

African Natural and Man-Made Disasters: The Management of the Continent's Nemesis

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Abstract— Disasters have been occurring since time immemorial and have significant economic and social impacts, causing direct damages and long-term economic losses requiring large fiscal outlays for reconstruction and recovery in Africa. This paper reviews the state of disaster management in Africa and how African countries can best strengthen their disaster preparedness and response capabilities. The review examines disasters that have occurred over the past five decades (1970–2023), including natural disasters (droughts, floods, cyclones, earthquakes, volcanoes, heatwaves, wildfires), man-made disasters (conflicts, insurgencies), and health emergencies (epidemics, pandemics, drug abuse). The research is based primarily on a qualitative literature review of secondary data sources, including journals, handbooks, working papers, government documents, and conference proceedings. The findings reveal that Africa faces a convergence of environmental, economic, and social vulnerabilities that reduce the capacity of individuals and communities to secure and protect their livelihoods. About 1,700 natural disasters have been reported in Africa over the past five decades, causing economic losses of approximately US\$38.5 billion and over 750,000 deaths. The paper concludes that while disasters cannot be prevented, disaster management can be reinforced to reduce mortality and suffering. Strengthening early warning systems, enhancing institutional frameworks, promoting regional cooperation, and addressing underlying vulnerabilities are essential for building resilience and reducing disaster losses in Africa.

Keywords— Africa, Climate change, Disaster occurrences, Disaster management, Pandemics, Conflicts, Drug abuse, Vulnerability, Resilience, Emergency management.

I. INTRODUCTION

This paper discusses the state of disaster management and how African countries can best strengthen their disaster preparedness and response capabilities. The paper reviews disasters that have taken place over the past five decades, covering the period from 1970 to 2023. Disasters have been occurring since time immemorial, but their impacts are being felt more acutely now than ever before [1]. Globally, the incidence of disasters appears to be increasing, and the number of vulnerable persons in disaster-prone areas, particularly in Africa, is also rising at alarming levels [2].

Disasters have significant economic and social impacts, causing direct damages to public and private property, resulting in short-term and long-term economic losses requiring large fiscal outlays for reconstruction and recovery, and further fueling the disaster risk and poverty nexus [3]. As societies have become more complex, it is evident that people are increasingly responsible, directly or indirectly, for the consequences of events previously ascribed to forces beyond their control [4].

Natural disasters include weather phenomena such as tropical storms, extreme heat or cold, winds, floods, earthquakes, and volcanic eruptions [4]. Disasters caused by humans include transportation accidents, industrial accidents, conflicts, and the collapse of poorly constructed buildings [4]. Reports state that the annual cost of natural disasters from 1980 to 2023 was approximately US\$60.81 trillion annually [5]. According to reports in 2023, man-made disasters have caused economic damages worth approximately US\$9 billion per annum [6].

II. BACKGROUND

The vulnerability of African countries to disasters is caused by a combination of environmental, economic, and social factors that negatively reduce the capacity of individuals to secure and protect their livelihoods [7]. Government assistance in such situations is often limited by already severe financial burdens, and recovery planning is often difficult. Consequently, only some national governments can assist all poor communities [2]. In 2022, the Emergency Event Database (EM-DAT) recorded 387 natural hazards and disasters worldwide, slightly higher than the average from 2002 to 2021, which was 370 [8]. The 2022 disasters resulted in the loss of 30,704 lives and affected 185 million individuals worldwide, and economic losses totaled approximately US\$223.8 billion [8]. Heatwaves caused over 16,000 excess deaths in Europe, while droughts affected 88.9 million African people [8].

Disasters cause significant losses to crops by directly damaging or destroying them and indirectly disrupting markets, infrastructure, and supply chains, ultimately affecting livelihoods and food security [17]. Extreme weather events such as droughts and floods reduce crop yields and shrink harvested areas. Similarly, disasters pose significant threats to animals, resulting in death, injury, and habitat loss [2]. However, many species have developed adaptive strategies to survive, such as sensing impending danger or seeking shelter in safer areas [2]. The prevalence of disasters in African countries, especially droughts and famines, is attributed to poor planning compared to the European Union (EU) countries, where there is no risk of food shortages due to the well-established EU agricultural sector supported by the EU Common Agriculture Policy [9].

It is anticipated that between 1990 and 2019, Africa alone suffered at least 1,107 floods and droughts, leading to US\$14 billion in damage to crops, livestock, and property [10]. In East Africa, the number of internally displaced populations is on the rise, with South Sudan leading with 281,000, Kenya 40,000, Tanzania 38,000, and Uganda 23,000 [11]. Terrorism is a new phenomenon on the continent currently fueled by the globalization of arms and trade and has contributed significantly to the escalation of conflicts in Africa [12].

III. PROBLEM STATEMENT

Disasters in Africa often take a significant toll on vulnerable populations consisting of more than 761.39 million people (the majority of whom live in makeshift accommodation), and the loss of life and livelihoods in the face of already existing challenges sets communities back, leaving them at risk when disasters occur [13]. African countries need more information to enable risk-informed decisions. While the magnitude and intensity of disasters are increasing in the region, the national capacity to systematically record disaster losses and damage is low [11].

