





Impacts of Tropical Cyclones Idai and Kenneth on Public Health in Southern Africa

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Abstract

Globally, extreme weather has negatively impacted on human health, particularly the burden of communicable and non-communicable diseases. Southern Africa experienced torrential rainfall caused by tropical cyclone Idai from 14 to 17 March 2019, followed by cyclone Kenneth on 25 April 2019. This chapter aims to document the public health impact of cyclones Idai and Kenneth in three African countries: Malawi, Mozambique and Zimbabwe. A mixed quantitative and qualitative methodology was utilized to gather information from the three countries. The impact of the cyclones on human health resulted in massive losses in human lives and health-related infrastructure and societal activities. All three countries had a lack of a back-up communication system for

warning and an emergency evacuation plan for towns. People infected with HIV who were displaced could not maintain access to antiretroviral medication which led to the discontinuation of treatment altogether. The long-term health impacts on other established health programmes, such as malaria, or nutritional programmes or the sequel caused by stress and post-traumatic distress disorder were not explored. Further research is needed to identify factors that improve community resilience to extreme weather as this mitigates against the negative impact of cyclones and flooding on health outcomes in the future.

Keywords

Cyclones · Idai · Kenneth · Public health · Southern Africa

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5.1 Introduction

Southern Africa experienced torrential rainfall caused by tropical cyclone Idai from 14 of March to 17 March 2019, a period followed by cyclone Kenneth on 25 March 2019. The two cyclones resulted in coastal flooding in the Comoros and Mozambique, as well as flooding and mudslides in Malawi and Zimbabwe, resulting in massive losses in human lives and health-related infrastructure and societal activities. While the imme-

diate public health impacts of cyclones Idai and Kenneth were acute and devastating, the long-term outcomes are still evolving and projected to last for decades to come.

Sustainable development goal (SDG) 3 and SDG 13 relate to healthy lives for all and fighting the impact of climate change, respectively. The advent of cyclone Idai personalized the intertwined relationship between these two sustainable developmental goals for southern Africa communities. Pre-cyclone Idai period, the world development indicators on mortality from non-communicable diseases for southern African countries were showing a declining trend. After the devastating trail of cyclone Idai in Malawi, Mozambique and Zimbabwe, the UN reported massive displacement of populations, loss of human life and infrastructure. Considering that some of the communities were yet to recover from the El Nino drought effects of 2018, the health trajectory for the communities affected by cyclone Idai are unlikely to meet the 2030 targets. Consequently, to prevent disease, prolong life and promote human health, understanding the link between extreme weather events to health is critical if alleviating efforts by society, organizations and individuals are to succeed in the southern African context.

Climate change and extreme weather events such as intense storms and flooding promote changes in the incidence and distribution of vector and water-borne disease, reduction in food availability, poverty and population displacement (Ryan et al., 2016). Communities become vulnerable to communicable and non-communicable diseases (Watts et al., 2015). Assessing the public health impact of cyclones Idai and Kenneth particularly among vulnerable communities informs strategies that improve resilience to extreme weather events in the future. This chapter aims to document the effects of tropical cyclones and floods on public health in southern Africa. The specific objectives were to document the impact of cyclone Idai on the short- and long-term patterns of the most common communicable and non-communicable diseases in three southern African countries, Malawi, Mozambique and Zimbabwe. A rapid assessment report of an HIV

programme in one of the affected districts Chipinge illustrated the impact of cyclone Idai on people living with HIV and the health system.

5.2 Background

5.2.1 Communicable Diseases: Malawi, Mozambique and Zimbabwe

As much as the meteorological and environmental impacts of climate change are well communicated and documented, their impacts on the health of the public are less documented. The impacts of extreme weather events may lead to communicable diseases, injuries and death (Hashim & Hashim, 2016). The public health impacts associated with extreme weather events (cyclones) are influenced by these five factors, namely severity, duration, surprise, differences in categories of the cyclones and differences between individual cyclones (WHO, 2008). This means that the more the cyclones with higher wind and speed (National Hurricane Centre, 2015), the greater the public health impacts will be and the longer the duration, the greater the period of exposure. If there were early warnings about the cyclones, the greater the emergency preparedness measures in place and hence there will be reduced public health impacts. The public health impacts of cyclones also depend on the categories and the differences between the individual cyclones (Hashim & Hashim, 2016).

