UNIVERSITY OF GHANA

ASSESSMENT OF THE EMERGENCY RESPONSE EFFORTS AND SURGE CAPACITY PREPAREDNESS OF THE GHANA ARMED FORCES MEDICAL SERVICES FOR ROAD TRAFFIC INCIDENCE: A CASE STUDY OF THE 37 MILITARY HOSPITAL

BY

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A DOCTOR OF PHILOSOPHY IN HEALTH POLICY AND MANAGEMENT

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DECLARATION

I, Richard Otchere Mintah, do hereby declare that this thesis is the result of my research undertaken towards the award of Doctor of Philosophy in Health Policy and Management Degree at the University of Ghana, Legon and that no part of it has been submitted to any institution of learning for the award of any degree.

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ABSTRACT

Globally, a robust healthcare emergency response system is imperative for ensuring healthy lives and promoting well-being for all ages, particularly in attaining sustainable development goal 3. Achieving such an objective requires identifying the prevailing emergencies and equipping health facilities to respond effectively. In Ghana, 72 individuals per 100,000 persons suffered serious bodily injuries, with nearly 8 individuals losing their lives due to Road Traffic Incidents in the past decade. Additionally, over 60% of road traffic deaths involved children and young people under the age of 35. The effects of Road Traffic Incidents could be reduced through effective emergency response systems, yet, the Ghanaian healthcare system exhibits infrastructural, logistical and personnel constraints that negatively affect access to appropriate emergency responses. Meanwhile, pre-hospital readiness, internal contingency planning, personnel capabilities, and infrastructure assessment, are essential for managing significant patient care and operational strains. For this reason, the World Health Organization recommends periodic assessments of health facilities' emergency response capacities. This research therefore assessed the preparedness of the Ghana Armed Forces Medical Services health facilities, particularly the 37 Military Hospital, focusing on the capacity to handle national emergency response including road traffic Incidents. Hence, the study utilized a scoping review and multiple-case study design to explore emergency response issues. The qualitative approach to data collection was used for the study drawing from the epistemological perspectives of the interpretive paradigm. The Arksey and O'Malley system analysis was used in the scoping review and data extraction. Scoping reviews, field visits, observations, and in-depth interviews using the World Health Organization field assessment test tools for national emergency response were used to gather data for the study. The purposive and convenient sampling techniques were used to select the participants. The findings have shown that Roads traffic Incidents are a major concern requiring emergency responses in Ghanaian Hospitals. The findings also revealed significant deficiencies in emergency finance, diagnostic imaging equipment, inadequate investment for specialized paediatric trauma care, lack of mutual aid agreements, and lack of protocols for ambulance diversion and emergency communicators within GAMS facilities. These deficiencies underscore the need for adequate health financing, enhanced diagnostic capabilities, inter-facility coordination and overall preparedness to improve the national emergency response system.

DEDICATION

I dedicate this work to my wife, Ivy, whose enormous support throughout the research study helped me complete it successfully. I also dedicate the work to my children, Nana, Awura, Panyin, Sima and especially Abraham Atitsogbe, for their inspiration and emotional support during my study. Thank you very much for being there for me.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADRA	Adventist Development Relief Agency
CSOs	Civil Society Organisations
CRED	Centre for Research on the Epidemiology of Disasters
DHMT	District Health Management Team
ERS	Emergency Response System
GAF	Ghana Armed Forces
GAMS	Ghana Armed Forces Medical Services
GNFS	Ghana National Fire Service
GPS	Ghana Police Service
GSS	Ghana Statistical Service
ICRC	International Committee of the Red Cross
IFRRCS	International Federation of the Red Cross and Red Crenscent Societies
ISSER	Institute of Statistical, Social and Economic Research
MoH	Ministry of Health
MoI	Ministry of Interior
NAA	National Ambulance Authority
NAHDP	National Adolescent Health and Development Programme
NADMO	National Disaster Management Organisation
NDRC	National Disaster Relief Committee
NGO	Non-Governmental Organisation
NRSA	National Road Safety Authority
NRSC	National Road Safety Commission

