Assessment of the frequency of disaster emergencies in Kenya's lake region economic bloc

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ABSTRACT

The United Nations Office for Disaster Risk Reduction noted that the world faces almost twice as many disasters as in the 1980s. While authorities in the Lake Region Economic Bloc [LREB] have introduced disaster response measures, the persistence of these disasters points to gaps in understanding disaster trends for stronger emergency management. The purpose of the study was to assess the frequency of disaster emergencies in Kenya's Lake Region Economic Bloc. This study was guided by disaster risk theory. The study utilized an explanatory research design. The target population was derived from 3 Lake Region counties (Busai, Kisumu, and Nandi), from which a study sample of 384 respondents was picked. The sampling strategy included multi-stage, proportionate, simple random, and purposive. Primary data was collected using questionnaires, key informant interviews, and focus group discussion guides, while secondary sources consisted of annual reports, books, and policy briefs. Data analysis was through descriptive statistics using SPSS version 20 and Excel. Results are presented in tables. Findings revealed 92%, 86%, 85%, 78%, 77%, and 60% were in agreement that floods, disease outbreaks, road traffic accidents, drought, fire outbreaks, and landslides, respectively, were frequent in the study area. This study concluded that a wide range of disasters were frequent in the study area, with floods leading. The study recommends that there is a need to take a more people-centered approach to disaster risk reduction by putting stronger systems in place to manage the most frequent disasters. The findings are intended to sensitize the community and inform policy strengthening on community emergency in the study area.

Key words: Disasters, Emergencies, Frequency, Lake Region Economic Bloc

I. INTRODUCTION

In the past decades, disasters occurrence and recurrences have increased in temporal and spatial scales in the world. What were once rare in occurrence and frequency have now become familiar part of daily experiences. These are mostly triggered by a complex mix of natural forces, technological risks, human choices and behaviors. According to the United Nations Office for Disaster Risk Reduction (UNDRR, 2023), the world is now experiencing nearly twice as many disasters as it did in the 1980s. This increase is no accident and is largely the result of climate change, rapid urbanization, bulging populations in high-risk and vulnerable areas, and weak disaster preparedness and response systems. Weather-related disasters floods, droughts, cyclones, wildfires and heat waves have dominated the scene, accounting for more than 90 percent of the calamities recorded each year in the world (Gould *et al.*, 2016). Across Africa, the patterns have become more evident and clearer on temporal and special scales. For instance, the Horn of Africa continues to battle persistent droughts while Southern Africa have continued to experience destructive cyclones almost on annual basis. West and Central Africa have not been spared too and are struggling to recover from recurring floods and diseases exacerbated by climate change such as malaria and cholera occurrences (UNDRR, 2019).

According to Intergovernmental Authority on Development (IGAD, 2022), droughts in East Africa have become three times more frequent over the last thirty years. This is evident with droughts in Kenya, Ethiopia, and Somalia recurring every three to five years, while floods are expected nearly every rainy season such as the March April May [MAM] in the countries within the East Africa. From such occurrence and recurrences, the consequences have become more devastating to communities that have continued to bear losses of crops and livestock in their farms (World Bank, 2021). In addition, families have continuously been displaced, lives have been lost, infrastructure, and other properties have been destroyed while extending to overall loss of the economies in the majority of East African Countries which form part of the Lake Victoria basin.

Kenya's case is no mean different as evidenced through data from the National Disaster Operations Centre (NDOC, 2021) that identified floods and droughts as the country's most frequent hazards leading to disaster emergencies, often occurring within the same calendar year. According to NDOC (2021), presently droughts affect at

least 23 Arid and Semi-Arid Lands [ASAL] counties annually, while flash floods in the flood prone areas such as Nyando, Budalangi, Tana River, Samburu routinely destroy homes, roads, and farmlands. Layered onto this are wildfires, disease outbreaks, and resource-based conflicts all amplifying the nation's exposure to risk. In addition, there have been also an increasing occurrence of technological disasters such as building collapse and road traffic accidents. These are also closely related to climate changes that have increased the vulnerabilities on such infrastructures leading to loss of lives and destruction of properties in Kenya. Similarly, fire outbreaks and conflicts have also characterized the Kenya mainly in boarding schools and along the borders such as between Kisumu - Nandi, Kakamega – Nandi respectively.

1.1 Statement of the problem

The Lake Region Economic Bloc (LREB) of Kenya, which brings together fourteen counties around Lake Victoria, is increasingly facing repeated disasters ranging from floods, landslides, and droughts to epidemics and human-induced crises. These shocks do more than claim lives they disrupt people's daily livelihoods, destroy infrastructure, force families from their homes, and slow down socio-economic progress in an area heavily reliant on agriculture, fishing, and trade. Recurring floods along rivers such as Nyando and Nzoia, outbreaks of waterborne diseases like cholera, and the growing threat of climate-related hazards have deepened the vulnerability of communities already struggling with poverty and marginalization (World Bank, 2020). While county governments within the LREB have introduced disaster response measures, the persistence and even increase of these disasters point to gaps in current approaches and make clear the urgent need to better understand disaster trends and patterns as a basis for stronger policies and resilience strategies.

