiatives that aim at mitigating the risk posed by drought. Reducing community vulnerability to the effects of recurrent droughts in ASAL Counties requires a comprehensive multi-sectorial approach. The drought risk reduction (DRR) in West Pokot County is a new approach to addressing the chronic impact of drought through adopting long-term strategies. The main objective of the study was to evaluate the drought management strategies employed in West Pokot County. The study used an evaluation research design. Respondents were selected through random and purposive sampling methods. Questionnaires were used to collect data from 398 respondents identified through random sampling from different strata of the community and the stakeholders in the drought management and food security sectors. Interview guides were used to collect data from the key informants and focus group discussions. Quantitative data obtained from relevant institutions were analysed using the SPSS version 20 method. The results obtained from the analysis were presented in tables, charts, graphs, and narratives. The study found that 32% of the respondents indicated that growing of drought tolerant crops is a key strategy in reducing drought impacts, while 20% indicated limiting the portion size at mealtime, 38% prefer access to early warning information and 44% indicated livestock migration is the main mitigation measure for drought risk reduction initiatives. In terms of factors contributing to community vulnerability to drought, it was indicated that poverty was the main factor, with 40%, 35% indicating climatic variability, and 17% indicating dependency syndrome on foreign aid. The study further indicated for the humanitarian programs in West Pokot, 36% of the respondents preferred food aid, and 28% indicated cash transfer. These results are useful in developing mitigation measures to reduce risks from

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drought and enhancing the communities' resilience to chronic drought and food insecurity adverse impacts.

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INTRODUCTION

Droughts are likely to occur and are relatively chronic particularly in the predominant pastoral zones of Pokot north and Pokot central sub-counties. High poverty levels that stand at 5 3.7% in the County expose the local population to high drought risks as their coping capacities are compromised. Overdependence on livestock coupled with insecurity makes the community more susceptible to drought and other livelihood shocks. Access to forage resources and markets for both livestock and food commodities is majorly constrained by insecurity related to cattle rustling (ACTED, 2013). Drought has been one of the primary reasons for widespread poverty and environmental degradation including deteriorating water quality and water security in West Pokot County (IPCC, 2007).

Most West Pokot residents derive their food and income needs from livestock. However, droughts cause a decline in livestock product quality and sometimes death of herds due to increased diseases coupled with the poor body condition of livestock during the dry season, thus, increasing the community vulnerability levels and exposing many households to food insecurity and starvation (NDMA 2013).

MATERIALS AND METHODS

Study Area

The study was carried out in West Pokot County, that is one of the 14 Counties in the Rift Valley region. It is situated in the North Rift along Kenya's Western boundary with the Uganda border. It borders Turkana County to the North and North East, Trans Nzoia County to the South, and Elgeyo-Marakwet County and Baringo County to the South East and east, respectively. The County lies within Longitudes 34^0 47'and 35^0 49' East and Latitude 10^0 and 20^0 North. The County covers an area of approximately 9,169.4 $km^{2,}$ stretching a distance of 132 km from North to South (*Figure 1*). The main social-economic activities in West Pokot County are pastoralism and agriculture.