Of immediate concern to public health practitioners is the risk of the transmission of communicable diseases following cyclones is caused by contaminated drinking water, poor sanitation, displaced and overcrowded populations and increased exposure to disease vectors (Karani et al., 2007). This may result in an increased number of communicable diseases such as cholera (Cambaza et al., 2019), acute respiratory diseases (Firger, 2017; Walker, 2018), leptospirosis (Lau et al., 2010; Haake and Levett, 2015), typhoid (Erickson et al., 2019), hepatitis (Davies et al., 2015) and malaria (Erickson et al., 2019). Table 5.1 gives details of the infectious patho-

Table 5.1 Infectious pathogens leading to communicable diseases as a result of cyclones

Pathogen	Infection caused by the pathogen
<i>Leptospira interrogans</i>	Leptospirosis
<i>Clostridium tetani</i>	Tetanus
<i>Salmonella typhi</i>	Typhoid
<i>Burkholderia pseudomallei</i>	Melioidosis
<i>Schistosoma haematobium</i>	Bilharzia
<i>Vibrio cholerae</i>	Cholera
<i>Influenza virus</i>	Flu
<i>Plasmodium falciparum</i>	Malaria
<i>Lyssavirus</i>	Rabies
<i>Cryptococcus neoformans</i>	Cryptococcal meningitis
<i>Shigella sonnei</i>	Shigellosis

Source: Davies et al. (2015), Bandino et al. (2015), Firger (2017), Saulnier et al. (2017), Tabuchi and Kaplan (2017), Boyer et al. (2018), Walker (2018), Centres for Disease Control and Prevention (2019), Erickson et al. (2019), Kraemer et al. (2019)

gens leading to communicable diseases as a result of cyclones.

5.2.2 Non-communicable Disorders: Zimbabwe, Malawi and Mozambique

The impact of extreme weather and climate change on non-communicable disorders are diverse and related to the local societal and environmental factors that affect disease burden. Over the past four decades, the frequency of natural disasters and the burden of non-communicable diseases (NCD) across the globe have been increasing (Benjamin 2016). The top conditions are coronary heart disease, stroke, mental health, type 2 diabetes mellitus, cancer, chronic obstructive pulmonary disease and chronic kidney disease. NCD is estimated to kill more than 38 million people each year, accounting for 70% of global deaths (WHO 2016). Among the vulnerable, at least 14 million die young and are aged between 30 and 70 years (WHO 2016). Mental health disorders are com-

mon in the aftermath of flooding and massive displacement. In particular, post-traumatic stress disorder was diagnosed in many people who lost loved ones or suffered injuries (Martin et al., 2016). The burden of trauma however remains ill defined.

Various mechanisms are postulated on how extreme weather impact on non-communicable disease (Frumkin & Haines, 2019; McMichael, 2013). Extreme weather threatens access to health care, essential treatment, water, food and shelter in the vulnerable, which can result in an exacerbation of existing conditions and preventable death. The holistic approach to public health focus of extreme weather management to include NCDs, as the long-term health impacts from extreme weather such a cyclone Idai linger long after the waters receded.

Extreme precipitation tends to damage walls when moisture enters structures and encourage mould growth. This negatively affected the quality of indoor air. When inhaled, the increased aeroallergens trigger allergic rhinitis and asthma (Johanning et al., 2014). A phenomenon known as ‘thunderstorm asthma’ occurs when outside aeroallergens are increased as a result of osmotic ruptures that occur when heavy precipitation coincides with the pollen season leading to a surge in aeroallergen concentrations and increasing the incidence and severity of allergic illness (Cecchi et al., 2010). The effects of such an event were demonstrated in Melbourne, Australia, in November 2016, when a thunderstorm led to 8500 people hospitalized for respiratory illnesses, overwhelming emergency health departments and ambulatory systems (Woodhead 2016). No report was made in southern Africa.

5.2.3 Mental Health: Malawi, Zimbabwe, Mozambique and South Africa

Exposure to extreme weather affects mental health as individuals experience the stress, trauma and displacement related to an event. Adults and children are equally affected. High prevalence of symptoms of depression, anxiety and suicide

were reported in the aftermath of hurricane Katrina (Galea et al., 2007). Extreme weather events contribute to mental illness, global burden of disease by the various mechanisms. One hypothesis attributes depression and anxiety to reduced physical activity due to extreme heat exposure (Mammen & Faulkner, 2013).

