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District Health Sector Preparedness on Climate Change-induced Disasters. A Case of Mount Darwin District, Mashonaland Central Province.

RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTERS OF SCIENCE DEGREE IN CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT (MSc.CCSD)

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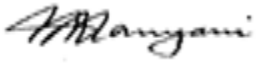

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DECLARATION

I Heaviness Pfidze do hereby declare that this dissertation is the result of my own research work, where others' ideas were used, they have been all and that it has not been submitted in part or full for any other degree to any University.

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DEDICATION

I dedicate this study to the almighty God who afforded me the opportunity to study and has taken me to this far end.

ABSTRACT

Evidenced by global trends happening climate change-induced disasters are increasingly prevalent, disturbing Africa Southern region and Zimbabwe in particular. Mount Darwin District of Mashonaland Central Province is no exception, facing challenges stemming from the impacts of climate change on health. Within the context of Mount Darwin District, the critical issue lies in the capacity of the local health system to sufficiently prepare for and respond to health crises exacerbated by climate change. Thus, a study was conducted to evaluate the preparedness of the District Health Sector in Mount Darwin District to handle climate change induced disasters. To achieve that researcher revealed literature from textbooks, journals, and articles aimed at assessing the awareness of public health practitioners regarding climate change-induced disasters and associated health risks. Additionally, it sought to evaluate the initiatives employed by the district health sector to bolster preparedness for climate change-related disasters and health challenges. The study encompassed approximately 257 district health workers, as well as individuals from Non-Governmental Organizations (NGOs) collaborating with the district health staff. The selection of study participants employed convenience sampling for key informants and random stratified sampling for the general population. Various tools such as interview guides for key informants, questionnaires for the general population, and observation checklists to assess resource availability and infrastructure were employed. Findings from the study discovered notable level of knowledge and understanding of climate change among individuals in the health district. The majority of respondents highlighted the frequent occurrence of droughts, heatwaves, veld fires, and cyclones in the district. Reported health risks associated with climate change-induced disasters ranged from drownings and fungal infections to respiratory problems, vector-borne diseases, waterborne illnesses, zoonotic diseases, and mental health challenges. Initiatives introduced by the district health sector, such as the installation of backup systems, resource budget allocations, and training programs, were noted. However, a significant number of respondents stated uncertainty regarding the availability and effectiveness of these initiatives in addressing climate change and health concerns. The study recommended targeted education and training programs, ongoing surveillance of climate change and health risks, prompt reporting of health-related incidents, and proactive engagement strategies to tackle concerns about resource availability within the District Health Sector

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DEHO	District Environmental Health Officer
DHPO	District Health Promotion Officer
DMO	District Medical Officer
DNO	District Nursing Officer
CeSHHAR	Center for Sexual Health HIV and AIDS

CHAPTER 1

1.1 Background of the study

One of the main goals of global public health structures is to prevent disasters. This involves meticulous planning coordination and capacity-building activities to guarantee efficient responses to a wide range of health emergencies such as natural disasters pandemics epidemics and other public health difficulties. There are common strategies and practices used globally to get ready for health-related mishaps even though specific approaches may also differ between countries and areas (Morfeld *et al* 2021). The World Health Organization (WHO) in 2018 emphasized the importance of studies and surveillance as well as evaluating the risks connected to climate trade variation bolstering early warning health systems enforcing vector-borne disease control measures with a focus on water control and sanitation and so on.

The impact of weather variation is evident on a global scale and presents a significant risk to accomplishing the Sustainable Development Goals (SDGs) of the United Nations. In systems aiming to execute SDGs 6, 7, 13, 14 and 15 efforts to address weather variability and decorate environmental sustainability are given priority. The need for urgent multisectoral actions to address weather change and guarantee sustainable improvement is emphasized by intelligence from the Intergovernmental Panel on Climate Change (IPCC) (Chen *et al* 2019).

According to the United Nations (UN) in 2017 there were excessive floods in West and Central Africa which resulted in significant losses in terms of people and property a high burden of traumatic illnesses and mortality rates in many nations (Rublee *et al* 2021). Along with factors like low-income inadequate healthcare infrastructure and harmful environmental conditions vector-borne illnesses are on the rise in Southern Africa in area particularly vulnerable to climate variability. Prior climate change-related disasters in Zimbabwe such as the Cyclone Idai in March 2019 and the flooding in February 2014 created crucial heath challenges. To address the health needs of impacted populations the Ministry of Health and Child Care (MoHCC) reacted by launching emergency medical services illness prevention health education and other crucial interventions (Morfeld et al 2021).

Zimbabwe has established laws rules and frameworks to manually handle disaster response and management in the health zone. The Civil Safety Act the nationwide catastrophe hazard

discount coverage the nationwide health approach that prioritizes catastrophe preparedness the countrywide health Emergency Response Plans that detail emergency reaction procedures and the crucial role played by the MoHCC in coordinating disaster response efforts in Zimbabwe are a few examples. In line with Nhamo and Manyurus 2019 findings Mashonaland East Province in Zimbabwe has chosen to reduce risks and strengthen resilience in the face of growing threats. It acknowledges the complex and challenging circumstances surrounding weather exchange and health. Weather changes effects and extreme weather events have made low-income communities more vulnerable endangering public health infrastructure service delivery and standard heath facilities. Proactive measures aimed at mitigating these demanding situations are essential for public health life and safety in the face of climate-related failures.

1.2 Statement of the problem

Despite the increasing recognition of climate change as a significant health threat, there is a lack of comprehensive understanding of the preparedness of district health systems in Zimbabwe to respond to climate change problems, (Nhamo and Manyuru 2019). In the context of Mount Darwin District, Mashonaland Central Province, the specific problem is the unknown capacity of the district health system to effectively prepare for and respond to health disasters induced or exacerbated by climate change. Therefore, this unknown can increase unnecessary morbidity and mortality in the event of climate change and health problems. This is particularly concerning given the projected increase in climate-related health diseases in the in the 20 first century such as increased malaria, rabies, human-wildlife conflict and schistosomiasis among others. Extreme weather events like floods, hurricanes, storms heat waves, droughts and changes in natural ecosystems, which include earlier flowering of plants, and poleward shifts in the distribution of several species are getting favourable conditions for vectors and parasite breeding. Drought had also led to water resource reduction leading to high incidences of water borne diseases, reduction in agricultural production which impacts food security culminating in increased malnutrition related diseases as supported. Therefore, the presence of these climate related events requires the existence of effective adaptation strategies and policies aimed at enhancing the resilience of the district health system. Hence, this research seeks to assess the current state of disaster preparedness in the district health system in line of these climate change projections.

1.3 Research objectives and questions

1.3.1 Main objective

To assess the level of preparedness of the District Health Sector on Climate Change-induced Disasters in Mount Darwin District, Mashonaland Central Province.

1.3.2 Specific Objectives

1. Determine the level of awareness on climate change induced disasters and health related issues/problems among public health practitioners in Mount Darwin District
2. Assess public health risks related to climate change induced disasters in Mount Darwin District
3. Assess the initiatives introduced by district health sector to enhance readiness for climate change- induced disasters and health related problems/issues.

1.3.3 Main research question

What is the level of preparedness of the District Health Sector on Climate Change-induced Disasters in Mount Darwin District, Mashonaland Central Province?

1.3.4. Research questions

1. What is the level of awareness on climate change induced disasters and health related issues among public health practitioners in Mount Darwin District?
2. What is the magnitude of public health risks related to climate change induced disasters in Mount Darwin District?
3. How effective are the initiatives introduced to enhance district health sector's preparedness for climate change induced disasters?

1.4 Significance of the study

The study's outcomes may contribute to the existing knowledge on district health disaster preparedness in the context of climate change. The study findings may inform policymakers, and relevant stakeholders about the strengths and weaknesses of the district's preparedness efforts and may also be extended to other district facing similar challenges. The evidence-based recommendations may also guide the development and implementation of targeted interventions, policies, and strategies to strengthen the district's health sector resilience to climate change impacts. Ultimately, this research aims at improving the district health capacity

to protect public health and enhance its overall preparedness for climate-related health emergencies. In the academia circles the study may be used as board of knowledge.

1.5 Delimitation

The study focuses only on the district health sector's preparedness and response capacities and provides a snapshot of disaster preparedness in the district. While other sectors, such as emergency management, agriculture, or infrastructure, may play a role in disaster preparedness, this study does not extensively cover their specific contributions or interactions with the health sector. Again, the study population will consist of all health personnel, village health workers, and key stakeholders within the mount Darwin District Hospital.

1.6 Limitations

Availability and accessibility of relevant data on climate change health impacts, health indicators, and district health infrastructure was incomplete, outdated, and insufficient. This limitation affected the comprehensiveness and accuracy of the assessment.

Time constrain on conducting a study within a specific time frame, such six months, limited the scope and depth of the research. As other aspects of disaster preparedness and climate change impacts require longer-term observation and analysis to draw meaningful conclusions.

Again, resource limitation such as constraints in terms of funding, personnel, and logistical support impacted the study's scope and implementation. Limitation on resources also affect the sample size, data collection methods, and the ability to conduct a comprehensive assessment of all relevant aspects.

Engaging relevant stakeholders, such as district health officials, community members, and policymakers, was crucial for a comprehensive assessment. However, limited participation or engagement from key stakeholders hindered the study's ability to capture diverse perspectives and gather comprehensive information.

The study was also influenced by external factors beyond the researcher's control, such as political, social, or economic changes. These factors impacted the implementation of disaster preparedness measures or the district's ability to respond effectively to climate change-related health risks.

The design used (cross sectional study) does not show a cause effect, but indicate the state of affairs at particular time which may warrant further studies. Cross sectional study is just a snap shoot therefore the findings only apply to the specific time period when the data was collected, (Thomas 2023). However, Lauren 2020 cited that, these limitations, was mitigated through, robust data collection methods, triangulation of data from multiple sources, and acknowledging the specific context and scope of the research. Transparency in reporting the limitations and their potential impact on the findings were important for the study's credibility and interpretation of the results.

1.7 Definition of terms

Climate change is a change in the state of the climate that can be determined by changes in the mean values and/or variability of its characteristics and that persists over a long period of time, usually decades or more (IPCC, 2007).

Vulnerability – the degree to which a system is vulnerable and unable to cope with the adverse impacts of climate change, including climate variability and extremes, (UNFCCC, 2007).

Preparedness plan A preparedness plan refers to a systematic and comprehensive set of actions, procedures, and measures developed by individuals, organizations, or governments to effectively anticipate, mitigate, respond to, and recover from potential emergencies, disasters, or crises, (Koeva and Rohova 2020).

Health preparedness plan it encompasses a range of activities aimed at enhancing the capacity and resilience of health systems to address various health threats and challenges, (Solomon and LaRocque 2019).

Climate change induced disasters Climate change-induced disasters refer to catastrophic events or occurrences that are directly or indirectly influenced by changes in climate patterns and conditions, resulting in significant environmental, social, and economic impacts, (Leo, Luhanga and Michael 2019).

CHAPTER 2

2.0 Literature review

The review of literature was done from text books, journals, articles, internet and other secondary sources as to have an insight on what other researchers and authors cited on district health sector preparedness towards climate change and health problems.

2.1 Theoretical framework

The Theoretical framework systems used the following, resilience theory, and health systems framework, to assess the district health's capacity on responding to natural disasters in the context of climate change. The case study focused on Darwin District in Mashonaland Central Province. Accordingly, structures or systems are seen by systems theory as linked entities whose components work together to form a whole (Koeva and Rohova 2020). Within the framework of this study, the health system in the region can be analysed as a complex system impacted by climate change. In light of the changing environment, this framework can assist in comprehending the interdependencies between various health system components, including staffing, policy, infrastructure, and community involvement.

According Grimm *et al* 2021, resilience theory concentrates on a system's ability to withstand, adjust, and bounce back from adversity. This framework can help assess district health systems' ability to withstand shocks, respond to climate-related disasters with effectiveness, and recover from them given the potential disasters brought on by climate change. The framework also looks at how well-built infrastructure, resource management, information technology, and community involvement all support resilience.

The health systems framework provides a thorough way to understand health care delivery, including all of its components, functions, and relationships. This framework can also be used to look at how district health systems prepare for and respond to health-related disasters and climate change. The system takes into account a number of factors, such as governance, funding, human resources, service delivery, and information systems, to assess its ability to address health risks associated with climate change (Alameddine *et al* 2019).

2.2 Conceptual framework

The conceptual framework was used to illustrate the expected relationship between variables and again, clarified the relevant points for the research process and maps out how they come together to draw coherent conclusions, Swaen and George (2022). Therefore, below is Fig 2.1 showing the relationship between variables.