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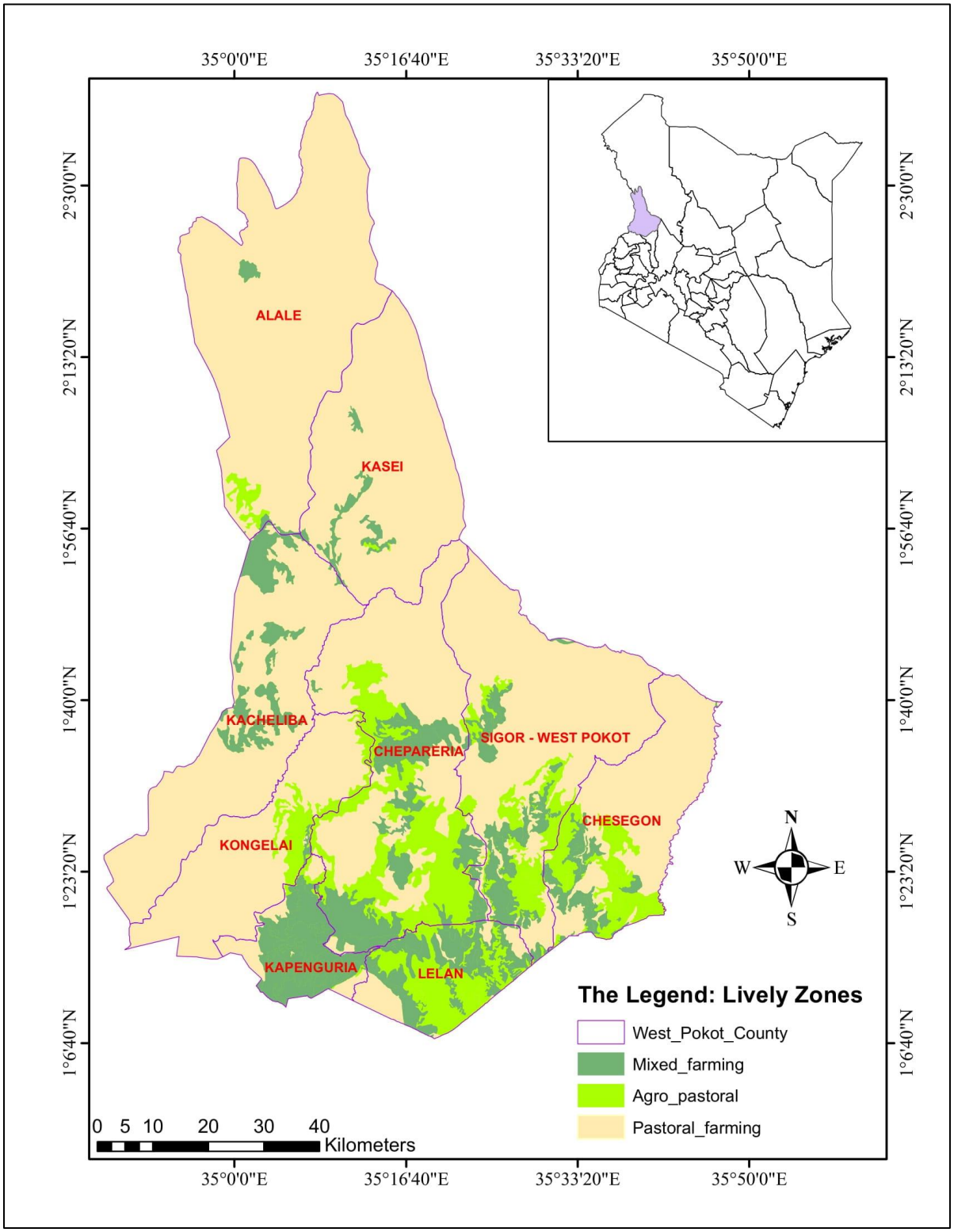
Figure 1: Location of West Pokot County in Kenya



Source: Author 2017

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Research Design

The study employed descriptive survey and evaluation research designs. This study adopted stratified random sampling in determining the sample size for different wards, simple random sampling for departmental representatives, and purposive sampling for key informants.

Sampling Strategy

The sample size of 398 respondents was obtained using a simplified formula (Yamane, 1967).

$$n = N/1 + N(e^2)$$

Where: n = Sample size, N = is the total population, e = is the error margin,

The sample size consisted of National Drought Management Authority (NDMA), the County line departments, UN representatives, and NGOs representatives. Data collection methods included Primary sources, focus group discussions (FGDs), observation checklists, interview schedules, and questionnaires. Secondary sources included the use of relevant documents and reports. Quantitative data were analysed using SPSS and MS Excel software packages.

RESULTS AND DISCUSSION

This study investigated the existing strategies for drought risk reduction for improved food security in West Pokot. The study focuses on evaluating the drought management strategies employed in West Pokot County. The study identified various strategies in place for mitigating the effect of drought (*Table 1*). The drought management strategies considered those linked to the implementation of ending drought emergency by 2022 (EDE) and the Sendai Framework for Action (UNISDR, (2015).

Table 1: Drought mitigation measures in West Pokot County

Mitigation	Indicator	Response
Relief food	Emergency situation	Relief food distribution
Planting drought-tolerant crops	Coping with harsh climatic conditions	Increase in food security
Establish Irrigation schemes	Reclamation of the area that was not agriculturally productive	Increase food security
Strengthening Early warning information System on drought	Capacity build community who are at risk on the necessary measure to reduce loss	Disseminating the information to reduce community vulnerability to drought and strengthen coping mechanisms for the local community

Source: Field data, 2017

The study revealed that the reduction of drought impacts in West Pokot County could be best achieved if such a measure is embraced by the stakeholder. It was also noted that for years, government and development partners have been using short-term measures aimed at saving lives and alleviating human suffering during drought and food insecurity crises. The finding indicated that such short-term programs had created dependency syndrome in governments and other stakeholders, thus increasing community vulnerabilities to food insecurity problems during drought periods. The study is consistent with that of DRYLAND (2016) who noted that short-term drought response and