About 1,700 natural disasters in Africa have been reported between 1970 and 2019, causing economic losses of around US\$38.5 billion and causing over 750,000 deaths [14]. Africa's droughts significantly affect human health, destroy crops, and hurt other economic sectors like mining and electricity generation [15]. Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) in Africa is also one of the most significant humanitarian catastrophes and has killed millions of people and led to serious social problems, which include the growing number of orphans (for example, in South Africa 1.7 million, Mozambique 1.2 million, and 670,000 in Malawi) and economic consequences [16].

Outbreaks of diseases such as Ebola, yellow fever, anthrax, measles, malaria, and cholera have also been on the increase since 2000 [17]. Large-scale natural and human-made disasters cause severe destruction of lives and livelihoods by creating serious disorders and affecting people's social and economic well-being [18].

IV. METHODOLOGY

This research review seeks to highlight the management, or lack of management, of disasters (natural or man-made) in Africa. It examines various forms of disasters and their environmental, economic, and social impacts on the continent's population. This qualitative research review is based primarily on literature review from secondary data sources. Since the review is qualitative in nature, the research methods have been used to gather primarily non-numerical data and find meaning, opinions, and underlying reasons from various sources. It is based mainly on, concerned with, and verifiable by observation and experience. Theories on natural and man-made disasters and disaster management are scrutinized to confirm and understand statements and comments attributed to natural and man-made disasters.

The literature is drawn from journals, handbooks, working papers, published and unpublished theses, and publications from global scenarios of disaster occurrences and their manifestations, including conferences, seminars, and government documents drawn from Africa and the world. The paper defines perceptions of global disaster management, examines epidemics and

pandemics (focusing on ways to manage them), and covers conflicts, cyclones, floods, droughts (including the El Niño phenomenon), wildfires, and drug abuse, leading to recommendations and conclusions.

V. LITERATURE REVIEW

5.1 Disasters

Disasters are defined as severe and aggressive damage to property, loss of lives, and disruptions that affect the functioning of a community and exceed its capacity to cope using its resources [19]. Disasters are caused by man-made, natural, and technological hazards, as well as various factors that influence the exposure and vulnerability of a community [19].

5.2 Emergency Management Theory

Emergency Management Theory is a disaster and risk management theory propounded by David McEntire, an American expert in emergency administration [20]. The theory was created to provide a realistic, proactive, and reactive paradigm for the management of disruptive and hazardous phenomena, especially after the insurgent attacks on the Pentagon and World Trade Centre in September 2001 [20]. The Emergency Management Theory suggests that disastrous emergencies are inevitable in society and tend to cause unrecoverable effects unless responsible, immediate, and urgent actions are taken to prevent, respond to, recover from, and mitigate these emergencies [20].

The Emergency Management Theory further states that unless these measures and the strategies for carrying them out are put in place, society is doomed to be marred by unrecoverable emergencies that will threaten its existence [20]. The theory also holds that if the human species and society do not want to be likened to extinct animal species, they should evolve proactive, reactive, and post-emergency measures and plans to prevent disastrous emergencies and their effects head-on [20]. Adopting measures should align with the nature of the disaster and conform to the essential principles of preparedness, response, recovery, and mitigation [20].

The measures to curb emergencies and their effects from destroying and ruining society should be taken before a disaster occurs in preparation for any eventuality of disastrous nature, and measures should be taken to eliminate, suppress, and minimize the effects of an already occurring disaster [20]. The measures should also be able to help disaster victims at the time of disaster occurrence in terms of disaster rescue and measures taken to normalize the area affected by the disaster and disaster-affected victims [20].

5.3 Disaster Management Cycle

Disaster management encompasses measures, programs, and activities that can be taken up before, during, and after a disaster to circumvent it, minimize its impact, or recover from its losses [21]. The three critical stages of activities taken up within disaster risk management include:

Pre-disaster: Activities taken during this stage are meant to minimize human and property losses caused by a potential hazard, and some of the initiatives include carrying out awareness campaigns, strengthening the existing weak structures, and preparing disaster management plans at household and community levels [21]. The measures taken under this stage are typically considered mitigation and preparedness activities.

Mitigation activities eradicate or diminish the chance of disaster occurrence or lessen the effects of inevitable disasters [22]. Mitigation largely depends on the integration of appropriate measures in regional and national development planning, and it largely depends on the readiness of information on emergency risks, hazards, and countermeasures to be taken [23].

In terms of preparedness, a well-prepared response is very effective, and preparedness addresses the strategy already in place that allows the implementation of a successful operational response [22]. The principle objective of emergency preparedness programs is to achieve an acceptable level of readiness to react to any emergency through programs that strengthen the managerial and technical capacity of governments, communities, and organizations [24].

During a disaster: During this stage, the plans taken are meant to ensure that the needs and provisions of the victims are met and that suffering is minimized. These activities are known as emergency response activities [21]. Emergency response mainly focuses on providing immediate assistance to improve health, maintain life, and support the confidence of the affected population [23]. The type of assistance under response initiatives includes the provision of temporary shelter, transport, and food to establish semi-permanent settlements in camps and other locations [25].

