ENSIGN GLOBAL COLLEGE, KPONG

FACULTY OF PUBLIC HEALTH

DEPARTMENT OF COMMUNITY HEALTH

POST-FLOOD HEALTH RISKS AND CHALLENGES TO HEALTHCARE ACCESSIBILITY IN SELECTED DISTRICTS IN GHANA: CASE STUDY OF THE AKOSOMBO DAM SPILLAGE

By

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September 2024

DECLARATION

I hereby declare that this thesis has been the result of my own research, except references cited that have been duly acknowledged. It has never been submitted in part or full for any award of my intended degree.

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Doh Gladstone Elikem

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Signature Date

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…… September 30, 2024

Signature Date

Head of Academics

Dr Stephen Manortey

…… September ……., 2024

Signature Date

DEDICATION

This thesis is dedicated to the resilient people of the Central Tongu and Ada East Districts who endured the devastating impacts of the Akosombo Dam spillage in October 2023. Your courage and perseverance in the face of adversity serve as a profound source of inspiration. This work is especially dedicated to the families who lost properties and livelihoods but continue to rebuild their lives with unwavering strength.

To the frontline rescue teams and community volunteers who selflessly helped during the floods, your commitment and dedication are invaluable. You are the unsung heroes who, despite the immense challenges, ensured that help reached the most vulnerable.

I also dedicate this work to my family for their endless support and encouragement throughout this academic journey. Your unwavering belief in my abilities gave me the strength to persevere through this challenging project.

Finally, to the future generations of researchers and public health professionals, may this work serve as a catalyst for more in-depth studies on post-flood health risks and healthcare accessibility challenges. I hope it inspires continuous efforts to develop sustainable solutions that improve the resilience of communities facing similar disasters.

ACKNOWLEDGEMENT

I am deeply grateful to the Almighty God for His divine guidance, protection, and inspiration throughout this academic journey. Without His grace, this work would not have been possible.

I extend my deepest appreciation to my supervisor, Dr. Millicent Ofori Boateng, for her invaluable mentorship, insightful guidance, and unwavering support throughout the course of this research. Your dedication and critical feedback were instrumental in shaping this work.

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This thesis is a product of the Mepe Project, which examined the post-flood health risks and healthcare accessibility challenges following the Akosombo Dam spillage. I am immensely grateful to Sister Lynette Gay, whose generous funding made this project possible. I also extend my sincere gratitude to "Engage Now Africa" for their support and commitment to community development, which greatly facilitated this study.

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DEFINITION OF TERMS

Fluvial Floods – Where rivers/streams overflow their banks and water flows out onto the adjacent low-lying areas.

Dam-mediated Floods – Flooding events caused by the release of water from a dam.

Large Dam – A dam with a height of 15 metres or greater from lowest foundation to crest or a dam between 5 metres and 15 metres impounding more than 3 million cubic metres.

Functional Health Facilities – A functional health facility is one that is fully operational, well-staffed, and equipped to provide essential healthcare services, including preventive, diagnostic, curative, and emergency care, while maintaining access to medical supplies, ensuring patient safety, and delivering quality care (Kruk *et al.*, 2018).

LIST OF ABREVIATIONS

ICLOD - International Commission on Large Dams

IFRC – International Federation of Red Cross and Red Crescent

LI – Legislative Instrument

ABSTRACT

Background: Floods are devastating natural disasters that have significantly impacted global public health, with dam-mediated flood events increasingly contributing to these public health concerns. Africa faces unique challenges in managing the health impacts of these dam-related floods. This study focuses on the health risks and healthcare access challenges faced by communities along the lower Volta River of Ghana following the Akosombo Dam spillage.

Methods: A community-based cross-sectional survey was conducted involving 381 residents from three purposively selected communities. Participants were selected using a systematic random sampling technique. Data collection was done through structured questionnaires. The data were analysed using Stata version 17, with descriptive statistics, chi-square tests, and logistic regression employed to determine the significance of various factors, with a p-value set at 0.05.

Results: The study found that a significant portion of the population (33.3%) reported experiencing health issues due to the flood, with skin infections being the most common, followed by vector-borne diseases and gastrointestinal issues. Access to healthcare services was significantly hindered, with 64% of respondents reporting the unavailability of functional health facilities during and immediately after the flood. Additionally, factors such as age, employment status, and pre-existing health conditions were identified as significant determinants of post-flood health risks.

Conclusion: The Akosombo Dam spillage has highlighted the health risks and challenges in healthcare accessibility in the affected communities. The findings emphasize the need for improved disaster preparedness, better healthcare infrastructure, and community resilience-building to mitigate the impacts of such flooding events in the future.

Keywords: Post-flood health risks, Healthcare accessibility challenges, Dam-mediated floods, Akosombo Dam spillage, Resilience-building practices.

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1 CHAPTER 1

INTRODUCTION

1.1 Background information

Floods are recognized as one of the most catastrophic natural disasters globally, and have affected 2.3 billion people worldwide in the last 20 years (Suhr and Steinert, 2022). Global data from 2019 suggests that floods are responsible for 43.5% of all deaths from natural disasters (CRED, 2019), and they pose significant threats to public health, particularly in rural communities and can result in a range of health risks, including vector-borne diseases such as malaria (Watts *et al.*, 2018). The aftermath of floods often leads to contaminated water sources, compromised sanitation infrastructure, and limited access to healthcare services, exacerbating the risk of disease transmission (UNDRR, 2022). Infrastructure damage, transportation disruptions, and overwhelmed healthcare systems hinder the delivery of essential medical care to affected populations (Hosseini, Barker and Ramirez-Marquez, 2016), particularly vulnerable groups such as the elderly, children, and individuals with pre-existing health conditions, who face heightened barriers in accessing timely healthcare interventions (WHO, 2014).

According to the International Commission on Large Dams (ICOLD), a dam is defined as an artificially created barrier across a river, stream, or watercourse for the purpose of confining and controlling the flow of water, and thereby storing, diverting, or regulating water. And according to current estimates, there are now around 62,000 dams worldwide (International Comminsion on Large Dams, 2019) with an estimated cumulative storage capacity of between 7,000–8,300 km3 (Zarfl *et al.*, 2015). Currently 37,600 dams are higher than 15 meters or greater from lowest foundation to crest (classified as large Dams) worldwide and a further 3,700 are planned or under construction (International Comminsion on Large Dams, 2019). Dams are constructed for many purposes, including reservoir creation, flood prevention,

irrigation, and hydroelectric power generation. But fluvial flood regimes (where rivers overflow their banks) are increasingly being mediated by dams (Dotse-Gborgbortsi *et al.*, 2022). These Dam mediated floods usually occur when water holding capacities of dams are exceeded as a result of heavy rainfalls. Consequently, this leads to the controlled spillage of the dam to retain its integrity but causing flooding in low-lying communities along the watercourse (Atubiga *et al.*, 2023).

In Africa, the impact of dam mediated floods on public health is particularly pronounced due to various socio-economic and environmental factors such as poverty and climate change. In September 2020, small and medium scale floods affected millions of people in 15 countries across the continent (IFRC, 2021). Nearly seven million people were affected and 1,273 deaths occurred, the highest figure since 2006 (IFRC, 2021) . The Bagre Dam Spillage (in Burkina Faso), which occurs annually during the rainy season, often leads to widespread flooding in villages along the river course in Burkina Faso and in the northern regions of Ghana, displacing thousands of people, posing health risks, disrupting livelihoods and destroying about 196 km^2 of farmland in northern Ghana each year (Kansuk and Chimbar, 2021) (Baah-Kumi and Ward, 2020).

The continent's susceptibility to the brunt of climate change, coupled with inadequate infrastructure and resource constraints, exacerbates the health risks associated with flooding (Jia *et al.*, 2022). Moreover, the prevalence of waterborne diseases, such as cholera and typhoid fever, is significantly higher in African countries, further amplifying the disease burden in flood-affected communities (Legros, 2018).

In Ghana, recent flooding incidents, including those resulting from the Bagre Dam spillage have highlighted the vulnerability of rural communities to post flood health risks and healthcare accessibility challenges. Similarly, the Weija Dam spillage in 2018 resulted in flooding in

communities along the Densu River, causing property damage and posing health risks to residents (Asare, 2020).

1.2 Problem statement

The recurring occurrences of flooding events in Ghana, particularly those stemming from dam spillages like the Bagre Dam and the Weija Dam, have long posed significant health consequences to affected communities (Asare, 2020; Atubiga *et al.*, 2023). The recent Akosombo Dam spillage emerged as the most devastating man-made disaster, affecting communities in North Tongu, Central Tongu, South Tongu districts in the Volta Region, Ada East district in the Greater Accra Region and some communities in the Eastern Region. Communities in these districts have over the years endured recurrent flooding events as a result of the spillage of the Akosombo Dam, primarily triggered by heavy rainfall, dam maintenance activities, or operational decisions, leading to minimal but consequential flood occurrences (Miescher, 2021). The last recorded spillage was in 2010 (Miescher, 2023).

The severity of the issue became evident in October 2023, when an estimated 35,857 individuals, including children who are particularly vulnerable, were displaced due to flooding induced by the Akosombo dam spillage (Kobina, 2023). The resultant evacuation from homes and overcrowding at shelters following such flood event sets a fertile ground for outbreaks of various illnesses, including respiratory, skin and soft tissue, zoonotic, and gastrointestinal diseases (Paterson, Wright and Harris, 2018). Communities such as Bakpa Awadiwoekome, Kebegodo, and Pediatorkope in the Central Tongu and Ada East Districts, situated downstream along the Volta River, bear the brunt of these flood impacts, perpetuating a cycle of heightened post-flood health risks and healthcare accessibility challenges.

While existing literature acknowledges the occurrence of flooding events and their associated health consequences in Ghana (Asare, 2020; Atubiga *et al.*, 2023), there remains a paucity of in-depth studies focusing specifically on the Akosombo Dam spillage and its impacts on affected communities.

Predominantly, existing research highlights the immediate aftermath of flood events, such as displacement figures and basic health risks (Kobina, 2023). However, there is limited exploration into the ongoing challenges in healthcare accessibility, and resilience-building practices unique to the circumstances of the communities in the Central Tongu and Ada East Districts.

Furthermore, while global statistics emphasize the prevalence of waterborne diseases like cholera linked to flood events (Ntajal *et al.*, 2022), there is limited local research examining the specific vulnerabilities and health outcomes within the context of the selected districts. This research gap underscores the pressing need for a comprehensive study that not only quantifies the extent of post-flood health risks but also delves into the underlying factors exacerbating these risks and identifies effective resilience-building practices.

Assessing the post-flood health risks faced by selected communities within the Central Tongu and Ada East Districts, specifically Bakpa Awadiwoekome, Kebegodo, and Pediatorkope, is imperative to inform evidence-based public health policies, disaster preparedness, and effective management strategies.

1.3 Rationale for the study

Despite the increasing frequency of dam mediated flooding events and their detrimental effects on public health globally, limited research has been conducted to assess the specific post-flood health risks and healthcare accessibility challenges faced by the impacted communities in the Central Tongu and Ada East Districts in the context of the October 2023 spillage of the Akosombo Dam.

By evaluating the post-flood health risks and healthcare accessibility challenges faced by Bakpa Awadiwoekome, Kebegodo and Pediatorkope, the study aims to provide evidence-based insights that can inform healthy public policy formulation, adequate healthcare provision, effective disaster preparedness and management, and community resilience-building efforts in flood-prone areas in Ghana. This study will also fill the literature gap on post flood health risks in Ghana and serve as a reference point for future studies.

1.4 Conceptual framework

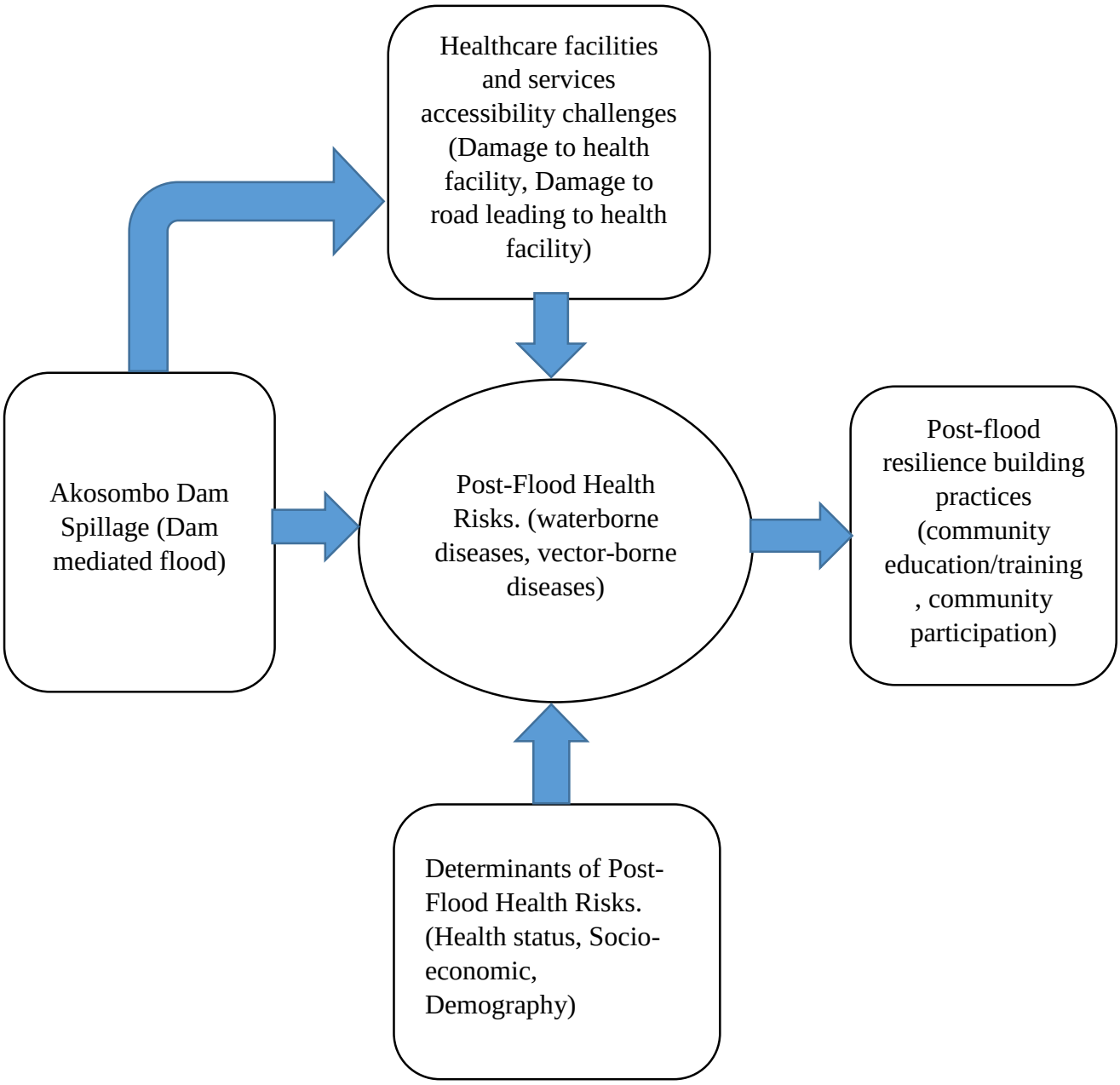

Figure 1.1 Conceptual Framework, Adapted from (Zhong et al.,2018)

This conceptual framework recognizes at its core the intricate connections between environmental hazards such as floods, post-flood health risks such as waterborne diseases and their determinants, accessibility to healthcare facilities and services and post-flood resilience building practices in the context of the Akosombo Dam spillage.