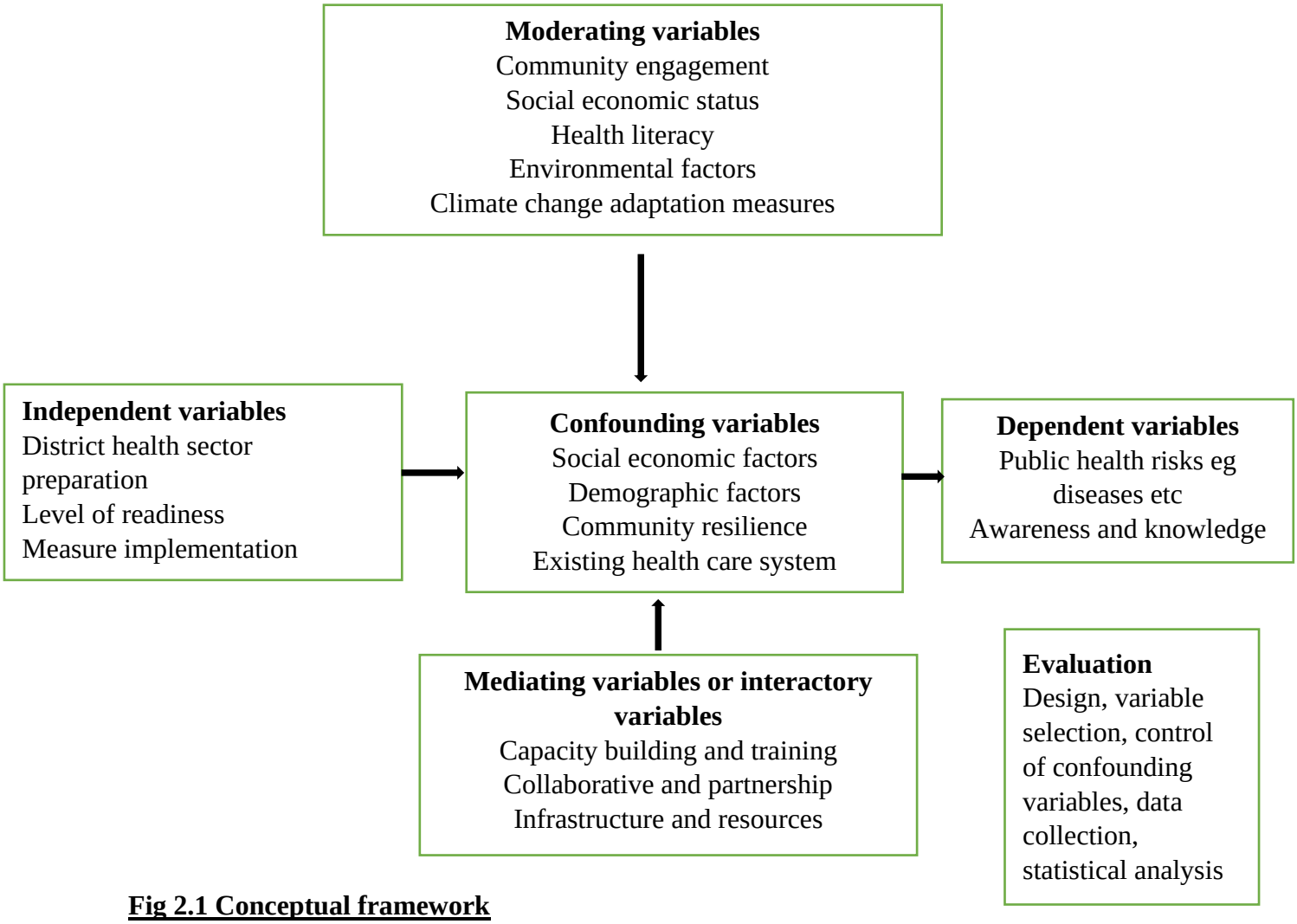

Fig 2.1 Conceptual framework

The conceptual frame work was used by the researcher to understand the relationship between variables and clarifying how various factors interact to influence the outcomes of the research objectives. Therefore, this comprehensive approach ensured that the research identified true effects and relationships while accounting for external influences and variations.

2.3 Climate change and health

The increased frequency of climate change-related disasters and associated health issues presents a major priority for public health practitioners and policymakers worldwide. The World Health Organization (WHO) reported in 2021 that between 2030 and 2050, an additional 250,000 deaths per year are expected as a result of climate change. The primary causes of these deaths are heat stress, diarrhoea, malaria, malnourishment, and other factors. Furthermore, Gould and Rudolph 2023 have pointed out that there could be direct and indirect health risks associated with climate change as it has the capacity to increase the frequency, severity, and unpredictability of natural disasters like storms, heatwaves, floods, and wildfires.

2.4 Climate awareness and health

According to Hess *et al* 2020, a variety of factors, including the availability of information, training, resources, and support, affect public health professionals' varying levels of awareness regarding the relationship between climate change and health. According to a study by Singh et al. 2020, many medical professionals have low to moderate awareness of climate change and its effects on health, underscoring apparent shortcomings in collaboration, leadership, and guidance. These studies have identified a number of obstacles that prevent people from taking action and increasing awareness, including conflicting priorities, a lack of political will, inadequate data, a lack of funding, a lack of public engagement, and ineffective communication and education strategies.

Only a few countries had submitted enhanced Nationally Determined Contributions (NDCs) by December 2020, with modest ambitions to curb emissions, as pointed out by Maibach 2020. This was in spite of the urgency highlighted in early 2020 by the Paris Agreement, which required countries to submit revised NDCs to reduce greenhouse gas emissions. Even though most nations include health in their NDCs, the World Health Organization (WHO) noted in 2022 that many lack the funding or coordination between health and other sectors to carry out the crucial plans and policies. According to Maibach 2020, there are significant health risks associated with climate change despite the fact that its significant effects have been well-documented in the literature over the years. Despite concerted efforts and resources, however, these efforts have not always met expectations. According to the World Health Organization (WHO), climate-related factors will cause an additional 250,000 deaths annually between 2030 and 2050. The health sector could incur direct costs of up to $4 billion annually, with sub-Saharan Africa bearing a disproportionate share of these costs.

Many studies demonstrate the strong correlation between human health and climate change, and it has been suggested that public health may benefit from efforts to mitigate climate change (Watts *et al* 2019 and Haines, 2017). This emphasizes the need for climate change mitigation strategies to get more support because of their beneficial effects on health systems, which is in line with the Lancet commissions' recommendation, as emphasized by Rublee *et al* 2021. There are opportunities for healthcare professionals to be key players in promoting emissions reduction and protecting public health from the effects of climate change, but obstacles still remain.

According to Hathaway and Maibach (2018), efforts to close the knowledge-action gap and improve involvement among healthcare professionals are still vital. As Salas 2019 and Solomon 2019 have shown, healthcare professionals can further increase their impact in addressing climate change risks through advocacy, education, and personal commitment to decarbonization efforts. Notwithstanding these positive developments, questions remain about how much knowledge and involvement global health professionals have in the health effects of climate change, indicating the need for more research and action in this area.

Furthermore, Besley 2018, efforts to lower obstacles and strengthen support networks for healthcare professionals in tackling climate change are critical for promoting significant change and coordinating attitudes with actions. Brito 2020 further highlights the scarcity of research on health professionals' perceptions of climate change impacts, with a focus primarily on developed countries. Research gaps can be filled by conducting surveys across various healthcare specialties and regions to provide a comprehensive understanding of the perspectives and challenges faced by healthcare professionals in addressing climate change and its health effects.

2.5 Climate change and health risks

The exposure, vulnerability, and adaptive capacity of affected populations and health systems are determinants of the public health risks resulting from climate change-induced disasters, as Chen *et al* 2019 indicated. The global risk of disasters linked to climate change was found to be 0 point63deaths per 100,000 individuals annually from 1991 to 2015, with low- and middle-income countries having the highest risk. This information was derived from a meta-analysis that combined data from 10 studies conducted across 9 countries. The entire burden of disease, the extent of disability, the implications for mental health, the potential for interaction and

coordination of responses across different types of disasters even though health outcomes are not included in this statistic.

According to Morfeld *et al* 2021 there are three main categories in which the observed effects of climate change on health fall: direct impacts include an increase in the frequency and intensity of extreme weather events, like heatwaves, which can cause harm to the body, fatalities, and mental health issues. The prevalence and distribution of vector-borne and water-borne diseases, as well as food- and nutrition-related health problems, can be altered by ecosystem-mediated effects such as air pollution, temperature changes, or changes in precipitation patterns. Effects on social and human systems, such as increased poverty, migration, or conflict, are examples of socially mediated impacts. These effects can hinder access to healthcare, have a negative impact on the behaviour of seeking care, and ultimately increase the prevalence of disease.

2.6 Severity and impact of climate change on health systems

Roos *et al* 2021 highlighted the various hazards linked to climate change, stressing that it is poised to increase the frequency and severity of shocks and stresses related to climate change. Rublee *et al* 2021 point out that risk assessment and vulnerability and risk levels are closely related. Health systems are impacted by these climate-related factors both directly and indirectly, which emphasizes how crucial it is for them to be resilient in the face of, and recover from, these risks.

In order to be in line with global climate objectives and to create partnerships that support national development goals, the World Health Organization (WHO) in Geneva 2021 emphasizes the importance of incorporating climate change considerations into health programs. The potential scope and severity of climate change impacts on the sustainability and global performance of health systems, however, are frequently underestimated by health practitioners, as noted by Gould and Rudolph 2023. In contrast, Rublee *et al* 2021 contend that improving efforts to strengthen health systems and guarantee long-term resilience requires an understanding of the fundamental connections between climate change and health systems.

Climate change places direct and indirect pressures on health systems, reducing their capacity to respond, manage, and adapt to shocks and stresses. This is why McMichael *et al* 2012

noted that climate change poses a threat to healthcare accessibility, quality, and financial sustainability. The environment in which health services are provided and consumed must adapt as the climate does in order to effectively handle the challenges that lie ahead. As noted by Roos *et al* 2021 a regular occurrence of severe weather can cause significant resource losses (financial, human, and material,among others) for the healthcare system by impeding patients' and providers' access to high-quality medicine.

In addition to causing damage to infrastructure, extreme weather events can further disrupt supply chains for healthcare services. For instance, according to Chen *et al* 2019 wildfires may result in the destruction of facilities or extended closures for clean-up. The devastation caused by extreme weather events or changes in viable livelihoods may in extreme cases force entire populations to evacuate climate-vulnerable areas. Stress resulting from the events and the healing process, therefore, has a major effect on the mental health of the communities affected. There are many difficulties associated with climate-related migration, such as health risks from poor access to services, food, water, and shelter along migration routes, which affect refugees and internally displaced people.

According to Roos *et al* 2021 and Chen *et al* 2019, temperature and precipitation variations are suspected of contributing to the rise in incidence and seasonality of climate-sensitive diseases like malaria, dengue fever, and other food- and water-borne illnesses. These diseases are also spreading geographically. The rise in temperature is facilitating the spread of diseases carried by ticks and mosquitoes to previously unaffected areas.

Serious changes in the climate increase the risk of infectious disease outbreaks by promoting the growth of pathogens or vectors and putting nations that are not as advanced in medical treatment against these illnesses at risk. Three ways that climate affects the emergence of diseases are listed by Chen *et al* 2019 loss of biodiversity, increased cases of vector-borne illnesses as a result of global warming, increased transmission of new pathogens due to changes in land use, and resurgence of ancient viruses as a result of thawing permafrost.

Singh et al 2020 provided additional explanation of the interconnectedness of the environment, climate change, human health, and health systems, highlighting the significance of evaluating global changes in air quality and the effects of rising temperatures. Urbanization is a major factor changing weather variables, causing problems for public health like the urban heat island

effect (UHI). It also accelerates variations in temperature, wind speed, and air quality. UHIs, or urban heat islands, are caused by urban growth and result in considerably warmer temperatures in cities than in rural areas.

Air pollution can cause health issues to worsen for health systems in low-quality air-polluting nations, potentially putting long-term strain on their capacities and resources. Elevated temperatures have the potential to impact service costs by raising the need for electricity to run cooling systems. Sea level rise may force coastal areas to look for alternate water sources, which will affect agriculture and water availability. Health risks are made worse by climate change, particularly in low- and middle-income nations. This emphasizes the necessity of adaptive health systems that can respond quickly and strategically to challenges. In order to recognize and address the interconnected threats that climate change poses to global health and well-being, cooperation between governments, regional partners, and international stakeholders is essential (Rublee *et al* 2021).

2.7 Recommendations to climate change and health challenges

The degree of integration, coordination, and assessment of the interventions affects the efficacy of programs meant to improve the district health sector's readiness for climate change-related disasters (Chen *et al* 2019). Four categories of initiatives were identified by an exploratory review of 23 studies conducted in 14 countries: disaster risk reduction, health co-benefits, health system strengthening, and climate change adaptation. The review made clear that most initiatives neglected the implementation and evaluation phases in favor of the planning and assessment phases. Evidence regarding the results and effects of the interventions and measures was lacking. The review stressed the need for increased community involvement, equity-focused, context-specific approaches, and cross-sectoral and multi-level collaboration.

Health services play a critical role in protecting individuals and communities from the negative health effects of climate change. To achieve this, it is essential to establish resilient health systems that can provide accessible, affordable, responsible, and reliable care during climate-related emergencies. Linden, Leiserowitz, and Maibach 2019 emphasize the urgent need for action to prepare for climate change by implementing measures to strengthen the resilience of health systems. This includes improving risk management practices, promoting collaboration across sectors, and identifying investments and actions that can enhance the ability of health systems to withstand climate impacts in the short and long term.

To tackle the challenges posed by the local weather crisis, improving the overall performance of current fitness systems and filling current gaps will not be sufficient. Health structures worldwide, according to Frontera et al. 2020, need to be proactive in understanding how local weather change will have an effect on their ability to guard public health, assessing the efficacy of interventions, evaluating their systems underneath a range of climatic prerequisites and interim impacts, and figuring out opportunities for institutional capability building. USAID supports fitness systems in their efforts to absorb, adapt, and seriously change as needed to assurance high-quality care that is cheap and acceptable to the communities, they serve on each day basis, not simply during emergencies (Maibach, 2020). This helps fitness systems adapt to all risks, which include climate change.

The dedication made by USAID in April 2021 to create a new agency-wide local weather strategy that would direct efforts thru 2030 and concentrate assets on addressing the immediate and pressing effects of local weather change used to be acknowledged via Gould and Rudolph 2023. With a focus on social and environmental justice and equity, the method seeks to strengthen the fitness sector's critical position in leading resilience and local weather adaptation in development help and empowering communities to respond greater effectively to conflicts and failures related to local weather change.