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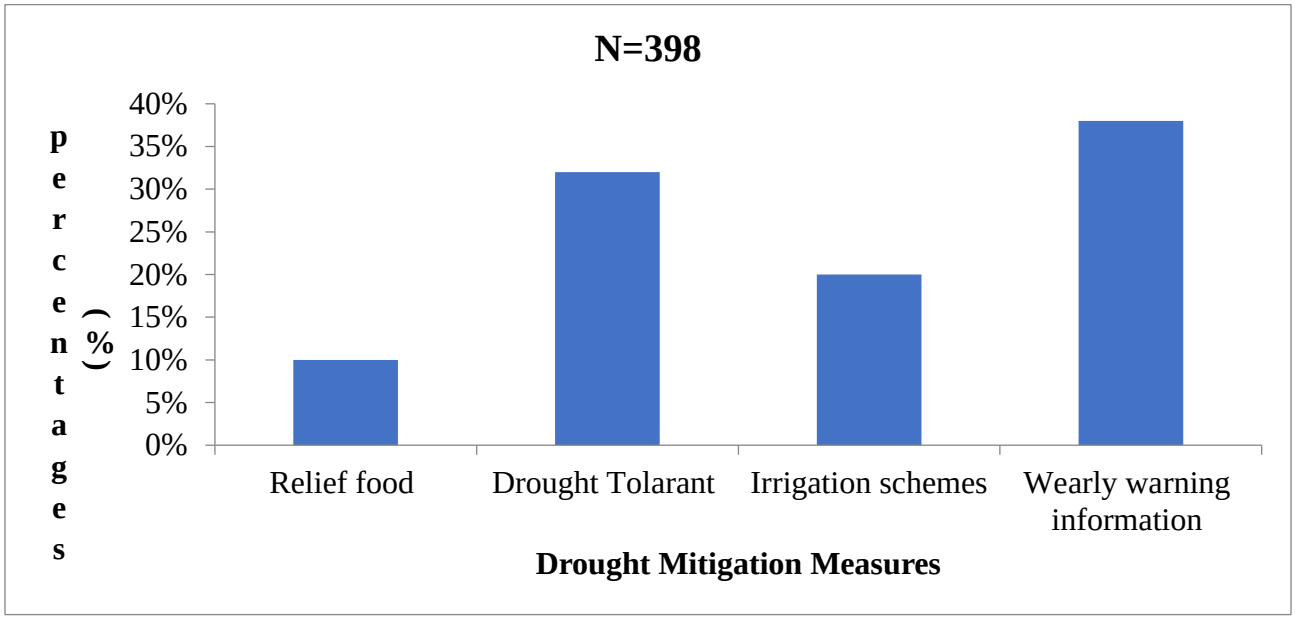
intervention mechanisms tend to promote community recovery from the impacts of drought, thus creating dependency problems on relief food aid.

The long-term programs for drought risk reduction and food insecurity are best addressed by the Sendai framework of action 2015, EDE 2012, and SDG 2015. The study revealed that 38% of the respondents indicate that access to early warning information reduces community vulnerability to the effects of droughts, while 32% indicate that growing drought-tolerant crops reduce the effects of drought on food security. On the other hand, 20% indicated use of irrigation schemes could enhance food security, thus reducing the food crisis that community experience during drought. However, 10% of the respondents said relief food aid the drought management remedies food challenges attributed to drought. This implies that preparedness for drought, through access to early warning information, enhances community resilience to adverse impacts of drought (*Figure 2*).

Figure 2: Proportion of interviewees preferred drought mitigation measures



Source: Field Data, 2017

The finding also reveals that most of the households in West Pokot County preferred early warning information to other drought mitigation measures. However, these findings disagree with those of Munro (2006), who pointed out that food aid is a very popular drought mitigation strategy since the majority of the households receive food hand-outs during drought times when there are food shortages. Most vulnerable households always benefit from food aid in West Pokot, and this program has been running for years since the 1991 drought.

These results are attributed to new institutions like the national drought management authority and the County Government that brought in policies and approaches for mitigating drought while encouraging the use of non-food relief strategies. This finding is further linked with a change in community and stakeholders' mindset and the way of doing things from being reactive to the effects of drought to being proactive. The GOK (2012) imitated a drought management framework, ending drought emergency (EDE), aimed at enhancing community resilience to drought in the ASALs

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Counties. Its main aim was to identify comprehensive strategies that promote community adaptive capacity to drought impacts (*Table 2*).

Table 2: Drought Risk Reduction programs

Programs	Activities
Increasing food production Embrace dry land crop production programme	Promote water management in the dry lands Project
	Promote water harvesting in the dry lands Project
	Promote agroforestry in the dry lands
	Establish regional forums for dryland farmers
Agricultural technology programme	Promote the use of seed production by private companies Project
	Promote the exchange of improved seeds among member states, also for relief Programme
	Harmonies seed laws/regulations in the region, including taxes and patents,
	Facilitate seed certification in the region

Source: GOK, 2012

The finding indicated that achieving sustainable drought risk reduction requires various programmes and activities that provide long-term and more sustainable mitigation of food insecurity, which is a recurrent problem in West Pokot. The Sendai framework for disaster risk reduction (UNISDRR, 2015), 2015-2030, seeks to promote the mainstreaming of disaster risk assessments into land-use policy development.