Flood, resulting from the dam spillage introduce contaminants into water sources and also disrupt sanitation infrastructure and practices, increasing the risk of waterborne diseases (Few et al., 2004). This direct impact on water quality and sanitation practices serves as a primary pathway for health risks in flood-affected communities.

In parallel, limited access to healthcare facilities and services, exacerbated by damage to health infrastructure and logistics is a key effect of the flood and influences post-flood health risks (Paediatric Society of Ghana, 2023).

The determinants of post-flood health risks encompass environmental, individual, socioeconomic and community factors that influence the likelihood and severity of post-flood health risks following the flood event.

Community resilience practices influence and emerges as a critical factor in shaping post-flood health risks. Resilient communities exhibit adaptive capacities to withstand and recover from adverse events, often fuelled by local initiatives, social networks, and resource mobilization (Aldrich, 2012). Assessing the post-flood resilience building practices among residents of Baka Awadiwoekome, Kebegodo and Pediatorkope can inform effective interventions aimed at mitigating post-health risks and promoting recovery in flood-affected areas.

By assessing these interrelated factors within the context of the Akosombo Dam spillage in the selected communities, this research seeks to provide insights into post-flood health risks and inform evidence-based strategies for disaster preparedness, response, and resilience-building in flood-affected areas in Ghana and beyond.

1.5 Research Questions

1. What are the post-flood health risks in the selected communities of the Central Tongu and Ada East Districts?
2. What are the determinants of post-flood health outcomes among residents of the Central Tongu and Ada East Districts?
3. What are the challenges in accessing healthcare facilities and services in the selected communities post-flooding?
4. What are the post-flood resilience building practices among residents in the Central Tongu and Ada East Districts?

1.6 General Objective

To assess post-flood health risks, healthcare accessibility challenges and resilience building practices in the Central Tongu and Ada East Districts in the aftermath of the Akosombo dam spillage.

1.7 Specific Objectives

1. To assess the post-flood health risks in the selected communities of the Central Tongu and the Ada East Districts.
2. To investigate the determinants of post flood-health outcomes among residents of the Central Tongu and Ada East Districts.
3. To identify the challenges in accessing healthcare facilities and services in the selected communities post-flooding.
4. To explore the post-flood resilience building practices among residents in the Central Tongu and Ada East Districts.

1.8 Profile of Study Areas

1.8.1 Central Tongu District

Central Tongu District Assembly is one of the 18 District Assemblies in the Volta Region and among the Two Hundred and sixty (260) administrative districts created in Ghana. The District was carved out of the former North Tongu District Assembly with Legislative Instrument (LI) 2077 of 2012. Its administrative Capital is at Adidome. The District shares common borders with South Tongu to the South, Ada East District in the Greater Accra Region to the West, Akatsi South District to the East with North Tongu and Adaklu Districts to the North. Central Tongu District covers a total land area of about 682.22km² and it is dominated by mix of high lands, valleys and plain grounds making an undulating topography. The District lies within the Tropical Savannah Grassland zone and the Volta River runs through the district with many communities dotted along the banks of the river. This makes the district a suitable place for large scale farming. Agriculture is the leading employment sector in the District engaging 78.3 percent of the total households in the district (Ghana Statistical Service, 2014).

The district has three hundred and three (303) communities including Bakpa Awadiwokome and Kebegodo, (which are the selected communities from the district), and 26 health facilities dotted across the 303 communities according to the 2021 Population and Housing Census. The District population figure as at the 2021 Population and Housing Census was 83,803 (https://ctda.gov.gh/). The growth rate is higher than both the Regional and National growth rates of 2.5%. This indicates that there will be a rapid increase in the pressure exerted on socio-economic services and resources in the District (Busia, 2023).

Source: Ghana Statistical Service, GIS

2

Figure 1.2 Map of Central Tongu District (Ghana Statistical Service,2014)

1.8.2 Ada East District

The Ada East District is situated in the Eastern part of the Greater Accra Region. The total land area of the District is 289.78 (square km). The District shares common boundaries with the Central Tongu District to the North, South Tongu District and Ada West to the East and West respectively. It is bounded to the south by the Gulf of Guinea, which stretches over 18 kilometers from Kewunor to Totope. It is also bounded by the Volta River South–Eastwards extending to the Gulf of Guinea southwards thereby forming an Estuary, about 2 kilometers away from the District capital, Ada-Foah (https://aeda.gov.gh/) .

The district is divided into three administrative sub-districts as follows: Ada-Foah sub-district, Kasseh sub-district, Pediatorkope sub-district. It has thirteen health facilities comprising of twelve government facilities and one private facility. Pediatorkope Sub district which is an Island with about 22 communities has Pediatorkope Health Centre(https://aeda.gov.gh/)and the major activities of the people in the district are fishing and farming(Sandqvist, 2019).

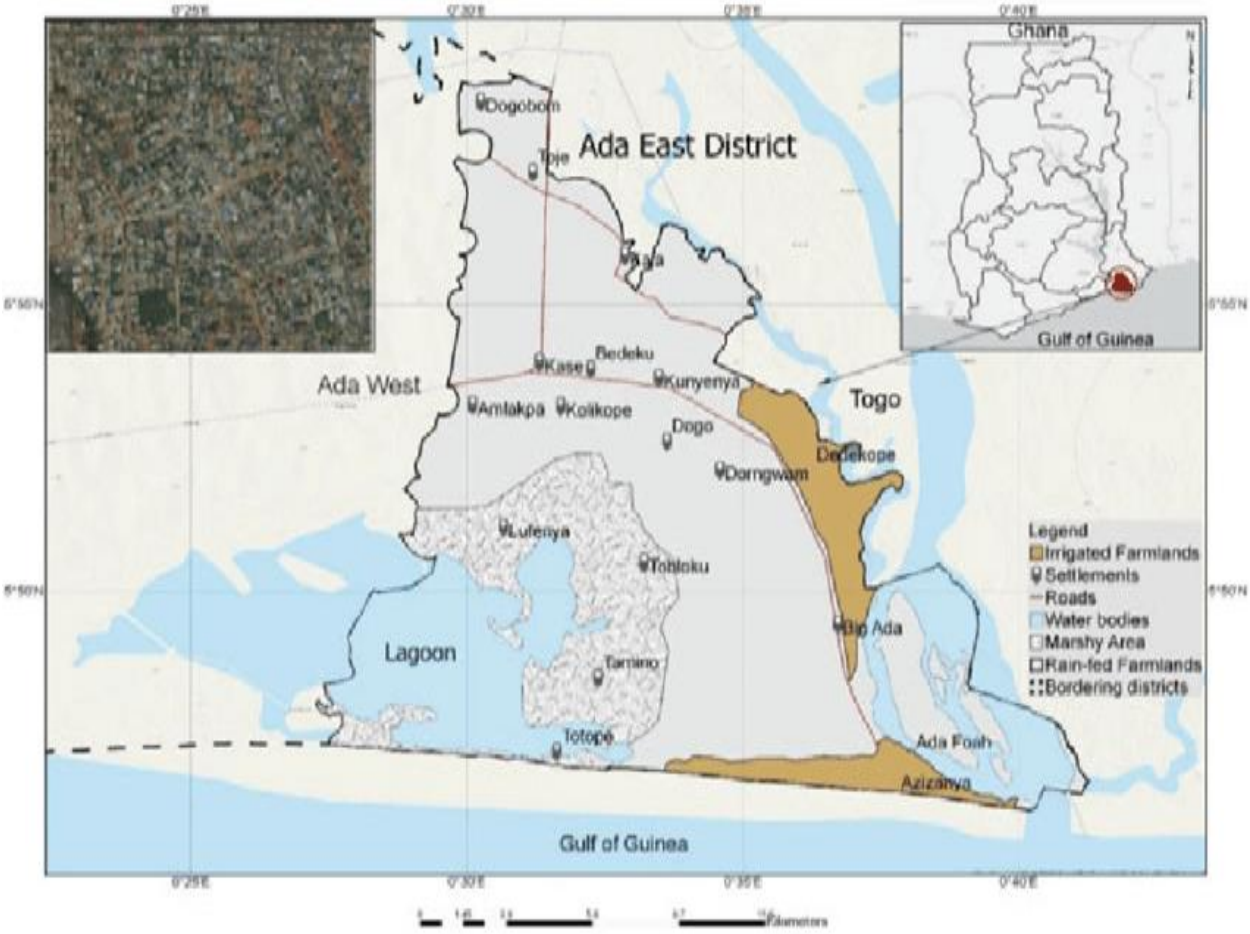

Figure 1.3 Map of Ada East District (Ghana Statistical Service,2014)

1.9 Scope of Study

The scope of this study encompasses an assessment of post-flood health risks and healthcare accessibility challenges faced by communities affected by the spillage of the Akosombo Dam in the Central Tongu and Ada East Districts of Ghana. The research focuses on Bakpa Awadiwoekome, Kebegodo, and Pediatorkope, aiming to quantify the exposure to health risks and measure the accessibility challenges to healthcare services. This study employed a cross-sectional survey design to gather numerical data from residents aged 18 years and older, providing insights on health risks and healthcare accessibility challenges they faced post-flooding that could inform public health policy, disaster preparedness, and community resilience strategies in their communities and other flood-prone areas.

1.10 Organisation of Report

This thesis report is organized into six chapters. Chapter 1 briefly introduces the subject matter of the study, provides a problem statement, justification and states the objectives of the study. In addition, it states and describes the conceptual framework, as well as gives a narration on the study site. Chapter two discusses relevant peer-reviewed literature on the topic of this thesis. In chapter three, the methodology employed in this study, the study design, the analysis of the data and the limitations of the study are discussed. Chapter four summarizes the findings of the study in prose and tables and appropriate figures. In chapter five, the findings of the study are discussed; whilst in chapter six, conclusions; and recommendations are provided for the appropriate bodies they are targeted to. References based on the Harvard referencing style are provided both in-text and at the end of the study report; and an appendix at the tail end of the study provides administrative documents like ethical clearance certificates, letters of introduction and correspondence, and extra tables and charts as well as statistical tests'

calculations. At the beginning of the study report, there is a title page; followed with acknowledgements, foreword, a list of abbreviations, table of contents, and a list of abbreviations, figures and tables; as well as a structured abstract; all forming the front-matter of the thesis report.

2 CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Floods are among the most frequent and devastating natural disasters globally, with significant impacts on human health and well-being. These events can occur due to various factors, including heavy rainfall, river overflow, dam spillages, and storm surges, leading to the inundation of land areas that are typically dry. The impacts of floods on human health are multifaceted, affecting physical, mental, and social dimensions of health. Over the last 20 years, it was estimated that floods have affected 2.3 billion people globally (Douben, 2006; Suhr and Steinert, 2022).

The World Health Organization (WHO) reports that floods account for 40% of all-natural disasters worldwide, affecting an average of 250 million people annually (World Health Organization(WHO), 2013). The impacts on public health can be severe, encompassing a range of physical, mental, and social health issues often resulting in immediate physical injuries and fatalities. The global mortality rate from floods is substantial; between 1980 and 2016, over 2.5 million people were killed by floods (Debarati Guha-Sapir, Philippe Hoyois and Below Regina, 2016).

2.2 Dam-Mediated Floods

Dam-mediated floods occur when the release of water from dams, either planned or accidental, leads to downstream flooding. These events can have severe impacts on communities, human health, infrastructure, and ecosystems. The controlled release of water from dams is often necessary to prevent structural failure, but can still result in significant flooding downstream.

According to the International Commission on Large Dams (ICOLD), a dam is defined as an artificially created barrier across a river, stream, or watercourse to confine and control the flow of water, thereby storing, diverting, or regulating water and according to current estimates, there are now around 62,000 dams worldwide (International Commission on Large Dams, 2019) with an estimated cumulative storage capacity of between 7,000–8,300 km3 Zarfl et al., (2015).

37,600 dams are higher than 15 meters (classified as large Dams) worldwide and a further 3,700 are planned or under construction. Dams are constructed for many purposes, including reservoir creation, flood prevention, irrigation, and hydroelectric power generation, but fluvial flood regimes (where rivers overflow their banks) are increasingly being mediated by dams (Dotse-Gborgbortsi et al., 2022). This phenomenon usually occurs when the water-holding capacities of dams are exceeded as a result of heavy rainfalls. Consequently, this leads to the controlled spillage of the dam to retain its integrity but causes flooding in low-lying communities along the watercourse (Atubiga et al., 2023).

In Africa, the impact of dam-mediated floods on public health is particularly pronounced due to various socio-economic and environmental factors such as poverty and climate change. In September 2020, small and medium-scale floods affected millions of people in 15 countries across the continent. Nearly seven million people were affected and 1,273 deaths were caused, the highest figure since 2006 (IFRC, 2021). The Bagre Dam Spillage (in Burkina Faso), which occurs annually during the rainy season, often leads to widespread flooding in villages in Burkina Faso and the northern regions of Ghana, displacing thousands of people, posing health risks, disrupting livelihoods and destroying about 196 km² of farmland (Kansuk and Chimbar, 2021) (Baah-Kumi and Ward, 2020).

The continent's susceptibility to the brunt of climate change, coupled with inadequate infrastructure and resource constraints, exacerbates the health risks associated with these flooding events (Jia et al., 2022). Moreover, the prevalence of waterborne diseases, such as cholera and typhoid fever, is significantly higher in African countries, further amplifying the disease burden in flood-affected communities (Legros, 2018).

In Ghana, recent flooding incidents, including those resulting from the Bagre Dam spillage have highlighted the vulnerability of rural communities to post-flood health risks and healthcare accessibility challenges. Similarly, the Weija Dam spillage in 2018 resulted in flooding in communities along the Densu River, causing property damage and posing health risks to residents (Asare, 2020).