Post-disaster: These are activities taken as responses to a disaster. They are meant to ensure early recovery and rehabilitation of the affected communities just after a disaster strikes, and these activities are known as recovery activities [26]. Recovery activities continue until all systems become better or return to normal, and both short-term and long-term measures include temporary housing, returning vital life support systems to minimum operating standards, health and safety education, counseling programs, reconstruction, public information, and economic impact studies [23].

5.4 An Overview of Disasters in Africa

5.4.1 Epidemics and Pandemics

HIV/AIDS (Pandemic): HIV/AIDS is one of the biggest humanitarian disasters of our time. It has devastating social and economic implications and is still one of the most important societal challenges [16]. It is estimated that at least 25.5 million people living with the infection reside in Sub-Saharan Africa, and in 2016, there were 730,000 HIV/AIDS-related deaths in the region. The countries most affected by the epidemic include Botswana, Kenya, Lesotho, Malawi, Namibia, Nigeria, South Africa, Swaziland, and Zimbabwe [16]. South Africa is the hardest-hit country, with at least over 7 million people living with the virus.

It has been established that there are at least 1.7 million AIDS orphans in South Africa, 1.2 million children in Mozambique, and 670,000 children in Malawi, all of whom have lost one or both parents to the virus [16]. HIV/AIDS has resulted in the average life expectancy of many African countries decreasing, the number of people living below the poverty datum line increasing, loss of labor, reduction of production (especially in agriculture), rising health spending which weighs on public budgets, a decrease in tax revenues, and a reduction in economic growth [16].

COVID-19 (Pandemic): Another notable pandemic in Africa is COVID-19, which spread rapidly in March 2020 and claimed over 250,000 lives, with over 14 million cases recorded as of November 2022 in the region [27]. COVID-19 was a significant threat to many societies and economies, and this pandemic exposed inequality in health, economy, security, and social protection and intensified gender inequality in Africa [28]. Some health system challenges that COVID-19 intensified include the disruption of routine immunizations, diagnosis and treatment of other diseases, and maternal and child healthcare [29]. COVID-19 also intensified food insecurity in areas with conflicts or natural disasters, and tens of millions of people in African countries were pushed into extreme poverty by this pandemic [28].

Cholera (Epidemic): Cholera is also one of the epidemics ravaging African countries. It is an acute, extremely virulent infection that spreads rapidly and causes dehydration, which then results in high mortality and morbidity [30]. It is estimated that 26,000 cases and 660 deaths were reported as of 29 January 2023 in ten African countries facing the outbreak since the beginning of the year [31]. In 2022, nearly 80,000 cases and 1,863 deaths were recorded in 15 affected countries [31]. It is anticipated that if the fast current trend prevails, it could surpass the number of cases recorded in 2021, which was the worst year for cholera in Africa in nearly a decade [31]. Most cases were recorded in Malawi, Mozambique, and Zambia, and in East Africa, Ethiopia, Kenya, and Somalia were also affected [30].

Ebola (Epidemic): Ebola, a hemorrhagic fever caused by a virus, has affected African countries since its first appearance in 1976 in South Sudan and the Democratic Republic of Congo [32]. West African countries that were seriously affected by Ebola between 2014 and 2016 include Guinea, Liberia, and Sierra Leone. More than 28,000 cases were recorded, and more than 10,000 deaths and 10,000 survivors with after-effects [33]. It is estimated that the economic burden of the Ebola epidemic in West Africa ranges from US\$2.8 billion to US\$32.6 billion in GDP loss, and the overall economic and social burden of the 2014 Ebola epidemic has been estimated at US\$53.19 billion [34].

5.4.2 Conflicts

According to [35], a conflict is best described in four ways, including antecedent conditions of conflictual behavior (such as scarcity of resources or policy differences), the affective states of individuals involved (such as tension and hostility), the cognitive state of individuals (referring to their perception or awareness of the conflictual situations), and lastly, the conflictual behavior ranging from passive resistance to over-aggression [35].

Conflicts in Africa are caused by several factors, such as arbitrary borders created by the colonial powers, corruption, poverty, climate change, and the heterogeneous ethnic composition of African states [36]. Conflicts primarily result in the displacement of people. It has been noted that the number of documented persons of concern from Africa, inclusive of internally displaced persons, asylum seekers, and refugees, has more than tripled, rising from 5 million in the 1980s to 18 million in 2017, with

more intense conflicts generally implying larger displaced populations [37]. In 1994, over 1 million Tutsis were killed by the Rwandan government during the Rwandan genocide [37]. This disaster recorded the highest number of fatalities in Africa from any one-sided event recorded since 1989, as well as the most significant number of fatalities from any conflict event, regardless of the nature of the conflict [38].

Insurgency in Africa has been on the rise, and it is an evolving global problem and is one of the most intricate and demanding security challenges for the international community [39]. According to the Global Terrorism Index 2023 report, the Sahel region is now the epicenter of insurgency [40]. The report brings to light that at least 22,074 people have died in 6,408 insurgent attacks between 2007 and 2022 in Africa [40]. Most of the insurgent attacks, particularly in Burkina Faso, have been attributed to unknown insurgents. However, Daesh and Al Qaeda and Daesh/ISIS, which is linked to a group of Muslims, are also active [39]. Burkina Faso, Mali, and Niger, in particular, have experienced continued attacks from insurgents, and the Liptako-Gourma border area among the three countries remains highly volatile to insurgent threats [41].