Over the years, studies in Kenya have grown, but much of it has focused on single hazards such as droughts or floods or on national-level policies, leaving little attention to specific regional blocs like the LREB (Munene, 2022; UNDRR, 2019). Many studies also take a generalized view, overlooking the differences in how disasters play out across regions and over time (Zhou & Zhai 2023). Research on the Lake Victoria Basin has mostly emphasized issues such as environmental degradation and climate variability, but has rarely combined these with a broader multi-hazard perspective that captures how natural and human-induced disasters intersect (Masese *et al.,* 2025). This gap makes it important to undertake a focused study on the frequency of Disasters in the Lake Region Economic Bloc of Kenya. Such research would provide much-needed localized evidence and help strengthen regional cooperation in building preparedness, mitigation, and effective response systems.

1.2 Research Objective

The objective of the study was to assess the frequency of disasters frequencies in the counties within the Lake region bloc of Kenya

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Disaster Risk Theory

In efforts to enhance better understanding of the occurrence and recurrence of potentially harmful hazards within the Lake region economic bloc of Kenya, the theory of disaster risk was employed. According to this theory, there exists a nexus between hazards, vulnerabilities with considerations of the capacities that exist in a given community that is susceptible to the risks of losses and damages. These three factors are well illustrated using Pressure and release model. According to Blaikie *et al*. (1994) using Pressure and Release (PAR) model, disasters are not natural rather, disasters occur when natural hazards exist in an environment with increased degree of susceptibility of social, physical, economic, institutionally and environmental nature. In this regard, the higher the susceptibility, the higher the chances of occurrence and recurrence leading to high frequency of a given disasters emergencies in a given location and time. For example, Burton *et al*. (1993) through the Risk–Hazard framework highlighted that locations with repeated flooding, landslides, fire, technological accidents and disease outbreaks such as the LREB are subjected to increased risks because environmental hazards keep colliding with ongoing socio-economic pressures.

2.2 Empirical Review

Focusing on the year 2023, the EM-DAT database indicated that approximately 399 natural-hazard related disasters occurred on the global scale hence leading to 86,473 deaths, destabilizing 93.1 million people, and causing US$202.7 billion in losses economically. This pointed out that there have been a year-to-year totals rise and fall, and some long-term increase reflects better reporting. In addition, UNDRR assessments indicated that environments becoming more dangerous especially from heat, drought, and coastal hazards that have increased risks on the growth

and development for years by governments (UNDRR, 2024). Fatalities have also increased in single bad years as with the 2023 Türkiye–Syria earthquakes even if the overall number of events is not at a peak (UNDRR, 2024).

In African region, studies show that disasters are mainly as associated to the changes in climate, with indicators such as floods and droughts setting the pace as climate variability. An Africa Risk Capacity analysis using EM-DAT (2000–2023) found that climate related such as intensive rains, heat stress and dry spell events make up the majority of disasters in 29 countries, and multi-country flood years have become more common since the mid-2000s; drought remains an often occurrence in the Sahel and the Horn (ARC, 2024). UNDRR's 2023/2024 reviews show these hazards have over the years exacerbated food insecurity, lack of jobs, and affected education hence amplifying their societal negative impact.

At the local scale, Kenya has also over the years experienced recurring and persistent drought and flood in subsequent seasons annually. These have equally triggered, destabilize social and economic systems and infrastructures hence increased risks of disasters occurrence and emergencies. World Bank estimated that about 70% of Kenya's natural disasters are climate-related (World Bank, 2021). After a multi-season drought (2014–2023), intense 2023–2024/25 rains associated with El Niño–IOD brought deadly floods, large-scale displacement, and sharp month-to-month volatility in impacts socially and economically. National Drought Management Authority County (NDMAC) bulletins confirms these shifts, while government and media reports in 2024 cited over 180 flood deaths during peak periods in MAM Seasons for floods and DJF for drought episodes (NDMA, 2024). These experiences of the climate related hazards occurrence coupled with the pre-existing conditions subjecting the country to increased susceptibility, frequent, climate-linked emergencies have also increased.

III. METHODOLOGY

3.1 Study Area

This study was conducted in the Lake Region Economic Bloc. This region is found within the Lake Victoria basin. The region lies between latitudes 10 16' N and 10 54' S and longitudes 330 55' and 350 51' E and the equator passes across the region.