2.3 Health Risks Associated with Post-Flooding

Flooding can lead to a wide range of health issues, both immediate and long-term. Immediate health risks include physical injuries, hypothermia, and drowning. Some long-term health risks which often emerge in the aftermath of flooding include waterborne diseases (e.g., cholera, typhoid fever) and vector-borne diseases (e.g., malaria and dengue fever). The stagnation of water creates breeding grounds for mosquitoes, leading to outbreaks of diseases like malaria and dengue fever (Wellcome, 2022). Injuries can occur from drowning, debris, and collapsing structures. For example, the 2015 flood in Chennai, India, resulted in over 300 deaths and thousands of injuries due to collapsing buildings and electric shocks (Bureau, 2016).

A systematic review of health outcomes related to floods in sub-Saharan Africa identified significant increases in the incidence of diseases such as cholera and malaria following flooding events (BMC Public Health, 2023). For instance, a study in Uganda found a high incidence of

cholera during flood periods compared to non-flood periods, with an incidence rate ratio of 144 (Rieckmann et al., 2018).

Also, after the 2010 floods in Pakistan, there were over 200,000 reported cases of acute watery diarrhoea, primarily due to contaminated drinking water (Kouadio et al., 2014). After the 2017 floods in Bangladesh, there was a notable rise in malaria cases, with health officials reporting a 30% increase compared to the previous year (Willford, Roelofs and Leifman, 2019). Additionally, the disruption of water supply systems and the overflow of sewage systems during floods significantly contribute to the spread of various diseases (Qadri et al., 2017). Studies have shown that children under five are especially vulnerable to such diseases during flood events due to their weaker immune systems and the increased likelihood of coming into contact with contaminated water (Dewan, 2015).

The damp and mouldy conditions following floods can lead to respiratory infections. Exposure to mould spores and the proliferation of bacteria in flooded homes contribute to respiratory issues such as asthma and bronchitis. In the aftermath of Hurricane Harvey in 2017, the incidence of respiratory illnesses in Texas significantly increased due to mould exposure (Paterson, Wright and Harris, 2018).

Common mental disorders such as anxiety and depression are likely to affect certain subgroups of the population, particularly those with low incomes. The psychological effects of these disorders can persist for months or even years after flood events (Asian, 2002). Flood disasters can be especially traumatic for vulnerable groups, including children, women, and the elderly (Hamidazada et al., 2019). In some cases, there is a need to relocate people when their homes or communities have been destroyed, impacting their well-being and stability

In a study conducted in the UK, flood victims were found to be between 4 to 8.7 times more at risk of long-term mental health problems compared to those who had not experienced flooding

(Paranjothy et al., 2021). Displacement from one's home, loss of property and livelihoods, and disruption of economic and social activities can cause ongoing stress. The stress of overcoming these losses can be overwhelming and produce lasting psychological impacts (Fernandez et al., 2015). The emotional cost of flooding can be long-lasting. Follow-up studies found that about one-quarter of affected individuals could not recover from the emotional trauma of the event (Emergency Management Australia, 2020). Factors contributing to this non-recovery included the severity of the flooding, the extent of resulting financial hardship, age, and socio-economic status. Elderly people on low incomes whose houses were flooded were the most severely affected (Flood Management in Australia, 2018). According to Songsore (2017), the health conditions suffered by the poor can be attributed to disaster risks such as floods. Using flood disaster events from 2014 to 2015, Songsore observed that the outbreak of cholera in many parts of Accra, including Weija, was a result of floods. Personal interviews at the household level revealed that communities affected by the floods experienced disruptions in services such as safe drinking water, which increased health risks due to water contamination. A study conducted by Asare (2020) on the effects of water spillage on residents in Weija, Accra, also found that the post-flood health effects observed included infections and outbreaks of cholera and typhoid.

Furthermore, in the Philippines, increases in leptospirosis, a bacterial infection spread through water contaminated with rodent urine, have been documented following heavy rainfall and flooding events (World Health Organization, 2018). Similarly, in India, the incidence of dengue fever and chikungunya has been observed to rise during monsoon seasons when flooding is more common (Mishra et al., 2020). These diseases pose serious public health challenges, particularly in areas with inadequate healthcare infrastructure.

Floods can destroy crops and food supplies, leading to food insecurity and malnutrition, especially in vulnerable populations such as children and the elderly. A study by Musah et al.

(2013) showed that recurrent floods in Tolon-Kumbungu in the Northern Region of Ghana, caused by the opening of the Bagre Dam in Burkina Faso, destroy farmlands in the district every year, washing away vital soil nutrients. Consequently, leading to low yields and the resultant surges in food prices, increasing the vulnerability of poor households to malnutrition and food insecurity. This, in turn, contributes to adverse health outcomes, including higher rates of illness and poor physical development. A study in Mozambique found that children in flood-affected areas were more likely to suffer from acute malnutrition compared to those in non-affected areas (WFP, 2019).

According to Fewtrell & Kay, (2018), floodwaters can contain hazardous chemicals and pollutants from industrial sites, agricultural fields, and residential areas. Exposure to these contaminants can cause a range of health problems, including skin rashes, respiratory issues, and long-term diseases such as cancer. In Haiti, the displacement following the 2010 earthquake and subsequent floods led to rise in skin infections, respiratory diseases and gastrointestinal diseases such as cholera that claimed thousands of lives (Cravioto et al., 2012).

2.4 Determinants of Post-Flood Health Risks

The determinants of post-flood health risks are multifaceted, encompassing environmental, social, and economic factors. Environmental factors include the extent and duration of flooding, which influence the likelihood of water contamination and the proliferation of disease vectors. For instance, prolonged flooding can lead to stagnant water, which becomes a breeding ground for mosquitoes and other vectors, thereby increasing the risk of vector-borne diseases such as malaria and dengue fever (Fewtrell & Kay, 2018; WHO, 2018). A study conducted in Pakistan highlighted the importance of sanitation in reducing post-flood health risks, showing that communities with better access to clean water had significantly lower rates of diseases

(Qadri et al., 2017). A review of health outcomes in Bangladesh following severe flooding events found that timely public health interventions were critical in preventing large-scale outbreaks of infectious diseases (Islam et al., 2014).

Loss of livelihoods and financial instability can lead to poor nutrition and delayed medical care, further increasing vulnerability to diseases (IPCC, 2022). The economic strain on families often forces them to prioritize immediate survival needs over health care, leading to increased morbidity and mortality rates. The economic impacts of flooding were particularly evident in Mozambique, where the destruction of agricultural land led to food shortages and malnutrition among flood-affected communities (WFP, 2019).

Displaced individuals frequently experience anxiety, depression, and post-traumatic stress disorder (PTSD) due to the loss of their homes and livelihoods. A study in Haiti following the 2010 earthquake and subsequent flooding found high levels of PTSD among displaced populations, highlighting the need for mental health support in disaster response efforts (Cravioto et al., 2011).

A study in Nigeria found that urban areas with poor drainage infrastructure experienced more severe flooding and higher rates of waterborne diseases compared to areas with better infrastructure (Adelekan, 2010). This underscores the importance of investing in resilient infrastructure to mitigate the health risks of flooding.

2.5 Challenges in Accessing Healthcare Facilities and Services Post-Flooding

Access to healthcare facilities and services is often severely disrupted in the aftermath of flooding. Infrastructure damage, loss of medical supplies, and displacement of healthcare professionals can significantly impede the delivery of essential health services (Cravioto et al.,

2011). A study on the health effects of flooding in developing countries highlighted that healthcare systems often struggle to cope with the increased demand for services following a flood, leading to delays in treatment and care (Wellcome, 2022).

A report from South Sudan indicated that immunization coverage for children under five continues to drop due to limited access to supplies and communities being cut off mostly by floods (Whande,2022). According to the report, flooding has isolated pregnant women and children under one year from antenatal care and immunization services, particularly those in villages and swamp islands. As a result of missed doses, an increasing number of children are growing up without immunizations, posing a significant public health risk (Whande,2022). A study in Bangladesh found that healthcare facilities in flood-prone areas often suffer severe structural damage, leading to prolonged closures and a significant reduction in healthcare availability (Shimi et al., 2010). This damage disrupts health services and poses as a major risk of developing complications from contaminations and infections due to floods.

Also, a study in rural India highlighted that the destruction of transportation infrastructure during floods significantly increased travel times to healthcare facilities, resulting in delayed treatment and higher mortality rates (Kar, 2013). Floodwaters can wash away roads and bridges, isolating communities and making it difficult for residents to access healthcare facilities. This isolation is particularly problematic for rural areas where transportation options are already limited (Kar, 2013).

Another study in Bangladesh found that healthcare facilities in flood-prone areas often suffer severe structural damage, leading to prolonged closures and a significant reduction in healthcare service availability (Shimi et al., 2010).

Additionally, flooding can lead to the displacement of healthcare professionals (WHO, 2019). Health workers may be forced to evacuate their homes and workplaces, resulting in a shortage

of medical personnel during critical periods. This shortage can delay emergency response efforts and reduce the overall capacity of healthcare systems to manage post-flood health crises. Research in Mozambique after severe flooding showed that the displacement of health workers was a major barrier to providing timely and effective medical care to affected populations (WHO, 2019).

Studies highlight the significant economic impact of floods, which includes the loss of income and property, often leaving families with limited financial resources to seek medical care. This financial strain frequently results in delays in treatment, exacerbating existing health conditions. For instance, research conducted in the Philippines demonstrated that the economic consequences of flooding, such as reduced household income and increased healthcare costs, significantly hinder access to medical services (Porio, 2011).

The economic impact of floods, including loss of income and property, can leave families with limited financial resources to seek medical care. This financial strain often leads to delays in seeking treatment, exacerbating health conditions. Research in the Philippines demonstrated that the economic consequences of flooding, such as reduced household income and increased healthcare costs, significantly hindered access to medical services (Porio, 2011).

Moreover, the psychological impact of flooding on affected populations can also impede access to healthcare. The trauma and stress associated with flooding can lead to mental health issues such as anxiety, depression, and post-traumatic stress disorder (PTSD), which may go untreated due to a lack of mental health services and the stigma associated with seeking help. A study in Pakistan found high levels of PTSD among flood survivors, highlighting the need for mental health support in disaster response and recovery efforts (Norris et al., 2022). A study conducted in the United States after Hurricane Katrina found that healthcare facilities faced significant challenges in maintaining quality care due to increased patient loads and resource shortages

(VanDevanter et al., 2017). During flooding events, the quality of healthcare services can be compromised as overwhelmed facilities may struggle to maintain standard care procedures, leading to suboptimal treatment outcomes (VanDevanter et al., 2017).

2.6 Post-Flood Resilience-Building Practices

Building resilience to post-flood health risks involves a combination of community-based and institutional strategies. Community-based practices include public health education, which can improve awareness and preparedness, and community-led initiatives to improve water and sanitation infrastructure. Institutional strategies involve strengthening healthcare systems, improving early warning systems, and implementing effective response plans (Whande,2022).

Research has shown that community involvement is crucial in building resilience (Jahan et al.,2010). A study in Northern Ghana demonstrated that community-based water, sanitation, and hygiene (WASH) programs were effective in preventing diarrheal diseases after floods. These programs, which include the distribution of water purification tablets and the promotion of handwashing, have proven to be cost-effective measures in reducing health risks (Armah et aL,2010). Strengthening healthcare infrastructure is another critical component of resilience-building. In Mozambique, the establishment of flood-resistant healthcare facilities and the training of healthcare workers in emergency response significantly improved the health outcomes of flood-affected communities (WHO, 2019). These facilities were equipped with emergency medical supplies and were designed to remain operational during and after flood events.

A review of flood early warning systems in South Asia found that timely alerts and effective communication strategies significantly reduced mortality and morbidity rates during flood

events (Hagenlocher et al., 2018). These systems enable communities to evacuate in a timely manner and take preventive measures to protect their health.

The psychological impact of flooding, including anxiety, depression, and post-traumatic stress disorder (PTSD), can have long-lasting effects on affected populations. A study in the Philippines after Typhoon Haiyan highlighted the importance of providing mental health services as part of disaster relief efforts (Porio, 2011). Community-based mental health programs, including counselling and support groups, have been effective in addressing these issues and promoting long-term resilience.

Strong social networks and community cohesion can enhance collective action and resource sharing during and after flood events. Research in the United States after Hurricane Katrina demonstrated that communities with higher levels of social capital were better able to cope with the aftermath of the disaster and recover more quickly (Aldrich & Meyer, 2015). These findings underscore the importance of fostering social connections and community engagement in resilience strategies. A study in Vietnam found that community-based disaster preparedness training significantly improved residents' knowledge and readiness to respond to flood events (Pham et al., 2011).

Moreover, economic resilience is a key factor in mitigating post-flood health risks. Providing financial support and livelihood recovery programs to affected communities can help them rebuild and reduce vulnerability to future floods. Microfinance schemes and cash transfer programs have been effective in supporting recovery efforts and promoting economic stability (Schipper et al., 2015). These initiatives enable families to repair their homes, restore their livelihoods, and access healthcare services, thereby enhancing overall resilience.

3 CHAPTER 3

METHODOLOGY

3.1 Research Methods and Design (Study methods and design)

A cross-sectional survey was employed in this study to allow for the collection of numerical data, making it easier to quantify and measure the number of people in the selected communities exposed to post-flood health risks and had healthcare accessibility challenges. This study design was used because members of the selected communities were engaged at only one point in time. The main advantage of this research design is that it allows for gathering a relatively large data within a short period of time.

3.2 Data Collection Techniques and Tools

Data was collected using a structured questionnaire which has been categorized into 8 (Eight) sections, i.e. Participant socio-demographic characteristics, Post-flood health risks and determinants, Psychological distress scale, Water quality and sanitation practices, Healthcare facility and services accessibility, Resilience building practices. Food security, and Chronic illnesses

Section 1 (Participant socio-demographic characteristics), Section 2 (Post-flood health risks and determinants), section 3 (Psychological distress scale), section 4 (Water and sanitation practices), section 5 (Healthcare facility and services accessibility) and section 7 (Food security) of the questionnaire were adapted from (Paterson, Wright and Harris, 2018; United Nations Office for the Coordination of Humanitarian Affairs, 2021) which are studies on health risks of flood disasters and floods rapid needs assessments respectively. Section 6 (Resilience

building practices) was adapted from (Manandhar et al., 2023), a Post-Flood Resilience Assessment of July 2021 Flood in Western Germany and Henan, China.

Research assistants were trained to administer the questionnaire in the local dialects.

A Multi-stage sampling technique was used in this study. Purposive sampling was used to sample the districts and communities affected by the flood and a Systematic random sampling technique was used to sample respondents from every second household.