OECD	Organisation for Economic Co-operation and Development
PHC	Population and Housing Census
RTA	Road Traffic Accident
RTI	Road Traffic Incidence
SDGs	Sustainable Development Goals
SPP	Strategic Partnership for Preparedness
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infections
TC	Testing and Counselling
UNHCR	United Nations High Commissioner for Refugees
UNFPA	United Nations Fund for Population Activities
UNDRR	United Nations Office for Disaster Risk Reduction
VCT	Voluntary Counselling and Testing
YFRHS	Youth-Friendly Reproductive Health Services
WHO	World Health Organization
ED	Emergency Department

CHAPTER ONE

INTRODUCTION

1.0 CHAPTER OVERVIEW

This chapter provides a comprehensive background to the study of the Ghanaian healthcare systems/facilities' readiness for medical emergencies and the overview of road traffic incidents. It also provides the problem statement which demonstrates the need for the study and based on which the research objectives and questions for the study are developed. The research objectives and questions guided the data collection. The chapter also provides the scope, justification, and significance of the study, and concludes by outlining the structure of the thesis.

1.1 BACKGROUND OF THE STUDY

There is a growing and increased concern about emergency preparedness, management and response throughout the world due to the widespread nature of health emergency cases and natural disasters (PAHO, 2012; Khan et al., 2018; Geneva: World Health Organization (WHO), 2021; Hassmiller & Wakefield, 2022). The current state of affairs has sparked an endless conversation among governments, medical professionals, legislators, academics, researchers, Civil Society Organizations (CSOs), and the global public about policies, procedures, and approaches to deal with these emergency cases and the ensuing effects on populations. An emergency is a phenomenon or event that happens all of a sudden and has the potential to seriously harm someone or a group of people, leading to deaths, property loss, and financial distress. (Banks & Banks, 1988).

1.12 Health Systems and Economic Growth

A country's development and growth are tied to the health and well-being of the_general population (Lozano et al., 2012). According to Lagomarsino (2012), for a country to attain its economic objectives, a robust health system is inevitably necessary to address the health needs of its workforce and citizens. This, therefore, suggests that a resilient healthcare system is essential to the well-being of a nation. It is no surprise that health is well placed within the Sustainable Development Goals (SDGs). The SDGs' third goal, which addresses healthcare for all, lays out the precise steps that must be taken in order to help reach this goal. Ensuring healthy lives and promoting well-being for all ages by 2030 is a key component of the aim (Johnston, 2016; United Nations Department of Economic and Social, 2019). The healthcare system has received significant funding from governments all around the world (Organisation for Economic Co-operation and Development (OECD, 2008)). This is to ensure that the health of the population is well taken care of.

1.13 Need for Emergency Response Systems

Numerous metrics are used to assess a clearly established healthcare system. An important measure of a country's health system is how responsive and proactive it is in handling emergencies (Lozano et al., 2012). When something unexpected happens and needs to be handled quickly to safeguard property, people, or the public's health and safety, it's called an emergency. One may say that the issue has been resolved when there is no longer an urgent risk to the public's health, safety, or property (law Insider, 2023). The emergence of viruses and disorders that have substantial effects on public health has made this part of the healthcare system essential. The World Health Organization lists the following as threats to human health:

new or emerging diseases, which could be released due to the accidental or intentional use of biological, chemical, or radioactive weapons; natural disasters; man-made disasters; complex emergencies; conflicts; and other events that could have a disastrous effect on human health (WHO, 2012). Because of this, the emergency response system has grown to be essential to the medical field. According to Lozano, Nagha and Foreman, (2012) health care services have proven over the years to be an integral component of the development of any nation. Undeniably, a key pillar of any health system is the modus operandi of the emergency system. Unfortunately, many countries have not been able to develop their emergency response system to be able to deal with the emergencies that confront them (Boin, & 't Hart, 2010). This has led to the call for countries to focus more on building emergency response systems that can handle emergencies that confront them (WHO, 2007).

1.14 Progress in Ghana Emergency Systems

Like many other nations, Ghana has worked hard to enhance its healthcare system (Asante, & Zwi, 2009). However, it appears that these efforts will not be sufficient in terms of emergency response. One of the constraints facing the Ghanaian healthcare system is the lack of appropriate support tools to manage emergency medical services (Lozano et al., 2012; Stewart et al., 2013; Japiong et al., 2016). Even though Ghana's emergency response system has gradually been more effective recently, there are still issues with infrastructure and emergency coordination (ISSER, 2020). The COVID-19 pandemic has exposed more vulnerabilities in the nation's health system, particularly with regard to the emergency response system (Narwal, & Jain, 2021). This study offers a detailed analysis of the literature. The breadth of knowledge and emergency practice within hospitals in Ghana.