3.2 Research Design

This study employed an explanatory sequential mixed method design whose thrust was to assess how often various hazards recur within lake-region economic bloc counties such as Kisumu, Busia and Nandi. According to Creswell and Plano (2018), this design is two phased where a researcher collects quantitative data and analyses then elaborate the results with qualitative information from the Key informants and group discussions. In this respect, the study design was used with respect to need of the study that was to first quantify how often the disasters occur in the study area then a follow up be made in relation to the opinion of other stakeholders and interested authorities in the study area based on their experiences and knowledge of occurrence and recurrence of the disasters. This design therefore ensured that the numerical findings are not isolated in the study but proper triangulation is done to exhaustively leverage conclusion and for better recommendation.

3.3 Target Population

The study target population consisted of responders from three Counties namely Kisumu, Busia and Nandi. The emergency responders were the main respondents in acquiring primary data as they were most involved in the disaster response and most of them were volunteers right from the communities with historical experiences of the disasters in those counties.

3.4 Sampling techniques and sample size

A sample size of 384 was sampled using multistage sampling techniques from the larger Lake region economic bloc and to the three Counties. Additionally, purposive sampling was used to sample sub counties such as Budalangi, Nyando and Tinderet based on the historical occurrence of various types of disasters those sub counties. Proportionate sampling was then used to sample emergency responders from the varying numbers in the sub counties in the study area and from one organization to the other.

3.5 Data Collection Methods

Primary quantitative data from the emergency responders was mainly collected using questionnaires, while qualitative primary information was collected using Key informant interview guide and Focus group Discussion guide. Secondary qualitative data was collected from journals, reports and magazines.

3.6 Methods of Data Analysis

All the quantitative data from the questionnaires were cleaned, coded and analyzed using the Statistical Package for Social Scientists (SPSS) version 20.0 for descriptive statistics and results are presented in a table. Secondary information from the KII and FGD guides were cleaned, organized and thematically analyzed.

IV. FINDINGS & DISCUSSION

This section presents and discusses results in relation to findings on the frequency of the disaster emergencies in the Lake region economic bloc of Kenya. This study focused on the most dominant hazards such as floods, disease outbreaks, fire outbreaks, road traffic accidents, droughts and floods.

4.1 Frequency of the disaster emergencies within the Counties in the Lake Region Economic Bloc of Kenya

The study sought to assess the frequency of various disaster types across counties within the Lake Region Bloc of Kenya. Results in Table 1 show that majority of the respondents 81% (243) strongly agreed that floods are frequent and intense, 65% (195) agreed that they often experience prolonged droughts, 55% (165) strongly agreed that landslides occur regularly in their counties, 67% (201) strongly agreed that disease outbreaks have become frequent, and 60% (180) strongly agreed that fire outbreaks are frequent and intense in occurrence in their counties within the LREB of Kenya.

Table 1

Frequency of Disaster Emergencies in Counties within the Lake Region Economic Bloc of Kenya

Frequency aspects of the disaster emergencies	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Flooding is a frequent and an intense disaster in this county.	6 (2%)	18 (6%)	0	33(11%)	243 (81%)
This county often experiences frequent and prolonged droughts.	12 (4%)	27 (9%)	27 (9%)	195 (65%)	39 (13%)
Landslides occur regularly and intense in this county.	42 (14%)	30 (10%)	48 (16%)	15 (5%)	165 (55%)
This county frequently experiences outbreaks of waterborne diseases (e.g., cholera, typhoid).	12 (4%)	21 (7%)	9 (3%)	57 (19%)	201 (67%)
Fire outbreaks are becoming more frequent.	18 (6%)	18 (6%)	33 (11%)	51 (17%)	180 (60%)
Frequency of Road Traffic Accidents has increased	9 (1%)	36 (12%)	6 (2%)	45 (15%)	210 (70%)

4.1.1 Frequency of floods within the Counties of Lake Region Economic Bloc in Kenya

Results in Table 1 shows that there was a consensus among respondents on the frequent occurrence of flooding in their counties, with an overwhelming 81% strongly agreeing and an additional 11% agreeing that flooding is a recurring hazard. This accounts for 92% of the sample size who affirmed the presence of frequent flood disasters. Only a small minority (6% disagreed and 2% strongly disagreed) dismissed the frequency of floods, and notably, no respondents were neutral. The absence of neutrality indicates that communities have directly experienced or witnessed repeated flood events, making flooding a widely recognized and deeply felt threat across the surveyed counties.