Morfeld et al 2021 highlight that whilst climate risks cannot be absolutely lessened, the negative influences on people and economies can be decreased or managed through adaptation measures. Adaptation entails making adjustments in herbal or human systems in response to predicted or unanticipated climatic events and their effects. Implementing techniques like early warning systems, preparedness plans for extreme climate events, and flexible insurance policies can help fitness systems cope successfully with climate affects and contextual changes. Assessing the scale and depth of the climate venture within a country's nearby context is crucial for fitness systems earlier than determining gorgeous adaptation approaches. Climate risk administration forms a crucial part of USAID task design and execution, assisting in assessing, addressing, and managing climate dangers to enhance contributions to local weather change adaptation and mitigation. Examining historic data to respect how target areas have developed over time is also crucial for informed sustainable improvement planning. Continuous climate threat assessments must be built-in into program format and monitoring activities to make sure resilience and effective response to climatic changes.

At COP26, the President's Emergency Recovery and Adaptation Plan (PREPARE) was once launched as a whole-of-government initiative to assist prone communities worldwide in adapting to local weather impacts. USAID will play a central role in enforcing this initiative,

aiming to help 1/2 a billion people cope with and adapt to the outcomes of climate trade through locally-oriented improvement by 2030. Supporting international locations in aligning with the National Health Adaptation Plan (H-NAP) and conducting continuous local weather risk assessments are quintessential steps toward bettering resilience and addressing health dangers associated with local weather change.

In conclusion, addressing climate change pressures to health structures requires integrating climate alternate adaptation into development work by way of considering local weather impacts and discovering opportunities for adaptation and transition. Health structures need to act straight away by promotion and enhancing potential for effective threat management, fostering multidisciplinary engagement, and identifying short- and long-term investments to bolster gadget resilience (Mehta et al., 2021).

In conclusion the literature reviewed that climate awareness and preparedness has a positive impact on the prevention and reduction of the risks associated with climate change and health. Therefore, in this study the literature was used as a measuring tool for assessing the preparedness of the District Health system and the vulnerability was determined after the study.

CHAPTER 3

3.0 Methodology

3.1 Introduction

This section outlined the research methodology implemented in the study which included the following description of the study area, research design, sampling, data collection including instrument design, ethics, reliability validity and the data presentation and analysis. The methodology used was also justified.

3.2 Study area

Mount Darwin, a district situated in the Mashonaland Central Province of Zimbabwe, lies in the Northeast Region about 156 km North of Harare. It shares borders with Rushinga to the East, Shamva to the South, Muzarabani to the West, and Mozambique to the North. Encompassing an area of around 8,575 square kilometers, Mount Darwin has a population of 240,728 as per the Zimbabwe Population Census 2022, with its name derived from the prominent mountain in the area, Mount Darwin.

Compared to other districts in Zimbabwe, Mount Darwin has a relatively small population, primarily residing in rural communities spread across villages and towns. The predominant ethnic groups in the district are Shona and Korekore. Agriculture plays a vital role in the district's economy, with farming and livestock activities like tobacco, cotton, and various vegetables being the mainstay. As noted by Mashingaidze 2022, agriculture serves as the primary source of income for the local populace.

Highlighted by Bishi 2015, the district holds cultural and historical significance, boasting a rich tapestry of traditions, customs, and practices within the local community. Mount Darwin is home to various educational institutions, medical facilities, and essential infrastructure, including roads and communication networks. The administrative structure is organized into wards and villages, each with its own local leadership setup.

The district features two hospitals, Mount Darwin District Hospital (Governmental) and Karanda Hospital (Missionary), along with 17 rural health facilities and one private clinic. Both hospitals offer primary and secondary levels of healthcare services, while the rural clinics cater to primary healthcare needs. However, access to safe drinking water and sanitation remains a challenge in certain areas.

Education is a focal point in Mount Darwin, with several primary and secondary schools in the district. Mount Darwin District Hospital is overseen by a District Medical Officer and provides a range of healthcare services, in line with the guidelines set by the World Health Organization (WHO) in 1992. The district health system prioritizes offering primary healthcare services to the local population, emphasizing prevention, control of diseases, and community engagement.

Below is an extract of Mount Darwin map showing the location of the district on Zimbabwe map, size and number of wards, hospitals, business centre and among others.

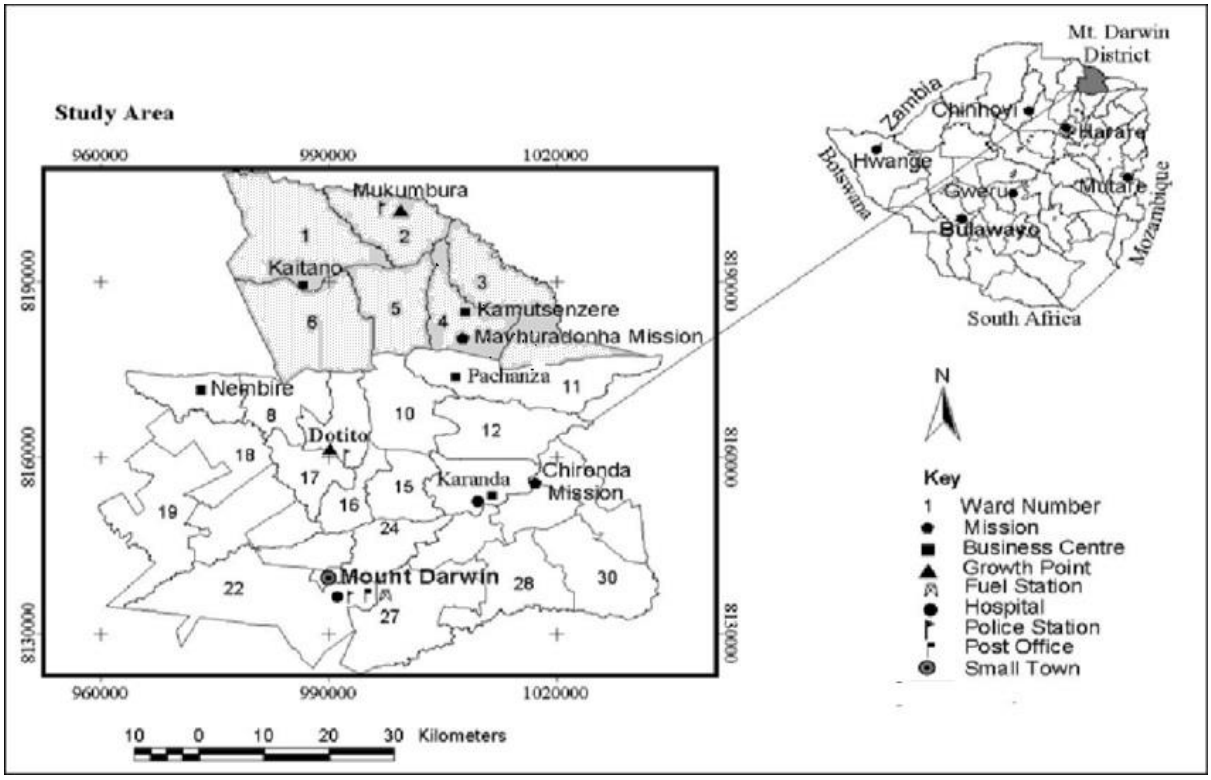

Figure 3.2 Extract of Mount Darwin District map adopted, (Mashingaidze 2022).

3.3 Research approach

The researcher adopted a descriptive cross-sectional analysis style encompassing each quantitative and qualitative methodology. Therefore, during the study, the researchers analysed a bunch of participants to portray the present characteristics at intervals to the population while not influencing the setting or variables as cited by Wang and Cheng 2020.

Additionally, Thomas 2023 cited those cross-sectional studies, being data-based and descriptive in nature, do not aim to find relation or relationships and thus cannot verify causative factors like diseases. Researchers document the present data at intervals a population

while not manipulating variables. This approach is often utilised to draw inferences regarding potential associations or to assemble initial information which will support additional analysis endeavours and experimental investigations

3.4 Study population, sample size and sampling procedure

3.4.1 Study population

The study population was 254 district health workers and 3 workers from one of the non-governmental organization (NGO) CeSHHAR that was working in collaboration with the district health system. Again, they are key in understanding community perceptions, knowledge and experiences related to the impacts of climate change, natural disaster prevention and hygiene risks.

3.4.2 Sample size

To determine the sample size the researcher used sample measurement calculator for a population of 257 people in which all were District Health workers and NGO workers and the sample size was 155 people again all from the District Health workers and NGO. Therefore, study sample size was composed of 154 District Health Workers and 01 subject from NGO (CeSHHAR) giving a total of 155 subjects. This was in accordance to Szyk (2023), who acknowledged that, a population of 257 subjects gives a sample size =155 where 1.96 for a confidence degree (α) of 95%, population proportion =0.5 margin of error of 0.05.

According to Haynes et al (2021) figuring out the appropriate sample measurement is key for accurate statistical analysis. Szyk (2023) also stated the need of sample measurement calculation as it ensures reliable results and minimizes sampling error. Samples measurement calculator offers several blessings over manual calculation such as precision, accuracy and statistical power as it considers elements like confidence level, margin of error, and population percentage when compared to manual calculations which may additionally be prone to errors or oversights. Again, design size calculation allows the researcher to modify parameters easily by exploring specific scenarios by various confidence levels, margins of error, and other elements without redoing extensive calculations (Thomas 2023). Below is Table 3.1 and Tbale

3.2 showing sample from the key informants and distribution of sample from the health workers respectively.

Table 3.1: Sample from the key informants

Ser	Stratum	Population
01	DMO	1
02	Administrator	1
03	DEHO	1
04	DNO	1
05	Procurement Officer	1
06	DHPO	1
07	Laboratory scientist	1
08	Pharmacist	1
09	CeSHHAR	1

Table 3.2: Sample from the general population

Ser	Stratum	Population	Sample	Sample percentage
1	Nurses	139	81	52.2
2	Pharmacy	4	2	1.3
3	Administration	35	22	15.1
4	Medical Laboratory	4	2	1.3
5	Environmental Health	37	24	16.4
6	Catering	7	5	3.2
7	Stores	9	5	3.3
8	Records	3	2	1.3
9	Transport	5	3	1.9
10	Health promotions	3	2	1.3
11	Human resources	7	4	2.4
12	Accounts	3	2	1.3
	Total	**257**	**155**	**100**

3.4.3 Sampling Techniques

The researcher determined to utilize a blend of sampling techniques, which are purposive and random stratified sampling. The researcher purposively selected the District Health workers heads of department (representative for the head of department) who were the DMO, Administrator, DEHO, DNO, Procurement Officer, DHPO, Laboratory scientist, Pharmacist and CeSHHAR for the study considering that they possess specialised knowledge and experience of the District Health system. Again, the researcher employed random stratified sampling to ensure that all significant subgroups were included and represented accurately, to achieve this, the researcher divided the population into distinct subgroups, (departments) known as strata, and then randomly selected 0.60 x number of subjects from each stratum and figure was the sample size from each stratum. Where 0.60 was the quotient got from 155 sample size divided by 257 study population. Purposive sampling involves the deliberate selection of individuals based on specific standards relevant to the research targets (Heeringa et al 2020). For this reason, the researcher purposefully chose participants from the district medical institution executive and from the Centre for Sexual Health HIV and Aids Research (CeSHAR), a Non-Governmental Organization actively engaged in raising attention on climate change and heath within the district health system. This choice was made based on the group's doable to contribute valuable expertise and insights on the district's preparedness for climate change and health-related challenges.

Stratified easy random sampling was employed by categorizing rural health clinics and individuals within the heath sector into departments (such as environmental health, nursing, doctors, administration, and laboratory staff). According to Berman (2020), stratified random sampling involves the random resolution of participants from a defined population, ensuring an equal opportunity for each and every individual to be included in the study. Within every stratum, participants were randomly chosen till the desired sample dimension was achieved. By combining purposive and random stratified sampling techniques, the researcher achieved a stability between selecting informed and applicable participants (purposive sampling) and ensuring the generalizability of findings to the broader populace (Heeringa *et al* 2020)

3.5 Data Collection methods and Tools

3.5.1 Data collection methods

Methodological triangulation was enforced within the study, in which unstructured interviews were used to the key informants, questionnaires were used to the rest of the district health

workers and observation checklist was used for the assessment on the availability of district health preparedness plan and serviceability of equipment and among others. Triangulation enhances thick description of information and reach knowledge saturation quicker as compared to at least one qualitative data assortment methodology. Similar approach on triangulation of 3 knowledge assortment strategies (In-depth interviews, questionnaires and Observation) were utilized in similar studies, (Dube and Phiri 2013; Phiri *et al* 2014)

3.5.2 Unstructured interview

Morgan (1988) defines unstructured interviews as a method involving the sitting of open-ended queries and a willingness to numerous responses, resulting in a richer information assortment like structured and semi-structured interviews. In utilizing the unstructured interview technique, the scientist aims to turn over deeply into the respondent's personal views and experiences, particularly in areas wherever info is also restricted, to attain a comprehensive understanding. The scientist seeks to broadly speaking assess the health sector's readiness for global climate change challenges, thence choosing in-depth (unstructured) interviews because the most fitted technique. Through in-depth interviews, the scientist is inspired to actively listen, analyze variable situations, and empathise with the emotions sent to understand the underlying significance. The interviews were transcribed into written documents and conducted in either vernacular (Shona) or English supported the participant's language favourite.

3.5.3 Questionnaire

This is the process of collecting data through an instrument consisting of a series of questions and prompts to receive a response from the individuals. Dichotomous questions, calling questions and open-ended questions were used. Questionnaires were used to collect information due to their capacity to collect data from a huge number of participants, (Bhandari 2023). Therefore, in the study 145 questionnaires were distributed and yielded 138 responses which is equal to 95.2% response rate and 7 questionnaires (4.8 %) were not returned.