The study found that long-term strategies are the cornerstone of achieving sustainable drought risk reduction and building community resilience to the effects of drought; the strategy needs to be anchored on the six pillars of ending drought emergency, which is a key framework for reducing drought emergencies. The EDE pillars and sustainable development goals are the core guide principles for mitigating the impact of drought and poverty eradication in developing countries; drought-prone counties in Kenya ought to implement these two frameworks in order to realise sustainable development, as it was noted that poverty, drought, and food insecurity retired development in ASAL counties.

Drought Early Warning Systems in West Pokot County

The study found that to operationalise disaster preparedness; the respondents were asked whether there is an early warning system in place for drought monitoring in West Pokot County. About 52% of the households indicated that they do not have an early warning system in place, 20% said they have an early warning system in place, while 28% believed that they do not know about it (*Figure 2*).

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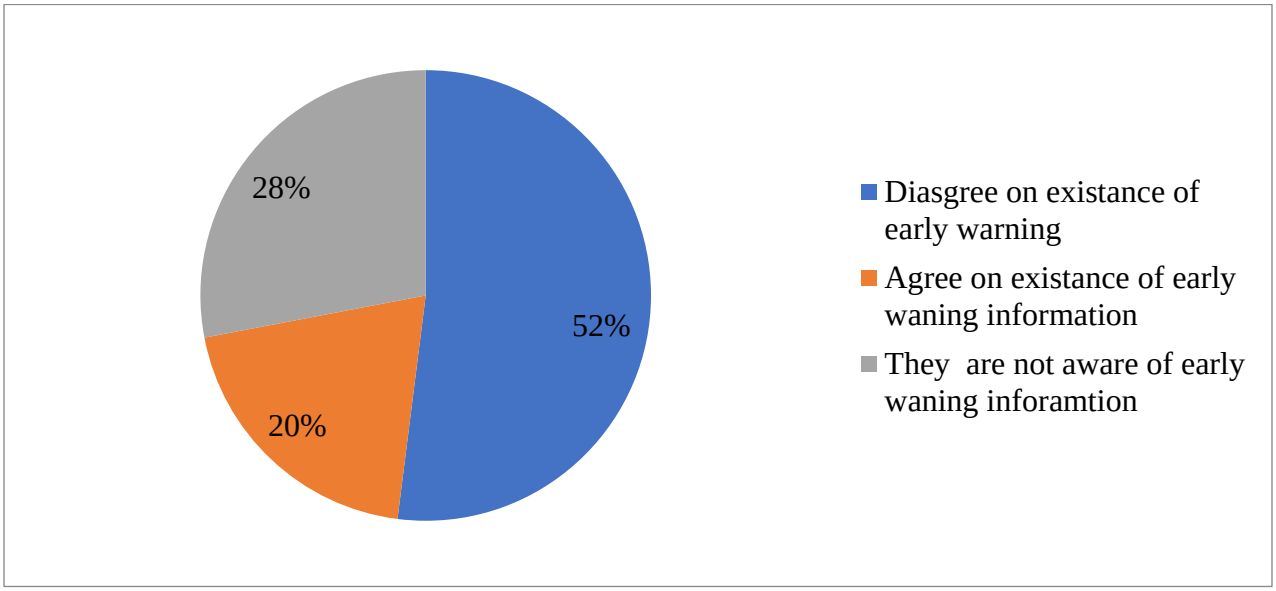
Figure 3: Existence of drought early warning system



Source: Field Data, 2017

This study implies that early warning information was indicated to be an important strategy to promote preparedness and ensure that communities make early decision-making to reduce their vulnerability to drought shocks. It also implies that the majority of the respondents are not gating early warning information or are not aware of this information. This finding is consistent with NDMA (2013), which indicated that West Pokot County is prone to drought due to a lack of early warning systems and disaster management teams and experts. The majority of respondents revealed that an early warning system does not exist in West Pokot, and this justifies how the residents are more exposed and more susceptible to numerous disasters that strike them due to inadequate early warning systems place.

Drought Coping Mechanisms

The study found that 20% of the respondents indicated limiting portion size at mealtime, 15% indicated surviving one meal a day, and 11% indicated dropping children out of school, among other strategies, as indicated in *Table 3*. This means that communities in the SAL area prefer to portion meals, although others survive on one meal a day. During FGD, it was revealed that taking several meals a day was considered a misuse and irresponsibility of not thinking of tomorrow and the future. This was used as strategies for reducing food wastage.

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Table 3: Drought coping mechanism practised in West Pokot County

Mechanism	Percentage %
Limit the portion size at mealtime	20.0
One meal in a day	15.0
Postpone marriage	7.4
Early marriage to young girls	8.1
Hunting and gatherers	4.3
Sending children to relatives	3.4
Children drop out of school	11.0
Postpone special festivals	3.0
Selling charcoal and firewood to purchase food	5.0
Selling land to purchase food	2.0
Slaughter healthy bull and preserve the meet	8.6
Selling big livestock to buy food	9.2
Selling minerals to buy food	3.0
Total	100

Source: Field data, 2017

The study reveals that communities in West Pokot County employ various coping responses against extreme drought events. These coping responses are more reactive and mainly involve temporary adjustment of livelihood activities in drought-stricken areas.