It was therefore evident with the majority assenting to the frequent occurrence and recurrence of floods in the study area. This study observed that this was mainly due to the region's geographical setting particularly its proximity to Lake Victoria, an area well-known for heavy rainfall and complex hydrological systems. This made flooding one of the most significant hazards affecting local communities in the region. These findings are consistent with earlier research carried out within the Lake Victoria Region Economic Bloc (LREB). For example, Oluchiri (2025) note that Kisumu County has for years struggled with recurring floods, largely driven by a mix of high precipitation, inadequate drainage infrastructure, and backflow from Lake Victoria. Similarly, Budalang'i in Busia County had a long history of devastating floods caused by the bursting of River Nzoia, which regularly displaces communities and disrupts livelihoods and other economic activities such as transportation and communications (Opilo et *al*., 2023).

These findings on the frequent flooding further resonate with Kundu and Olang (2011), who observed that El Niño events and expanding land-use changes have intensified both the severity and recurrence of floods in western Kenya. Recent data from the Kenya Meteorological Department (2023) reinforces this, while highlighting the Lake Victoria Basin as one of the most flood-prone regions in the country. This study found out that as there exists a surge on the flood's frequency and intensity, the situation is worsened by poor agricultural practices, weak urban planning, clogged waterways, and poor disaster preparedness, particularly in counties such as Homa Bay and Siaya. From an expert, a key informant as one of the staffs of the Kisumu County special programs point of view was in tandem with the high level of agreement among respondents,

"Frequency of floods underscores the urgent need for localized flood risk reduction strategies in the Lake Region Bloc. County governments must invest in early warning systems, improve drainage infrastructure, and promote community-based adaptation programs to build flood resilience".

The findings served as a wake-up call for counties in the LREB, highlighting the urgent need to strengthen collaboration on watershed management and cross-border disaster response. Ogenga et al. (2025) also indicated that, without coordinated action, floods will continue to destroy communities and erode hard-won development gains in Western Kenya.

4.1.2 Frequency and persistence of droughts occurrence within the Counties of Lake Region Economic Bloc in Kenya

In relation to the persistence of droughts, 195 (65%) of respondents agreed and 39 (13%) strongly agreed that the counties often experience such prolonged dry spell at least in a year. Meanwhile, 27 (9%) remained neutral, another 27 (9%) disagreed, and 12 (4%) strongly disagreed of the occurrence of the frequent and persistent droughts in the study area. The results show a consensus among the respondents that persistent droughts are a frequent occurrence in their respective counties within the Lake region, with a cumulative 78% (65% agreeing and 13% strongly agreeing) attesting to the assertion.

The high number in agreement indicates a dire climate related concern, showing that droughts in the region are not isolated events but recurring with negative implications on populations, their livelihoods, and property. Just a small fraction of 13% showed disagreement, further reinforcing the broad recognition that drought is a persistent problem in their communities. Notably, this confirmation excluded the counties such as Nandi, Kericho, and Trans Nzoia, as counties that have over the years received high annual amount of rainfall and have experienced relatively low average temperatures.

This study observed that Counties such as Kisumu, Siaya, Homa Bay, Migori and Busia have historically been subjected to climate variability from prolonged dry spells to increased amount of rainfall leading to floods. This this observation resonated with the sentiments from one of the participants in an FGD comprising social workers, community volunteers and the Kenya Red cross officials in Kisumu County. She said,

"Ones in a year most of us and this county have had effects that are as a result of low amount of rainfall affecting mostly our crops leading to low crop failure or total failure hence food insecurity. This is mostly in the months of December to February and June to August".

According to Opiyo *et al*. (2015) in a study in Turkana and Kisumu observed that communities mostly in the ASALs have viewed droughts as becoming more often and severe, with negative effects in both rural and peri-urban areas. Similarly, Ogenga *et al* (2025) on the trends of drought in Siaya County found out that droughts occur in Siaya County which is in the Lake region bloc at least ones a year and mainly in the season of MAM and with high probability in the short season of JJA. According to Ogenga (2025) on the probability of dry spells occurrence on rain dependent agriculture, the Lake Victoria Basin is has two main agricultural seasons and occurrence of prolonged dry spells implies a significant negative impact on the depended on livelihood to communities. Relatively, the Kenya Meteorological Department (2022) reported that Western Kenya have in the past decade experienced irregular rainfall, often marked by prolonged dry spells that interrupt seasons of farming. This was in particular to the rain-dependent agricultural zones. These two studies have hence reinforced the participants in this particular study asserted on the frequent and persistent occurrence of droughts in the Lake Region Economic Block (LREB) of Kenya.