3.3 Study Population

The study included individuals aged 18 years and older, residing in the selected communities affected by the spillage from the Akosombo Dam. Both males and females who are mentally sound were included in the study population.

3.4 Study Variables

The following were the variables that were employed to carry out the empirical investigation in the study:

1. Post-flood health risks assessment: This assesses whether a respondent experienced a post-flood health risk. It also provides information on the specific types of post-flood health risk experienced.
2. Post-flood health risk determinants: This variable is sub-divided into two categories: dependent and independent variables. Table 3.1 provides information on their definition and measurement.

Table 3.1 Study Variables

Variable	Definition	Measurement
Dependent Variable		
Prob_health_risk	Probability that a respondent will experience health risk	*Experience post-flood health risk (coded 1). *Did not experience any post-flood health risk (coded 0).
Independent Variables		
gender	Gender of respondents	*Male (coded 1). *Female (coded 0).
age	Age of respondent	*18-35 years (coded 1). *36-55 years (coded 2). *56 years (coded 3).
educ	Respondent's level of education	*No formal education (coded 1). *Primary education (coded 2). *Junior high education (coded 3). *Senior high education (coded 4). *Tertiary education (coded 5).

marstatus	Respondent's marital status	*Never married (coded 0). *Married but living alone (coded 1). *Married but living with spouse (coded 2). *Divorced or separated (coded 3). *Widowed (coded 4).
work	Respondent's current employment status.	*Yes (coded 1). *No (coded 0).
flood_duration	Duration of flood reported by a respondent.	*Less than a week (coded 1). *More than a week but less than a month (coded 2). *More than a month (coded 3).
pre_health_issue	Respondent with pre-flood health issue.	*Yes (coded 1). *No (coded 0).

Table 3.0.1 Study Variables

Source: Field Data, 2024.

3. Availability of health facilities: This variable indicates respondents' report on the availability of a functional health facility in the community they reside, the type of health facility and the distance to the health facility.

4. Access to healthcare services post-flood: This variable comprises the following; respondents report on whether they received medical treatment for health issues they experienced; record of any delays in receiving medical treatment; reasons for the delay; availability of mental health support services; utilization of the mental health support services where they were provided; and the effectiveness of the mental health support services provided to affected communities.
5. Resilient-building practices and post-flood preparedness: This variable assesses whether respondents put in place measures to prepare for the flood. It also indicates the respondents' actions when the flood occurred. Also, the variable outlines the resources the respondents' employed in order to cope with the devastating impacts of the flood. In addition, it provides information on the respondents' engagements in resilient-building activities after the flood and their assessment of the level of community collaboration after the flood. The variable also measures post-flood preparedness measures implemented by respondents in their various communities.

3.5 Sampling

For this study a multi-stage approach was employed where the researcher used a Purposive sampling technique to select the communities and a systematic random sampling was used to select participants for the study. The sample was calculated using the Cochran's formula (Cochran, 1977).

$$\mathrm{n} = \frac{Z^2 \; x \; P \; (1-p)}{e^2}$$

Where;

n = required sample size

z = reliability co-efficient (95% CI, z ≈ 1.96)

p = proportion of study population = 50% ≈ 0.5

e = margin of error = 5% = 0.05

therefore,

$$n = \frac{(1.96)^2 x\ (0.5)(\ 1-0.5)}{0.05^2} \qquad = 384.16 \approx 384$$

A 10% non-response rate was estimated on the calculated sample (i.e. ≈ 38) and then added to the required sample size to make a total working sample of 422 residents.

Proportional allocation technique was further used to estimate the number of residents to be considered in each selected community. Using the formula below:

$$nh = \frac{Nh}{N}\ x\ n$$

Where,

nh = sample size for a particular community.

Nh = Total population of a community.

N = Total population for all the selected communities.

n = Total working sample size.

Therefore,

Table 3.2 Populations in the selected communities and required sample sizes.

Name of Community	Total Residents population	Required sample size
Bakpa Awadiwoekome	1060	$\frac{1060}{9934} x\ 422 = 45$
Kebegodo	800	$\frac{800}{9934} x\ 422 = 34$
Pediatorkope	8,074	$\frac{8074}{9934} x\ 422 = 343$
TOTAL	9934	422

Table 3.2 Populations in the Selected Communities and Required Sample Sizes.

3.6 Pre- Testing

The questionnaire was administered to 40 residents of Bakpa Awadiwoekome for pretesting. This community which is part of the study sites was selected for pre-testing because Adidome which was initially selected for pre-testing was inaccessible due to a broken bridge leading to the town. The pre-testing helped to evaluate respondents' comprehension of the questionnaire, identified and addressed potential problems with the questionnaire, making it more reliable and valid. Results from the pretesting was included in the analysis.

3.7 Data Handling

Data was collected using a structured questionnaire. Participants were informed of the purpose of the study by so doing, their consent was sought, and the questionnaire was administered to

them to answer appropriately. Research assistants were trained to assist in collecting the data. Guidance was provided where necessary. The research instrument was given to the Research Supervisor for acceptance and to cross- check to see whether it is sufficiently comprehensive in seeking the proper range of responses and whether the questions have good content and face validity.

3.8 Data Analysis

Descriptive statistics (frequency and percentage) and charts (bar chart and pie charts) were used to summarize the following; demographic characteristics of the respondents; the post-flood health risks experienced by the respondents; challenges in accessing health facilities and healthcare services; and the resilient-building activities and post-flood preparedness measures employed by the respondents. The study also employed the Pearson Chi-squared test to investigate whether the sociodemographic features of the respondents differ across the two districts. In addition, the test was used to determine whether the study variables (particularly relating to challenges in accessing health facility and healthcare services post-flood, resilient-building activities post-flood, and post-flood preparedness measures) vary across the two districts. The study also conducted a logistic regression analysis to determine the factors influencing the likelihood that a respondent will experience post-flood health risk. For both the Pearson Chi-squared test and the logistic regression analysis, the level of statistical significance was set at 5%. The STATA software (Version17) was used to perform all the statistical analysis.

3.9 Ethical Considerations

A letter of approval was received from the Institutional Review Board of the Ensign Global College. Written permission was sought from both the traditional and civil leaders of the selected communities. Respondents were duly informed about the purpose of the study and both verbal and written consents were sought from respondents before answering the questionnaire. Any information regarding the identity of the respondents was not required in order to ensure anonymity and confidentiality. During the administration of questionnaires, participants who decided not to partake in the exercise again were given the liberty to do so.

3.10 Limitations of Study

The reliance on self-reported data from residents may introduce some biases such as recall bias, as participants might forget details and overestimate or underestimate their health risks and accessibility issues. Accessibility to the selected community of Bakpa Zorotodzi was hindered by ongoing flood conditions which destroyed access to the community. Bakpa Zorotodzi was then replaced with Kebegodo, a community with similar characteristics and population size which was also affected by the flood in similar magnitude.

3.11 Assumptions

No assumptions were made in this study.

4 CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents the findings of the study. The results provide insights into the health issues experienced by the flood victims, the determinants of post-flood health risk among the respondents, difficulties in accessing healthcare services during the floods, and the measures taken to build resilience against future floods.

4.2 Sociodemographic Characteristics of Respondents

Table 4.1 depicts the sociodemographic characteristics of the respondents. In all, 381 respondents participated in the study: comprising 190 respondents (49.9%) from the Central Tongu district in the Volta Region and 191 respondents (50.1%) from the Ada East district in the Greater Accra Region. Respondents between the ages of 36-55 years constituted about 35.7% of the total sample. The smallest age group which represented 30.2% of the sample were at least 61 years old. The age distribution in the Central Tongu district indicate that 45.8% of the respondents were at least 56 years old with the smallest age group being those within 18-35 years. In the Ada East districts, the largest (18-35 years) and the smallest (at least 56 years) age group constituted about 47.6% and 14.7% of the sample respectively. The total sample comprise more males (70.1%) than females (29.9%). The gender distribution for the sample selected from the two districts show a similar picture: more males from both districts (76.3% and 63.9% in the Central Tongu and Ada East districts respectively) than females (23.7% and 36.1% in the Central Tongu and Ada East districts respectively) participated in the study.

Table 4. 1 Sociodemographic Features of Respondents

	Total		Central Tongu District		Ada East District	
Sociodemographic Feature	**Frequency(n)**	**Percentage (%)**	**Frequency(n)**	**Percentage (%)**	**Frequency(n)**	**Percentage (%)**
Age						
18-35 years	130	34.12	39	20.53	91	47.64
36-55 years	136	35.70	64	33.68	72	37.70
56 years and above	115	30.18	87	45.79	28	14.66
Gender						
Male	267	70.08	145	76.32	122	63.87
Female	114	29.92	45	23.68	69	36.13
Educational attainment						
No formal education	125	32.81	87	45.79	38	19.9
Primary	113	29.66	66	34.74	47	24.61
Junior High	95	24.93	26	13.68	69	36.13
Senior High	42	11.02	11	5.79	31	16.23
Tertiary	6	1.57	-	-	6	3.14
Current working status						
Yes	292	76.64	142	74.74	150	78.53
No	89	23.26	48	25.26	41	21.47
Occupation						
Not applicable	1	0.34	1	0.7	-	-
Farmer	126	43.15	111	78.17	15	10
Fisher	46	15.75	8	5.63	38	25.33
Religious leader	14	4.79	1	0.7	2	1.33
Student	3	1.03	-	-	1	0.67
Teacher	1	0.34	2	1.41	4	2.67
Trader	6	2.05	19	13.38	76	50.67
Others (Artisans, carpenters, etc)	95	32.53	-	-	14	9.33

Marital status						
Currently married but living alone	14	3.67	10	5.26	4	2.09
Currently married and living together	182	47.77	78	41.05	104	54.45
Divorced/Separated	43	11.29	28	14.74	15	7.85
Never married	67	17.59	22	11.58	45	23.56
Widowed	75	19.69	52	27.37	23	12.04
Religious affiliation						
Christian	321	84.25	164	86.32	157	82.2
Traditionalist	19	4.99	6	3.16	13	6.81
Muslim	40	10.5	20	10.53	20	10.47
Other	1	0.26	-	-	1	0.52
Ethnicity						
Akan	2	0.52	190	100	2	1.05
Ewe	199	52.23	-	-	9	4.71
Ga-Adangbe	180	47.24	-	-	180	94.24

Table 4.1 Sociodemographic Features of Respondents

Source: Field Data, 2024.

In the case of the total sample, respondents with no formal education represented about 32.8%. Those who have had tertiary level education were the least group (1.6%). Similarly, most of the respondents selected from the Central Tongu district (45.8%) had no formal education. In the Ada East district, most of the respondents (36.1%) had Junior High school qualification. When asked about their current working status, the majority of the respondents (76.6%) indicated that they were currently employed. Similarly, majority of the respondents sampled in both the Central Tongu (74.7%) and the Ada East (78.5%) districts indicated they were currently employed. Specifically, most of the respondents were farmers (43.2%). The most represented occupation-type in the sample selected from the Central Tongu and the Ada East districts were farming (78.2%) and fishing (25.3%) respectively.

About 47.8% of the respondents were currently married and living together with their spouses, the smallest group according to marital status were those who were married but living alone (3.7%). Likewise, in both districts, the most represented group in terms of marital status were those who were married and living with their spouse (41.1% in the Central Tongu district and 54.5% in the Ada East district) and the least group were respondents who were married but living alone (5.3% and 4% in the Central Tongu and Ada East districts respectively).

Regarding religion, the majority of the respondents (84.3%) identified as Christians whereas 10.5% and 5% were Muslims and traditionalists respectively. In both the Central Tongu and Ada East districts, the majority of the respondents (86.3% and 82.2% respectively) were Christians. A little more than half of the respondents (52.2%) were Ewes, followed by those who belong to the Ga-Adangbe ethnic group (47.2%). All respondents sampled from the Central Tongu district belong to the Ewe ethnic group. In the Ada East district, the majority of the respondents were Ga-Adangbe (94.2%).

4.3 Variation in Sociodemographic Features across Districts

Table 4.2 indicates the chi-squared test results which tells whether the socio-demographic features of the respondents vary across the districts. The results indicate that age, gender, educational attainment, occupation, marital status, and ethnicity of respondents vary across the two districts at the 5% significance level. The religious affiliation of the respondents varies across the two districts at just the 10% significance level.

Table 4.2: Pearson Chi-squared Test of Variation in Socio-demographic Features across Districts

Variable	Pearson chi2	Prob value
Age	51.538	0.000
Gender	7.031	0.008
Educational attainment	57.387	0.000
Current working status	0.767	0.381
Occupation	143.797	0.000
Marital status	29.322	0.000
Religious affiliation	9.014	0.061
Ethnicity	346.628	0.000

Table 4.2 Pearson Chi-square Test of Variation in Socio-demographic Features across Districts

Source: Field Data, 2024.

4.4 Post-Flood Health Risks Assessment

Table 4.2 shows the various post-flood health risk experiences of the respondents. About 33.3% respondents reported experiencing health issues due to the flood caused by the dam spillage, while the remaining 66.7% did not report any health issues. Among those who experienced post-flood health issues, skin infections were the most common, reported by 44.1% of the respondents. The next commonly reported post-flood health issues among the respondents were Vector-borne diseases (30.7%), followed by gastrointestinal issues (15.8%), water borne (13.4%) and respiratory

diseases (13.4%), musculoskeletal diseases (12.6%), mental issues (10.2%), cardiovascular diseases (8.7%) and physical injuries (7.9%).

Table 4.3: Distribution of Post-Flood Health Risks

	Total		Central Tongue District		Ada East District	
Post-Flood Health Risk Assessment	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**
Experience Health Issue from Dam Spillage						
Yes	127	33.33	66	34.74	61	31.94
No	254	66.67	124	65.26	130	68.06
Type of Post-Flood Health Issue Experienced						
Respiratory issues	17	13.39	11	16.67	6	9.84
Gastrointestinal issues	20	15.75	9	13.64	11	18.03
Skin infections	56	44.09	28	42.42	28	45.9
Vector-borne diseases	39	30.71	12	18.18	27	44.26
Water-borne diseases	17	13.39	5	7.58	12	19.67
Mental health issues	13	10.24	11	16.67	2	3.28
Cardiovascular diseases	11	8.66	8	12.12	3	4.92
Musculoskeletal diseases	16	12.6	9	13.64	7	11.48
Physical injury	30	7.87	17	25.75	13	21.31
Other health issues	1	0.79	-	-	1	1.64

Table 4.3 Distribution of Post-Flood Health Risks

Source: Field Data, 2024.