In cases when there is insufficient quantitative evidence, a mixed-method approach may be used and a scoping review is required. A scoping review, as noted by Dixon-Woods et al., (2006), combines the benefits of qualitative and quantitative investigations to map out various sorts of evidence, particularly in situations where quantitative information is scarce (Lozano et al., 2012). By exposing the common emergency types, response methods, and level of preparedness of the national emergency hospital and other emergency response stakeholders to address common emergency types in Ghana's healthcare sector, this study highlights the critical needs of the country's emergency response systems.

Health scientists and practitioners believe that epidemics are unavoidable in a world that is changing quickly (World Health Organization, 2015; Madhav et al., 2017; Madhav et al., 2017). The Covid pandemic served as a warning about the increased risk of disease epidemics in the future as was predicted by World Health Organization in 2015 (World Health Organization, 2015). Consequently, there is increasing demand on national governments and healthcare systems to take action to reduce the likelihood of emergencies including technology problems, natural disasters, infectious disease epidemics, and conflicts. In order to guarantee health security, strategies, policies, and resources must be implemented globally in order to drastically reduce the health risks and associated high expenses. The Covid pandemic served as a warning about the increased risk of disease epidemics in the future (World Health Organization, 2015). The United Nations High Commissioner for Refugees (UNHCR), United Nations Office for Disaster Risk Reduction (UNDRR) and World Health Organization assert largely that, while conflict and disasters (cyclones, drought, flood, bushfires, tornados, tidal waves, etc.) affect over 170 and 190 million people respectively; the contributing impact it has on the health of people is much greater. Other localized incidents such as traffic collisions and domestic fires, have a collective cost to

human life (World Health Organization, 2019). Generally, emergencies alter the normal operational procedures/protocols of any organization, as situations that come about are deviations from the normal (Turoff, 2002). In many developing countries, as in the case of Ghana, the emergency response system has not had as much attention as required ((Norman et al., 2012; Asiedu-Berkoe et al., 2022). For instance, Doctors, nurses, and other hospital staff are often called in times of health emergencies to respond to the handling and management of these emergencies (Norman et al., 2012b). Yet, the majority of these personnel do not have the requisite training to manage emergency cases aside from the inadequate numbers of these personnel serving in the public healthcare facilities (Zakariah et al., 2017; Kyei-Onanjiri et al., 2018). Additionally, the exodus of healthcare professionals from Ghana has further worsened the plight of the Ghanaian healthcare system in responding to emergency cases. There are also infrastructural and other logistical deficits in the emergency response system. For instance, Ghana's preparedness in times of emergency was badly exposed during the outbreak of the COVID-19 pandemic. It challenged the health sector in terms of personnel, transportation, policy direction, road network, infrastructure, vaccines and medicine.

1.14 Overview of Road Traffic Accidents Morbidity and Mortality

Road traffic injuries (RTIs) are a leading cause of global morbidity and mortality. Each year, approximately 1.2 million people die from road traffic crashes, while tens of millions sustain nonfatal injuries, many resulting in long-term disability (World Health Organization, 2018). Road injuries are now the leading cause of death for individuals aged 5–29 years, disproportionately affecting low- and middle-income countries (Gu et al., 2025). The economic

burden of RTIs is also substantial, with losses estimated at 3% of a country's gross domestic product (World Health Organization, 2018).

Africa experiences the highest road traffic death rates globally despite relatively low levels of motorization. In 2021, over 200,000 road traffic deaths were reported in the WHO African Region (World Health Organization Regional Office for Africa, 2023). Vulnerable road users such as pedestrians, cyclists, and motorcyclists bear the heaviest burden. Additionally, under reporting and inconsistent data collection practices obscure the true scale of injuries, making effective policy design challenging (Peden et al., 2022).