Identified risk factors for post-disaster depression in both wealthy and resource-poor settings include pre-extreme event mental and physical health, personality and beliefs, the extreme event experiences and availability of post-disaster support. The aftermath of hurricane Katrina was a case in point. A study conducted a few months after the disaster showed that at least 49% of those surveyed in New Orleans had a diagnosis of a mental disorder. Half of them suffered from post-traumatic stress disorder (Galea et al., 2007). The prevalence of depression was shown to have increased 2 years after the hurricane. It is important to note slow-moving climate-related disasters such as drought may also increase the incidence of anxiety, depression and suicide among resource-constrained populations (Mammen & Faulkner, 2013).

5.2.4 Food Security

The effects of extreme weather on crop yields and its impact on human health are complex and not understood in many cases. When small tributaries are involved as was the case in Zimbabwe and Malawi, the damage is intense as it is characterized by highly localized, short-duration and high-intensity rainfall. Floods tend to submerge vast treks of arable farmland and destroyed food crops. Loss of domestic animals, an important source of animal protein, leaves families destitute and at risk of under nutrition.

Climate change is resulting in the rising of sea levels, with the threat of saline intrusion of groundwater, particularly in coastal areas such as Beira. WHO/FAO suggest that the doubling of salt content above the recommended limits expose to high salt intake and this increases the risk of hypertension in adults, hypertension in pregnancy and preeclampsia as suggested by study findings in Bangladesh (Scheelbeek et al., 2017).

To determine the impact of cyclone and floods in three African countries (Malawi, Mozambique and Zimbabwe) and suggest outline measures to improve the resilience of public health to extreme events in the future, identification of direct, indirect and delayed elements is critical.

5.3 Methods and Materials

The study was conducted in three southern African countries (Malawi, Mozambique and Zimbabwe) after southern Africa experienced torrential rainfall caused by tropical cyclone Idai from 14 to 17 March 2019, followed by cyclone Kenneth on 25 April 2019. A mixed quantitative and qualitative methodology was utilized to gather health-related information from the three countries.

A desk study and consultation of key state and non-state actors were done as the first step to gather all the information needed. Primary data in Zimbabwe were also provided by Higherlife foundation, a philanthropic organization, and the Presbyterian Church. In-depth interviews were conducted with key informants at the affected health facilities. The interview questions were structured in such a way that only the necessary information needed for this study was collected. Participation in the interviews was voluntary, the identity and confidentiality of the participants were protected by not including the names of participants against their responses. In Chipinge, Zimbabwe, a rapid assessment of the impact of cyclone Idai on people living with HIV (PLVH) was conducted. Senior nurses at health facilities (HF) were interviewed on the effect of the cyclone on clinic workload, availability of HIV commodities and priority actions to support people living with HIV. Participants were encouraged to seek clarification from the researcher if the questions asked were not clear. Questions were also translated into the language that the participant understood better.

A convenience sampling technique was used to enrol participants. In the Chimanimani district, hospital records of common communicable diseases were reviewed and the impact of cyclone Idai on health outcomes was documented.

Descriptive summary statistics were used to analyse participants' sociodemographic characteristics and service delivery for people living with HIV.

Permission to collect health-related information and interview health workers was sought from the Ministry of Health and Child Care in Zimbabwe. The names of research participants were kept strictly confidential and they were only known to the researchers, and this encouraged the participants to be free and honest when responding to the questions.

5.4 Findings

Of the three southern African countries which experienced torrential rainfall caused by tropical cyclone Idai from 14 to 17 March 2019, followed by cyclone Kenneth on 25 April 2019, Mozambique suffered the greatest human and economic losses. The associated losses are presented in Table 5.2.

The exact figures of human fatalities remain under-reported as some whole families were swept away by the torrential rains to the Indian Ocean. Estimates of country mortalities are shown in Table 5.2. In the context of the southern African countries, the loss of human life might have been influenced by the high population density, styles of agrarian living and substandard pre-existing infrastructure which increase the risk of further loss.

5.4.1 Communicable Diseases and Responses in Malawi, Mozambique and Zimbabwe

In week 10 of 2019, seven cases of cholera were reported in Malawi (United Nations International Children's Emergency Fund, 2019). In response to the cholera cases, the WHO provided medical support to the communities in Malawi (WHO, 2019). Table 5.3 provides details on the estimated populations affected by the cyclone Idai in Malawi, Mozambique and Zimbabwe.