This study further agrees with Opiyo *et al.* (2015) study, which found that coping responses to drought are reactive and mainly involve intensive exploitation of scarce pasture resources. The overexploitation of these resources through wood fuel collection and charcoal production are among the major causes of rangeland degradation in the study area. The study further revealed that the sale of charcoal and firewood, which is considered labour-intensive and environmentally destructive, was among the coping strategy mainly for poorer households.

Households Adaptation Strategies in West Pokot County

The study found that major adaptive strategies among the sampled households include diversification of crops (13.2%), diversification of livestock breed (11.5%), livestock migration 44%, Water harvesting 10.9%, and growing early maturing and drought tolerant crops 6.4% as shown in *Table 4*: Households adaptive strategies to the impacts of drought that enhance the community resilience and reduce their vulnerability to the effects of drought and food insecurity.

Table 4: Household's adaptive strategies in West Pokot County

Adaptation strategies	Percentage %
Diversifying crops	13.2
Livestock breed diversification	11.5
Livestock migration	44.0
Seasonal grazing area management	14.0
Water harvesting	10.9
Growing early maturing and drought-tolerant crops	6.4

Source: Field data, 2017

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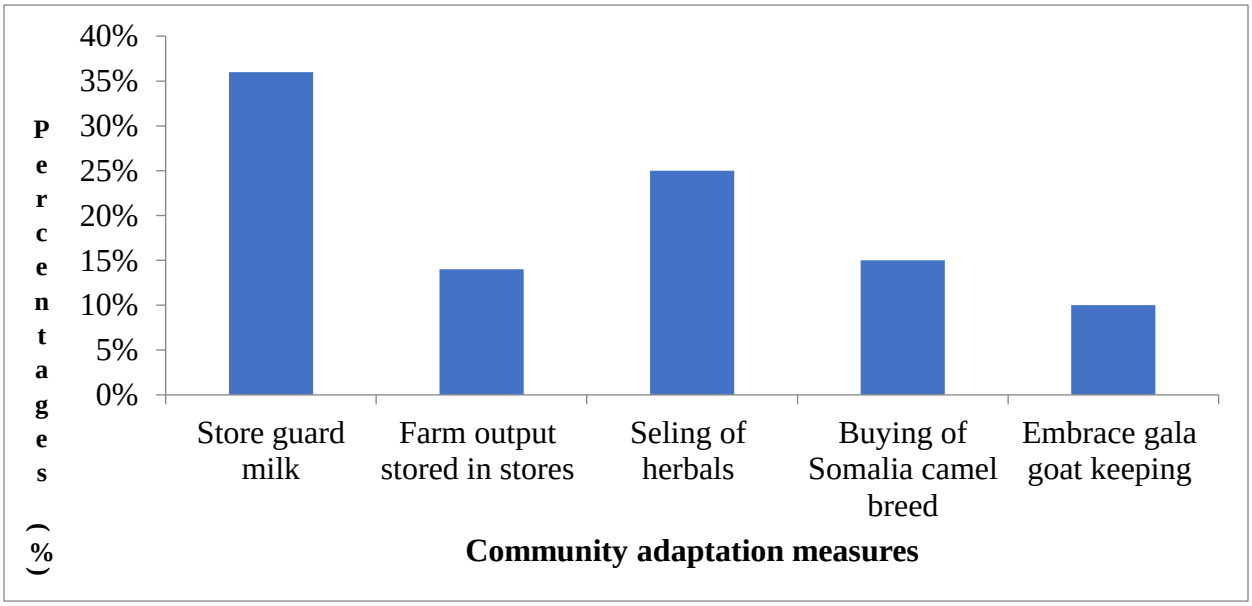
This study reveals that communities in West Pokot prefer livestock migration as an adaptive strategy that enhances community resilience to the risks posed by drought on food security, although others engaged in seasonal grazing management, crop, and livestock diversification. The study agrees with Berlie **(**2015), who found that prevailing conditions forced poor households to engage in short-term (coping) and long-term (adaptive) strategies to climate and climate-related shocks in order to maintain the food security status of their households. This study agreed with UNEP (2006), who indicated that during periods of drought crises, communities tend to develop their own coping mechanisms that enable them to survive the harsh climatic condition.

A study conducted in the semi-arid Pokot regions of Kenya and Uganda (ACTED, 2013) confirmed that during times of drought, the number of meals taken per day was reduced and family members who were not productive were sent to relatives. This study implies that pastoralist use migration as their main drought mitigation measure; they migrate to other places where there is plenty of water and pasture; this finding was also reported by a key informant that during the drought period, most of their animals migrate to Uganda where pasture and water are in plenty.