One of the most prominent insurgent organizations in Africa is Boko Haram, which was established in Borno State, northern Nigeria, in 2002 as a domestic Islamic religious group [40]. The Boko Haram insurgency resorted to deadly violence due to differing religious ideologies in northern Nigeria as a tactic to counter non-Islamic ideology and influence the introduction of Sharia law [42]. Boko Haram has carried out more than 3,416 insurgent events since 2009, leading to more than 36,000 fatalities [43]. Boko Haram has been involved in sophisticated and diverse methods of warfare, and this has led to the mass forced displacement of over 2 million people who have crossed borders to other countries [43].

The Al-Shabaab insurgency has also considerably contributed to instability on the African continent and further polarized Somali society, which is already divided [40]. The Al-Shabaab insurgent group has remained a notorious group and creates severe security threats in Africa. The Al-Shabaab insurgent group is in charge of most rural parts of south and central Somalia, and the presence of this group has been felt in the country through intimidation and fear tactics [40]. Over 68 million civilians were displaced at the end of 2017 due to armed conflict between Al-Shabaab and the Somali army [40].

In Mozambique, the Cabo Delgado extremist insurgency known as Ansar Al-Sunna WaJamma (ASWJ) has been ongoing since October 2017 [44]. The alleged Jihadists targeted the Mozambican coastline and have carried out indiscriminate attacks in the Northern Province of Cabo Delgado, with the capture of coastal towns Mocimboa Da Praia in 2020 and Palma in 2021 being essential markers for the insurgents [44]. The intensive conflict, which has spanned more than five years, has resulted in 4,000 deaths and 800,000 internally displaced persons [45].

5.4.3 Cyclones and Floods

Climate change in Africa has led to increased rainfall associated with tropical cyclones [46]. Storm Daniel ravaged Libya in September 2023 and left more than 5,300 people dead as of 14 September 2023, and the death toll was expected to rise to 20,000 after heavy downpours hit eastern Libya [47]. The heavy rains accompanying Storm Daniel affected areas including Derna, Benghazi, and Tobruk, resulting in the collapse of two dams and sending waves more than 6 meters through the heart of Derna, leaving 10,000 missing and more than 7,000 wounded [48]. Most deaths could have been avoided if better warning systems had been in place [47].

The most damaging cyclones in Africa in the past few years include Cyclone Idai and Cyclone Kenneth, which hit Mozambique hard in March and April 2019 [46]. Cyclone Idai had more than 1,500 fatalities in Malawi, Mozambique, and Zimbabwe, and many more were missing [46]. In 2023, Cyclone Freddy hit Southern Africa and killed more than 500 people, mainly in Madagascar, Malawi, and Mozambique [49]. Cyclone Freddy lasted for more than a month, and it was recorded as the longest storm in history for its accumulated energy and cycles of intensification [49].

Flash flooding from heavy rains in Ethiopia and Somalia in 2023 killed dozens of people and affected more than 300,000 people [50]. The damaging flooding came after the East African region experienced almost three subsequent years of extreme drought [50]. In the Ethiopian Highlands, heavy rains overtopped the banks of the Shabelle and Juba rivers, and homes, schools, and health facilities were destroyed along the banks of the two rivers in Southern Somalia and Eastern Ethiopia, with more than 1,000 hectares of cropland destroyed [50].

Severe cyclones struck Madagascar, Malawi, and Mozambique in January and February 2022; these were Cyclone Ana and Cyclone Batsirai [51]. Cyclone Ana was characterized by strong winds and heavy rains and caused much damage and destruction to parts of Madagascar, Malawi, Mozambique, and Zimbabwe [51]. At least 21,000 people were affected by the cyclone, destroying schools and health centres in Mozambique [52]. Cyclone Batsirai followed, striking the south coast of

Madagascar, resulting in 94 deaths and affecting 116,000 people [53]. Mananjari was one of the towns in Madagascar that was severely affected by Cyclone Batsirai, where five health centres were destroyed, and rescue operations were complex to conduct since most roads were blocked [53].

In 2019, Cyclone Idai ravaged Madagascar, Malawi, Mozambique, and Zimbabwe; it brought strong winds and widespread flooding, which ripped apart roads, bridges, houses, schools, and health facilities and submerged large agricultural land [55]. In Zimbabwe, Cyclone Idai was characterized by flooding and landslides, which affected 270,000 people and left many people dead and others missing [54]. Chimanimani and Chipinge districts were the most affected, and roads and bridges collapsed, making the areas inaccessible. Cyclone Idai affected 840,000 people in Mozambique and 740,000 in Malawi [55].