As of 8 April 2019, 3577 cholera cases and 6 deaths were reported in Mozambique with the main affected being Beira, Nhamatanda and Dondo [United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA, 2018)]. As part of the response to the outbreak, Mozambique implemented the 2018–2019 Mozambique Humanitarian Response Plan (UNOCHA, 2018). This plan has four major health-related response measures which are social mobilization campaigns for prevention, the establishment of treatment centres and units, coordination to ensure the improvement of water, sanitation and hygiene (WASH) and surveillance for the displaced populations.

The Ministry of Health in Mozambique also conducted a 6-day emergency cholera vaccination campaign (WHO, 2019). The WHO also deployed epidemiologists, logisticians and medical experts (WHO, 2019). The National Health Institute

Table 5.2 Human and economic losses due to cyclone Idai (UN 2019)

Country	Predominant weather event	Number displaced	Mean loss of life	Number of people injured	Confirmed cholera case	Confirmed cholera deaths	Mean loss in \$
Zimbabwe	Extreme precipitation, flooding and mudslides	16,000	344	200	0	0	613 million
Malawi	Extreme precipitation, flooding and mudslides	19,328	69	672	0	0	43 million
Mozambique	Coastal flooding	239,682	602	1641	6766	8	656–778 million

Table 5.3 Estimated populations affected by the cyclones

Country	Estimated population affected
Malawi	868,900
Mozambique	1,850,000
Zimbabwe	270,000

Source: European Centre for Disease Prevention and Control (2019)

(2019), the WHO and Centres for Disease Control and Prevention organized a short course on outbreak investigation in Mozambique. Cholera treatment centres were established in Pemba and Mecúfi cities in Mozambique in May 2019, with 50 beds and 16 beds respectively (National Health Institute, 2019). In Zimbabwe, 10,730 cases were reported from the beginning of the cholera outbreak on 5 September 2018 to week 10 of 2019 (WHO, 2018; Cann et al., 2013). As part of the response to the outbreak in Zimbabwe, medical supplies were delivered to the health facilities and 11 satellite clinics were established to provide emergency health services to affected communities (WHO, 2019). Established health programmes such as malaria, family health and HIV were disrupted.

5.4.2 Results of the Rapid Assessment for Impact of Cyclone Idai on People Living with HIV (PLHIV) in Zimbabwe

Chimanimani is a mountainous district located in the southeastern border of Zimbabwe and Mozambique. The area has 2 mission hospitals, 2 rural hospitals and 23 rural health centres. The torrential rainfall caused by cyclone Idai caused riverine flash flooding and landslides. It is estimated that 16,000 households were displaced and 250,000 persons affected. In Chimanimani district, before the cyclone, there were 8377 PLHIV on ART of whom 400 were children younger than 15 years, while in Chipinge 18,766 PLHIV were on ART with 427 children younger than 15 years. Before the assessment, the magnitude of disruption of HIV services in these two districts was

unknown, neither was the number of PLHIV affected. It is against this background that a rapid assessment, supported by UNICEF, was conducted in the Manicaland province situated on the Zimbabwean eastern border with Mozambique. Two out of seven most affected districts of Chipinge and Chimanimani were assessed to determine the impact of the cyclone on HIV services.

Senior nurses at health facilities (HF) were interviewed and information was gathered on the effect of the cyclone on their clinic workload, availability of HIV commodities and priority actions to support PLHIV affected by the cyclone and assess processes done to re-initiate clients without cards or whose medicines were washed away.

5.4.3 HIV Rapid Assessment Results

The findings from the rapid assessment are presented in Tables 5.4, 5.5, 5.6 and 5.7. Table 5.4 shows that most of the facilities reported no change in demand for ART medicines, condoms and treatment of opportunistic infections possibly because ART refill was for 3 months and as a result, most had their medicines except a few who had their houses washed away. The other reason could be that access to health facilities was reduced due to the damaged bridges and roads. Demand for food was high among most facilities because the effects of the cyclone had exacerbated the effects of a preceding drought. Demand for psycho-social support was high across most of the facilities, we had expected this considering the number of lives and property lost in this cyclone.