Worth noting, 9% of respondents remained neutral. This in essence, has the potential to signal reduced awareness or reflect localized changes in drought experiences. For instance, counties such as Nandi that is naturally wetter due to their highland geography are less prone to prolonged dry spells experiences as compared to semi-arid areas in Kisumu or parts of Busia during peak dry seasons. This variation underscores the need for disaggregated climate impact data to design county-specific adaptation strategies within the LREB framework. Supporting this, the 2023 NDMA bulletin highlighted that even high-rainfall counties are increasingly facing localized droughts, largely driven by deforestation and land degradation. Overall, the study's findings resonate with wider climate change projections for the Lake Victoria Basin. As the World Bank (2021) cautioned, rising temperatures and shifting rainfall patterns are expected to intensify both the frequency and severity of droughts across the region.

4.1.3 Frequency of Landslide occurrence within the Counties of Lake Region Economic Bloc of Kenya

Results in Table 1 show that 165 (55%) of the respondents strongly agreed and 15 (5%) agreed that landslides occur regularly in the Lake region economic bloc. Interestingly, 48 (16%) were neutral, while 30 (10%) disagreed and 42 (14%) strongly disagreed, showing a mixed perceptions of the respondents on landslide occurrence and recurrence in the Lake region economic bloc of Kenya. These findings therefore have indicated a significant concern over the frequency of landslides in the Lake Region Bloc Counties, with a cumulative 60% of respondents (165 strongly agreeing and 15 agreeing) affirming that landslides occur regularly.

Similar to other hazards in the study area, these findings indicate that landslides too are not isolated events but a recurring hazard in the region. The study observed that this is largely shaped by the topography of the regions based on the physically steep slopes, fragile soils exacerbated by heavy and increased rainfall. This study noted that sections of Nandi and Busia counties were particularly vulnerable because their poorly drained soils and sloping landscapes combine with seasonal downpours to create conditions ripe for land hold failure. As illustrated by the findings that over a half of the respondents strongly agreed with this view underscores that frequent landslides are part of the lived reality in these areas. These were identified as to have dire consequences historically leading to losses of lives, destruction on the crop lands, homesteads and infrastructure such as roads.

Relatively, perceptions of the respondents indicated a non-uniform experiences and knowledge of landslides occurrence and recurrences in the prone areas. It is evident from the results that 16% of respondents were neutral, while 24% (10% disagreed and 14% strongly disagreed) did not agree of landslides as a common occurrence in the Lake region economic bloc. This non-convergence points to localized differences in exposure and experience of the landslides in different counties of the study area. This was evident that lower-lying zones, such as parts of Kisumu and Busia, had not witnessed landslides firsthand, unlike those in hilly areas such as Chepterit in Nandi, or parts of Kisii and Nyamira counties. This study observed that levels of community awareness and collective memory also play a role. In this essence, in some cases, landslides were associated more with rare, extreme episodes than with regular hazards such as floods. This perception gap was especially evident in counties like Busia, where early warning and response systems for landslides are either not there or minimal.

These study findings have demonstrated resonance with findings of other studies in the past. According to Masese *et al.* (2025), Kisii and Nyamira which both form part of the Lake Region Bloc has faced heightened risk of landslides. This was mainly due to dense populations, deforestation, and farming on steep slopes. Relatively, Kericho County Climate Change Action Plan [KCCAP] (2023) asserted that Kericho County has in the past decades experienced an increased landslides event. The study learnt that all these due to erratic rainfall patterns linked to climate change acting as a trigger. Similarly, Opilo et al (2023) further showed how land-use changes in Homa Bay destabilize slopes and accelerate erosion, contributing to landslide risks. In agreement, these studies reinforce the understanding of the respondents that both natural and human factors intertwine to shape the frequency and severity of landslides across regions leading to disaster emergencies such as loss of lives, property and livelihoods.

4.1.4 Frequency of Diseases outbreak within the Counties of the Lake Region Economic Bloc in Kenya

Results in Table 1 show that disease outbreaks of waterborne diseases such as cholera and typhoid, 201 (67%) strongly agreed and 57 (19%) of the respondents agreed that such outbreaks are frequent. A smaller proportion disagreed (21; 7%) or strongly disagreed (12; 4%), while 9 (3%) were remained neutral. The results therefore show that a significant majority of respondents 67% strongly agreed and 19% agreed that outbreaks of waterborne diseases such as cholera and typhoid are frequent within their communities hence causing a disaster emergency. This indicates that at least 86% of the respondents in the study area of the Lake Region Bloc Counties (LRBC) perceive waterborne disease outbreaks and other communicable diseases as a regular threat to public health. Additionally, pandemics such as Ebola and Monkey pox characterized the fatal diseases mainly in counties at the border such as Busia and Migori in the lake region economic bloc.