3.5.4 Observation

The purpose of the observation was to gather first-hand data on district health state on global climate change problems The research worker utilised this technique of knowledge assortment to watch the condition of the infrastructure, availableness of back-up systems, medicines

personnel, coaching programs among others. knowledge gained through observation was cross-referenced with knowledge gathered through questionnaires and interviews. Observation permits the gathering of original data, allowing natural processes to occur, (Kamlongera and Katenga-Kaunda 2023).

3.5.5 Data collection tools

An unstructured interview is a qualitative research method characterized by a flexible and open-ended approach. Unlike structured interviews, which follow a predetermined set of questions, unstructured interviews allow the interviewer to explore topics more freely. Here are some key features:

A questionnaire guide is a structured document designed to assist researchers in developing and administering questionnaires for data collection. It typically includes the following components:

An observation checklist is a structured tool used to systematically record and evaluate specific behaviours, events, or conditions during an observation period. It's commonly employed in various fields, including education, social sciences, healthcare, and quality assurance. Here are its key components:

Therefore, unstructured interview guides, questionnaire guide and observation guides were designed and submitted to the supervisor for scrutiny.

3.5.6 Pilot study

The pilot study was carried out in Muzarabani District, a district that has similar characteristics on climate change issues with Mount Darwin district. The purpose of the pilot study was to test the reliability and validity of the data collection tools. Actual data collection was conducted after 04 days of pilot study to allow time for the researcher to make some adjustments and time to travel to the actual study area.

3.5.7 Reliability

The reliability of the study is assured by preliminary testing of the data collection instrument, (Urbina and Monks 2021). Therefore, on this study the instruments were sent to the supervisor for expert verification. Again, a pilot study was conducted at Muzarabani District Hospital. Thereafter, adjustments were made as to align the tools with targeted purpose.

3.5.8 Validity

The study ensured validity of the research through triangulation of data collection methods and sampling methods (stratified random sampling and purposive sampling which have high degree of accuracy, (Duckett 2021). According to Mostert (2022 purposive sampling ensures that people with sufficient experience, expertise and others are included in the study.

3.5.9 Ethical Considerations

Ethics, as outlined by Daniels et al. 2023, includes the norms governing conduct that distinguish between acceptable and unacceptable behaviour. Once embarking on an enquiry endeavour, it's imperative to deal with and cling to moral issues to safeguard the rights and well-being of participants and uphold the quality of the study, as cited by Kamlongera and Katenga-Kaunda 2023. during this study, the man of science can abide by analysis ethics, incorporating many moral principles, such as:

To obtain written and verbal consent from participants within the Mount Darwin District hospital the researcher provided them participants with comprehensive details regarding the study's purpose, measures, risks, and advantages. Therefore, by so doing the participants got the liberty to interact voluntarily and had the libert to withdraw at any time while not facing adverse repercussions, (Daniels et al. 2023)

Ensuring participant confidentiality and obscurity to safeguard personal information or information collected throughout the analysis, creating it accessible solely to licensed personnel. information was anonymized throughout analysis and reportage to forestall the identification of people or organizations, (Fournier 2023). The researcher promised that the information collected during the study was only to be used for academic purposes and no names of participants will be mentioned or required at any stage of the study or after the study.

Again, the researcher seek for securing necessary authorizations by getting clearance from the District Medical Officer to conduct the study using a research letter from the university.

Upholding beneficence and non-maleficence by pains to maximise analysis advantages whereas minimizing any attainable hurt to participants or the general public. The researcher

took necessary preventative measures to ensure the study do not cause redundant stress, harm, or negative consequences to participants or the surroundings. Again, the researcher promised to share the study findings with stakeholders through varied channels to make sure they stakeholders benefit from the study. Therefore, conducting analysis with honesty, integrity, and transparency, as advocated by Fournier 2023,will help avoid conflicts of interest and making certain that the study is was conducted objectively and impartially.

3.6 Data analysis and presentation

The researcher applied thematic analysis as a technique to investigate the qualitative knowledge. Thematic analysis includes scrutinizing all the gathered info to spot revenant themes and customary threads, with the aim of summarizing the collected views by pinpointing the predominant themes that surface.

By utilizing thematic analysis, the investigator was ready to correlate the prevalence of themes with the whole content, enhancing the accuracy and quality, thereby enriching the general significance of the analysis. This approach expedited the correct identification of linkages between concepts and enabled comparisons with the reproduced knowledge.

As printed by Thomas 2023 the thematic analysis enclosed four key stages: reading and expanding upon the transcripts, finding themes, establishing a writing, and secret writing the info. Initially, the investigator adjusted themselves with the transcript content, proceeded to extract themes from every transcript, and compiled a comprehensive list of those themes. Then, a writing was developed supported the known themes, making certain a broad analysis scope and mitigating personal base concerning the topic matter.

Lastly, the section was concerned about coding of the data collected whereby the researcher created codes then enter the data on Statistical Package for the Social Sciences (SPSS) computer software. Upon decoding all the data, the codes were organized and clustered along, forming the idea for the patterns and connections at intervals the known themes. What is more, the quantitative data was analyzed victimization the applied math code package SPSS, using descriptive statistics as a very important analytical tool within the method.

3.7 Chapter summary

This chapter outline the methodology to be used by the researcher. It focused mainly on the study area, approach, research design, study setting, study population, sample size determination and the sampling techniques were outlined and justified. The chapter also discussed the data collection methods and tools used and the method of data analysis.

CHAPTER 4

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This section presents the study findings. The findings are presented in the following main sections which are demographic characteristics, level of awareness on climate change induced disasters, public health risks associated to climate change and initiatives introduced by district health sector to enhance readiness on climate change induced disasters.

4.2 Response rate

Interview conducted to 9 respondents from the key informants yielded 100 percent responds rate while the questionnaires from the general health workers yielded 138 responses out of 145 respondents which was equal to 95.2% respond rate and 7 respondents (4.8 %) of the study failed to return the questionnaires. All aspects listed on the observation check list were observed in the study.

4.3 Demographic characteristics of the respondents

The majority of the respondents were females accounting for 68.8% showing that the survey or study had more participation rate from females (Table 4.1). The age distribution of the respondents indicated a comparatively balanced illustration across totally different cluster age bracket of study although the most important age group is 40-49 years, comprising 34.8% of the respondents. Again, the study finding conjointly shows that, the bulk of respondents have a certificate as their highest level of education, accounting for 67.4% of the entire sample size as shown on table 4.1 below.

Table 4.1: Demographic characteristics of the respondents (n=138)

Characteristic		Frequency	
		Number (N)	**Percentage (%)**
Sex	Male	43	312%
	Female	95	68.8
Age	18-29 years	31	2.5%
	30-39 years	29	21.0

	40-49 years	48	34.%
	50 years plus	30	21.7%
Level of education	Certificate	29	21.0%
	Diploma	93	67.4%
	Degree	16	11.6%
Work experience	0-3 years	35	25.%
	4-5 years	35	25.4%
	6-8 years	22	15.9%
	9 years plus	46	33.3%
Station	Hospital	75	54.3%
	Clinic	63	45.7%

Again, shown in Table 4.1 the majority has an average of 9 years or more of work experience accounting for (33.3%) and 54.3% of respondents work at the district hospitals as indicated on the table above.

4.4 General health worker's knowledge level on climate change induced disasters and health related issues

The findings indicate 92.75% awareness rate from the general health work workers of the district hospital, suggesting a high level of knowledge or familiarity with climate change among the individuals in the health district.

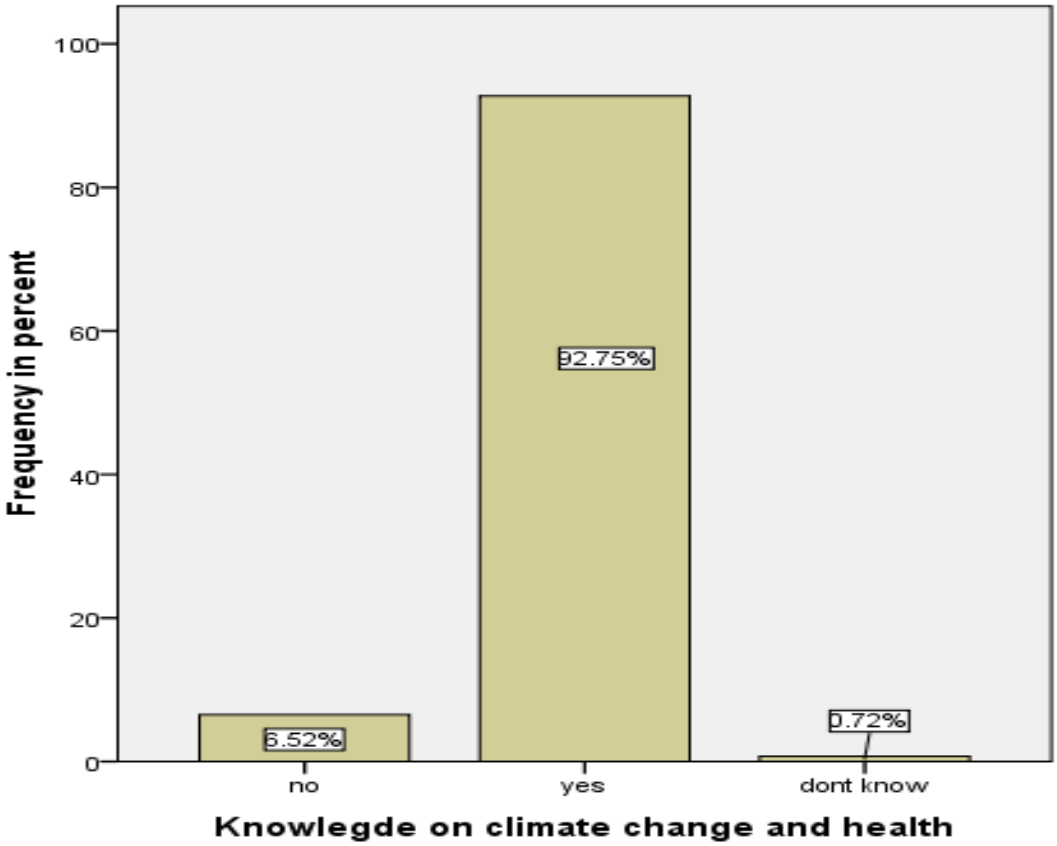

Figure 4.1 Knowledge on climate change and health (n= 138)

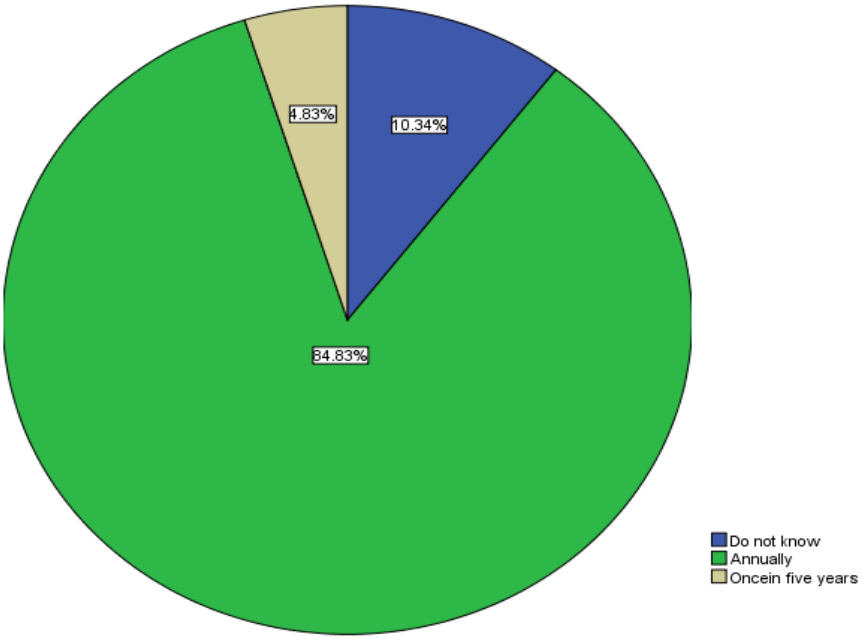

Figure 4.2 Frequency at which climate change induced hazards are occurring (n=138)

The results obtained from the questionnaires were consistent with that provided by the key informants, as both interview guide and questionnaires confirmed the presence of training

programs on climate change and health. Furthermore, the presence of a Non-Governmental Organization named CeSHHAR in the district conducting awareness campaigns on climate change and health for healthcare professionals was noted. A significantly higher (84.83%) proportion of the health workers on questionnaires was able to account the frequency of climate change-induced hazards occurring, as shown in Figure 4.2. This finding from the general health workers was validated by the key informants on interview, who also indicated the significant occurrence of such hazards in the district. Furthermore, the data corresponded with observations from a checklist, revealing examples of building damage due to cyclones and hospital equipment rendered unusable following exposure to floods