Reducing Vulnerability to Drought

The study identified various strategies that the local community utilised in order to reduce their vulnerability to the effects of drought. The community believed that these measures helped them to develop their own coping mechanisms. The findings further indicate that 36% of the pastoralist community store guards milk so that it can be used during drought periods when animals produce no milk, 14% of the respondents preferred to store their farm output in stores so that it can be utilised by families during drought periods, while 25% of the respondents preferred selling of herbals so that they can convert the money to buy maise. About 15% of the respondents have bought Somalia camel breeds that are drought tolerant and offer high-yield milk, whereas 10% of the respondents have embraced keeping gala goats breeds that cope with dry seasons and have a high yield of milk (*Figure 4*).

Figure 4: Community adaptation measures to drought in West Pokot County



Source: Field data, 2017

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The results also reveal that most of the households preferred storing maize during bumper harvest for use during drought and famine. This means that pastoralists and communities in ASAL being the survivors of numerous droughts have been able to identify coping mechanisms for the effects of climate change.

The results are consistent with NDMA (2013), which revealed that the households that store maize in granaries are more resilient than those that do not store it. During key informant interviews, it was revealed that drought risk reduction strategies require stakeholders to invest in prepared and early warning. This finding also agrees with the Sendai framework of action (2015), which argued that for the community/society to achieve sustainable resilience and coping mechanisms to adverse impacts of drought, they need to invest more in preparedness and early warning for the community to develop mitigation measure for the expected hazard.

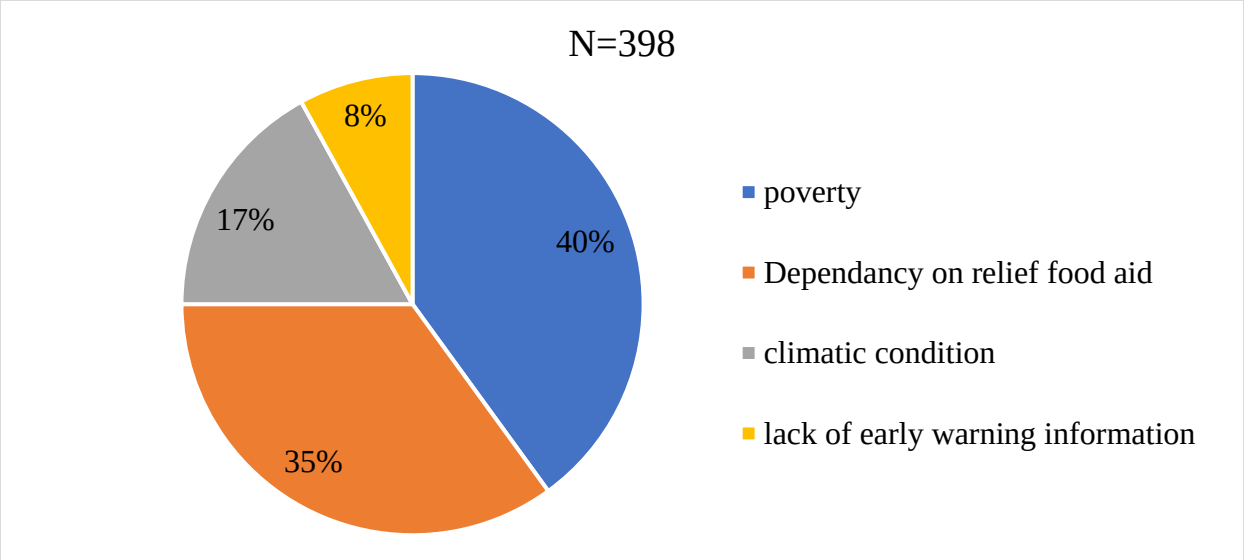
One of the respondents interviewed had this to say:

> *Maize after being harvested is stored in granaries for future use, we have traditional pesticides that our communities use to kill pests thus preserving the farm output, and those who do not store food in granaries are vulnerable to the effect of drought compared to those who store (*Sikamoi, 2016)

Factors Contributing to Vulnerability Households to drought in West Pokot County

When the 398 respondents were asked about factors that make them greatly affected by drought disasters, 40% indicated poverty, 35% suggested high dependency syndrome on relief aid, and 17% indicated the climatic condition of the area. Also, 8% cited a lack of early warning information (*Figure 5*). This implies that the high poverty index among the Pokot Community exposes them to be more susceptible to drought effects in West Pokot; although other factors may contribute, such as dependency syndrome and climatic variability as great problem that increased community vulnerability to the effects of drought in West Pokot County