1.141 Road Traffic Crashes in Ghana

In Ghana, road traffic crashes remain a critical public health issue. Data from the National Road Safety Authority (NRSA) indicate that thousands of deaths and injuries occur annually, with pedestrians and motorcyclists disproportionately affected (National Road Safety Authority, 2022). Police records, the primary national data source, tend to under-report the true burden, particularly long-term disability resulting from road injuries (Ackaah & Adonteng, 2011). Moreover, city-level analyses reveal persistently high crash rates in urban centers such as Accra, with serious socio-economic impacts on affected families (Afukaar et al., 2020). Hospitals in Ghana face significant challenges in managing victims of RTAs. Barriers include inadequate pre-hospital care, limited ambulance services, human-resource constraints, and shortages of essential supplies and imaging equipment (Tata et al., 2024). Overcrowded emergency departments and weak referral systems further delay treatment, contributing to preventable morbidity and mortality. Recent studies also highlight challenges in pain assessment, triage, and equitable access to

trauma services across different regions (Kunfah et al., 2025). These health system weaknesses limit Ghana's ability to reduce the burden of road traffic-related morbidity.

To unravel the rationale for these deficits that affect an appropriate response to emergency cases in the Ghanaian Healthcare systems, a scoping review to establish common emergency types was conducted alongside a multiple-case study to establish the level of preparedness of the Ghana Armed Forces Medical Services for road traffic emergency response. The dimensions of this review and study aims at identifying weakness associated with Ghanaian healthcare systems in response to emergency cases with the 37 Military Hospital as a Case study.

1.2 Problem Statement

Emergency response preparedness in Ghana's health system faces significant unaddressed gaps, particularly at institutional levels, even though international evidence increasingly underscores the importance of this readiness. Recent studies in Sub-Saharan Africa and globally reveal persistent limitations in hospital disaster and emergency preparedness. For instance, a systematic review found that hospitals across Sub-Saharan Africa are often not adequately prepared for disasters, citing deficits in disaster policy, infrastructure, supplies, and diagnostic equipment (Afoakwah et al., 2023). A study from South Africa demonstrated that during COVID-19 lockdowns, trauma-related EMS services experienced significant disruptions, showing that current emergency medical systems remain vulnerable to surge demands (Ugarte et al., 2023). Similarly, frontline nurses in a South African tertiary hospital identified training, staffing, and psychosocial support as major constraints to pandemic preparedness (Mokone et al., 2024).

In Ghana, broader assessments such as the Harmonised Health Facility Assessment (GHS, 2023) reveal systemic weaknesses—only 32% of facilities have emergency transport, and just 5% have

complete basic consulting equipment. However, these findings are not institution-specific and do not illuminate how national emergency institutions like the Ghana Armed Forces Medical Services (GAMS) are performing. The 37 Military Hospital, designated the National Emergency Response Hospital, bears the burden of responding to large emergencies, particularly road traffic accidents (RTAs). Despite RTAs being a major public health threat—over 2,300 deaths and 15,000 injuries in 2022 (National Road Safety Authority, 2023). No recent study has comprehensively evaluated the Hospital's surge capacity or operational readiness for RTAs. Likewise, other emergencies such asmaternal complications, cardiovascular incidents, and infectious disease outbreaks impose demands, but literature seldom addresses how GAMS copes when multiple emergencies occur simultaneously.

Inter-agency coordination remains another under-studied area. Effective emergency care requires multiple agencies (ambulance services, disaster management, fire service, health facilities) to work together through shared protocols, clear communication, and resource sharing. While some research in Ghana highlights logistical delays and inefficiencies (Adamtey et al., 2015; Osei-Ampofo et al., 2013), little empirical work examines how these agencies interact in emergencies or how coordination affects outcomes relative to best practices observed elsewhere in recent years.

Finally, institutional preparedness is constrained by financial, infrastructural, and technological gaps. Policy initiatives like the free 48-hour care for RTA victims exert financial pressure on GAMS, but the extent of this burden remains undocumented. Diagnostic capacity, example CT, MRI availability, Telemedicine adoption, and tailored protocols for vulnerable groups (children, elderly) are also under-explored. Recent evidence from Sub-Saharan Africa highlights that such

infrastructural and technological deficiencies significantly limit hospitals' resilience to emergencies (Afoakwah et al., 2023).