5.4.4 El Niño Phenomenon and Droughts

El Niño phenomena cause unpredictable weather patterns to escalate in Southern and East Africa, which causes droughts [56]. El Niño refers to warming of the ocean surface or average sea surface temperatures in the central and eastern tropical Pacific Ocean [57]. The low-level surface winds, which generally blow from east to west along the equator (easterly winds), instead weaken or, in some cases, start blowing in the other direction from west to east (westerly winds) [57]. The El Niño phenomenon will mostly lead to reduced planted areas and delayed planting, resulting in depressed yields [58].

The most significant impact of El Niño events is mainly prevalent in Southern Africa, and its secondary impacts include a slowdown in agricultural and industrial activities, food insecurity, food price inflation (which will impact low-income households), limited water availability, and poor pasture conditions (which in turn affect livestock) [58]. Ethiopia is in the grips of its worst drought over the past five decades due to poor rainy seasons heightened by the effects of El Niño. As a result, crop failure and lack of rainfall directly impact 80% of the population who depend on agriculture for food and income [56]. In 2016, it was reported that 10.2 million people in Ethiopia required food aid, and 2.2 million cases of moderate acute malnutrition were predicted [56].

An estimated 5.8 million people needed emergency water supplies, and young children bore the cost of the crisis too, as schools were closing down, and most of them were missing school days to help their families fetch water [56]. In Malawi in 2016, a national disaster was declared because of drought and failed harvests, and it was estimated that at least 4 million people needed assistance to take them through to the following year [56]. Most families in Malawi were faced with severe food insecurity, and at least half of the children in Malawi were stunted due to malnutrition [56].

Mozambique recorded that over 1.5 million lives were threatened by hunger due to the drought experienced in 2016, and the government declared a state of national disaster [56]. This resulted from poor rainfall, which led to widespread crop failure and rising prices of staple food, thereby limiting access to food and leading to food insecurity. In Somalia, seasons of failed rains were exacerbated by the El Niño phenomenon, resulting in several droughts, and the situation reached emergency levels. Food security issues are a cause of concern in Somalia, and the prolonged dryness in Somaliland has resulted in livestock deaths and depleted water sources [56].

Harvey [59] perceives that at least 50 million people in the Horn of Africa are affected directly by drought, and another 100 million in the wider area. As families face acute food insecurity, many have left their homes in search of food, water, and pasture for animals [60]. At least 44 million people require assistance, and 180,000 refugees have fled Ethiopia, Kenya, Somalia, and South Sudan, which have been affected by drought; this has primarily been attributed to global heating, which has made the soil and pastures of the region much drier than they would usually be [61]. The more people are food insecure, the more they have limited choices between food and healthcare. Most of the time, nutritional deficiencies make them increasingly vulnerable to diseases [60]. A super El Niño is predicted in 2026/27.

5.4.5 Earthquakes

In Africa, seismicity is considered to be modest by world standards, and seismic activities tend to vary from region to region. That is, some regions are still considered to be aseismic, while others have witnessed disastrous seismic events [62]. Seismic events in seismic-prone regions are connected to tectonic activities, which affect the structure of the earth's crust, resulting in disturbances on the earth's surface [62]. The most outstanding tectonic feature on the continent is the East African rift system, one of the world's typical examples of continental rifts on land [63]. The rift system in Eastern Africa extends from the distant triangle of the Red Sea and Gulf of Eden through North Africa to Southern Africa. It is the bedrock of most seismic activities in the continent's northern, eastern, and southern parts [64].

A powerful earthquake struck Morocco's High Atlas Mountains on 9 September 2023, and it was recorded as the deadliest quake to hit the North African country in decades [65]. The earthquake measured 6.8 magnitudes on the Richter scale, and more than 2,000 people lost their lives, mainly in Marrakech and five provinces near the epicenter [66]. At least 2,059 people were injured, 1,404 critically, and the total toll was on the increase as rescuers struggled to bypass boulder-strewn roads to the remote mountain villages that were hit hardest [66].

In 1992, an earthquake occurred in Cairo (Egypt) and resulted in more than 500 human casualties, and there was massive damage to structures, including domestic settlements and historical monuments [67]. Algeria is also another country in Africa that experiences seismic activities [68]. In 2003, an earthquake of 6.8 magnitude on the Richter scale was recorded in the Bourmedes region, Central Algeria, and the impact was felt in Algiers, Tizi-Ouzou, Bouira, and Blida and as far as the Mediterranean Spanish Coast [68]. The earthquake was considered the worst in the history of the country, and there were over 2,280 fatalities recorded, more than 10,000 people were injured, and hundreds of people went missing [68].

5.4.6 Volcanoes

Volcanoes happen when tectonic plates come together or separate, but they also occur in the middle of plates due to volcanic hotspots [19]. Over 100 young volcanoes that have had activity in the past 10,000 years dot the landscape of the East African rift. This area runs over 3,000 kilometers from Djibouti and Eritrea through the Democratic Republic of Congo, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda [69]. Volcanoes in East Africa are inactive but believed to erupt in the future, though 25% of Africa's volcanoes have erupted in the last 100 years [69].