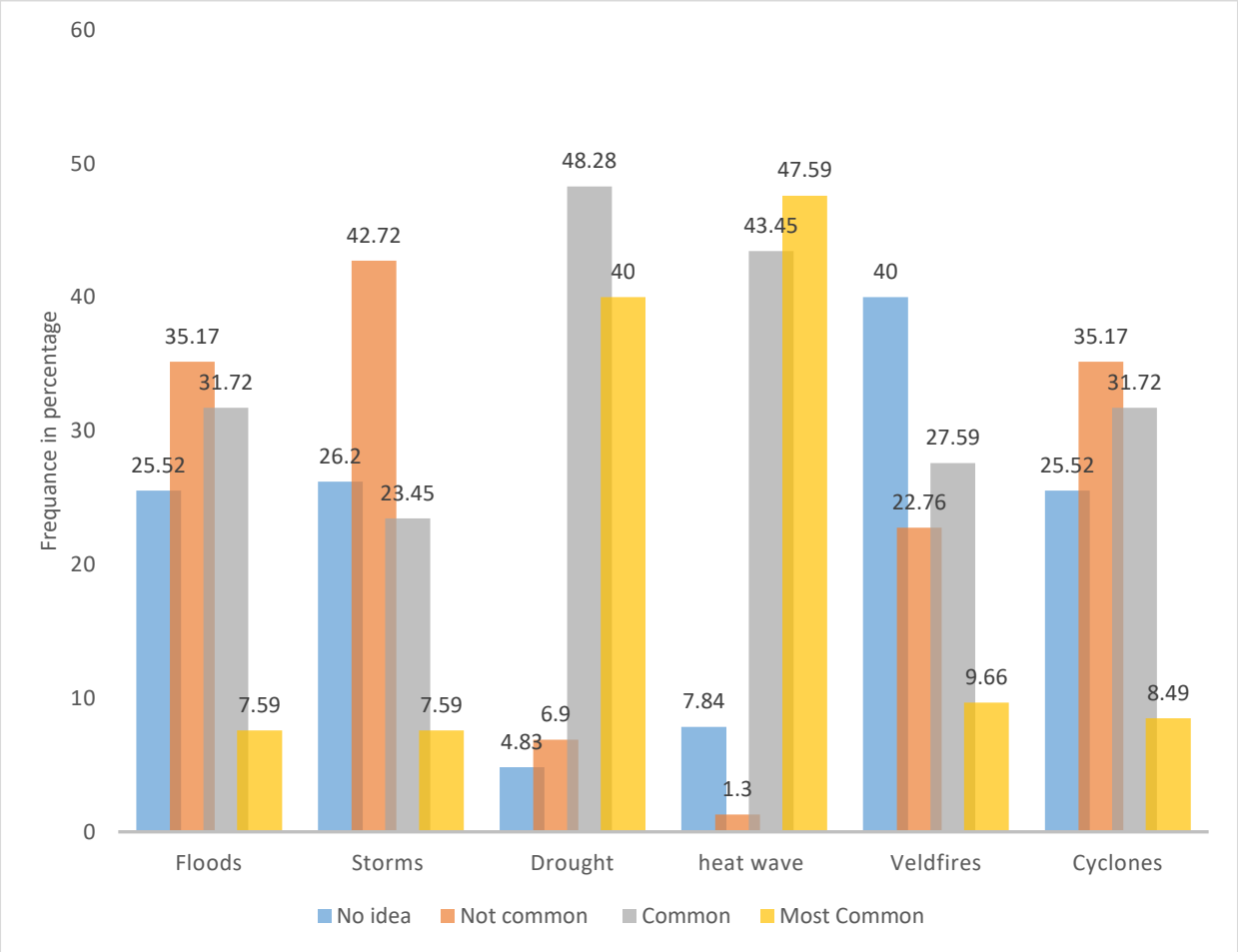

Figure 4.3 Frequency at which climate change related risks re occurring (ne138)

The findings gathered by questionnaires from the health workers and that from interviewing the key informants show that health issues caused by storms are not predominant, as the majority of respondents (98.9%) categorizing them as uncommon. This suggests that storms are relatively rare occurrences. In contrast, the occurrences of droughts, floods, and heatwaves

were distributed across different categories. The data from the interview and questionnaires also aligned with the observations checklist. Upon comparing the data from the general population with the comments of key informants and the observations recorded in the checklist, it was evident that incidents of floods and storms were generally less common when compared to droughts, heatwaves, veldfires, and cyclones. Droughts and heatwaves showed a higher frequency of occurrence, whereas storms were less prevalent, as shown on Figure 4.3.

4.5 Public health risks related to climate change induced disasters

Table 4.2: Occurrence of risk related to climate change induced disaster (n=138)

Characteristics	**Health Risks**	**Frequency of cases**	
Floods		**Number (n)**	**Percentage (%)**
	Drown	35	25.3
	Fungal infection	97	77.2
Heat wave	Heat exhaustion	61	45.6
	Fatigue	63	
	Respiration problems	51	36.9
	Heat rush	101	73.4
Epidemiological changes of vector borne diseases	Malaria	114	82.6
Epidemiological changes of water borne diseases	Cholera	92	66.7
	Dysentery	71	51.4
	Schistosomiasis	91	65.5
Epidemiological changes of zoonotic diseases	Dog bite cases	84	60.8
	Rabies	4	2.9
	Anthrax	44	31.8
Mental health issues	Psychological effects	103	74.6
	Post traumatic disorder	77	55.7
	Premature birth	37	26.8

The findings from questionnaires to the general population shows that malaria disease is the most reported with a frequency of 82.6% followed by psychological stress 74.6%. heat rush 73.4% % and the list is rabies with 2.9% as indicated on the table 4.2 above. The data from

the general population was also consistent with the finding from the key informants as well as the hospital records such diseases registers and tally sheet forms.

4.6 Initiatives introduced by the district health

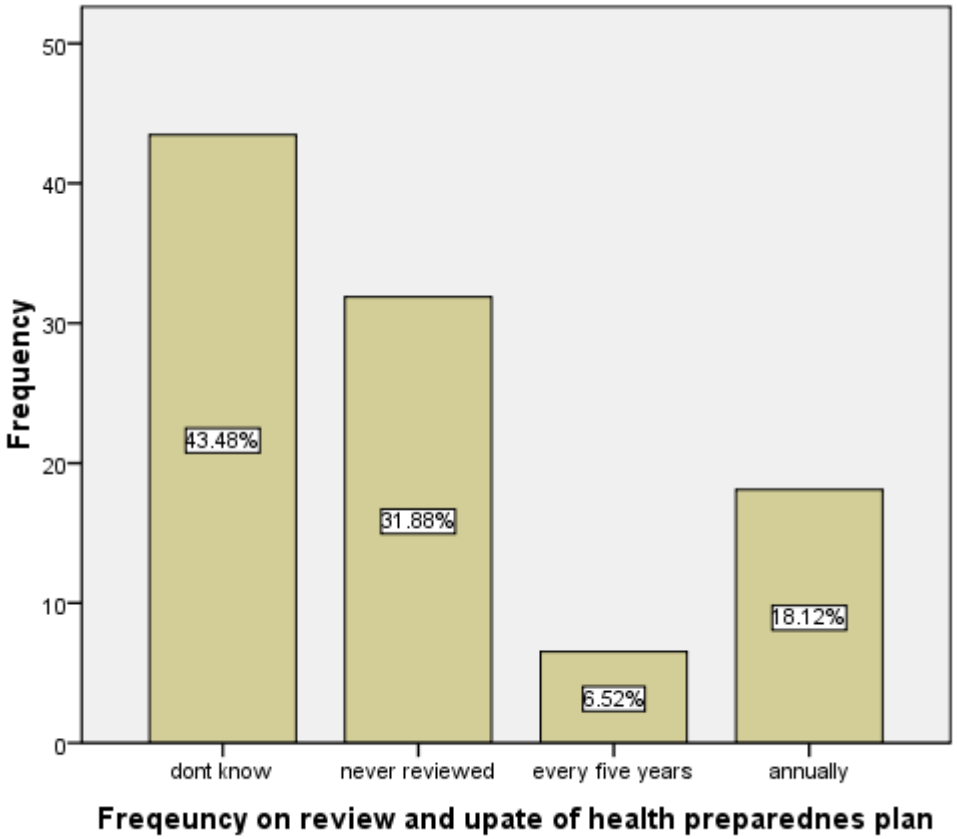

Figure 4.4 Frequency at which health preparedness plan is review or updated of (n=138)

The questionnaires indicated that 41.4 % where unaware on frequency at which climate change and health preparedness plan is revised. 30.3% acknowledged that the preparedness plan was never reviewed. Therefore, this is inconsistent with data from 7 of the key informants who indicated that the preparedness plan is reviewed and updated yearly. On other hand 30.3 % of the general population data which acknowledged that preparedness plan was never reviewed is consistent with data from observation as it was noted unavailability of preparedness plan specific for climate change health induced problems. Therefore, the data suggest the unavailability of preparedness plan on climate change and health induced problems as data from questionnaires, interviews and observations were inconsistent.

Table 4.3 Availability of resources for climate change and health preparedness (n=138)

Characteristic	Category	Frequency	
		Number (N)	Percentage (%)
Resources budget	no idea	62	42.8
Communication system	no	25	17.2
	yes	51	35.2
	poor	74	51.0
	good	64	44.1
mock drill trainings	No training	109	75.2
	Annually	29	20.0
	None of the above	0	0
Availability of back-up systems	No	56	38.6
	Yes	82	56.6
Availability of medical supplies	No	91	62.8
and equipment	Yes	47	32.4
Stakeholder engagements	don't know	2	22.2
	very unsatisfactory	1	11.1
	Unsatisfactory	2	22.2
	Satisfactory	3	33.3

42% of the respondents had no understanding about the availability of resource budgets, whilst 25% were positive on unavailability of resource price range allocated. This indicates a giant proportion of respondents who are unsure about resource allocation for preparedness. These discovering are in line with that of the two key informants who mentioned the absence of useful resource budgets and data from observations guidelines where assets designated for climate-induced failures were unavailable.

Additionally, records from the health workers showed that 51% of respondents pronounced a poor verbal exchange system, contrasting with 6 key informants who indicated a higher percentage reporting a good degree of communication. However, observations check listing revealed negative electronic and street network systems, rendering sure areas difficult to attain during emergencies, as highlighted by using the general population.

Concerning mock drills, the learn about found that a good-sized proportion of respondents do now not conduct mock drills, although there is a subset which acknowledged conduction of mock drills commonly on an annual basis. The data from the commonplace population indicating a lack of mock drills conduction, contradicted the statements of 5 key informants who stated mock are carried out on routine bases. Observation guidelines did not exhibit any training assets or records of coaching sessions, suggesting that mock drills might certainly not sometimes conducted, as perceived by the universal population.

Moreover, the general populace reported the unavailability of backup power, water, and verbal exchange systems, and the data in constant from that of 7 key informants stated availability of such resources. However, on statement it was printed that these resources have been available however inadequate. These findings emphasize the importance of making sure the provision and availability of backup systems to beautify preparedness and resilience in various scenarios.

Additionally, a great proportion (66.7%) of the regularly occurring population mentioned the unavailability of adequate scientific supplies and equipment, constant with data from the key informants' remarks and observations the place insufficient shares in pharmacies and storerooms were noted. Also, the statistics from the general populace showed that 62.1% of respondents pronounced zero maintenance of resources, with 25.5% indicating partial protection and 7.6% reporting well-maintained resources. The data is steady with statements from key informants who cited monetary challenges for the maintenance. In support to that, observations additionally revealed poorly maintained idle ambulance automobiles and medicine storage fridges among others at the hospital.

Lastly, the familiar population facts presented a greater frequency (69.7%) reporting the unavailability of technical support, contradicting the claims of 7 key informants who noted its availability. However, observations at some stage in the study did no longer confirm the existence of technical aid facilities

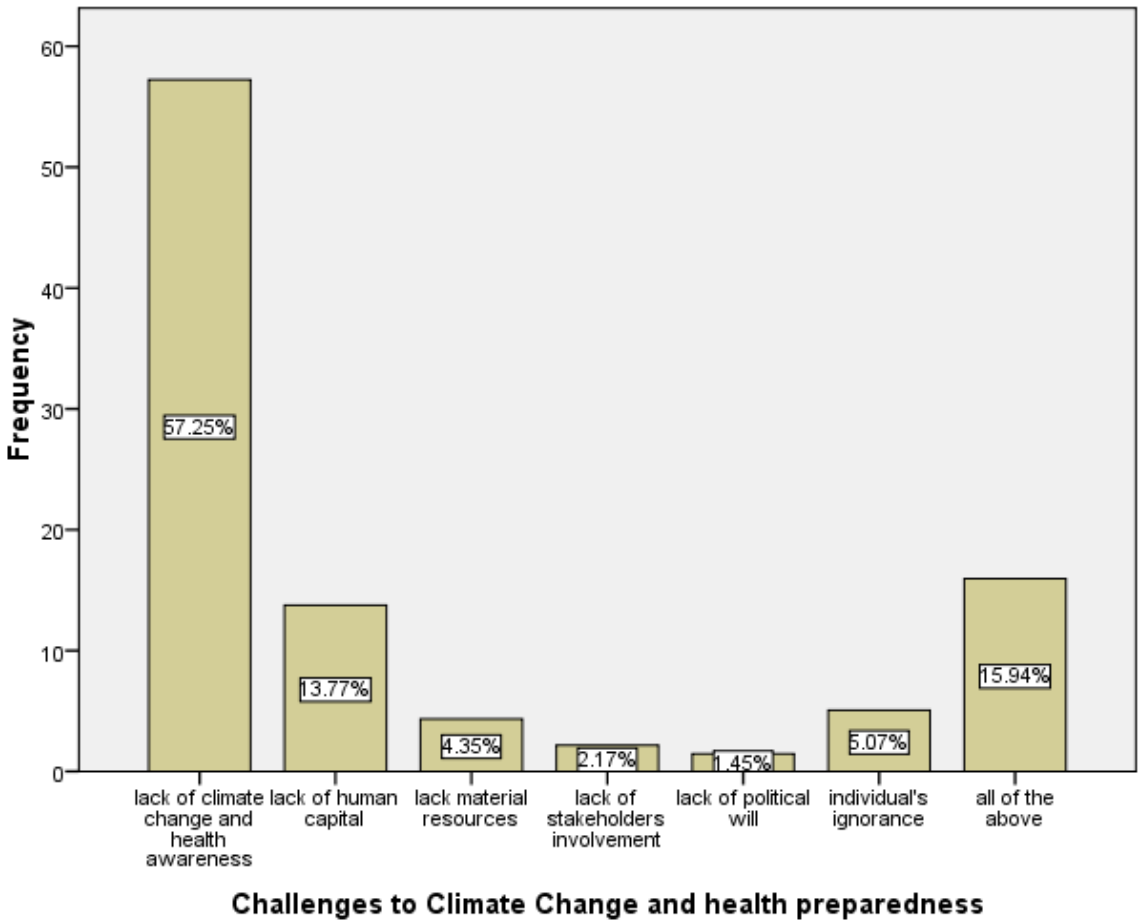

Figure 4.5 Challenges to climate change and health preparedness

The study mentioned lack of material resources, lack of stakeholders' involvement, lack of political will, individuals' ignorance, and all of the above, as to challenges to climate change and health preparedness. These findings are also in line with what the key informants alluded as the general population on questionnaires mentioned same challenges as mentioned by the general population.