Summary of Gaps to Be Filled are:

a. There is no recent institutional-level evaluation of emergency readiness, surge capacity, and operational preparedness of GAMS, especially the 37 Military Hospital, with respect to RTAs and other high-demand emergencies.

b. How GAMS aligns with Ghana's UHC Roadmap (2020–2030) in terms of emergency unit deployment, resource allocation, and coping strategies has not been explored.

c. There is scarce data on inter-agency coordination mechanisms in Ghana's emergency response system under stress (e.g. during mass casualty incidents or simultaneous emergencies).

d. The financial, infrastructural, and technological barriers to institutional resilience, particularly diagnostic infrastructure, telehealth, surge staffing, and inclusive protocols. These are insufficiently documented in recent Ghana context.

1.3 OBJECTIVES OF THE STUDY

The main objective of the study is to assess the emergency response efforts and surge capacity preparation of the Ghana Armed Forces Medical Service's for Road Traffic Incidence.

1.3.2 Specific objectives

1. To assess the common emergencies presented to hospitals in Ghana.
2. To examine the common emergencies that are received at the national emergency response hospital.

3. To assess the Ghana Armed Forces Medical Service health facilities' surge capacity preparedness for Road Traffic Incidence cases.

1.3.3 Research Questions

1. What are the common emergencies presented to hospitals in Ghana?
2. What are the common emergencies that are received at the national emergency response hospital?
3. How is the national emergency response hospital prepared in surge capacity for Road Traffic Incidence emergency response?

1.3.4 SIGNIFICANCE OF THE STUDY

This study is of immense significance to the Ghana Armed Forces Medical Service (GAMS) health facilities, particularly the 37 Military Hospital and its associated medical reception stations, as it provides a comprehensive assessment of their surge capacity preparedness for emergency healthcare response. By identifying the common emergencies presented at GAMS facilities and evaluating their capacity to handle road traffic incidents (RTIs), the study offers actionable insights into areas requiring improvement. For instance, the findings on gaps in equipment, infrastructure, and pediatric care will help policy makers and hospital administrators prioritize resource allocation and enhance emergency protocols. Additionally, the study underscores the importance of developing tracking systems for children during emergencies and implementing mutual aid agreements (MAAs) with other health facilities and agencies. These recommendations aim to improve inter-facility coordination and strengthen GAMS's role as the national

emergency response agency. By addressing these challenges, GAMS can enhance the quality of care it delivers and reinforce its capacity to manage both routine and large-scale emergencies effectively, ensuring its continued leadership in Ghana's healthcare emergency response framework.

The study provides policymakers with critical data and insights necessary for designing and implementing evidence-based policies to improve Ghana's emergency healthcare system. By confirming the most frequent emergencies presented at health facilities nationwide, policymakers can better understand the resource and training requirements for addressing these cases effectively. The findings on financial constraints, infrastructure gaps, and insufficient communication protocols within GAMS health facilities highlight systemic weaknesses that require immediate policy intervention. For instance, the study's recommendations on sustainable funding mechanisms for emergency care, such as insurance policies to cover RTI victims, provide a roadmap for policymakers to address financial challenges. Moreover, the lack of functional diagnostic equipment and inadequate pediatric care resources calls for targeted investments and policies to bridge these gaps. The study's emphasis on inter-agency collaboration and MAAs also guides policymakers in creating frameworks for seamless cooperation among emergency response agencies. These measures will ensure that Ghana's healthcare system is better prepared to respond to emergencies, aligning with the Universal Health Coverage (UHC) Target 2020–2030.

For future researchers, this study serves as a foundational reference for exploring emergency healthcare preparedness in Ghana and other developing countries. The methodology and findings provide a framework for conducting similar assessments, whether focused on specific emergencies, regions, or health systems. The study's use of systematic reviews, thematic analysis,

and case studies offers a replicable approach for analyzing emergency response systems comprehensively. Additionally, the study identifies critical gaps, such as pediatric care and inter-agency collaboration, which future researchers can explore further to propose innovative solutions. Researchers can also build on this work by examining the impact of proposed interventions, such as the implementation of tracking systems and MAAs, on healthcare outcomes. Furthermore, the study highlights the need for comparative analyses with successful emergency response systems in developed countries like Japan and New Zealand, providing a foundation for cross-national studies. By contributing to the academic discourse on healthcare emergency preparedness, this study inspires future research aimed at addressing the systemic challenges within Ghana's healthcare system and beyond. Ultimately, this study will contribute to the reduction of morbidity and mortality rates resulting from road traffic incidents in Ghana.