A higher number of facilities reported no change in terms of availability of medicines because medicines were immediately airlifted to the facilities soon after the cyclone (Table 5.5). Most of the medicines reported as reduced were not as a result of the cyclone, for example second-line ART medicines. A higher number of facilities reported diarrhoea and malaria; however, this could not be verified by records (Table 5.6). A higher number of facilities reported that patients

Table 5.4 How cyclone Idai affected demand for the following commodities and services

	No change	Reduced	Increased
ARV treatment	12	3	8
Condoms	13	3	7
Food security	7	2	14
Psychosocial support	8	0	15
Opportunistic infection treatment	15	3	5

Table 5.5 Cyclone Idai and the effect on the drug availability and supply

	No change	Reduced	Increased
ARV	13	4	6
PMTCT	15	3	5
Condoms	14	3	6
Medicines	9	6	8

Table 5.6 Health problems impacting people affected by cyclone Idai

Condition	Number of facilities
TB	1
Malaria	6
Diarrhoea	10
HIV related	3
Respiratory tract infections	10

Table 5.7 Cyclones and their effects on the day to day running of the health facilities

Variable	Frequency
Patients failing to access HF's as well as to referral hospitals due to damaged bridges	12
Lack of safe water supply	5
Increased workload	6
Lack of food	17
Lack of communication	6

were failing to access facilities due to damaged roads (Table 5.7). Other facilities were failing to also refer to complicated cases due to bad roads except those that were being serviced by a helicopter. Some facilities like Ngorima, Nyahode and Chimanimani clinics reported a high workload of clients because these were the most affected. Ngorima clinic lost a nurse, and a gen-

eral hand due to the cyclone. The only primary counsellor at the clinic was transferred after losing his family to the cyclone. Lack of clean water and food was also among the major challenges being reported at the facilities.

5.4.4 Obstetric, Newborn Care and Trauma

We were informed that there was a pregnant mother who had just delivery and had post-partum haemorrhage at Colonel Kaneta Temporary clinic. We summoned air rescue, but the site had no coordinates. We ended up carrying the mother across a shaky footbridge and we were so frightened. Eventually the mother was rescued at Ngorima clinic after hours of struggle. Said one of the Nurses at Ngorima clinic.

Damaged roads, bridges and flooded rivers reduced access to HF's resulting in some mothers delivering at home and some along the way. Some facilities reported a lot of post-delivery mothers missing scheduled reviews, while some pregnant women in waiting mothers' shelters failed to get food supplies.

In Chimanimani and Chipinge, as a result of the flooding, there was widespread destruction of infrastructures such as homes, boarding school buildings, roads and health facilities. People sustained severe injuries such as multiple fractures and lacerations. The vulnerable, women, children and the elderly were the most affected. Medical rescue response was slow in coming and initially, casualties were treated in the open fields. Air medical evacuations organized by the air force of Zimbabwe and volunteers to ferry the injured to tertiary centres where surgical operations could be conducted were delayed due to poor visibility as a result of persistent precipitation.

Ministry of Health officials reported a surge in off duty requests by healthcare workers attending to cyclone survivors, related to post-traumatic stress among the health workers. In Zimbabwe and Malawi unpublished reports from NGOs suggested an increase in the incidents of mental

health-related disorders in the communities affected by cyclone Idai (MOHCC 2019).

5.4.5 Nutritional Status Post Cyclone

The floods submerged vast expanses of arable farmland and destroyed food crops which were at the point of harvesting in some areas such as Chimanimani. In Beira, arable land swamped by salty sea water was rendered vast treks of land infertile. Domestic animals that provide animal milk and meat were also swept away to sea leaving families destitute. A rise in cases of child and adult undernutrition compared to national figures was reported as due to decreased maize yields and poor food security (Zimbabwe rapid impact and needs assessment, 2019).

5.4.6 Obstetric and Neonatal Outcomes

Women and children are the most vulnerable in natural disasters. No official figures were available from Malawi, Mozambique and Zimbabwe on the maternal and perinatal outcomes related to the effects of cyclone Idai. In the United States, they also demonstrated adverse birth outcomes including preterm birth, low birth weight and maternal complications (Auger et al., 2011). An isolated case is reported of a woman who gave birth in a tree after her home was swept away in Chimanimani.

5.5 Discussion

Cyclones Idai and Kenneth resulted in substantial loss of life, infrastructure and societal activities in Mozambique, South Africa and Zimbabwe. The health impact was exacerbated by identified major weaknesses on preparedness, emergency coordination and response. All three countries had a lack of a back-up communication system for warning and emergency operations and an evacuation plan for towns, particularly in low-

lying areas. Nursing staff in Chimanimani district even suggested creating a community level disaster management team for rapid response in future disasters.