Below is a graph which shows various forms of recommendations suggested by the health workers on questionaries for climate change and health preparedness.

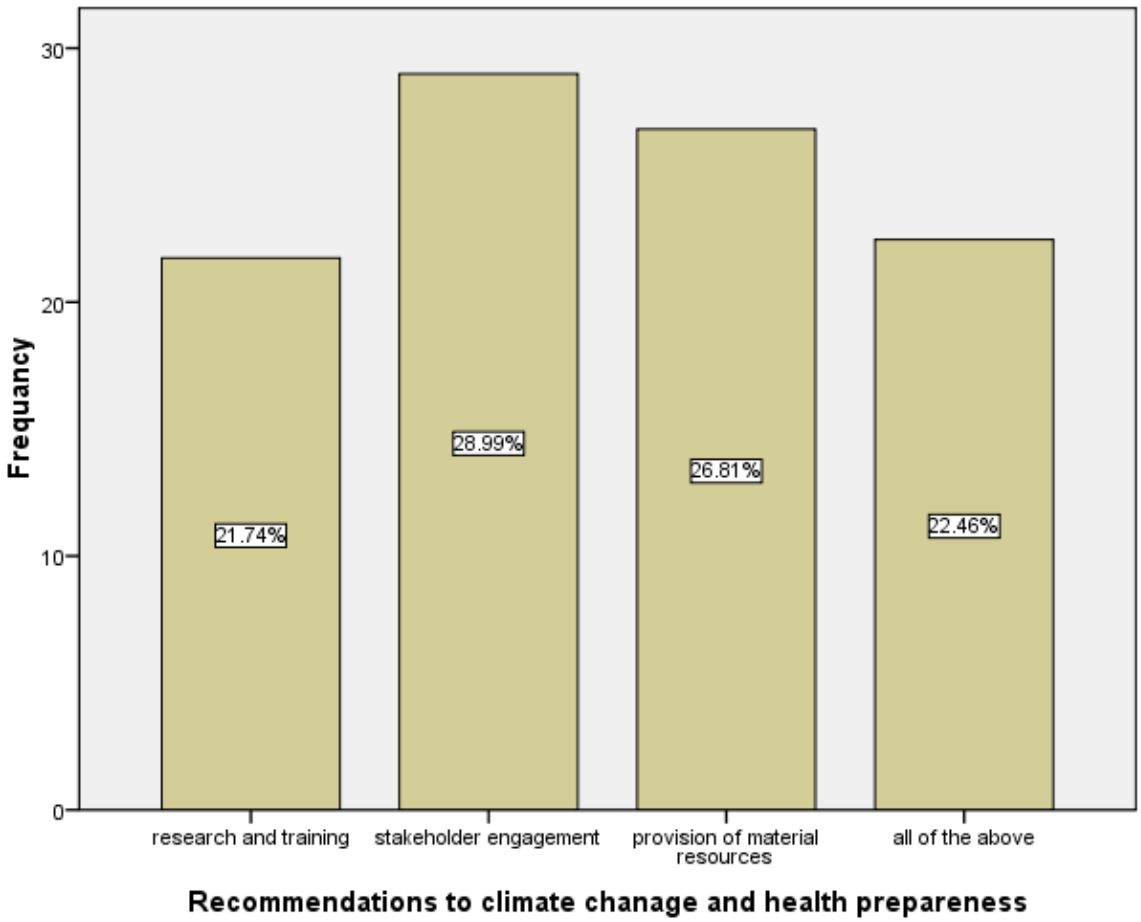

Figure 4.6 Recommendations to climate change and health preparedness

Questionnaire's data shows that health workers recommended research and training and stakeholder engagement as measures to district health preparedness as indicated on the graph above. The data is in line with key informants' data (interview guide) as well as data from observation check list which indicated unavailability of adequate resources, lack training programs or training documentations on climate change and health.

4.7 Discussions

The study shows that there is a positive indication of effective education and training about local weather change due to the sizable level of cognizance (88.3%) observed. However, the findings oppose that of Maibach in 2018, which revealed that healthcare employees have a lesser understanding of local weather change, especially in areas where it is a notably new or less vital issue. As a result, the researcher suggested that differences in the strength and scope of awareness campaigns played a role in these disparities.

The intensification in the prevalence of droughts and heatwaves, as mentioned in the study, aligns with world patterns as climate alternate and health issues affecting the whole globe are imaging from drought and heatwave. These risks have been more often observed in a range of regions worldwide, notably because of the everchanging climate, as referred to by Hess *et al* 2020. The presence of storms in the Mount Darwin District was once not significant, and the findings align with preceding studies by means of Roos *et al* in 2021 and Chen et al in 2019. as studies diagnosed that the occurrence of storms can differ based on the particular climate patterns and geographical points of the study location. As a result, versions in previous research may have befallen due to differences in the degree of exposure and susceptibility to precise climate-related hazards.

The public health dangers related with local weather change, such as drowning, fungal infections, heat-related illnesses, and diseases transmitted by way of vectors, that were diagnosed in the study and have been also steady to the findings of Rublee *et al* 2021. However, the disease patterns and adjustments in epidemiology highlighted in this investigation might fluctuate compared to different areas. This discrepancy can be attributed to numerous problems as described by Morfeld *et al* 2021, which covered prevalence of diseases, socioeconomic conditions, and the effectiveness of the neighbourhood healthcare system in figuring out and addressing these dangers. Hence, it is crucial to have the capacity to recognize disorder patterns and detect shifts in epidemiology in order to pick out probable fitness risks. The district health authorities' efforts and the difficulties encountered in these efforts align with world best practices, as noted in Linden, Leiserowitz, and Maibach's 2019 study.

4.8 Conclusion

By recognizing the above dynamics, it is essential for public health authorities to adapt their strategies effectively as the findings advocate for continued efforts to enhance awareness and preparedness regarding climate change impacts, aligning with global best practices to mitigate associated health risks.

CHAPTER 5

5.0 SUMMERY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarised the study and gave a conclusion and lasted with recommendations of the study findings.

5.2 Summary

Health sector preparedness for addressing the effects of local weather change on public health outcomes is vital. Effective planning, coordination, and ability building are key elements in attaining success in this regard. Evidence from a range of studies has proven that climate trade is affecting nations globally, inclusive of counties in Southern Africa such as Zimbabwe. The occurrence of local weather change-induced disasters has brought about the Ministry of Health and Child Care (MoHCC) to trigger emergency clinical response teams to grant immediate help to affected communities in the Mount Darwin District of Mashonaland Central Province.

In the context of Mount Darwin District, the specific trouble lies in the unrecognized capacity of the district health system to correctly prepare for and respond to health emergencies exacerbated by climate change. This lack of preparedness had led to increased morbidity and mortality during climate-related health catastrophes. To tackle this concern, a study was once conducted to consider the readiness of the District Health Sector in Mount Darwin District, Mashonaland Central Province, to respond to local weather change-induced disasters. The study worried a review of applicable literature from textbooks, journals, and articles.

The study targeted on several key areas, together with the awareness of local weather change-induced disasters and associated health dangers among public health practitioners, the identification of public health dangers linked to climate change-induced disasters, and an evaluation of initiatives implemented through the district health region to enhance readiness for local weather change-induced disasters and fitness issues. The study populace comprised approximately 257 district fitness workers, including personnel from Non-Governmental Organizations (NGOs) participating with district health staff. Purposive sampling and random stratified sampling techniques were used to choose study members among key informants and

the typical population, respectively. Tools used include interview guides, questionnaires, and commentary checklists, were utilized to acquire data.

Findings from the survey indicated a predominantly female respondent base, with a balanced age distribution and a large proportion maintaining diplomas as their highest degree of education. The respondents showed a excessive level of cognizance of climate change, with an 88.3% consciousness rate. Climate change-induced hazards, such as droughts and heatwaves, were often reported. Health risks related with climate change-induced mess ups comprised drownings, fungal infections, heat-related illnesses, respiratory issues, vector-borne diseases like malaria, waterborne ailments such as cholera, zoonotic diseases, and mental fitness concerns.

The district health authorities had carried out several initiatives, consisting of supply of drugs and equipment, training programs, stakeholder engagement, and backup systems. However, efforts have been hindered by challenges in preparedness such as aid availability uncertainties and inadequate conversation systems. Improvements were endorsed in areas such as conducting mock drill trainings, ensuring ample backup systems and scientific supplies, and enhancing upkeep of resources and technical support. Addressing challenges via research, training programs, and stakeholder engagement was once highlighted as crucial for improving preparedness and resilience to climate change-induced health risks.

5.3 Conclusions

The data reveals a considerable level of attention and understanding of local weather change amongst individuals in the health district, with an awareness rate of 88.3%. This can be attributed to the impact of coaching programs and focus campaigns organized with the aid of Non-Governmental Organizations focusing on Climate Change and Health in the district.

Regarding the occurrence of climate change-induced hazards, respondents indicated that storms were relatively uncommon, while droughts, heatwaves, veld fires, and cyclones had been reported to happen more frequently. These findings had been consistent with facts provided by means of key informants and observations. Therefore, the health dangers associated with local weather change-induced disasters protected drownings, fungal infections, heat-related illnesses, fatigue, respiratory issues, heat rash, vector-borne ailments like malaria, waterborne diseases such as cholera and dysentery, zoonotic illnesses like dog bites and

anthrax, as nicely as mental fitness issues such as psychological outcomes and post-traumatic disorder. Malaria and psychological stress emerged as the most commonly pronounced risks. The data additionally highlighted some gaps in the initiatives implemented by way of the district health sector. A good sized percentage (42%) of respondents expressed uncertainty about the availability of price range resources and pronounced inadequate conversation systems (51%). Furthermore, a tremendous percentage of respondents indicated that mock drills have been not often conducted. Again, there were reviews from the general populace regarding the inadequate availability of or inadequate backup systems, clinical supplies, equipment, and technical support. Maintenance of resources was once identified as an location that required improvement. The challenges in climate alternate and health preparedness covered a lack of material resources, restricted stakeholder involvement, insufficient political will, man or woman ignorance, and a combination of these factors. As a result, the widely wide-spread population encouraged measures such as research, training programs, and enticing stakeholders to enhance preparedness efforts.

5.4 Recommendations

Based on the findings of the study, here are some of the recommendations to enhance preparedness on climate change and health disasters in Mount Darwin District:

1. Implement tailored education and training initiatives aimed at enhancing health workers' knowledge and skills concerning climate change and its impacts on public health.
2. Establish a systematic monitoring system for climate-related health risks, ensure timely reporting of health incidents and developing of accessible spot maps for enhanced surveillance.
3. Enhance engagement strategies by fostering inclusivity and responsiveness to address concerns regarding resource scarcity, while actively involving stakeholders to fortify the District Health system.

References

1. Alameddine M, Fouad FM,Diaconu K, Jamal Z, Lough G, WitterS, Ager A. (2019). *Resilience capacities of health systems: accommodating the needs of Palestinian refugees from Syria.* SocSci Med. Jan; 220:22-30. [PubMed]
2. Andrade C. (2020). *Sample size and its importance in research*. Indian J Psychol Med; 42:102-3
3. Berman H.B., (2020). *Sample Size: Stratified Random Samples*", [online] Available at: https://stattrek.com/sample-size/stratified-sample URL [Accessed Date: 2/3/2024].
4. Besley JC Dudo A Yuan S Lawrence F (2018). *Understanding scientists' willingness to engage.* Sci Commun.; 40: 559-590 Crossref Google Scholar
5. Bhandari, P. (2023 June 22). *Questionnaire Design Methods, Question Types & Examples. Scribbr*. Retrieved January 29, 2024, from https://www.scribbr.com/methodology/questionnaire/
6. Bishi, G. (2015). *The colonial archive and contemporary chieftainship claims: the case of Zimbabwe 1935-2014.* The University of the Free State.
7. Brito MO Dugdale CM Collins-Ogle M Snowden J Wheeler DA (2020). *ID/HIV physician ambassadors: advancing policy to improve health. J Pediatr Infect Dis Soc*.; (published online Oct 24, (2020). https://doi.org/10.1093/jpids/piaa128 PubMed Crossref Google Scholar
8. Chen, Alice, and Vivek Murthy. (2019). *How Health Systems Are Meeting the Challenge of Climate Change.Harvard Business Review, Harvard University,* 18 Sept. 2019, https://hbr.org/2019/09/how-healthsystems-are-meeting-the-challenge-of-climate-change.
9. Daniels B, Boffa J, Kwan A, et al. (2023). *Deception and informed consent in studies with incognito simulated standardized patients: empirical experiences and a case study from South Africa.* Research Ethics 19(3).
10. Doucleff, Michaeleen. (2020). *Are There Zombie Viruses-like the 1918 Flu- Thawing in the Permafrost?* NPR, 19 May2020.
11. Duckett L. J. (2021). *Quantitative research excellence: Study design and reliable and valid measurement of variables.* Journal of Human Lactation, 37(3), 456–463. https://doi.org/10.1177/08903344211019285 Google Scholar
12. Fournier C, Stewart S, Adams J, et al. (2023). *Systemic disruptions: decolonizing indigenous research ethics using indigenous knowledges*. Research Ethics 19(3).