In the Central Tongu district, 34.7% of the respondents reported experiencing one post-flood health issue or another. The most widely reported health issue among the respondents in the district were skin infections (42.4%), followed by physical injury (25.8%), vector-borne diseases (18.2%), mental issues (16.7%) and respiratory diseases (16.7%), gastrointestinal difficulties (13.6%) and musculoskeletal diseases (13.6%), cardiovascular diseases (12.1%) and water-borne diseases (7.6%). In the Ada East district, 31.9% of the respondents reported experiencing post-flood health issues. The most common health issues among the respondents in that district was skin infection (45.9%). This is followed by vector-borne diseases (44.3%), physical injury (21.3%), water-borne

diseases (19.7%), gastrointestinal problems (18%), musculoskeletal diseases (11.5%), respiratory issues (9.8%), cardiovascular diseases (4.9%) and mental health issues (3.3%).

4.5 Determinants of Post-Flood Health Risks

Results according to the unadjusted odds ratio indicate that age, educational level, and employment status are significant factors influencing the likelihood that a respondent will experience post-flood health risk. Specifically, respondents between the ages of 36-35 years have higher odds (UOR=1.9) of experiencing post-flood health risk compared to those within the age group of 18-35 years. Also, respondents who have primary level education are more likely (UOR=1.8) to experience post-flood health risk compared to those who do not have any formal education. In addition, the findings show lower of odds (UOR= 0.5) of experiencing post-flood health risk among respondents who are employed.

Table 4.4 Logistic Regression Analysis of the Determinants of Health Risks among Flood Victims

Variable	UOR	95% CI	Prob Value	AOR	95% CI	Prob Value
Gender						
Female	Reference category			Reference category		
Male	1.319	0.834, 2.087	0.236	1.647	0.952, 2.848	0.074
Age						
18-35 years	Reference category			Reference category		
36-55 years	1.869	1.122, 3.114	0.016	2.344	1.253, 4.386	0.008
Above 56 years	0.969	0.555, 1.693	0.912	1.148	0.558, 2.364	0.708
Educational Level						
No formal education	Reference category			Reference category		
Primary education	1.761	1.028, 3.016	0.039	1.554	0.852, 2.835	0.151
Junior High education	1.256	0.706, 2.232	0.438	1.196	0.594, 2.409	0.616
Secondary education	0.877	0.398, 1.932	0.745	0.642	0.249, 1.652	0.358

Tertiary education	0.494	0.056, 4.381	0.527	0.358	0.037, 3.473	0.376
Marital Status						
Never married	Reference category			Reference category		
Currently married but living alone	1.534	0.474, 4.967	0.475	1.449	0.399, 5.258	0.573
Currently married and living with spouse	1.057	0.583, 1.916	0.856	0.964	0.479, 1.940	0.919
Divorced/Separated	0.987	0.436, 2.234	0.976	1.004	0.366, 2.752	0.994
Widowed	0.905	0.446, 1.836	0.782	0.908	0.360, 2.287	0.837
Employment Status						
No	Reference category			Reference category		
Yes	0.489	0.300, 0.795	0.004	0.398	0.234, 0.677	0.001
Flood Duration						
Less than a week	Reference category			Reference category		
More than a week but less than a month	3.056	0.359, 26.016	0.307	2.52	0.286, 22.239	0.405
More than a month				2.62	0.298, 23.044	0.385
Pre-flood Health Issue						
No	Reference category					
Yes	3.043	0.359, 25.764	0.307	1.722	1.025, 2.890	0.04

Table 4.4 Logistic Regression Analysis of the Determinants of Health Risks among Flood Victims

Note: UOR is unadjusted odds ratio, OR is adjusted odds ratio and CI is confidence interval.

Results according to the adjusted odds ratio indicate that gender, age, employment status and existence of pre-flood health issues are factors that determine susceptibility to post-flood health risk among the respondents. The finding points to higher odds of experiencing post-flood health issues among men (OR=1.6) relative to females, but this is only significant at the 10% level. With regards to age, the results show that at the 5% significance level, middle-aged adults (36-55 years) have higher odds (OR=2.3) of developing post-flood health problems as compared to young adults

(18-35 years). Also, the results suggest that individuals who are economically engaged have lower odds (AOR=0.4) of experiencing post-flood health issues at the 5% significance level, compared to their counterparts who are unemployed. In addition, according to the results, individuals who have pre-flood health issues have higher odds (OR=1.7) developing post-flood health issues at the 5% significance level. The results suggest marital status, educational level and flood duration, do not influence susceptibility to post-flood health issues among the respondents.

4.6 Challenges in Accessing Healthcare Facilities and Services Post-flooding

4.6.1 Availability of Healthcare Facility during Floods

More than half of the respondents (64%) reported the unavailability of functional health facilities in their community and the remaining approximately 36% indicated such facilities are available in the community.

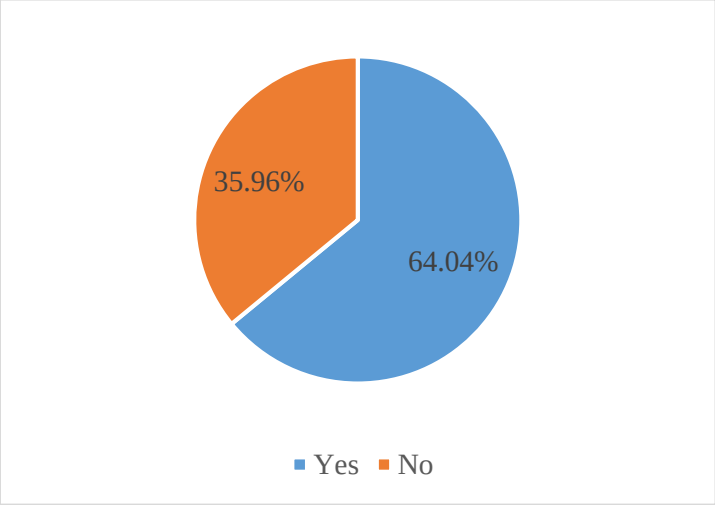

Figure 4.1 Respondents who reported having a functional health facility in their community (total sample)

Figure 4.1: Respondents who reported having a functional health facility in their community (total sample).

As displayed in Panel A, in the Central Tongu district, less than half of the respondents (49.5%) indicated they have a functional healthcare facility in their community. The majority of the

respondents in the Ada East district (78.5%) reported that they have access to a healthcare facility in their community (Panel B).

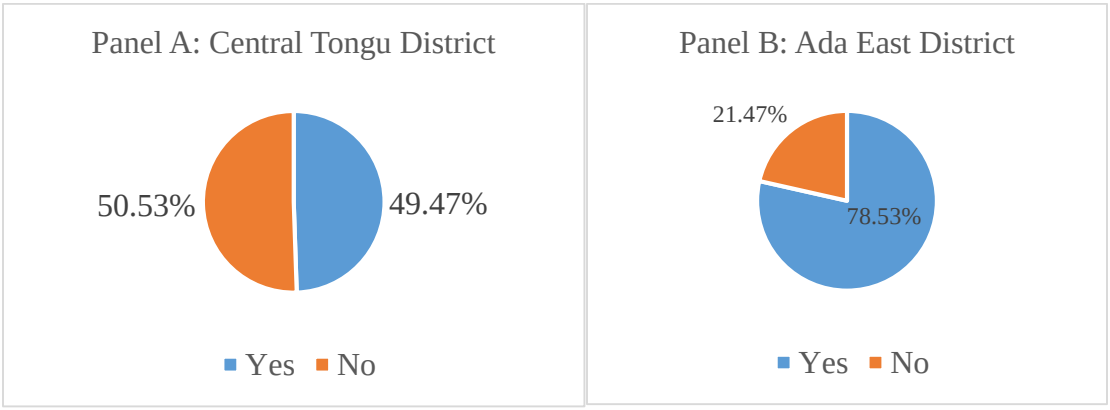

Figure 4.2 Respondents who reported having a functional health facility in their community, by district.

Figure 4.2: Respondents who reported having a functional health facility in their community, by district.

Regarding the type of health facilities in the community, both CHPS Compounds and Health Centres were the most common, each reported by 45.5% of the respondents. The presence of private clinics and district hospitals were reported by 8.3% and 0.8% of the respondents respectively. The most common healthcare facility in the Central Tongu district (Ada East district) is the CHPS compound (a Health centre). The least reported healthcare facility among the respondents in the Central Tongu district is a health centre and that in the Ada East district is a district hospital. With regards to proximity to the nearest healthcare facility, 33.9% of the respondents reported the distance to the nearest facility is between 1km to 5km. The respondents who indicated that the distance to the nearest facility is less than 1km comprise about 33.6% of the total sample. About 18.9% indicated the nearest healthcare facility is between 6km to 10km and 13.7% reported the distance to the closest facility is more than 10km.

Table 4. 5 Distribution and Accessibility of Healthcare Facilities

	Total		Central Tongu District		Ada East District	
Variable	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**
What Type of Health Facility						
CHPS compound	110	45.45	83	90.22	27	18

Health centre	110	45.45	4	4.35	106	70.67
District hospital	2	0.83	5	5.43	2	1.33
Private clinic	20	8.26			15	10
Distance to Nearest Healthcare Facility						
Less than 1 km	128	33.6	78	41.05	50	26.18
1km to 5 km	129	33.86	57	30	72	37.7
6km to 10km	72	18.9	33	17.37	39	20.42
More than 10km	52	13.65	22	11.58	30	15.71

Table 4.5 Distribution and Accessibility of Healthcare Facilities

Source: Field Data, 2024.

4.6.2 Variation in Respondents' Views on the Availability of Functional Health Facility across the Districts

Table 4.6 shows the chi-squared test for all the indicators of availability of health facility are significant at the 5% significant level. The results point to significant variation in the availability of functional health facility, type of and distance to health facility, as reported by respondent across the two districts.

Table 4.6: Pearson Chi-squared Test of Variation in Availability of Functional Health Facility across the Districts.

Variable	Pearson chi2	Prob value
Availability of functional health facility	34.93	0.000
What type of health facility	123.271	0.000
Distance to nearest healthcare facility	9.597	0.000

Table 4.6 Pearson Chi-squared Test of Variation in Availability of Functional Health Facility across the Districts.

Source: Field Data, 2024.

4.6.3 Access to Healthcare Services Post-flood

When asked about receiving medical treatment for health issues experienced post-flood, 53.3% respondents affirmed receiving treatment whereas 46.7% indicated otherwise. In the Central Tongu district, more than half of the respondents (61.5%) reported that they received medical treatment. On the other hand, in the Ada East district, less than half of the respondents (47.1%) had received medical treatment. For the total number of respondents who sought medical treatment for their health issues, 28.1% experienced delays while 71.92% did not face any delays. The reasons for delays included staff not being available (43.9%), lack of transportation (42.1%), shortage of medical supplies (40.4%), overcrowding at healthcare facilities (26.32%), and closed health facilities (14%). A little more than half of the respondents (58.62%) from the Central Tongu district reported shortage of medical supplies as the reason for the delay in receiving medical treatment. The respondents also cited the following as reasons why they did not receive treatment on time: lack of transportation (48.3%), overcrowding at health facilities (37.9%), and unavailability of staff (31%). In the Ada East the reasons for the delay in receiving medical treatment which were reported by the respondents were unavailability of staff (59.3%), lack of transportation (37%), shortage of medical supplies (22.2%) and closed healthcare facility (22.2%).

Table 4.7: Access to Healthcare Services Post-flood

	Total		Central Tongu District		Ada East District	
Variable	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**
Medical treatment for the health issues experienced						
Yes	203	53.28	104	61.54	90	47.12
No	178	46.72	65	38.46	101	52.88
Delays in receiving medical treatment						
Yes	57	28.08	29	27.88	27	30
No	146	71.92	75	72.12	63	70
Reasons for the delay						
Lack of transportation	24	42.11	14	48.28	10	37.03
Overcrowding at healthcare facilities	15	26.32	11	37.93	4	14.81
Shortage of medical supplies	23	40.35	17	58.62	6	22.22
Closed health facility	8	14.04	2	6.9	6	22.22

Staff not available	25	43.86	9	31.03	16	59.26
Others	1	1.75	-	-	1	3.7
Mental health support services provided in the community post-flooding						
Yes	75	19.69	62	32.63	13	6.81
No	306	80.31	128	67.37	178	93.19
Utilization of the mental health support services						
Yes	47	62.67	39	62.9	8	61.54
No	28	37.33	23	37.1	5	38.46
Effectiveness of mental health support services provided post flooding						
Very effective	20	44.44	16	43.24	4	50
Somewhat effective	22	48.89	18	48.65	4	50
Not very effective	3	6.67	3	8.11	-	-

Table 4.7 Access to Healthcare Services Post-Flood

Source: Field Data, 2024.

Overall, the provision of mental health support services post-flooding was reported by 19.69% of the respondents while 80.31% indicated the absence of such services. Among those with access to mental health support, 62.67% utilized the services and 37.33% did not. About 48.89% of the respondents indicated these services were somewhat effective whereas 44.44% reported they were very effective. In the district analysis, majority of the respondents in both the Central Tongu district (69.23%) and the Ada East district (87.96%) indicated that they were not provided any mental health support services after the floods. For the respondents in the Central Tongu district who indicated that mental health support services were provided, 62.90% utilized the services. With regards to the assessment of the services, 48.65% of the respondents who utilized the mental health support services in the Central Tongu district rated the services as somewhat effective whereas 43.24% were of the view that the services were very effective. Similarly, in the Ada East district, 61.54% of the respondents reported they utilized the mental health support services that were provided. Exactly half of the respondents (50%) who utilized the support services considered them very effective. The other half (50%) who benefited from the support services rated them as somewhat effective.

4.6.4 Variation in Respondents' Views on Access to Healthcare Services Post-flood across the Districts

Table 4.8 indicates that, at the 5% significance level, there is significant variation in responses on access to medical treatment for health issues experienced during the flooding across the districts. Also, the chi-squared test for responses on the provision of mental health support services post-flooding is significant at the 5% level, indicating there is variation in the responses across the two districts. The test for utilization and effectiveness of mental health support services is however not significant at the 5% level.

Table 4.8: Pearson Chi-squared Test of Variation in Responses across Districts on Access to Healthcare Services.

Variable	Pearson chi2	Prob value
Medical treatment for the health issues experienced	5.839	0.016
Delays in receiving medical treatment	0.296	0.587
Mental health support services provided in the community post-flooding	40.181	0.000
Utilization of the mental health support services	0.009	0.926
Effectiveness of mental health support services provided post flooding	0.719	0.698

Table 4.8 Pearson Chi-squared Test of Variation in Responses across Districts on Access to Healthcare Services.

Source: Field Data, 2024.