Disaster management practices entail the following guidelines on effective floodplain management practices, urban planning, updated building codes to withstand intense tropical cyclone winds and construction of multi-purpose infrastructure to serve as shelters in cases of tropical cyclones and accommodation during floods. The consideration of structural measures for protection and management where appropriate mitigate against the devastation health impact of exposure to extreme weather such as hypothermia or heat stroke. Exposure to extreme events affects mental health as individuals experience the stress, trauma and displacement related to an event (Galea et al., 2007).

The high number of health facilities that became inaccessible due to damaged roads might reflect lack of road network maintenance by local authorities before the cyclones. The cyclones led to infrastructure breakdown which affected the healthcare system and the supply of medication in Malawi, Mozambique and Zimbabwe. This meant that people infected with HIV who were displayed could not have access to ART medication, interrupting treatment altogether. In general, the long-term discontinuation of the HIV treatment predisposes to the development of resistance to available anti-retrovirals and treatment failure (European Centre for Disease Prevention and Control, 2019).

The rapid assessment of the HIV programme in Chimanimani and Chipinge provided a baseline information necessary for planning for the future of PLHIV. Priority actions identified to support people living with HIV affected by the cyclone included food assistance, provision of safe water supply, psychosocial support, constant supply at ART medicines, construction of toilets at homesteads and support in adherence counselling. HIV screening for pregnant or lactating mothers as well as children was disrupted and needed to be strengthened. In contrast, long-term impact on other established programmes such as malaria, TB or nutritional programmes remains

unknown. Notably, some challenges such as the psychosocial impact of cyclones Idai and Kenneth were not documented in detail because the immediate priority for disaster-affected communities was food, water and shelter. Future disaster management programmes should engage the affected communities first to determine their priorities which were lacking in most areas.

Non-communicable diseases pose a significant financial burden on already stretched healthcare budgets and southern African nations' welfare. This is worsened by extreme weather conditions. Although a good deal of research has gone into understanding the health outcomes of extreme events, work is still needed on understanding the ability of health departments and healthcare facilities to respond to non-communicable disorders that arise from more frequent and intense extreme events. All three countries demonstrated gaps in the disaster response plans. Healthcare facilities need to maintain operations during and after extreme events as they treat the traditional patient population and those affected by the storm. By understanding these risks, facilities are better prepared for these adverse effects.

Human hardship indicators that identify economic losses and deaths due to extreme weather are easily available yet human hardship as a result of losses due to extreme weather are difficult to measure. As such, the impact of cyclone Idai on human hardship and health in Malawi, Zimbabwe, Mozambique and South Africa is yet to be understood.

Research is still needed to identify the various ways human health is affected by extreme events in a changing climate. Although many pathways between extreme events and health outcomes have been established, there is still a need to construct specific pathways that account for regional differences. Each location has its vulnerabilities and environmental concerns that might reduce or exacerbate health issues. Identifying these differences can help local public health officials develop the tools necessary for issuing effective early warnings or capitalizing on opportunities to mitigate impacts. A concept of UBUNTU is unique to southern Africa and should be explored in devel-

oping models for mitigation health resilience during extreme weather events. Understanding these pathways is especially important for indirect or delayed health effects, as demonstrated.

The study had the following limitations: The prevalence of long-term sequel of psychological disorders such as post-traumatic stress disorders was underestimated as this study was conducted over a short period of time. The burden of mortality is unknown as some bodies were washed off or buried in the mudslides. Information from some hospital files was incomplete and it was not possible to conduct rapid assessments of other health programmes due to cost. Human hardship indicators due to extreme weather were not evaluated, thus underestimating the extent of economic losses. Notwithstanding the above, this chapter contributes to the body of knowledge on the impact of cyclones Idai and Kenneth to public health in Malawi, Zimbabwe and Mozambique.

5.6 Conclusion

Cyclones Idai and Kenneth resulted in substantial loss of life, infrastructure and livelihood in Mozambique, Malawi and Zimbabwe. Established health programmes such as HIV were disrupted in Chipinge, Zimbabwe. The long-term sequel caused by stress and post-traumatic distress disorder was not explored. Further research is needed to identify factors that improve community resilience to extreme weather as this mitigates against the negative impact of cyclone and flooding on health outcomes in the future.

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