1.4 Scope of the Study

Concerns about the quality of emergency healthcare delivery within the various hospitals in Ghana is a common phenomenon. The focus of this study was on the emergency response preparedness within the Ghana Armed Forces Medical Services headed by the Ministry of Defence with the national emergency response hospital, the 37 Military Hospital as a case study. The GAMS has about 16 health centres in all military bases nationwide. The emergency response preparedness of 12 health facilities alongside the 37 military hospital were assessed in this study. These 12 facilities are the Kpeshie Medical Centre, Duala Medical Centre, Arakan Medical Centre and Kpeshie Maternity, all located in Accra. The rest are: no.1 Medical Reception Station (Michel Camp), no.2 Medical Reception (Takoradi), no.3 Medical Reception (Sunyani), no.4 Medical Reception (Kumasi), no.6 Medical Reception(Tamale), no.7 Medical

Reception Station (Ho), Airborn Force Medical Centre and Airforce Medical Centre in Tamale. The study therefore used scoping review to look at the common emergency cases that report to the emergencies in Ghanaian hospitals, tested the outcome at the 37 Military hospital and further assessed the preparedness of the GAMS for the topmost emergency in terms of its surge capacity.

1.5 Synopsis of Chapters

The study is made up of six chapters. Chapter one is made up of the background of the study, Problem statement, research objectives, and questions, purpose and scope of the study. The chapter two comprised of review of empirical and theoretical literature of the study. The literature is centred on emergencies with particular reference to Ghana's emergency response systems and the challenges in responding to the emergencies. The theories of emergency management and stakeholders in emergency responses are thoroughly discussed leading to the basis for conceptualising framework for emergency response systems. Chapter three also comprised of the research methodology involving the philosophical foundation of the study. The research design, data collection procedures, data analysis, reliability and validity issues of the study are discussed. Chapter four focused on the scoping review in which results and analysis were made to support the existing gap of the study. Chapter five focused on the discussion of the results and findings obtained from the study. Chapter six presents the summary of key findings obtained from the study, and makes recommendations and conclusion thereafter. The limitations and directions for future research are also included in the chapter.

CHAPTER TWO

LITERATURE REVIEW

2.0 CHAPTER OVERVIEW

The literature on disaster preparedness, emergency response, and readiness is discussed in this chapter. It also examined the literature on Ghana's emergency response systems, emergencies in Ghana, and the difficulties in handling emergencies in Ghana. It also looked at the different instruments used to evaluate hospitals' emergency readiness. The conceptual framework was developed due to the discussion of emergency management theories and stakeholders. A review of the empirical literature concludes the chapter.

2.1 CONCEPTUALIZING EMERGENCY RESPONSE

To provide credibility and a solid foundation for the research, the study attempted to use a contextualization strategy in which pertinent literature was compared (Cook, 2020). Emergency Response Systems (ERS) are used by nations and organizations to deal with emergencies. To integrate data collecting, analysis, communication, and decision-making within the reaction measures, structures and processes must be implemented. Even though they are rarely used, emergency response systems must be able to act when necessary (Jennex, 2007). Emergency response in the 18th and early 19th century was quite haphazard. On the other hand, an organized emergency response system was established during the Cold War era. In the 1950s, the advent of the Cold War led to the creation of civil defence programs that focused on preparing for nuclear wars (Marks, 2018). Subsequently, the concept of instituting emergency response systems emerged. Some decades thereafter, the United States considered emergency management to address hurricanes and earthquakes. Thus, forcing legislation to protect life and property,

especially during natural disasters. The spectrum of impact was soon realized and hence informed a review that required efforts of individuals, the government, and local agencies to effectively manage risk and disaster. A standard model for an emergency response system was thus, identified (Belardo, Karwan, Wallace, 1984). The component included; a database, data analysis, normative models, and an interface (Belardo et al., 1984). However, though the model is exemplary, it somewhat failed to address its integration within an emergency response plan, infrastructure, and how it could operate within multiple systems.