The study learnt from participants in a FGD comprising of Community volunteers and social workers in Nandi County that such a high level of agreement is indicative of persistent and widespread challenges related to access to clean water, poor sanitation, and inadequate waste management. One of the participants said,

> *"Our main challenge is lack of clean water and this is normally during rains that lead to the contamination of our only water sources remembering that most of our water sources are open springs. The contamination has sent so many to hospitals looking for help from the diseases. If there was a way the government could help protect these water sources then the people in this village can be safer"*

This study's findings found out that cholera and typhoid outbreaks were the main and have been a recurring across the Lake Region Economic Bloc (LREB). Most counties that have been affected over the years were Kisumu, Homa Bay, Migori, Siaya, Bomet, Kakamega, and Busia. According to the Kenya Ministry of Health (2022) documented repeated cholera outbreaks in Siaya and Kisumu, often triggered by flooding and poor drainage infrastructures that contaminate drinking potable water that are relied upon by majority of the populations in those counties. Similarly, Mbae *et al.* (2020) emphasized that typhoid fever in places such as informal and rural settlements was closely associated with the consumption of untreated water and weak sanitation systems, particularly in informal settlements and rural parts of the counties.

Additionally, the study observed that beyond these endemic waterborne diseases, COVID-19 pandemic exposed the region's vulnerability to public health concerns. During such emergencies and crisis, counties such as Kisumu, Bungoma, Migori, and Busia were forced to establish emergency response centers in main medical facilities. However, according to (WHO, 2022), these efforts were hampered by inadequate resources. This indicated that while the Lake

region economic bloc continues to grapple with endemic diseases like cholera and typhoid, it also faced risks from global pandemics such as COVID, Ebola and Monkey pox that emergency response.

Relatively, Omwami *et al.* (2022) emphasized on the need to invest in water, sanitation, and hygiene (WASH) across the LREB as a proactive measure to such preventable diseases. Additionally, the study emphasized on the need to strengthen early warning systems, expand community health education, and develop reliable clean water infrastructure. The study observed such measures as essential in reducing recurring disease outbreaks and align with broader capacity-strengthening initiatives in health concerns risk reduction in the region.

4.1.5 Frequency of Fire outbreaks within the Counties of Lake Region Economic Bloc of Kenya

To understand the perception of the respondents in the study on fire outbreaks, results in Table 1 show that frequency of fire outbreaks, 180 (60%) of the respondents strongly agreed and 51 (17%) agreed that such events are becoming more frequent. In sequence, 33 (11%) chose neutral, and both disagreement and strong disagreement represented 18 respondents (6%) each. These findings established a strong perception among respondents that fire outbreaks are increasing in frequency across the Lake Region Economic Bloc as the study area. These results showed that (77%) shared this concern, underscoring a widespread sense of vulnerability of different systems both structurally and those that are not structural leading to fire-related emergencies. Interestingly, 11% remained neutral and this figure might have reflected respondents no or low magnitude experience of such fire disasters incidents. A small group disagreed or strongly disagreed (6% each) and are likely based in areas less exposed to fire hazards or where effective prevention measures have been put in place hence reduced level of losses and damages hence not perceived as a concern by a click of respondents in the study areas as Lake Region economic bloc.

This study established that Counties such as Kisumu, Kakamega, Homa Bay, Vihiga, Busia, and Nandi have all reported a rise in fire outbreaks, particularly in urban markets, expanding informal settlements, and educational institutions like secondary schools. This study learnt that Kisumu County, for instance, had repeatedly witnessed devastating fires in Kibuye Market, with investigations pointing to causes ranging from faulty electrical wiring and arson to poor infrastructure. Similarly, this study learnt that Busia County had over the years experienced multiple school fires at Sokoto Girls and Bukhalalire Boys, especially during student unrest, highlighting a mix of behavioral and infrastructural vulnerabilities in the schools. Apart from the schools and markets, fire accidents linked to petroleum tanker accidents have also over the years been reported along the Kisumu–Busia Road, particularly in Siaya (Sidindi) and Busia (Matayos), often resulting in fatal loss of lives. The evidence indicated a rising fire accidents in the Lake region economic bloc which were driven by rapid unregulated construction, limited awareness, and inadequate fire response capacity.

There exists a range of studies that are related to this on hazards occurrence and recurrence that have in support related. According to Hu *et al.*, (2022), poor urban planning and substandard materials and designs for housing in none formal settlements significantly increase fire risks in most informal settlements such as in Kisumu Obunga. This was evident mainly on urban areas and settlements where congestion of unplanned housings and structures blocked access for emergency responders such as fire fighters with wider firefighting machines. Similarly, Munene (2022) reported that frequent market fires in western Kenya counties such as in Kisumu were mainly attributed to illegal electricity connections and limited fire safety training and awareness among traders in the markets in various urban areas.