One of the most active volcanoes in Africa and one of the most dangerous in the world erupted in May 2021 [70]. The lava flow from the Nyiragongo volcano flowed to the northeast of Goma in the Democratic Republic of Congo. The lava destroyed houses, schools, and the city's main water reservoir in its path [70]. Reports state that more than 3,500 houses, seven schools, and four health centres were destroyed, nearly 200,000 people were left without access to drinking water, and around 234,000 people were displaced in the days following the eruption in Minova, Sake, Rutshuru East, and Goma [70]. The volcanic eruption also separated many children from their parents in the areas affected.

In 2002, the Nyiragongo volcano erupted, and its lava flowed into the city of Goma, killing 250 people [71]. The volcano displaced over 400,000 and destroyed 20% of the city [72]. The eruption surprised everyone, and the confusion and lack of preparedness made disaster management complicated in the early hours of the crisis [73]. The lava flow devastated a densely populated area, and the intense seismic activity lasted several days [72]. Nabro, a volcano near the Eritrean–Ethiopian border, erupted in 2011, leaving seven people dead, and more than 12,000 people were left homeless. Regional air traffic was also disrupted for several days [69].

5.4.7 Heatwaves and Wildfires

Heatwaves are extended periods of unusually high temperatures and often high humidity, often resulting in fires [19]. Wildfires are causing damage to ecology and people as they ravage forests after being triggered by climate change and human factors [74]. The number and extent of forest fires are increasing, as are the greenhouse gas emissions and the overall temperatures of the planet [74].

More than 30 people were killed, and 1,500 were evacuated in July 2023 in wildfires that blazed across Algeria. Among those killed were ten soldiers who were trying to get the fire under control in the face of high winds and sweltering summer temperatures [75]. The wildfires were spread by strong winds and moved across forests and agricultural areas in 16 regions, causing 97 blazes in the North African country [75]. In July 2023, the fires also ravaged pine forests in Tunisia near its border with Algeria and forced at least 300 people to be evacuated by sea and land with temperatures nearing 50°C [76]. There was extensive damage near Nefza, west of the country's capital, Tunis. Around mid-July, wildfires occurred, and a border crossing had to be temporarily closed after 470 hectares of forests were burned [76].

Two large villages located 15 kilometers from Bakala, which is 458 kilometers from Bangui in the Central African Republic, experienced fires on the night of 24-25 February 2022, which caused considerable material and human damages [77]. The area experiences severe drought and very high temperatures at the end of the dry season between February and March, and this is the period during which fields go up in flames, spreading through the fields and vegetation to the buildings around [77]. The fire quickly spread to other nearby houses and was aggravated by the strength of the dry winds specific to the season and the savannah area. The fire continued until 26 February, and after a few hours, it started again on 28 February, affecting other

villages [77]. An assessment done by IFRC 2022 highlighted that 503 households were affected in the areas affected, with 28 partially destroyed houses and 17 people injured [78].

Fires broke out in large parts of Algeria, killing almost 40 people, including 12 people who died in a bus trapped by the flames [79]. Some residents lost homes to the flames, and authorities have been accused of being ill-prepared with few firefighting aircraft available. The people affected were in the El Tarf region near Algeria's border with Tunisia, an area sweltering in 48°C [79]. This incident resulted in 200 people suffering from burns or respiratory problems [79]. Tunisia in North Africa endured one of the worst heatwaves and fires in Africa in July 2022, where Tunis recorded temperatures above 48°C, breaking a forty-year record [80]. The heatwave and fires severely damaged Tunisia's grain harvest, leading to the farmers union predicting that output would fall well short of government hopes [80]. In Morocco during the same period, 1,000 hectares of forests burned in Larache and Ouezzane, and the country is struggling under intense droughts and temperatures have risen to 45°C [80].

5.4.8 Drug Abuse

The number of drug users in Sub-Saharan Africa is anticipated to increase drastically, and the region is likely to experience the most significant growth of drug users [81]. The progression of the multifaceted global illicit drug problem is currently determined by a range of factors driven by socio-demographic trends, which include populations' gender, age, and the rate of urbanization [82]. The drug menace in Africa has been attributed to high unemployment levels in Africa, and the rate at which drugs are being consumed is intriguing [83].

The other force behind the rapid use of drugs is the fact that Africa is still young, increasingly affluent, and rapidly urbanizing; hence, all these factors elevate the probability that a person will decide to use illicit substances [81]. Cannabis remains the most widely abused drug in Africa, while in other countries such as Sierra Leone, children and youth use substances like benzodiazepines, which include diazepam, chlorpromazine, different inhalants, and other drugs that are injected [82].

Zimbabwe is one of the African countries experiencing an increase in problematic drug use among its population, along with the related public health issues that accompany specific drug type uses [84]. The substances that are used in Zimbabwe include alcohol, cannabis, heroin, glue, and cough mixtures such as histalix and bronclear, but cannabis (mbanje) remains the most used drug mainly because it is grown locally or smuggled in from neighbouring countries like Mozambique and Malawi [84]. Moonshine, locally known as tumbwa or kozoda, and prescription drugs such as Diazepam, Ketamine, Pethidine, Morphine, and Fentanyl are also being used by drug addicts in Zimbabwe [83].