2.2 CONCEPTUALISING DISASTER

A disaster is a major issue that affects a community or society for an extended length of time and results in widespread losses of people, property, economic resources, or the environment (International Federation of Red Cross and Red Crescent Societies, 2022). Again, The United Nations Office for Disaster Risk Reduction (UNISDR) defines a disaster as a serious disruption of the functioning of a community, on any scale, due to hazardous events that interact with conditions of exposure, vulnerability and capacity, resulting in a disaster that destroys one or more human beings. (UNISDR, 2017). To Yong-kyun and Hong-Gyoo, (2013), disaster is "a status of a community or nation's being seriously damaged by natural, technological or social cause and difficult to recover from the damage with its resources, requiring the whole community to cope together. Countries face a wide range of emergencies resulting from both natural and artificial causes (Federation & Societies, 2000; Zibulew, 2001). The severity and complexity of disasters vary from country to country (Caldera & Wirasinghe, 2022). The impact however is the same- disruptions to the political, economic and social lives of the people as well as public health (Bonotti & Zech, 2021; Caldera & Wirasinghe, 2022). The impacts of emergencies sometimes

are felt and, in most cases, leave a lasting print for years. Disasters may come from natural occurrences (floods, storms, droughts earthquakes, and landslides) conflict, disease outbreaks, food contamination, or chemical or radio-nuclear spills, among other hazards (FAO, 2021). They can undermine decades of social development and hard-earned health gains, damage hospitals and other health infrastructure, weaken health systems and slow progress towards the Sustainable Development Goals (World Health Organization, 2019). Focus and attention are shifted from disasters and their causes to the response system that a country deploys. How it can deal with the aftermath of the disaster becomes more important. Disaster theories has developed over the centuries from two to four fundamental theories. These four theories conceive disasters as acts of fate/acts of God, acts of nature, joint effects of nature and society, and social constructions.

According to the view point of disaster as acts of fate/acts of God, disasters are uncontrollable, inescapable events that are frequently attributable to fate or divine intent.

This is the historical interpretation of disasters held by many cultures and groups, particularly during periods of limited scientific understanding (Smith, 2020; Johnson, 2018). Disaster as acts of nature recognized catastrophes as natural occurrences. This view frames disasters as unavoidable components of the natural world and stresses the role that natural processes (such as earthquakes, floods, and storms) have in causing them (Brown & Davis, 2019; White, 2021). On the other hand, the theory of disaster as joint effects of nature and society acknowledges that while natural events trigger disasters, their impact is heavily influenced by societal factors. This includes how societies prepare for, respond to, and recover from such events. Infrastructure, readiness, and human vulnerability all have a significant impact on how severe a disaster is (Jones & Roberts, 2017; Green, 2022). Nonetheless, the theory of disaster as a social construct

contends that social, economic, and political settings have a substantial influence on disasters and that they are not only natural. According to this idea, society structure and human behavior are what cause what we declare to be a disaster (Taylor, 2016; Lee, 2021). For instance, governance, socioeconomic inequality, and urban planning can all either amplify or lessen the effects of natural disasters. But as time went on, researchers discovered that more recent theories offered a more accurate explanation of the catastrophe and its associated ideas.

2.3 CONCEPTUALIZING PREPAREDNESS FOR EMERGENCY RESPONSE

Emergency preparedness is a critical area of research that addresses the processes and frameworks necessary for effectively responding to crises, disasters, and emergencies. Identification of risks and vulnerabilities is one of the foundational concepts in emergency preparedness (Perrin, 2006). Understanding the specific threats that a community faces, be it natural disasters, technological hazards, or public health emergencies is essential for developing effective preparedness plans (Coppola, 2007). This risk assessment process is often coupled with community engagement, which is seen as vital for building resilience and ensuring that preparedness measures are culturally and contextually appropriate (Aldrich, 2012). Furthermore, the role of communication in emergency preparedness has garnered significant attention. According to Wray *et al.* (2008), effective communication before, during, and after emergencies is crucial in ensuring that individuals and communities receive accurate information and can take appropriate actions. Bolton and Harlow (2016) emphasize that clear communication strategies and public education initiatives can enhance community readiness and response capabilities. Another important dimension of emergency preparedness is the development of multi-agency collaboration. As noted by Kapucu and Van Wart (2006), emergencies often require coordinated responses from various stakeholders, including government agencies, non-profits, and private

entities. Collaborative frameworks not only facilitate resource sharing but also enhance the overall effectiveness of emergency management efforts (Perry & Lindell, 2003). Training and simulation exercises are also critical in reinforcing emergency preparedness. According to Drabek (2000), regular training helps responders practice their roles and improve coordination, ultimately leading to better outcomes during actual emergencies. The importance of fostering a culture of preparedness through educational programs cannot be overstated, as these initiatives can instill a sense of empowerment and readiness among community members (Gomez et al., 2017).