4.1.6 Frequency of Road Traffic Accidents (RTA) in the Lake Region Economic Bloc of Kenya

The study finally sought to investigate the prevalence of Road Traffic Accidents (RTA) in the Lake region economic bloc. Results in Table 5.1 indicated that 1% (9) strongly disagreed, 12% (36) disagreed, 2% (6) were neutral, 15% (45) agreed, while 70% (210) strongly agreed that road traffic accident incidences have been on the rise on the major roads in the Lake region economic bloc of Kenya.

Results show that 85% of respondents (70% strongly agreed and 15% agreed) felt that road traffic accidents (RTAs) are on the rise in the Lake Region Economic Bloc. This is study established that this was more than just statistic and it reflected the lived realities to the individuals who faced road crashes in Western part of Kenya. In relation to National data RTAs remain among the top causes of injury and death, especially in densely populated regions (NTSA, 2023). At a broader level, the World Health Organization (WHO, 2022) reported that Africa carries the heaviest burden of road traffic injuries globally, driven by rapid motorization, poor infrastructure, and weak traffic enforcement. For communities in the Lake Region, these realities are not abstract they point to an escalating crisis threatening both health and livelihoods.

Researchers and policy analysts have long linked this trend to structural and behavioral factors. Radan et al. (2022) identifies poor road design, limited pedestrian facilities, speeding, and lack enforcement of traffic laws as recurring causes. Within the Lake Region, studies reveal that major highways such as those linking Kisumu, Kakamega, and Kisii are notorious accident hotspots, plagued by reckless overtaking, inadequate signage, and the surge of motorcycles (boda-bodas) as a popular mode of transport. These challenges are intensified by the region's economic

dynamism: busy routes like the Kisumu–Busia Road not only support local traffic but also serve as vital corridors for cross-border trade with Uganda. The combination of structural weaknesses and risky human behavior makes RTAs a constant hazard for traders, commuters, and rural travelers alike.

The ripple effects of rising RTAs extend far beyond the immediate tragedies of crashes. Families often endure devastating medical costs, the loss of breadwinners, or long-term disability, all of which reduce productivity and strain household resilience (Terefe et al., 2025). From a policy standpoint, Kenya has endorsed global frameworks such as the UN Decade of Action for Road Safety and Vision Zero. Yet, turning these commitments into meaningful change at the county level has proven difficult. Without urgent interventions redesigning black-spot roads, enforcing helmet and seatbelt use, and improving emergency response systems accidents in the Lake Region are likely to keep increasing (WHO, 2022). Put simply, the findings emphasize the urgent need for locally grounded, multi-sectorial road safety strategies that respond to the lived experiences of Western Kenya's communities.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

A wide range of disasters are frequent in the Lake Region Economic Bloc counties of Kenya with floods standing out as the most frequent, followed by outbreaks of disease, drought, Road traffic accidents, fire outbreak, while landslides tend to occur more sporadically depending on the location. From these, communities in the region continue to suffer serious consequences including displacement, crop losses, damaged infrastructure, and tragic loss of life making it clear just how exposed they are to these hazards.

5.2 Recommendation

The Lake Region Economic Bloc counties need to take a more people-centered approach to disaster risk reduction by putting stronger systems in place to manage floods, stepping up public health monitoring to prevent disease outbreaks, and improving early warnings for drought. At the same time, attention should be given to making roads safer, boosting fire preparedness, and closely monitoring landslide-prone areas. These measures will go a long way in reducing the risks communities face, protecting their livelihoods, and ultimately saving lives.

REFERENCES

ARC. (2024). *The state of natural disasters in Africa report*. African Risk Capacity.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (1994). *At risk: Natural hazards, people's vulnerability, and disasters*. Routledge.

Burton, I., Kates, R. W., & White, G. F. (1993). *The environment as hazard* (2nd ed.). Guilford Press.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Gould, K. A., Garcia, M. M., & Remes, J. A. (2016). Beyond "natural-disasters-are-not-natural": The work of state and nature after the 2010 earthquake in Chile. *Journal of Political Ecology, 23*(1), 93–114. https://doi.org/10.2458/v23i1.20181

Hu, J., Xie, X., Shu, X., Shen, S., Ni, X., & Zhang, L. (2022). Fire risk assessments of informal settlements based on fire risk index and Bayesian network. *International Journal of Environmental Research and Public Health, 19*(23), Article 15689. https://doi.org/10.3390/ijerph192315689

IGAD. (2022). *East Africa regional climate risk and drought resilience report*. IGAD Secretariat.

Kenya Meteorological Department. (2022). *Climate outlook for the March-April-May 2022 season*. Kenya Meteorological Department.

Kenya Meteorological Department. (2023). *Annual weather review report*. Government of Kenya.

Kenya Ministry of Health. (2022). *Cholera situation report – Siaya and Kisumu counties*. Government of Kenya.