Figure 5: Factors causing vulnerability to drought in West Pokot County



Source: Field Data, 2017

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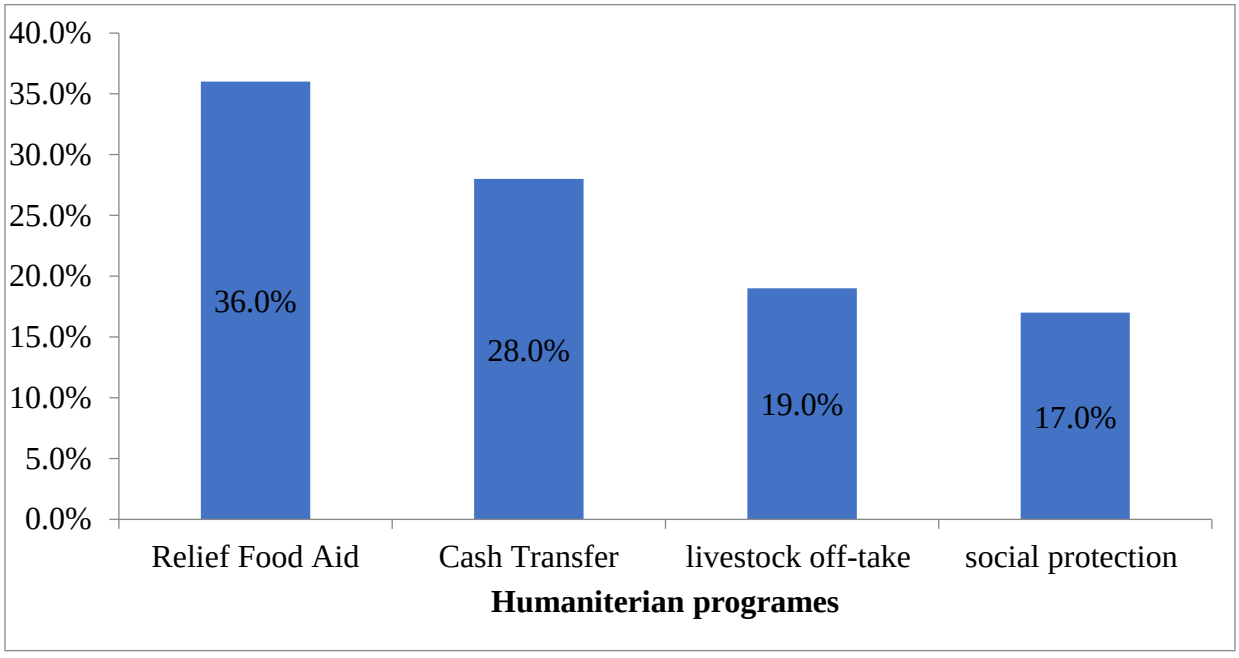
The key informants revealed that climatic conditions as a factor that make them more affected by drought. This is clear evidence that people in West Pokot County were aware of the various factors of vulnerability to disasters in their locality. The high dependency syndrome on relief food aid is also very rampant in the County because this was the main drought mitigation strategy before the formation of the devolved system of government and other institutions like the national drought management authority. This has continuously created generational poverty and vulnerability. The findings of this study are similar to Mutu (2017), who found that the level of poverty increases community susceptibility to the effects of disasters.

The study indicated that during the emergency phase of drought, that is, the time when the community are in a dire state of food crisis (food insecurity, famine and hunger), the state, the County government and other non-state actors do respond to such situation by providing humanitarian assistance to the affected households, whose lives are jeopardised by acute food shortage.

Humanitarian Programs in West Pokot County

The study sassed humanitarian programs in West Pokot and it was indicated that relief food aid was the most preferred humanitarian program in West Pokot with 36% of respondents preferring it, 28% for cash transfer, 19% for livestock off-take, and 17% for social protection as shown on *Figure 6.*

Figure 6: Humanitarian Programmes in West Pokot



Source: Field data 2017

The study reveals that relief food aid is the leading humanitarian programme on drought response in West Pokot County that focuses on saving lives and alleviating human suffering during the emergency phase of drought. The study noted that relief food aid used to be the most common drought response programme, but currently, due to changes in drought management strategies, new approaches have been introduced in West Pokot, such as cash transfer, food for an asset, and hunger safety nets as the new response mechanism that was not popular in West Pokot.

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Drought is a normal part of climate change that results in serious economic, environmental, and social impacts. Societal vulnerability to drought is increasing because of increasing pressures on natural resources. The study indicated that drought planning reduces the impacts of future drought events; therefore, developing monitoring tools, risk assessment techniques, and planning tend to reduce the risks associated with drought (Wilhite & Glantz, 1985). Building community resilience to adverse impacts of drought in ASAL areas requires various programme that can either strengthen the community's livelihoods or provide the community with an alternative survival mean during the drought period (*Table 5*).