4.7 Resilience Building Practices and Post-Flood Preparedness

4.7.1 Resilience Building Practices

Table 4.9 shows the most of the respondents (51.40%) did undertake personal actions to prepare for the floods. In the Central Tongu, more than half of the respondents (52.80%) indicated they did prepare for the flood. With regards to actions taken during the flood, 43.83% of the respondents indicated they ran away from their homes, 40.74% sought help from God and 21.6% initiated no action during the flood. In the Ada East district, 51.85% of the respondents reported they did not

prepare for the flood. In terms of actions taken during the flood, 49.74% of the respondents ran away from home and 26.18% sought God's intervention. About 32.86% reported they took no action.

The results indicate respondents made use of various resources to cope with the flood. Social support networks were utilized by 49.08% of the respondents. Respondents (19.16%) also indicated financial resources were very useful during the flood. Respondents who indicated access to information and community cohesion as their coping mechanism during the flood constituted about 8.14% and 5.51% respectively. In the Central Tongu district the most widely used resources as coping mechanism among the respondents were social support network (60.53%), access to information (12.11%) and financial resources (11.05%). In the Ada East district, respondents made use of social support network (37.7%) and financial resources (27.23%). About 27.23% of the respondents in the district did not use any resource as a coping mechanism during the flood.

Table 4.9 Resilient Building Practices during and after the Floods

	Total		Central Tongu District		Ada East District	
Variable	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**
Took specific measures before the flood						
Yes	92	51.40	66	52.80	26	48.15
No	87	48.60	59	47.20	28	51.85
Action taken when the flood occurred						
Run away from our homes	166	47.03	71	43.83	95	49.74
Run away with farm produce	1	0.28	1	0.62	-	-
Abandoned the farm and wait for the next season	2	0.57	1	0.62	1	0.52
Create drains to contain and direct the flood	16	4.53	3	1.85	13	6.81
Seek God's intervention	116	32.86	66	40.74	50	26.18
Nothing	97	27.48	35	21.6	62	32.46
Others	3	0.85	3	1.57	-	-
Resources used to cope with the flood event						
Financial resources	73	19.16	21	11.05	52	27.23

Social support network	187	49.08	115	60.53	72	37.7
Access to information	31	8.14	23	12.11	8	4.19
Community cohesion	21	5.51	14	7.37	7	3.66
None	69	18.11	17	8.95	52	27.23
Engagement in resilient-building activities after the floods						
Education and training	93	24.41	60	31.58	33	17.28
Community engagement	115	30.18	58	30.53	57	29.84
Psychological support	18	4.72	11	5.79	7	3.66
Policy advocacy	22	5.77	21	11.05	1	0.52
Environmental stewardship	23	6.04	17	8.95	6	3.14
The level of community collaboration post-flooding						
Excellent	70	18.37	58	30.53	12	6.28
Good	188	49.34	91	47.89	97	50.79
Fair	54	14.17	26	13.68	28	14.66
Poor	69	18.11	15	7.89	54	28.27

Table 4.9 Resilient Building Practices During and After the Flood

Source: Field Data, 2024.

4.7.2 Variation in Resilient Building Activities Employed by Respondents across the Districts

Results according to the chi-squared test show that, at the 5% significance level, there is no variation in whether the respondents across the districts employed measures to prevent the flood. Also, the test for all the resilient building activities is significant at the 5% level. This indicates that there is significant variation in the resilient building activities employed by respondents across the two districts.

Table 4.10: Pearson Chi-squared Test of Variation in Resilience Building Practices.

Variable	Pearson chi2	Prob value
Took specific measures before the flood	0.327	0.568
Action taken when the flood occurred	51.114	0.000
Resources used to cope with the flood event	50.395	0.000
Engagement in resilient-building activities after the floods	61.245	0.000
The level of community collaboration post-flooding	52.535	0.000

Table 4.10 Pearson Chi-squared Test of Variation in Resilience Building Practices

Source: Field Data, 2024.

In terms of engagement in resilience-building activities after flooding, 30.18% engaged in community-based efforts and 24.4% of the respondents participated in education and training initiatives. Respectively, the respondents who were involved in the provision of psychological support, policy advocacy and environmental stewardship activities constituted about 4.7%, 5.8% and 6% of the total sample. In the Central Tongu districts, 31.6% were involved in education and training and 30.5% of the respondents were involved in community engagement. Respondents who participated in policy advocacy and environmental stewardship activities were about 11.1% and 9% of the total sample respectively. In the Ada East district, 29.8% indicated they were involved in community engagement, 17.3% participated in education and training and 3.7% offered psychological support.

Perceptions of community cooperation post-flooding varied with 49.3% of the respondents rating it as good, while 18.4% described it as excellent. Respondents who rated the level of cooperation as fair make up 14.2% of the total sample. About 18.1% considered the level of community cooperation as poor. In the Central Tongu district, 47.9% of the respondents rated the level of cooperation in the community as good, 30.5% considered it to be excellent and 13.7% described it as fair. The respondents in the Central Tongu district who thought the level of cooperation in the community was poor were about 7.9%. In the Ada East district, 50.8% of the respondents considered the level of cooperation among community members after the flood as good whereas 28.3% rated it as poor. About 14.7% rated the level of cooperation as fair while 6.3% considered it as excellent.

4.7.3 Post-flood Preparedness Measures Implemented in the Community

Post-flood preparedness measures implemented in the community included evacuation planning and routes for (27%), early warning systems (13.6%), emergency response and coordination (8.7%), infrastructure resilience measures (8.9%), and post-flood recovery planning (5.3%). However, 43.3% of the respondents reported taking no post-flood preparedness measures in place, and 17.6% did not know of any such measures.

Figure 4.3: Post-flood preparedness measures implemented by respondents

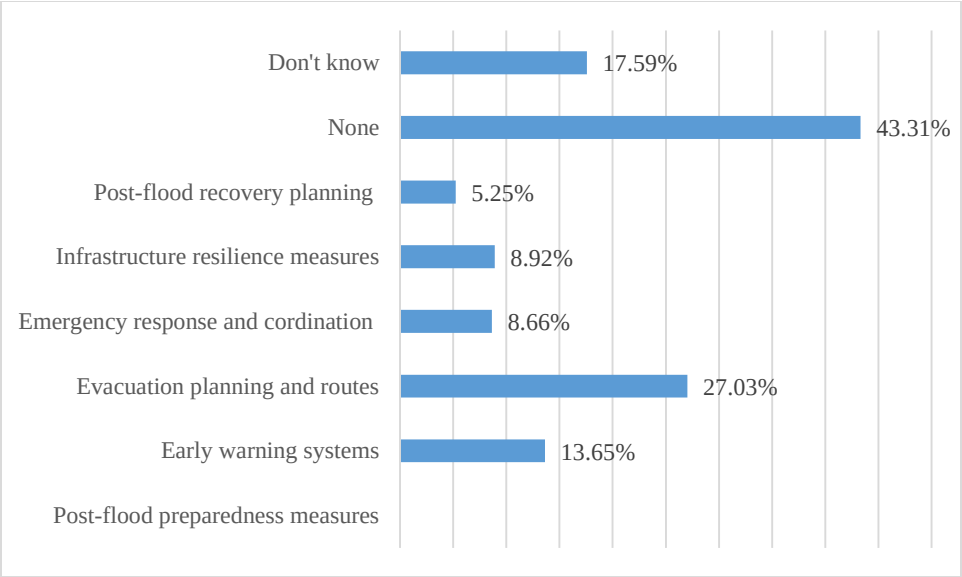

Figure 4.3 Post-Flood preparedness and measures implemented by respondents

Source: Field Data, 2024.

Figure 4.4: Post-flood preparedness measures implemented by respondents, by districts.

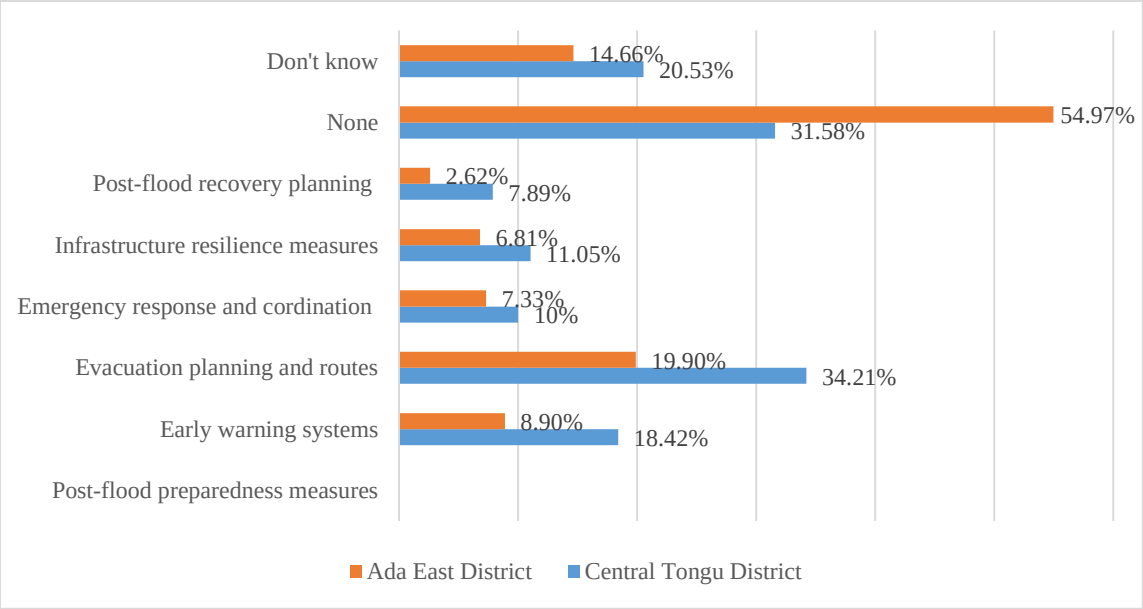

Figure 4.4 Post-Flood preparedness measures implemented by respondents, by districts

Source: Field Data, 2024.

Post-flood preparedness measures implemented by respondents in the Central Tongu district were evacuation planning and routes (34.2%), early warning systems (18.4%), infrastructure resilience measures, and emergency responses and coordination (10%). About 31.6% of the respondents in the Central Tongu district indicated they had not initiated any post-flood preparedness measures whereas 20.5% reported they had no knowledge about such measures. Respondents in the Ada East district indicated they had put in place the following measures; evacuation planning and routes (19.9%), early warning systems (8.9%), emergency response and coordination (7.3%) and infrastructure resilience measures (6.8%). While about 55% reported they had not taken such measure, 14.7% reported they do not know of such initiatives.

5 CHAPTER 5

DISCUSSIONS

5.1 Introduction

This chapter discusses the key findings of the study on post-flood health risks, determinants of these risks, challenges in accessing healthcare services, and resilience-building practices among residents of the Central Tongu and Ada East Districts. The results were analysed in the context of existing literature and frameworks to provide a comprehensive understanding of the impact of flooding on community health.

5.2 Post-Flood Health Risks Assessment

The results of this study indicate that a substantial portion of the population in the Central Tongu and Ada East Districts experienced significant health risks following the dam spillage. This prevalence of post-flood health issues aligns with previous studies conducted in various flood-affected regions, underscoring the substantial health risks posed by flooding events (Milojevic et al., 2011; Tunstall et al., 2006; Gordon et. al., 2009).

Among the reported health issues, skin infections were the most common. This finding is consistent with the observations made in Chennai, India, where skin infections were prevalent following the 2015 floods due to exposure to contaminated water and damp environments (Bureau, 2016). Vector-borne diseases reported by the respondents highlight the increased mosquito breeding grounds created by stagnant floodwaters leading to outbreaks of diseases like malaria. Similar patterns were observed in Bangladesh after the 2017 floods which saw a notable rise in malaria cases (Willford, Roelofs, and Leifman, 2019). The high prevalence of skin infections and

vector-borne diseases indicates an immediate health risk among flood-affected populations potentially leading to increased healthcare demands and morbidity rates in these communities.

The gastrointestinal issues reported by the respondents can be attributed to the consumption of contaminated water and food during the flooding. This aligns with findings from Pakistan's 2010 floods where over 200,000 cases of acute watery diarrhoea were reported due to contaminated drinking water (Kouadio et al., 2014). The reported respiratory issues and water-borne diseases such as typhoid further underscore the health challenges faced by flood-affected communities. The increase in respiratory illnesses due to damp and mouldy conditions post-flood has also been documented in other flood events, such as Hurricane Harvey in 2017 (Paterson, Wright, and Harris, 2018). The occurrence of gastrointestinal and waterborne diseases underscores the importance of ensuring access to clean water and sanitation facilities in flood-affected communities. Strengthening water quality monitoring and emergency water supply systems is essential to prevent water-related disease outbreaks post-flood.

Mental health issues recorded among the respondents reflect the psychological impact of flooding. The emotional trauma associated with displacement, loss of property, and disruption of daily life has been well-documented in flood-related studies, including those conducted in the UK and the USA (Tunstall et al., 2006; Fernandez et al., 2015). The mental health burden underscores the need for comprehensive mental health support in flood-affected communities. Musculoskeletal disorders, cardiovascular diseases, and other health issues reported by the respondents highlight the multifaceted nature of post-flood health risks. These findings underscore the vulnerability of individuals exposed to natural disasters, emphasizing the need for targeted mental health support and resilience-building efforts within flood-prone areas. The findings indicate that some of the respondents suffered various forms physical injuries like fractures and lacerations or abrasions. These findings are consistent with previous studies that documented similar types of injuries

during flooding events (Bureau, 2016). This reveals the need for better safety measures and emergency medical services during floods. Enhancing community awareness and preparedness can reduce the risk of injuries and fatalities.

The results of this study underscore the critical need for improved flood preparedness and response strategies to mitigate health risks in flood-prone areas. The high prevalence of health issues, both physical and psychological, emphasizes the importance of timely pre-flood warnings, effective evacuation plans, and access to healthcare services. The lack of preparedness measures reported by majority of the respondents in both districts further highlights the need for community education and infrastructure improvements to enhance resilience against future floods.

5.3 Determinants of Post-Flood Health Risks

The findings from the logistic regression analysis suggest that gender, age, employment status and existence of pre-flood health issues are key factors that influence the probability of experiencing post-flood health risks. Specifically, the results indicate that middle-aged adults have higher odds of experiencing post-flood health issues. This result is consistent with the findings of the study by Tunstall et al (2006) which found that in England and Wales, individuals who are over 60 years who experience flooding had worse general health. Heo et al (2008) and Ginexi et al (2000) also found evidence which suggest that younger age and adults are at greater risk of experiencing post-flood health issues. The Environment Agency and British Red Cross research indicate that young people are the most at risk during flood events due to their lack of knowledge about the dangers of flooding in their area and what to do in an emergency (Environment Agency, 2018).