13. Gould S Rudolph L (2023). *Challenges and opportunities for advancing work on climate change and public health. Int J Environ Res Public Health.*12: 15649-15672 View in Article Scopus (32) PubMed Crossref Google Scholar
14. Grimm PY, Oliver S, Merten S,Han WW, Wyss K. (2021), *Enhancing the un-derstanding of resilience in health sys-tems of low- and middle-income coun-tries*: A qualitative evidence synthesis.Int J Health Policy Manag. Jan16 (in press);1-13. [PubMed]
15. Haines A (2017). *Health co-benefits of climate action. Lancet Planet Health*.; 1: e4-e5 View in Article Scopus (52) PubMed Summary Full Text Full Text PDF Google Scholar
16. Han H (2014), *How organizations develop activists: civic associations and leadership in the 21st century*. Oxford University Press, USA Crossref Google Scholar
17. Hancher-Rauch HL Gebru Y Carson A (2019). *Health advocacy for busy professionals: effective advocacy with little time.* Health Promot Pract. 20: 489-493 PubMed Crossref Google Scholar
18. Hathaway J Maibach EW (2018). *Health implications of climate change: a review of the literature about the perception of the public and health professionals*. Curr Environ Health Rep.; 5: 197-204 View in Article Scopus (81) PubMed Crossref Google Scholar
19. Haynes AG, Lenz A, Stalder O, Limacher A. (2021. *Presize: An R-package for precision-based sample size calculation in clinical research*. J Open Source Softw.;6:3118.Article Google Scholar
20. Heeringa SG, West BT, Berglund PA. (2020). *Applied survey data analysis* (Second Edition). New York: Chapman and Hall/CRC.
21. Hess, Jeremy et al. (2020) *Strengthening the global response to climate change and infectious disease threats.* BMJ (Clinical research ed.) vol. 371 m3081. 26 Oct. 2020, doi:10.1136/bmj.m3081
22. Hubbert B Ahmed M Kotcher J Maibach E Sarfaty M (2020). *Recruiting health professionals as sustainability advocates. Lancet Planet Health.*; 4: e445-e446 View in Article Scopus (9) PubMed Summary Full Text Full Text PDF Google Scholar
23. IPCC, (2007). Climate Change 2007: *Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,*
24. Islam, S., Chu, C., Smart, JCR., Liew, L. (2020). *Integrating disaster risk reduction and climate change adaptation: a systematic literature review.* Climate and Development. 12(3): 255-267.

25. Kamlongera MI and Katenga-Kaunda MW (2023). *Researchers' reflections on ethics of care as decolonial research practice: understanding Indigenous knowledge communication systems to navigate moments of ethical tension in rural Malawi*. Research Ethics 19(3).
26. Koeva S, Rohova M. 2020). *Healthsystem resilience: Concept develop-ment.* J of IMAB. Jul-Sep; 26(3):3251-3258. [Crossref]
27. Koeva S, Rohova M. 2020, *Health system resilience:* Concept development. J of IMAB. Jul-Sep; 26(3): 3251-3258. [Crossref]
28. Kotcher J Maibach E Montoro M Hassol SJ (2018). *How Americans respond to information about global warming's health impacts: evidence from a national survey experiment*. Geohealth. 2: 262-275 View in Article Scopus (33) PubMed Crossref Google Scholar
29. Kreslake JM Price KM Sarfaty M (2016). *Developing effective communication materials on the health effects of climate change for vulnerable groups: a mixed methods study*. BMC Public Health.; 16: 946 View in Article Scopus (25) PubMed Crossref Google Scholar
30. Lauren, T. (2020). *What is a cross-sectional study*? Retrieved June 14, 2021, from https://www.scribbr.com/methodology/cross-sectional-study/.
31. Lemery J Balbus J Sorensen C (2020). *Training clinical and public health leaders in climate and health*. Health Aff (Millwood).; 39: 2189-2196 PubMed Crossref Google Scholar
32. Leo, J., Luhanga, E., & Michael, K. (2019). *Machine Learning Model for Imbalanced Cholera Dataset in Tanzania.* Scientific World Journal, 9397578. doi:10.1155/2019/939757
33. Linden S Leiserowitz A Maibach E (2019). *The gateway belief model: a large-scale replication*. J Environ Psychol.; 62: 49-58 View in Article Scopus (136) Crossref Google Scholar
34. Maibach E (2019). *Increasing public awareness and facilitating behavior change: two guiding heuristics. in: Hannah L Lovejoy T Climate Change and Biodiversity*. 2nd edn. Yale University Press, London Google Scholar
35. Maibach E Miller J Armstrong F et al. (2021). *Health professionals, the Paris agreement, and the fierce urgency of now.J Clim Change Health.* 1100002 View in Article Scopus (42) Crossref Google Scholar
36. Maibach E Sarfaty M Gould R Damle N Armstrong F (2020). *A call to action by health professionals. in: Al-Delaimy WK Ramanathan V Sánchez Sorondo M Health of people,*

health of planet and our responsibility: climate change, air pollution and health. Springer International Publishing, Cham: 395-405 CrossrefcGoogle Scholar

37. Maibach EW Nisbet M Baldwin P Akerlof K Diao G (2010). *Reframing climate change as a public health issue: an exploratory study of public reactions*. BMC Public Health.; 10: 299 View in Article Scopus (284) PubMed Crossref Google Scholar
38. Maibach EW Sarfaty M Mitchell M Gould R (2019). *Limiting global warming to 1·5 to 2·0°C—a unique and necessary role for health professionals.* PLoS Med.; 16e1002804 View in Article Scopus (25) PubMed Crossref Google Scholar
39. Mashingaidze, G. (2022 May 6). *Let's give credit where it's due.* Retrieved from The Patriot : https://www.thepatriot.co.zw/opinion/lets-give-credit-where-its-due/https://doi.org/10.4135/9781071812082.n207 Google Scholar
40. Mehta S Machado F Kwizera A et al. (2021). *COVID-19: a heavy toll on health-care workers*. Lancet Respir Med.; 9: 226-228 Google Scholar
41. Mock CN, Nugent R, Kobusingye O, et al. (2021). *Injury Prevention and Environmental Health*. 3rd edition. Washington (DC):
42. Morfeld, Peter, and Thomas C Erren. (2021). *Countdown on Health and Climate Change: Too Important for Methodological Errors."* The Lancet, vol. 398, no. 10294, p. 26., https://doi.org/10.1016/s0140-6736(21)00884-9.
43. Mostert M. (2022). *Face validity. In Frey B. (Ed.), The SAGE encyclopedia of research design* (Vol. 1, pp. 558–561). SAGE Publications.
44. Murdock M and Erickson S (2023). *Research Responsibility Agreement: A tool to support ethical research.* Research Ethics 19(3).
45. Nabi RL Gustafson A Jensen R (2018). *Framing climate change: exploring the role of emotion in generating advocacy behavior.* Sci Commun.; 40: 442-468 View in Article Scopus (205) Crossref Google Scholar
46. Nhamo, G. and S. Muchuru (2019). *Climate adaptation in the public health sector in Africa:* Evidence from United Nations Framework Convention on Climate Change National Communications. Jamba 11(1): 64
47. Roos, N., Kovats, S., Hajat, S., Filippi, V., Chersich, M., Luchters, S., Scorgie, F., Nakstad, B., Stephansson, O. and (2021). *Maternal and new born health risks of climate change: A call for awareness and global action.* Acta Obstet Gynecol Scand, 100: 566-570. https://doi.org/10.1111/aogs.14124

48. Roser-Renouf C Maibach EW Leiserowitz A Zhao X (2014) *The genesis of climate change activism: from key beliefs to political action. Climate Change*.; 125: 163-178 View in Article Scopus (175) Crossref Google Scholar
49. Rublee, Caitlin, et al. (2021). *At Ground Zero—Emergency Units in Low- and Middle-Income Countries Building Resilience for Climate Change and Human Health.*" World Medical & Health Policy, vol. 13, no. 1, pp. 36–68., https://doi.org/10.1002/wmh3.417.
50. Salas RN Slutzman JE Sorensen C Lemery J Hess JJ (2019). *Climate change and health: an urgent call to academic emergency medicine*. Acad Emerg Med. 26: 837-840 View in Article Scopus (6) PubMed Crossref Google Scholar
51. Sample Size Calculator. Caculator.net.https://www.calculator.net>math/sample-size access 23/02/2024.
52. Sarfaty M Kreslake J Ewart G. (2016). *Survey of International Members of the American Thoracic Society on climate change and health.* Ann Am Thorac Soc.; 13: 1808-1813 View in Article PubMed Google Scholar
53. Sarfaty M Kreslake JM Casale TB Maibach EW (2016). *Views of AAAAI members on climate change and health. J Allergy Clin Immunol Pract.*; 4 (35.e26): 333 View in Article Scopus (35) PubMed Summary Full Text Full Text PDF Google Scholar
54. Saulnier DD, Hean H, Thol D, *et al*. (2020). *Staying about: community perspectives on health system resilience in the management of pregnancy and childbirth care* in Cambodia. BMJ Glob Health;5: e002272
55. Scheerens, C., Ruyssen, I., Ray, S., De Sutter, A., Vanhove, W., Bekaert, E., De Maeseneer, J. (2020). *Tackling adverse health effects of climate change and migration through intersectoral capacity building in Sub-Saharan Africa*. BJGP Open. doi:10.3399/bjgpopen20X101065
56. Schenk EC Cook C Demorest S Burduli E CHANT (2019). *Climate, health, and nursing tool: item development and exploratory factor analysis*. Annu Rev Nurs Res.; 38: 97-112 View in Article Scopus (11) PubMed Crossref Google Scholar
57. Sellers, S., Ebi, K. L., & Hess, J. (2019). *Climate change, human health, and social stability: addressing interlinkages.* Environmental health perspectives, 127(04), 045002.
58. Singh, G N, Jaiswal, A. K., and Pandey A. K. (2021). *Improved Imputation Methods for Missing Data in Two-Occasion Successive Sampling, Communications in Statistics*: Theory and Methods. DOI:10.1080/03610926.2021.1944211

59. Singh, Nidhi, Saumya Singh, and R. K. Mall. (2020). *Urban ecology and human health: implications of urban heat island, air pollution and climate change nexus."* Urban Ecology. Elsevier. 317-334
60. Solomon CG LaRocque RC (2019) *Climate change – a health emergency.* N Engl J Med.; 380: 209-211 View in Article Scopus (77) PubMed Crossref Google Scholar
61. Swaen, B. & George, T. (2022). November 15). *What Is a Conceptual Framework? | Tips & Examples.* Scribbr. Retrieved February 12, 2024, from https://www.scribbr.com/methodology/conceptual-framework
62. Szyk, B. (2023). *Sample Size Calculator*. Available at: https://www.omnicalculator.com/statistics/sample-size. Accessed: Feb 04, 2024.
63. The International Bank for Reconstruction and Development / The World Bank; 2017 Oct 27. Chapter 8. Available from: https://www.ncbi.nlm.nih.gov/books/NBK525226/doi: 10.1596/978-1-4648-0522-6_ch8
64. Thomas, L. (2023, June 22). *Cross-Sectional Study Definition, Uses & Examples*. Scribbr. Retrieved February 6, 2024, from https://www.scribbr.com/methodology/cross-sectional-study/
65. Thomas, L. (2023, June 22). *Stratified Sampling Definition, Guide & Examples.* Scribbr. Retrieved February 1, 2024, from https://www.scribbr.com/methodology/stratified-sampling/
66. Urbina J., Monks S. M. (July 26, 2021). *Validating assessment tools in simulation. StatPearls* Publishing. https://www.ncbi.nlm.nih.gov/books/NBK560531/ Google Scholar.
67. Wang, X., & Cheng, Z. (2020). *Cross-sectional studies: strengths, weaknesses, and recommendations*. Chest) 158(1) Suppl, S65–S71. https://doi.org/10.1016/j.chest. 2020.03.012
68. Watts N Amann M Arnell N et al (2019). *The report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate.* Lancet. 2019; 394: 1836-1878 View in Article Scopus (828) PubMed Summary Full Text Full Text PDF Google Scholar
69. Wheeldon J and Heidt J (2023). *Cannabis, research ethics, and a duty of care*. Research Ethics19(3
70. WHO (2018). COP24 special report: *health and climate change*. World Health Organization, Geneva View in Article Google Scholar
71. WHO (2019). *WHO Director-General urges world leaders to protect health from climate change?* https://www.who.int/director-general/speeches/detail/who-director-general-

urges-world-leaders-to-protect-health-from-climate-change Date: Sept 11, 2019 Date accessed: December 21, 2020 Google Scholar

72. WHO (2022). *WHO health and climate change survey report: tracking global progress*? World Health Organization, Geneva, Switzerland View in Article Google Scholar
73. World Health Organization (WHO) (2018). *Health and climate change survey report: tracking global progress.* Geneva: World Health Organization; 2019 (WHO/CED/PHE/EPE/19.11). Licence: CC BY-NC-SA 3.0 IGO.
74. World Health Organization; (2021). *WHO guidance on preparing for national response to health emergencies and disasters,* Geneva. Licence: CC BY-NC-SA 3.0 IGO.