Methamphetamine, better known on the streets as (crystal meth or mutoriro), is also a powerful addictive stimulant being used in Zimbabwe. It affects the central nervous system and is being heavily abused by young adults, and a massive rise in demand was recorded during the COVID-19 period [85]. Apart from the imported drugs in Zimbabwe, locals are also flooding the market with cheap, highly intoxicating substitutes. There is also musombodiya, a colourless drink made from ethanol and emblematic powders [83]. Some drug addicts even go to the extent of dipping diapers and bleach products in boiling water and inhaling the vapours as intoxicants [83]. Drug abusers in Zimbabwe are taking anything they think will keep them euphoric or sedated, and cases of organic psychosis are on the rise [83].

In Kenya, residents in the various suburbs of Nairobi have complained about the increasing number of teenagers who have been chewing what is called locally khat whilst others smoke cigarettes and bhang, consume alcohol, and use other substances like jet fuel [85]. The abuse of drugs such as marijuana, methamphetamines, and opioids is also rampant in South Africa in recent years, and this has resulted in the rise of criminal activities, poverty, and health-related issues [86]. Many drug addicts in South Africa have resorted to criminal activities to finance their addiction, and this has led to an increase in theft and violent crimes. Drug addiction has also contributed to poverty in South Africa, as many individuals who are addicted to drugs find it difficult to take care of themselves and their families [86].

5.4.9 Boat Disasters

The most disastrous boat disaster that took place in Nigeria in June 2023 was when more than 100 people drowned after a boat carrying them down the river Niger capsized in southwestern Nigeria [87]. The boat was ferrying more than 300 people travelling from Kwara State to Niger State after attending a wedding, and the boat capsized after part of the vessel collapsed, causing water to flood the boat [87].

A boat carrying 200 passengers capsized in the northwestern Congo's Equateur province, and the boat was headed to Lilanga in the neighbouring Republic of Congo when it sank in the Lulonga River near the town of Basankusu, leaving 145 people

unaccounted for [88]. It has been reported that a lot of boat sinking has caused fatalities in the remote parts of the Democratic Republic of Congo, where travel by road is at times impossible [89].

At least 29 migrants from Sub-Saharan Africa died when their two boats sank off the coast of Tunisia as they tried to cross the Mediterranean to Italy in March 2023 [90]. It is also believed that in the same month of March 2023, 5 migrant boats sunk off the coast of the Southern city of Sfax in Tunisia, leaving 67 missing and nine dead after a significant increase in boats heading towards Italy [90]. Tunisia has taken over from Libya as a main departure point for people fleeing poverty and conflict in Africa, hoping for greener European pastures [90]. In October 2022, an estimated 75 people were killed in a boat when flooding of the Niger River caused it to tip over in Anambra State in Nigeria [91]. Boat accidents frequently occur in Nigeria because of overloading, speeding, poor maintenance, and disregarding navigation rules [91].

A rubber boat carrying dozens of migrants heading to Europe sank off the coast of Libya in April 2023, resulting in 55 people drowning, including women and children [92]. The boat was ferrying 60 migrants and had set off from the coastal town of Garabouli, East of Libya's capital, and the five migrants who survived the disaster were brought back to shore by the Libyan coast guard [92]. Another boat accident that occurred in Djibouti in 2021 killed 43 people after a migrant ship controlled by smugglers capsized off the coast of Djibouti [93]. The ship was packed with at least 60 migrants trying to return home to the horn of Africa, having fled from war-torn Yemen [93]. In March 2021, at least 80 migrants, including minors, were thrown overboard by people smugglers in the same waters, and more than five people were killed [93].

5.5 Challenges that Hinder Disaster Management in Africa

There are several areas of vulnerability to disaster management in Africa, and these include:

- **Limited fiscal resources and the scope to invest in disaster risk reduction measures.** Public spending on ex-ante investments in disaster risk reduction competes with other demands such as infrastructure development, health, defense, and debt service [3].
- **Lack of a collective regional approach when addressing disasters** [94]. This is evidenced by the response from Southern African Development Community (SADC) member states when Cyclone Idai hit the region in 2021. The regional body was unprepared, and member states have yet to learn much from earlier disasters [94]. During Cyclone Idai, out of the sixteen-member states, only Angola, Botswana, South Africa, Tanzania, and Zambia contributed to the relief efforts [94].
- **Weak and incomplete institutional frameworks** make it challenging to manage disasters, and there need to be more nationally developed, agreed-upon, and harmonized disaster management strategies, policies, and legal frameworks [94].
- **Africa's infrastructure to buffer against hydrometeorological events is limited** compared to other continents [3]. Transport infrastructure is poor, and schools and hospitals must be better built and maintained according to minimum standards to resist disasters such as earthquakes, cyclones, or floods [3]. Building standards in Africa should be enforced, which may result in higher costs for construction. The costs of reconstructing extensive infrastructure networks can significantly burden these economies [3].
- **Weak knowledge and information base to support disaster management** mainly due to a lack of awareness of disaster management among the public and some national authorities, lack of data and information, weak communication, inadequate inventory and exchange of best practices, unavailability of information about risks to support decision making, and inadequate research [94].
- **Providing health and other services in the African region is challenging** due to protracted humanitarian emergencies, poverty, lack of political commitment, and fragile health systems. Disease outbreaks are not detected early due to a lack of real-time surveillance, an optimal functional laboratory network, inadequate diagnostic testing capacity at national and peripheral healthcare levels, and inadequate human resources and technical and managerial capacities [95].