The results point to a weak effect of gender as a risk factor for post-flood health issues. This outcome nonetheless supports the findings of Tunstall et al (2006) and Norris et al (2002) which found that females experience more post-flood health issues, particularly psychological issues,

than males. Although disasters like floods are not discriminatory irrespective of gender, women have been found to be more vulnerable and bear a greater burden of the consequences of disasters than men. This is due to physiological, biological and social economic differences as well as inequality in power relations (Ashraf et al., 2024). The study also found that the odds of experiencing post-flood health issues is lower among the employed. This result is consistent with the findings of Peek-Asa et al (2012) which found that individuals whose work are disrupted by floods are more likely to experience mental and physical health post-flood. For individuals whose economic life are not disrupted by floods, they are able to have access to economic resources which reduces the pressure to rebuild their economic life or restore their socio-economic status. The reduction in such pressures in turn reduces the probability that the employed would experience any emotional, mental or psychological health issues.

Also, the findings of the logistic regression show individuals with pre-flood health issues are more vulnerable to post-flood health problems. This result confirms the findings of Lowe, Ebi and Forsberg (2013) which found existing illnesses to be a risk factor for negative health effects following floods. Heo et al (2008) also found that, having previous psychological symptoms appears to be a risk factor for mental health challenges post flood. Floods may have negative impacts on the ecological determinants of good health, including access to clean and safe drinking water, secure shelter and food security (Hancock, Spady and Soskoline, 2015; Lawrence, 2011; Patwardhan, Mutalik and Tillu, 2015). The destruction to water and sanitation infrastructure by floods may lead to contamination of drinking water sources from agricultural waste, sewage, industrial waste and chemicals (Rashid, 2000). These developments exacerbate pre-existing health challenges. For individuals suffering from non-communicable diseases like hypertension, diabetes, and heart diseases among others, floods could worsen their conditions due to fear or anxiety.

Floods have been found to also worsen respiratory conditions leading to worsening conditions of asthma and bronchitis (Local Government Association, UK, 2024).

5.4 Challenges in Accessing Healthcare Facilities and Services Post-Flooding.

The findings of this study highlight the challenges in accessing healthcare facilities post-flooding in the Central Tongu and Ada East Districts. The most widely reported barrier to healthcare access was road damage caused by the flood. This finding aligns with previous studies, such as those conducted in rural India and Bangladesh, which reported similar infrastructural challenges that increased travel times to healthcare facilities and disrupted services (Kajihara et al., 2017; Jerin et al., 2023). This finding implies that infrastructure damage severely limits residents' ability to reach healthcare facilities, potentially leading to untreated health issues and delayed medical intervention.

Another significant barrier identified was staff unavailability. This issue is consistent with global findings where healthcare professionals are often displaced during floods, leading to a shortage of medical personnel at critical times (Gabrysch et al., 2018; WHO, 2014). This disruption can lead to inadequate healthcare provision during critical times, exacerbating health outcomes for the affected population.

The findings also indicated that shortages of medical supplies posed a great challenge to healthcare access. This reflects a common post-flood challenge noted in other studies, such as the one in South Sudan, where limited access to supplies hindered immunization efforts (Whandy, 2024). This can result in a lack of essential medical resources, compromising the quality of care provided and potentially leading to worsened health conditions. The results also show that the damage to healthcare facilities caused by the floods further compounded challenges to healthcare access. This is similar to findings from Bangladesh where structural damage caused by floods led to prolonged

closures and increased risks of infection (Jerin et al., 2023). These challenges can result in longer-term healthcare access issues and increased health risks for the population. The respondents also mentioned overcrowding at healthcare facilities a challenge to access to healthcare. A similar challenge was also noted in the aftermath of Hurricane Katrina in the United States (Icenogle, Eastburn, and Arrieta, 2017). This can lead to longer waiting times, increased strain on healthcare workers, and reduced quality of care.

5.5 Post-Flood Resilience-Building Practices Among Residents

In both the Central Tongu and Ada East Districts, the findings underscored varying levels of preparedness and response strategies among community members facing recurrent flood events. The majority of the respondents prepared for the floods indicating a positive attitude towards flood preparedness. Some of the respondents reported undertaking personal preparedness measures, such as evacuation planning and seeking divine intervention. This percentage reflects a moderate level of proactive behaviour compared to findings from similar studies in other flood-prone regions, where traditional coping mechanisms and early warning systems are commonly utilized (Whandy, 2024). These findings shed light on both community-based and institutional strategies employed to mitigate the impact of flooding on public health. During flooding, the primary response among respondents was evacuation, with most of the respondents reporting they decided to flee their homes. This aligns with global trends where evacuation to safer locations remains a crucial survival strategy during natural disasters (Porio, 2011). However, the study also revealed diverse responses, such as creating drainage systems and relying on divine intervention, indicating cultural and practical approaches to coping with emergencies but also suggesting areas where more structured disaster management plans could enhance effectiveness.

The findings indicate the majority of the respondents relied predominantly on social support networks and financial resource as coping mechanisms post flood. These findings are consistent with research highlighting the critical role of social capital and economic stability in disaster recovery (Schipper, 2015; Bwire et al., 2017). However, the lower utilization of information access and community cohesion suggests potential areas for improvement compared to regions where these factors play a more prominent role in resilience-building efforts (Bonanno et al., 2010). Strengthening community engagement and improving access to timely information is vital for enhancing post-flood resilience and reducing vulnerability.

In terms of resilience-building activities post-flooding, the study identified participation in education and training initiatives and community-based efforts as predominant activities. These activities reflect ongoing efforts to enhance preparedness and response capabilities within the community, akin to successful programs observed in disaster-prone regions (Mensah and Ahadzie, 2020; Bwire et al., 2017). However, the lower emphasis on psychological support and policy advocacy suggests potential gaps in addressing mental health needs and advocating for the involvement of the community in pursuing systemic improvements in disaster policies. Integrating these aspects into resilience-building strategies is crucial for comprehensive disaster preparedness and recovery efforts.

Perceptions of community cooperation post-flooding varied among respondents. These findings underscore the importance of fostering social connections and enhancing community cohesion, which are essential for collective action and resource sharing during and after flood events (Bonanno et al., 2010). Improving perceptions of cooperation and trust within communities can strengthen resilience and facilitate more effective collaborative efforts in disaster response and recovery.

6 CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

The study's main objective was to investigate the level of post-flood health risk among residents in the Central Tongu and the Ada East district who were affected by flood caused by the spillage of the Akosombo Dam. Specifically, the study sought to achieve the following objectives; identify the post-flood health issues among the residents; determine the factors influencing the vulnerability of residents to post-flood health risks; identify the challenges to access to healthcare facilities and healthcare services during and after the floods; and on post-flood and determine the resilience-building practices employed by the communities affected by the flood. This study adopted a quantitative approach to collect primary data from a sample of 381 flood victims using a multi-stage sampling technique. The sample comprise 190 respondents from the Central Tongu district and 191 respondents from the Ada East Districts. The study analysed the data using descriptive statistics (frequency and percentage), logistic regression analysis and Pearson chi-squared test.

The data analysis revealed majority of the respondents did not experience any health issue as a result of the flood. For those who experienced post-flood health issues, the most common health issues reported were skin infections, vector-borne diseases, gastrointestinal diseases, water-borne diseases, respiratory issues, musculoskeletal diseases and mental issues. Findings from the logistic regression analysis indicated that age, gender, employment status and pre-flood health issues are significant factors influencing the probability that a flood victim will experience post-flood health issue.

More than half of the respondents indicated they received medical treatment for the health issue they experienced during the flood. The majority of the respondents reported they received prompt medical treatment for the health issues during the flood. For those who reported delays in receiving medical treatment, the reasons they cited for the delay were in the following order; staff unavailability, lack of transportation, shortage of medical supplies, overcrowding at the healthcare facilities and closed healthcare facility. Also, the majority of the respondents utilized the mental health support services which were provided to the communities. Most of them were of the view that the mental health support services were effective.

Furthermore, the findings show majority of the respondents did prepare for the flood. The action taken by most of the respondents during the flood was to flee from their home and or seek God's intervention. Some of them also sought God's intervention during the flood event. Others also did not initiate any action during the flood. The most employed coping mechanism among the respondents during the flood was social support network. The main resilient-building activities the communities engaged in post flood were community engagement and education and training. Most of the respondents indicated they have not put in place any post-flood preparedness measures. A few of them indicated they have adopted evacuation planning and route as a post-flood preparedness measure.

6.2 Conclusions

The study assessed the post-flood health risks in selected communities in the Central Tongu and Ada East Districts which were affected by floods caused by the spillage of the Akosombo dam. The study concludes that the flood has created health issues like skin infections, vector-borne diseases, gastrointestinal issues, respiratory issues, and mental health problems among the affected

populations. The study also concludes that the key factors influencing susceptibility to post-flood health issues among the respondents are age, employment status and existence of pre-flood health issues. Furthermore, the study concludes that even though medical treatment was provided for the affected communities, they were some issues that require attention. Notable amongst these challenges relate to delays in access to medical services due to staff unavailability, lack of transportation, and inadequate medical supplies among others. Also, from the findings, the study concludes that the respondents had a positive attitude towards flood preparedness.

Resilience-building practices among residents highlighted a mix of proactive and reactive measures. The study concludes that social support network is a useful coping mechanism for flood victims based on the experiences of the respondents. The study also concludes based on the findings that, engagement in resilience-building activities after floods, like education and training initiatives, community-based efforts, psychological support, policy advocacy, and environmental stewardship, are key to ensuring a community's effective recovery from floods. In addition, post-flood preparedness measures like early warning systems, evacuation planning and route, infrastructure resilient measures, and emergency response coordination, should be encouraged among communities who have experienced flood events to ensure they are adequately prepared for future floods.

6.3 Recommendations

The study proposes the following policies and strategies based on the findings.

- The Ghana Health Service (GHS) should establish and strengthen health surveillance systems specifically in the Central Tongu and Ada East Districts to promptly identify and address post-flood health risks. This includes setting up mobile clinics and rapid response

teams to manage common post-flood health issues like skin infections, vector-borne diseases, and mental health problems.

- The Ghana Health Service (GHS) should improve healthcare infrastructure and accessibility in flood-prone areas by developing and maintaining resilient healthcare facilities. This involves building or upgrading facilities to withstand floods, ensuring they are located outside high-risk zones, and maintaining clear and accessible roads to these facilities.
- The National Disaster Management Organization (NADMO) should implement comprehensive community-based disaster preparedness programs in the Central Tongu and Ada East Districts. These programs should include education and training on disaster preparedness, flood risks and resilience-building practices. NADMO should also establish and maintain effective early warning systems to provide timely alerts to residents, coupled with clear evacuation plans and routes to ensure swift and safe relocation of affected individuals.
- Non-Governmental Organizations (NGOs) and Civil Society Organizations (CSOs) should integrate mental health support into post-flood response efforts. NGOs and CSOs should provide access to psychological counselling and support services for flood victims to address the high prevalence of anxiety, panic attacks, and other mental health issues. They can also organize community outreach programs and support groups to help individuals cope with the psychological impact of flooding and build long-term resilience.
- Flood support services should also target vulnerable groups like women and those with pre-flood health complications.

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Appendices

Appendix 1

ETHICAL CLEARANCE

ENSIGN GLOBAL
COLLEGE

OUR REF: ENSIGN/IRB/EL/SN-256/02
YOUR REF:

April 29, 2024.

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Gladstone Elikem Doh
Ensign Global College
Kpong.

Dear Gladstone,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Thursday, April 25, 2024, your research proposal entitled **"Post-Food Health Risks and Challenge to HealthCare Accessibility in Selected Districts in Ghana: Case Study of the Akosombo Dam Spillage"** was considered.

You have been granted Ethical Clearance to collect data for the said research under academic supervision within the IRB's specified frameworks and guidelines.

We wish you all the best.

Sincerely,

Dr. (Mrs.) Rebecca Acquaah-Arhin
IRB Chairperson

P. O. Box AK 136 | Tema-Akosombo Highway, Kpong, Eastern Region, Ghana |

Appendix 2

INFORMED CONSENT (PARTICIPANTS)

Participant ID –

Date .....

TITLE OF STUDY: POST-FLOOD HEALTH RISKS AND CHALLENGE TO HEALTHCARE ACCESSIBILITY IN SELECTED DISTRICTS IN GHANA. CASE STUDY OF THE AKOSOMBO DAM SPILLAGE.

General Information about Research

This study seeks to find out about the health risks and healthcare accessibility challenges faced by your community in the aftermath of the Akosombo Dan Spillage. The study aims to provide evidence-based insights that can inform healthy public policy formulation, adequate healthcare provision, effective disaster preparedness and management, and community resilience-building efforts in flood-prone areas in Ghana. This study will take about 15minutes. You will need to answer number of questions and your role is to provide accurate answers according to your knowledge. There are no right or wrong answers and therefore, please feel free to ask for clarifications.

Risks/Benefits of the study

There are no foreseeable direct risks associated with your participation in this study except for your time (15mins) to be spent answering the questions.

There are no direct benefits to you but the findings will inform healthy public policy formulation, adequate healthcare provision, and effective disaster preparedness and management in your community and Ghana as a whole.

No data you provided will be disclosed to anybody except my supervisor. The data will not associate any individual with specific responses. Thus, by signing this written consent form, you or your representative is authorizing such access. You have the right to access information about you collected as part of the study.

Compensation

There are no compensation packages except verbal appreciation. However, a cake of soap will be given to each participant at the end of the study.

Withdrawal from Study

Your participation in this study is voluntary and you may withdraw at any time without penalty. You will not be adversely affected if you decline to participate or later stop participating.

You or your legal representative will be informed in a timely manner if information becomes available that may be relevant to your willingness to continue participation or withdraw.

Name of Participant Date

……. ……

Signature or Thump-print of participant

……

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been fully explained to me.

Contact for Additional Information

Please contact me in case of any issues related to the study;

Principal Researcher: Gladstone Elikem Doh

Ensign Global College

Kpong

gladstonedoh@gmail.com

+233 (0) 261972282

Appendix 3

QUESTIONNAIRE

POST-FLOOD HEALTH RISKS QUESTIONNAIRE

TITLE OF STUDY: POST-FLOOD HEALTH RISKS AND CHALLENGE TO HEALTHCARE ACCESSIBILITY IN SELECTED DISTRICTS IN
GHANA. CASE STUDY OF THE AKOSOMBO DAM SPILLAGE

Date & Time

yyyy-mm-dd hh:mm

Did you and/or your household experience the flooding from the Akosombo Dam Spillage ?

- Yes
- No

Do you wish to participate in this study?