Appendix I:

Interview guide for the key informants

Good Morning/Afternoon

I am Heaviness Pfidze a postgraduate student in the faculty of Science & Engineering School of Geosciences MSc in Climate Change & Sustainable Development at Bindura University of Science and Education. In partial fulfillment of the requirements of the programme am undertaking a study entitled ***District Health Sector Preparedness for Climate Change-induced Disasters. A Case of Mount Darwin District, Mashonaland Central Province***. You have been identified as one of the key informants to the study and you are therefore kindly invited to participate in the study. There are no direct benefits associated with participation in this study, however the data you provide may be very useful towards planning on climate change resilience. You are also reminded that the right to participation in this study solely lies with you if you feel to withdraw from the study at any stage, you are free to do so.

The interview may take 10 minutes or more and it will be audio recorded to save time and later on transcribed.

1. <u>Demographic data</u>

Date of the survey …….

a. Sex

Male	☐
Female	☐

b. Age

18-29 years	☐
30-39years	☐
40-49years	☐
50years +	☐

☐

c. Level of qualification

Certificate ☐
Diploma ☐
Degree ☐
Postgraduate degree

d. Employment ……

e. How long have you been working in Mount Darwin district?

0-2 yars ☐
3-4years ☐
5-7 years ☐
8-10 years ☐
9 years plus ☐

f. Level of health facility (station)

Hospital ☐
Clinic ☐

2. Climate Change Knowledge and Awareness:

a) Is your district staff members aware climate change and health. Yes ☐
No ☐

b) If yes, do they provide you with health-related events on climate change induced disasters when such incident occurs yes ☐
No ☐

c). Of the following which are most common climate change-related risks or disasters that your district staff usually report to you?

	Frequency of occurrence			
Climate change induced hazard	**Most common**	**Common**	**Not common**	**No idea**
Floods				
Storm				
Drought				

Heatwave				
Wildlife				
Veldfire				
Cyclones				

d). How would you rate the level of knowledge and awareness of climate change among your health staff?

Satisfactory	
Unsatisfactory	
No idea	

3a. Have you ever received reports on any of the flowing risks as caused by climate change?

Climate change and health related events	**Occurrence**		
	Yes	**No**	**No idea**
Drown, fungal infection,			
Heat related illness eg heat exhaustion, fatigue or respiratory problems			
Change in patterns on infectious diseases eg malaria, diarrhoea			
Increased water borne diseases			
Increased mental health, eg psychological effects, post traumatic disorder			
Health complication after a delay in seeking or receiving treatment due to damaged infrastructure by climate change induced disasters.			

4. Climate–induced Disaster Preparedness Policies and Planning:

a. Do u have a specific health emergence preparedness plan that can be used by your staff to address climate change and health induced problems emerging from the listed hazard?

Hazard	**availability of emergence preparedness plan**		
	Yes	**No**	**No idea**
Floods			
Storm			
Drought			
Heatwave			
Veldfire			
Cyclones			

b. If yes, how often do you review and update the plan for the district health?

Annually ☐
Every five years ☐
Never reviewed ☐
No idea ☐

c. Do u allocated resources specifically for climate change and heath induced problems?

Yes ☐
No ☐
No idea ☐

d. How do you rate the level of communication on health emergence preparedness policies in our district between your staff and the stakeholders?

Poor ☐
moderate ☐
Good ☐

5. Infrastructure and Resources:

Assessing the availability and functionality of essential infrastructure, such as hospitals, clinics, emergency shelters, etc., in the district.

a. Have provided your health facilities with backup power, water, and communication systems?

Yes ☐
No ☐

b. Are all your health facilities supplied with adequate equipment and medicines to address the potential health impacts of climate change-induced disasters?

Yes ☐
No ☐

c. How well are these resources maintained by your staff for their readiness?

Well maintained and assessed ☐
Not maintained and no assessed ☐
Partially maintained ☐

6. Capacity Building and Training:

a. Are there training programs available for health staff to enhance their capacity in responding to climate change-induced disasters?

Yes	
No	

b. How often do you train your staff on climate change and health preparedness plan and response?

Monthly	
Annually	
Quarterly	
Yearly	
None of the above	

7. Community Engagement and Awareness:

a. Do you have technical support from the government forecasting local effects that you provided to your staff for developing preparedness plans, and communicating with the public on climate change's health effects?

Yes, ……...

No, ……

b. Describe the level of stakeholder engagement in disaster preparedness activities.

Very satisfactory	
Satisfactory	
Unsatisfactory	
Very unsatisfactory	

d. How do you ensure that health staff get engaged with community members in the planning and implementation of climate change and health emergence preparedness plan?

Climate change and health awareness campaigns	
Engaging local leaders	
Individual willingness	
All of the above	
None of the above	

8. Challenges and Recommendations:

a. What are the challenges faced by your health staff in addressing climate change-induced disasters.

Lack of climate change and health awareness	
Lack of human capital	
Lack of material resources	
Lack of stakeholder involvement	
Lack of political will	
Individual’s ignorance	
All of the above	
None of the above	

b. What recommendations are being suggested by your health staff as to improve the district's health sector preparedness?

Climate and health awareness	
Capacitating the health workers and community	
Stakeholder engagement	
All of the above	
None of the above	

Thank you for participation.

Appendix 2

Questionnaire for the general participants

Good Morning/Afternoon

I am Heaviness Pfidze a postgraduate student in the faculty of Science & Engineering School of Geosciences MSc in Climate Change & Sustainable Development at Bindura University of Science and Education. In partial fulfillment of the requirements of the programme am undertaking a study entitled ***District Health Sector Preparedness for Climate Change-induced Disasters. A Case of Mount Darwin District, Mashonaland Central Province***. You have been identified as one of the key informants to the study and you are therefore kindly invited to participate in the study. There are no direct benefits associated with participation in this study, however the data you provide may be very useful towards planning on climate change resilience. You are also reminded that the right to participation in this study solely lies with you if you feel to withdraw from the study at any stage, you are free to do so.

1. Demographic data

Date of the survey …….

a. Sex

Male ☐

Female ☐

b. Age

18-29 years ☐

30-39years ☐

40-49years ☐

50years + ☐

☐

c. Level of qualification

- Certificate ☐
- Diploma ☐
- Degree ☐
- Postgraduate degree

d. Employment ……

e. How long have you been working in Mount Darwin district?

- 0-2 years ☐
- 3-4years ☐
- 5-7 years ☐
- 8-10 years ☐
- 9 years plus ☐

f. Level of health facility

- Hospital ☐
- Clinic ☐

2. Climate Change Knowledge and Awareness:

a. Are you aware of climate change

- Yes ☐
- No ☐

b. If yes is climate change impacting negatively the district's health services?

- True ☐
- False ☐

c. Areas with weak health infrastructure in your district will be the least able to cope without assistance to prepare and respond to climate change and health issues.

- True ☐
- False ☐

d. Climate change also affects community health, both physical and mental.

True ☐

False ☐

f. Hospitals and clinics shoulder the burden of caring for people experiencing the health consequences of climate change.

True ☐

False ☐

g. Health care facilities also often face disruptions to their operations in the form of power outages during flooding and storms and this will inhibit the delivery of high-quality care.

True ☐

False ☐

h. Floods can expose more people to water borne diseases due to contamination of water sources

True ☐

False ☐

i. Emerging and remerging of communicable diseases in catchment area are attributed to climate change induced disasters such as drought, heat wave and floods,

True ☐

False ☐

Health risks

3a. What are most climate change-related risks or disasters that your district is vulnerable to?

	Frequency of occurrence			
Climate change induced hazard	**Most common**	**Common**	**Not common**	**No idea**
Floods				
Storm				
Drought				
Heatwave				
Veldfire				
Cyclones				

3b. Have you ever recorded any of the following problems induced by climate change?

Climate change and health induced problem	**Occurrence**		
	Yes	**No**	**No idea**
Drown, fungal infection,			
Heat related illness eg heat exhaustion, fatigue or respiratory problems			
Change in patterns on infectious diseases eg malaria, diarrhoea			
Increased water borne diseases			
Increased mental health, eg psychological effects, post traumatic disorder			
Health complication after a delay in seeking or receiving treatment due to damaged infrastructure by climate change induced disasters.			

4. Infrastructure and Resources:

Assess the availability and functionality of essential infrastructure, such as hospitals, clinics, emergency shelters, etc., in the district.

a. Is your facility equipped with backup power, water, and communication systems?

Yes ☐

No ☐

b. Is your health facility have adequate equipment, and medicines to address the potential health impacts of climate change-induced disasters?

Yes ☐

No ☐

c. How well are these resources maintained for their readiness by the district executive?

Well maintained and assessed ☐

Not maintained and no assessed ☐

Partially maintained ☐

5. Capacity Building and Training:

a. What training programs have you attended to enhance your capacity in responding to climate change-induced disasters?

……

……

……

e. How often do you conduct some mock drills on disaster preparedness plan?

Monthly	☐
Quarterly	☐
Annually	☐
None of the above	☐

Initiatives and training

6. Climate change and health Preparedness Policies and Planning:

a. Does your district health have a specific climate change and health preparedness plan in place to address climate change-induced health problems?

Yes	☐
No	☐
Don't know	☐

b. If yes, how frequently is the plan reviewed and updated?

Annually	☐
Every five years	☐
Never reviewed	☐
Don't know	☐

c. Do you receive resources specific for climate change induced health related problems?

Yes	☐
No	☐
No idea	☐

d. Do you receive any communication on climate change and health preparedness policies from the executive?

yes	☐
No	☐

7. Community Engagement and Awareness:

a. Do you receive support from district executive forecasting local effects, developing preparedness plans, and communicating with the public about climate change's health effects?

Yes, ……...

No, ……

b. If yes above, is the support satisfactory?

Yes……...

No ……

d. If you are asked to rate the level of community engagement in your area of responsibility on climate change and health preparedness activities, how will you score it.

Very well prepared

Well prepared

Prepared

Not prepared

Well not prepared

Very well not prepared

e. Are there initiatives to raise awareness on climate change and health to the community?

Yes ☐

NO ☐

f. How are the community members engaged in the planning and implementation of climate change and health induced problems preparedness plan?

Climate awareness campaigns ☐

Engaging local leaders ☐

Political leaders ☐

Voluntary ☐

8. Challenges and Recommendations:

a. What challenges are you facing in addressing or responding to climate change and health induced problems?

☐

☐

☐

☐

☐

Lack of climate awareness ☐

Lack of human resources ☐

Lack of material resources

Lack community involvement

Lack of political will

Individual’s ignorance

All of the above

b. What recommendations can you suggest so that the top management may consider as to improve the district's health sector preparedness?

Stakeholder engagement ☐

Climate and health awareness ☐

Capacitating and the health workers and the ☐

All of the above ☐

None of the above

Thank you for participation.

Appendix 3

Observation check list on resources assessment

Good Morning/Afternoon

I am Heaviness Pfidze a postgraduate student in the faculty of Science & Engineering School of Geosciences MSc in Climate Change & Sustainable Development at Bindura University of Science and Education. In partial fulfillment of the requirements of the programme am undertaking a study entitled ***District Health Sector Preparedness for Climate Change-induced Disasters. A Case of Mount Darwin District, Mashonaland Central Province***. You have been identified as one of the key informants to the study and you are therefore kindly invited to participate in the study. There are no direct benefits associated with participation in this study, however the data you provide may be very useful towards planning on climate change resilience. You are also reminded that the right to participation in this study solely lies with you if you feel to withdraw from the study at any stage, you are free to do so.

		Very satisfactory	**Satisfactory**	**Unsatisfactory**	**Very unsatisfactory**
Ser	**Item**				
01	**Health Infrastructure and Facilities.**				
	Condition of health facilities (hospital/clinics).				
	Availability of emergency equipment (e.g., generators, water purification systems).				
	Infrastructure resilience to extreme weather events (floods, storms).				
02	**Human Resources and Capacity Building**:				
	Observing staffing levels and qualifications of health workers.				
	Assessing training programs for disaster response and climate resilience.				
	Presence of community health workers and their roles at health facility				

03	**Early Warning Systems and Risk Monitoring**:				
	Availability of climate-related early warning systems.				
	Functionality of climate-related early warning systems.				
	Availability of communication system for dissemination of alerts to health facilities and communities.				
	Records on received climate-related risk information from Metrological department.				
04	**Community Engagement and Preparedness**:				
	Records on awareness campaigns on climate-related health risks.				
	Verify the existence of community on hospital disaster preparedness plan.				
	Provision of spot map				
05	**Health Information Systems and Data Collection**:				
	Availability of diseases and incidence surveillance charts.				
	Check if climate-sensitive health indicators are monitored.				
	Evaluate reporting system of information to relevant authorities.				
06	**Emergency Response Plans and Protocols**:				
	Identify disaster response plans at health facilities.				
	Verify coordination mechanisms with other sectors (e.g., water, sanitation).				
07	**Medicines and Supplies Stockpiling**:				
	Stock levels of essential medicines and medical supplies.				
	Storage conditions.				
	Availability of first aide kits				
	Availability of resources materials for disaster response				
08	**Climate-Resilient Health Policies and Governance**:				
	Provision policies that address climate change and health.				
09	**Community Health Facilities and Outreach Services**:				
	Budget for visit health posts, mobile clinics, and outreach programs.				
	Records on health education sessions on climate change and health.				

KEY

CATERGORY	**SCORE**
Very satisfactory	3
Satisfactory	2
Unsatisfactory	1
Very unsatisfactory	0

THE END

Appendix 4

Approved research letter by Mount Darwin District Hospital

Research Letter for
pH 01-Jun-2024 15-3