Kericho County. (2023). *Kericho County climate change action plan (KCCAP) 2023–2027 report*.

Kundu, P., & Olang, L. O. (2011). The impacts of land use change on runoff and peak flood discharge for Nyando River in Lake Victoria drainage basin, Kenya. *Ecology and the Environment, 153*, 83–94. https://doi.org/10.2495/WS110081

Masese, F. O., Wanderi, E. W., & Nyangweso, H. N. (2025). Challenges and strategies for management and conservation of water resources and freshwater biodiversity in the Lake Victoria Basin. *Frontiers in Conservation Science, 6*, Article 1544429. https://doi.org/10.3389/fcosc.2025.1544429

Mbae, C., Mwangi, M., & Gitau, N. (2020). Factors associated with occurrence of salmonellosis among children living in Mukuru slum, an urban informal settlement in Kenya. *BMC Infectious Diseases, 20*, Article 422. https://doi.org/10.1186/s12879-020-05134-z

Munene, M. (2022). Disaster risk governance and resilience building in Kenya: A review. *Journal of Disaster Risk Studies*, *14*(1), Article 1244. https://doi.org/10.4102/jamba.v14i1.1244

NDOC. (2021). *Annual report on disaster incidences in Kenya*. Government of Kenya.

NTSA. (2023). *Annual road safety status report 2023*. National Transport and Safety Authority.

NDMA. (2024). *The long seasons report* (p. 23). National Drought Management Authority County.

Ogenga, J. O. (2025). Examining the probability of dry spells occurrence on rainfed agriculture in Homa Bay County, Kenya. *International Journal of Scientific and Research Publications*, *15*(7), 31–35. https://doi.org/10.29322/IJSRP.15.07.2025.p16305

Ogenga, J. O., Ngaira, J. K. W., & Mugalavai, E. M. (2025). Examining the relationship between drought trends and food crop production in Siaya County, Kenya. *Journal of the Kenya National Commission for UNESCO*, *5*(2), 2–18. https://doi.org/10.62049/jkncu.v5i2.287

Oluchiri, S. O. (2025). Urban flooding in the cities of Kisumu, Mombasa, and Nairobi, Kenya: Causes, vulnerability factors, and management. *African Journal of Empirical Research*, *6*(1), 342–351. https://doi.org/10.51867/ajernet.6.1.29

Omwami, D. O., Kurauka, J. K., & Ochola, S. O. (2022). Examining the effectiveness of the WASH programme on public health in public schools in Kisumu East Sub-county, Kenya. *Asian Journal of Geographical Research*, *5*(1), 47–56. https://doi.org/10.9734/ajgr/2022/v5i1125

Opilo, B. N., Soita, S., & Nyandiko, N. O. (2023). The prevalence of flood risk by farmers in Western Region Kenya. *International Journal of Scientific and Research Publications*, *13*(7), 303–312. https://doi.org/10.29322/IJSRP.13.07.2023.p13933

Opiyo, F. E. O., Wasonga, O. V., Nyangito, M. M., Schilling, J., & Munang, R. (2015). Drought adaptation and coping strategies among the Turkana pastoralists of northern Kenya. *International Journal of Disaster Risk Science*, *5*(4), 295–304.

Radan, B., Ogendi, J., Stewart, T. C., & Shkrum, M. (2022). Implementation of road traffic crash injury surveillance tool in a trauma referral hospital in Kisumu City, Western Kenya: Lessons learned from the pilot study. *Traffic Injury Prevention*, *23*(1), 1–6. https://doi.org/10.1080/15389588.2022.2115295

Terefe, B., Jembere, M. M., & Liyew, B. (2025). Road traffic accidents and its determinants among Kenyan households: Analysis of the 2022 national health survey using multilevel modeling. *BMC Public Health*, *25*(1), Article 2383. https://doi.org/10.1186/s12889-025-23605-3

UNDRR. (2019). *Global assessment report on disaster risk reduction 2019*. United Nations Office for Disaster Risk Reduction. https://www.undrr.org/publication/gar19

UNDRR. (2024). *Global status of multi-hazard early warning systems report*. United Nations Office for Disaster Risk Reduction.

UNDRR. (2023). *Global assessment report on disaster risk reduction 2023*. United Nations Office for Disaster Risk Reduction.

WHO. (2022). *Disasters and emergencies definitions training package*. Pan.

World Bank. (2020). *Kenya country climate and development report*. World Bank. https://openknowledge.worldbank.org

World Bank. (2021). *Kenya country climate and development report (CCDR)*. World Bank.

Zhou, S., & Zhai, G. (2023). A multi-hazard risk assessment framework for urban disaster prevention planning: A case study of Xiamen, China. *Land*, *12*(10), Article 1884. https://doi.org/10.3390/land12101884