- Yes
- No

Instructions:

Thank you for your interest in participating in this study. This questionnaire aims to gather valuable information into the post-flood health risks and healthcare accessibility challenges following the Akosombo Dam spillage in your community. Your experiences and insights are essential to help us understand the health risks faced by your community and the healthcare accessibility challenges that emerged in the aftermath of the flood. Your participation is entirely voluntary, and your responses will remain anonymous. Feel free to share your thoughts openly. Please provide much detail when specified and as you are comfortable with. If you do not wish to answer any particular question, feel free to let me know. Check the boxes as applied.

GENERAL INFORMATION

Interviewer Name

Gladstone

Akua

- Shine
- Deborah
- Judith
- Solomon
- Dzifa
- Emmanuel
- Bless
- Thomas

Participant Code

Add interviewer first name initial then participant number (e.g G001)

LOCATION/SITE INFORMATION

Region:

Volta

Greater Accra

District

Central Tongu

District

Ada East

Community

Bakpa Awadiwoekome

Bakpa Zorotodzi

Kebegodo

Community

Pediatorkope

Clam Shed Area (Pediatorkope)

PARTICIPANT SOCIO-DEMOGRAPHIC CHARACTERITICS

Gender:

Male

Female

Age (years)

Educational Level

- No formal education
- Primary Education
- Junior High Education
- Secondary Education
- Tertiary Education
- Vocational/Technical training

Are you currently working?

- Yes
- No

Current Occupation

- Farmer
- Trader
- Fisher
- Teacher
- Student
- Health worker (Nurse, Midwife, Doctor)
- Religious leader
- Other

Other (Please specify)

Was this your primary occupation before the flooding?

- Yes
- No

what was your occupation before the flooding?

- Farmer
- Trader
- Fisher
- Teacher
- Student
- Health worker (Nurse, Midwife, Doctor)
- Religious leader
- Other

Other (Please Specify)

How long have you been continously living in this community ? (in years)

- 1 year - 2 years
- 3 years - 5 years
- 6 years - 10years
- More than 10 years

Religious Affiliation

- Christian
- Muslim
- Traditionalist
- Atheist
- Other

Other (Please Specify)

Marital status

- Currently married and living together
- Divorced or seperated
- widowed
- Never married (single)
- Currently married but living alone (without spouse)

Household Size

1-3 members

4-6 members

7-9 members

10 or more members

Ethnicity

Akan (Ashanti, Akwapem, Fante,

Ga-Dangme

Ewe

Mole Dagbane

Other

Other (Please specify)

In general, would you say that your household has,

More money than you need?

Just enough money?

Less money than you need?

POST-FLOOD HEALTH OUTCOMES AND THEIR DETERMINANTS

How long did the flood last in your area?

Less than a day

1 - 3 days

4 - 7 days

More than a week

More than a month

How would you rate the severity of the flood you experienced?

Minor

Moderate

Severe

Catastrophic

Did the flooding destroy your properties?

- [ ] yes, Farm
- [ ] yes, Household Items
- [ ] yes, House (the building)
- [ ] yes, Canoe
- [ ] yes, Fish farm
- [ ] yes, Livestock
- [ ] Yes, Motorcycle
- [ ] Yes, Bicycle
- [ ] Clothes
- [ ] Provisions and food
- [ ] Fishing traps
- [ ] Fishing nets
- [ ] Nothing was destroyed
- [ ] Other
- [ ] No response

Other (Please Specify)

Have you or any member of your household experienced any health issues following the Akosombo Dam spillage?

- ○ Yes
- ○ No

Please specify the type of health issues experienced (check all that apply):

- [ ] Respiratory problems
- [ ] Skin infections
- [ ] Gastrointestinal issues (e.g. diarrhoea)
- [ ] Vector-borne diseases (e.g., malaria, dengue fever)
- [ ] Water-borne diseases (e.g. typhoid fever, cholera)
- [ ] Mental health issues (including post-traumatic stress disorder, PTSD)
- [ ] Cardiovascular Disorders (e.g. high blood pressure)
- [ ] Musculoskeletal Disorders (e.g muscle pain)
- [ ] Other

Please specify other types of health issues experienced

Physical health effects experienced during or immediately after the flooding

- Cough
- Headaches
- High blood pressure
- Skin Irritations (e.g Rashes)
- Insects and animal bites
- Stomach upset
- No physical challenge experienced
- Ulcer
- Other

Other (Please specify)

Psychological health effects experienced durring or immediately after the flooding

- Sleeping problems
- Flasback to the flood (Pictures in my head of what happened;feels like it is working right now)
- Increased tension in relationship (eg. more arguing)
- Anger or tantrums
- Panic attacks
- Nightmares (Bad dreams remembering me of what happened)
- Increaded use of alcohol or drugs
- Thoughts of suicide
- Lack of energy
- Anxiety
- Overthinking or thinking too much
- None

On a scale of 1 to 5, how severe were these health issues? (1 being not severe, 5 being very severe)

- Not Severe
- Mild
- Moderate
- Severe
- Very Severe

Have you or any member of your household suffered any physical injuries as a result of the flood?

- Yes
- No

What kind of injuries were sustained? (check all that apply).

- Lacerations/Abrasions
- Fractures/ Sprains
- Burns by electrocution
- Burns from flammables

What were the main health problems in your household before the flooding? (check all that apply)

- Typhoid fever
- Cholera
- Malaria (fever)
- Dysentery
- Schistosomiasis (Bilharzia)
- High blood pressure
- Diarrheal disease aside those mentioned above
- Don't Know
- None
- Other

Other Please specify

Have you noticed an increase in the prevalence of infectious diseases (including waterborne diseases) in your community post-flooding?

- Yes
- No
- Don't Know

Please specify the infectious diseases. (check all that apply).

- Typhoid fever
- Cholera
- Dysentery
- Malaria
- Schistosomiasis (Bilharzia)
- Other

Other (Please Specify)

Was there any reported flood related death in your household?

- Yes
- No

What was the cause of death? (check all that apply)

- Drowning
- Physical Injury
- Infectious diseases
- Psychological problem

Did your home sustain damage due to the flood?

- Yes
- No

Did you have to evacuate your home due to the flood?

- Yes
- No

Before the flood, were you aware of any flood preparedness measures?

- Yes
- No

Did you receive any warnings or alerts before the flood occurred?

- Yes
- No

What did you do when you received these warnings

We prepared for relocation in case it happens

Adopted a wait and see attitude

Relocate

Secure our property ahead of the floods

Invest less on the farm

Plant early in order to harvest before the flood

Pray to God for guidance

The flood warnings came late therefore we could not prepare

Did nothing

Did you take any preventive actions based on the flood warnings?

Yes

No

How would you rate your overall health?

Very Poor

Poor

Neither Poor nor Good

Good

Very Good

PSYCHOLOGICAL DISTRESS SCALE

In the past four weeks, have you felt unhappy and not yourself that nothing could cheer you up?

None of the time

Little of the time

some of the time

Most of the time

All of the time

In the past four weeks, have you felt downhearted and letdown?

None of the time

Little of the time

Some of the time

Most of the time

All of the time

In the four weeks, have you been a nervous person?

None of the time

Little of the time

Some of the time

Most of the time

All of the time

In the past four weeks, did you feel wornout?

None of the time

Little of the time

Some of the time

Most of the time

All of the time

In the past four weeks, have you felt worthless or hopeless?

None of the time

Little of the time

Some of the time

Most of the time

All of the time

In the past four weeks, did you feel full of life and bounce?

None of the time

Little of the time

Some of the time

Most of the time

All of the time

In the past four weeks, have you felt calm and peaceful?

- None of the time
- Little of the time
- Some of the time
- Most of the time
- All of the time

In the past for weeks, did you have alot of energy?

None of the time

- Little of the time
- Some of the time
- Most of the time
- All of the time

In the past four weeks, have you been a happy person?

- None of the time
- Little of the time
- Some of the time
- Most of the time
- All of the time

WATER QUALITY AND SANITATION PRACTICES

Which of the following were sources of your drinking water prior to the flood? (check all that apply)

- River / Surface water
- Rain water
- Pipe borne water
- Borehole
- Bottle / Sachet water
- Water trucking
- Other
- No response

Other (Please specify)

What are the main sources of drinking water accessed by you in the community since the flooding? (Check all the apply)

- Piped water network
- Open well / Closed well
- River / surface water
- Rain water
- Water Trucking
- Borehole
- Sachet water / Bottle water
- Other
- No response

Other (Please Specify)

Which of these were problems with your main drinking water source since the flooding? (check all that apply)

- There were no problems
- Water tastes/smells/looks bad
- Water is not available
- Water volume available is not enough
- No answer

How would you rate the water quality in your community before the flood event?

- Excellent
- Good
- Fair
- Poor

How would you rate the water quality in your community after the flood event?

- Excellent
- Good
- Fair
- Poor

How are you storing water prior to the flooding? (check all that apply)

- Jerrycans
- Storage tanks
- Barrels
- Buckets
- Basins
- Clay pots
- Other
- No response

Other (Please Specify)

How are you storing water post flooding? (check all that apply)

- Jerrycans
- Storage tanks
- Barrels
- Buckets
- Basins
- Clay pots
- Other
- No response

Other (Please Specify)

Did many people in the community negatively change their hygiene practices because of lack of water? (Select all that are applicable)

- No
- Yes, people are not doing laundry in 2 weeks
- Yes, people are not bathing in days
- Yes, women find it very difficult to do menstrual hygiene management
- Yes, people are sometimes not washing hands after going to the toilet
- Yes, people are sometimes not washing hands before cooking and eating
- Don't know

How would you rate the sanitation practices in your community before the flood event?

- Excellent
- Good
- Fair
- Poor

How would you rate the sanitation practices in your community after the flood event?

- Excellent
- Good
- Fair
- Poor

Have you received any education or training on proper sanitation practices following the flood event?

- Yes
- No

How helpful was this education/training in preventing health issues?

- Very helpful
- Fairly helpful
- helpful
- Not helpful

Do you believe there was sufficient infrastructure for managing sanitation and water quality in your household during or immediately after the flood?

- Yes
- No
- Unsure

Were people using latrines in your community prior to flood? (select all that apply)

- Yes, communal latrines
- Yes, household latrines
- Yes, both household and communal latrines
- No, there were no latrines
- Open defecation

Are people currently using latrines in your community? (select all that apply)

Yes, communal latrines

Yes, household latrines

Yes, both household and communal latrines

No, there were no latrines

Open defecation

Have you noticed any governmental or non-governmental initiatives aimed at improving sanitation and water quality in your community post-flooding?

Yes

No

HEALTHCARE FACILITIES AND SERVICES ACCESSIBILITY

Is there a functional health facility within your community?

Yes

No

What type of health facility is in your community?

CHPS Compound

Health Centre

District Hospital

Regional Hospital

Teaching Hospital

Private clinic

Is the healthcare facility located in a flood prone zone?
(select all that apply)

Yes, near a drainage channel

Yes, in the steep slope

Yes, agriculture lands

No, not located in the flood prone zone

Don't know/ No answer

Have you or any member of your household received any medical treatment for the health issues experienced post-flooding?

Yes

No

Did you experience any delays in receiving medical treatment?

- Yes
- No

What were the reasons for the delays? (check all that apply)

- Lack of transportation
- Overcrowding at healthcare facilities
- Shortage of medical supplies
- Closed Health Facility
- Obstructions in accessing the health facility
- Staff not available
- Other

Please specify other reasons for the delays:

Have there been any mental health support services provided in your community post-flooding?

- Yes
- No

Have you or any household member utilized these services?

- Yes
- No

How would you rate the effectiveness of mental health support services provided post-flooding?

- Very effective
- Somewhat effective
- Not very effective
- Not effective at all

How far is the nearest healthcare facility from your residence?

- Less than 1 km
- 1-5 km
- 6-10 km
- More than 10 km

Did you face any challenges in accessing the healthcare facility and services post-flooding?

Yes

No

Please specify the challenges faced. (check all that apply)

Health facility damaged by flood

Staff not available

Road to health facility damaged by flood

Shortage of medical supplies

Overcrowding at Healthcare facility

Other

Please specify other challenges

How would you rate the accessibility of healthcare services in your community post flooding?

Very accessible

Somewhat accessible

Not very accessible

Not accessible at all

Did you receive any guidance or information from local authorities or healthcare providers regarding health risks after the flood event?

Yes

No

How helpful was this information?

Very helpful

Fairly helpful

Helpful

Not helpful

RESILIENCE BUILDING PRACTICES

Are there any specific measures you have personally taken to prepare for or mitigate the impact of floods on your property or household?

Yes

No

What did you do when the flood happened

- We ran away from our homes to live with family an friends
- Harvest and ran away with farm produce
- Abandon the farms and wait for the next season
- Create drains to contain and direct the water away
- Seek God's intervention
- Nothing
- Other

Other (Please specify)

What resources helped you cope with the flood event?

Financial Resources

- Social support network
- Access to information
- Community cohesion
- None

Did you engage in any resilience building activities after the flood? (select all that apply)

- Yes, Education and Training
- Yes, Community engagement
- Yes, Psychological support
- Yes, Policy advocacy
- Yes, Environmental stewardship
- No

How would you rate the level of community cooperation and collaboration post flooding?

- Excellent
- Good
- Fair
- Poor

What resources or assistance do you think will be needed to improve health in your community post flood? (select all that apply)

- Clean water and sanitation
- Medical care and services
- Mental Health support
- Vector control and disease prevention
- Community engagement and education
- Infrastructure rehabilitation
- Government support and funding
- Other

Other (Please Specify)

What post-flood preparedness measures have been put in place in your community? (select all that apply)

- Early warning systems
- Evacuation planning and routes
- Emergency response and coordination
- Infrastructure resilience measures
- Post-flood recovery planning
- None in place
- Don't know

FOOD SECURITY

In the past month of october, did your household run out of money to buy food?

- Yes
- No

In the last seven days, has anyone in your household gone hungry because there was not sufficient food?

- Yes
- No

What are the main sources of food in your community? (select top three (3))

- Own farm/Garden
- Casual labor/work
- Borrowed
- Gifts from friends/neighbors
- Purchase from main market
- Food assistance
- Purchase from roadside vender

NON-COMMUNICABLE DISEASE DIAGNOSIS

Have you ever been diagnosed by a medical professional that you have any of these conditions? (Check all that apply)

- Heart disease
- Stroke
- Hypertension (High blood pressure)
- Asthma
- Kidney disease
- Liver disease
- Diabetes
- Obesity
- None
- Peptic Ulcer Disease
- Other

Other (please specify)

Are you taking medication or therapy for the condition... during the last 12 months?

- Yes
- No

Thank you for time !!

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ORIGINALITY REPORT

11%	10%	4%	3%
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