5.6 How Human Beings Can Improve Disaster Preparedness through Animal Behaviour in Determining the Occurrence of Disasters

Animal behaviour before disasters has prompted some researchers to devote severe scientific attention to the theory that animals may have built-in systems that alert them to impending natural disasters [96]. Some animals have empathetic senses of hearing or smell, while others can detect changes in atmospheric pressure or electromagnetic fields [97]. Many studies have shown that some animals can sense significant changes in the weather. For instance, birds are sensitive to air pressure changes and often hunker down before a big storm, and worms are known to flee rising groundwater [98].

In 2004, when the devastating Asian Tsunami occurred, local artificial early warning systems failed to raise any clear alerts, and a few hours before the Tsunami, some animals seemed to sense imminent danger and made efforts to flee [96]. Elephants ran for higher ground, flamingos abandoned low-lying nesting areas, and dogs refused to go outdoors in the coastal village of Bang Koei in Thailand [96]. Animals, which included cattle, birds, cats, and goats, deliberately moved inland shortly before the Tsunami struck and survived the disaster [99].

The research on how animals could predict disasters was conducted in Germany between October 2016 and April 2017. The study involved recording movement patterns of different animals, including sheep, dogs, and cattle, a process known as biologging on a farm [96]. This research was conducted in the earthquake-prone area of the Marches in central Italy, and collars with chips were attached to each animal, which sent movement data to a central computer every few minutes between October 2016 and April 2017 [96]. More than 18,000 earthquakes were recorded in the region, and the researchers found evidence that the farm animals began to change their behaviour up to twenty hours before an earthquake [96]. It was also highlighted that whenever the monitored farm animals were collectively 50% more active for more than 45 minutes at a stretch, the researchers predicted an earthquake above 4.7 on the Richter scale [96].

People have described unusual animal behaviour over the past centuries before seismic events whereby dogs tend to bark relentlessly, cow's milk let down is affected, and toads leap from ponds [100]. Some researchers have tried to establish a link between animal behaviour and seismic events. In a 2013 study, German scientists videotaped red wood ants that nested along a fault line and found that they had changed their usual routine before a quake, becoming more active in the evening and less active during the day [100].

VI. RECOMMENDATIONS

- **One of Africa's most crucial fundamentals of disaster management is the need to commit to early warning systems.** The investments are enormous as they have to focus on adaptation and resilience and information that allow countries to predict events such as droughts, heat waves, floods, and storms.
- **Investments in hydrometeorological services are another alternative for African countries to minimize disasters** since this helps people predict, understand, and warn citizens about hazards and disasters. The use of early warning systems helps communities deal with everything from volcanic eruptions to floods.
- **There is a need for Regional Economic Communities in Africa to work collectively to pool resources and mobilize disaster management efforts.** Secretariats for these regional economic communities must oversee these activities and ensure that funds for immediate humanitarian assistance and the reconstruction of infrastructure are available in a pre-existing disaster risk fund.
- **African countries must develop hazard risk maps and models identifying vulnerabilities** to help governments prioritize physical interventions. Strategic, innovative interventions must be built to reduce underlying risks and vulnerabilities.
- **African countries must enhance their capacity and capabilities to prepare for and respond to any public health event** that may threaten public health security by implementing international health regulations.
- **African countries must deal with the root causes of terrorism in the long run** by ensuring commitment to socio-economic progress and shared prosperity for all citizens. This can be done when governance reforms are included to strengthen public financial management, promote accountability and transparency in public service delivery, and combat corruption.

- **When it comes to the increasing number of drug users on the continent, there is a need to address the underlying causes**, which in most cases include poverty and unemployment, by providing education and job training programs so that individuals are empowered to break the cycle of addiction and poverty.
- **Early warning systems and heat action plans need to be put in place**, and these can be based on information from other countries with similar climates. Collaboration between local researchers, hospitals, and epidemiologists can identify direct health impacts of extreme heat. Simple procedures such as opening public buildings to provide cool rooms, distributing free drinking water, informing people about the dangers of heat, and early warning can reduce the damage considerably.

VII. CONCLUSION

Disasters cannot be stopped, but disaster management can be reinforced, aiming to reduce people's death rates and suffering. Disasters are amongst the main challenges facing Africa and not only lead to the loss of lives but also hinder the stabilization of local economies and prevent development. The economic costs of disasters have increased in Africa, where remediation funds are either lacking or limited. The high costs of dealing with the damages caused by disasters reflect the need to encourage disaster risk reduction, which lies in the strength of efficient disaster management and adaptation planning. The management of disaster risks largely depends on the strength of disaster management policies and strategies to prevent new disaster risks, reduce existing disaster risks, and manage residual risks, contributing to the strengthening of resilience and reduction of disaster losses.

The African Union can be tasked to set up a department to make Africa disaster prepared.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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