Table 5: Long-term and sustainable drought Risk reduction programmes

Programme	Its Role in Building Resilience
Establishment of pasture for livestock	Livestock's access pasture during drought thus, reducing livestock body condition from deteriorating thus guarantee milk production
Embracing new livestock breeds such as Somalia camel bread	Drought-tolerant animals with high yield milk, this guarantees milk throughout the seasons
Embracing irrigated agriculture	Help enhance food production, thus increasing food security
Livelihood diversification	Strengthen livelihood, thus reducing community vulnerability to drought
Embracing early maturing and drought-tolerant crops	Improving food security
Investing in water harvesting technology	To guarantee livestock availability of water and irrigated crops
Embracing seasonal grazing management	Guarantee pasture for livestock throughout the seasons

Source: Field Data, 2017

The study revealed programmes that aimed at strengthening the capacity of the local community to cope and withstand drought shocks. The finding further indicated that communities in arid and semi-arid areas could mitigate the food crisis if long-term and more sustainable programmes are initiated, the programmes that aimed at providing a solution to a chronic problem of food insecurity. This study agrees with that of Kakuko (2013), who stated that drought could be mitigated through investing in long-term programmes that are more sustainable rather than going for short-term, which is appellative care to the victims of drought.

The study further agrees with WFP (2018), which reported that promoting livelihood diversification by supporting the involvement of pastoralists and agro-pastoralists in commercialisation through value addition, promoting engagement of pastoralists, and smallholder farmers in markets by enabling greater access to financial services, market information, market infrastructure, and trade associations. WMO (2016) further noted that long-term investments have built in response capacity for dealing with periodic shocks. Programs must also achieve sufficient scale to ensure a lasting impact on the food and livelihood security of affected communities. Potential entry points for programming in support of enhanced resilience include: -Develop and using ecosystem-based planning that enables improved access to and management of the natural resources upon which people depend.

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CONCLUSION

The major adaptive strategies among the sampled households include diversification of crops, livestock breeds, livelihoods, water harvesting, and growing fast-maturing plants. The World food programme, which has been the main relief food distributer since the 1990s, changed its strategies from offering relief food to empowering communities to be able to develop their own adaptive capacity. For instance, introducing piloting programmes for drought-tolerant crops and strengthening community livelihoods. Communities in West Pokot County had their own coping mechanisms that helped them reduce their vulnerability to the effects of droughts. The introduction of adaptive strategies such as diversification of livestock and growing of early maturing crops are some of the new initiatives that the community is embracing to remedy food insecurity triggered by drought.

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REFERENCES

ACTED. (2013). *Household Food Security in the United States in 2013*. Department of Agriculture, Economic Research Service, www.ers.usda.pdf

Berlie, A. B. (2015). Coping strategies and household food security in drought-prone areas in Ethiopia: the case of lay Gayint District. *Ghana Journal of Development Studies*, *12*(1-2), 1-18.

DRYLANDS, A. (2016). Strengthening the concept of Early Warning for Disaster Risk Reduction and Food Security.

GOK. (2012). Programme Framework to Ending Emergencies in the Horn of Africa. *Ending Drought Emergencies in Kenya Country Programme Paper*

IPCC. (2007). *Climate Change Impacts in the United States a State of Knowledge Report from the U.S. Global Change Research Program.* Cambridge: Cambridge University Press,

Kakuko, K. J. (2013). *Impact Of Irrigation Scheme On Food Security: A Case Of Wei-wei Irrigation Scheme In Central Pokot District, West Pokot County, Kenya* (Doctoral dissertation, University of Nairobi)

Munro, L. T. (2006). Zimbabwe's drought relief programme in the 1990s: a re-assessment using nationwide household survey data. *Journal of contingencies and crisis management*, *14*(3), 125-141.

Mutu, P. L. (2017). Causes of drought vulnerability and indigenous drought early warning methods among the Turkana nomadic pastoralists of Ilemi Triangle region of northern Kenya. *Research in Health Science*, *2*(2), 209.

NDMA. (2013). Kitui county short rain food security assessment report.

Opiyo, F., Wasonga, O., Nyangito, M., Schilling, J., & Munang, R. (2015). Drought adaptation and coping strategies among the Turkana pastoralists of northern Kenya. *International Journal of Disaster Risk Science*, *6*(3), 295-309.

UNISDRR. (2016). Sendai Framework for Disaster Risk Reduction 2015-2030. http://www.unisdr.org/we/inform/terminology

Article DOI: https://doi.org/10.37284/ajccrs.1.1.1008

UNEP. (2006). Agriculture: investing in natural capital: Towards a Green Economy. Geneva. www.unep.org/green economy Agriculture.pdf

Yamane, I., & Sato, K. (1967). Effect of temperature on the decomposition of organic substances in flooded soil. *Soil Science and Plant Nutrition*, *13*(4), 94-100.

WFP. (2018). Resilience Building to Combat Hunger and Malnutrition. *technicalnsortium.org Resilience-to-Food-Security-Shocks, retrieved on* [5thAugust 2018]

WMO. (2016). Building resilience to drought: Learning from experience in the Horn of Africa: *Integrated Drought Management Programme in the Horn of Africa PP (20-25)*

Wilhite, D. A., & Glantz, M. H. (1985). Understanding: the drought phenomenon: the role of definitions. *Water international*, *10*(3), 111-120.