2.4 CONCEPTUALISING HOSPITAL SURGE CAPACITY

Hick et al. (2009), define hospital surge capacity as the ability of a healthcare facility to rapidly expand beyond its normal services to meet an increased demand for medical care during events like pandemics, natural disasters, or mass casualty incidents. This capacity is essential for ensuring that hospitals can maintain functionality and provide adequate care during crises. Hospital surge capacity is critical in managing health crises, especially in developing countries like Ghana, where healthcare resources are often limited. According to Adom et al. (2020), surge capacity in Ghana has been tested during various public health emergencies, including the Ebola outbreak and the COVID-19 pandemic, revealing both strengths and areas for improvement.

2.4.1 Components of Surge Capacity

Surge capacity is generally categorized into four primary components: space, staff, supplies, and systems (Surge Capacity, 2021). Each component plays a crucial role in managing increased patient volume. The physical space includes additional beds, both within and outside the hospital, such as makeshift wards or field hospitals (Barbisch & Koenig, 2006). Staff includes the ability

to increase workforce numbers, often by reassigning existing staff, calling in reserves, or using volunteer healthcare workers (Hick *et al.,* 2009). Supplies involve stockpiling critical medical resources such as medications, ventilators, and personal protective equipment (PPE) (Christian et al., 2006). Systems refer to the protocols and communication networks needed to coordinate the hospital's response, including incident command structures and patient triage procedures (Kaji *et al.,* 2006).

2.4.2 Challenges in Surge Capacity

One of the significant challenges in surge capacity worldwide is the unpredictability of the demand. Hospitals often struggle with balancing the need for preparedness with the constraints of daily operations (Hick *et al.*, 2004). For instance, maintaining a reserve of supplies and staff can be cost-prohibitive, and there may be a reluctance to invest in surge capacity due to the infrequent occurrence of large-scale emergencies (Schultz *et al.,* 2008). Additionally, during a crisis, hospitals may face issues with supply chain disruptions, further complicating the ability to scale up resources (Gomersall *et al.,* 2012). Ghana's healthcare system also faces several challenges that limit its surge capacity. These include inadequate infrastructure, insufficient healthcare personnel, and a lack of essential medical supplies (Ghana Health Service, 2020). The scarcity of intensive care units (ICUs) and ventilators was particularly evident during the COVID-19 pandemic, highlighting the urgent need for increased investment in healthcare infrastructure (Osei & Dordunoo, 2021).

Additionally, the uneven distribution of healthcare facilities across the country exacerbates the problem. Urban areas like Accra and Kumasi have relatively better healthcare resources, while rural areas struggle with limited access to essential services (Adom *et al.,* 2020). This disparity

creates significant challenges in managing patient surges during emergencies, as rural hospitals often lack the capacity to handle large numbers of patients.

2.4.3 Strategies for Enhancing Surge Capacity

Effective strategies to enhance surge capacity include integrated regional planning, robust training programs, and the use of technology to predict and manage patient influxes (Hick *et al.,* 2009). Collaboration across local, state, and federal levels is vital to ensure resources can be mobilized quickly and efficiently during a crisis (Barbisch & Koenig, 2006). Furthermore, simulation exercises and drills are recommended to prepare hospital staff for the operational challenges of surge situations (Kaji *et al.,* 2006). In response to these challenges, the Ghanaian government has implemented several initiatives aimed at improving hospital surge capacity. These include the establishment of emergency response centers, the training of healthcare workers in emergency preparedness, and the creation of mobile clinics to extend healthcare services to underserved areas (Adusei, 2021). During the COVID-19 pandemic, Ghana also adopted innovative approaches such as the use of drones to deliver medical supplies to remote areas, which helped to mitigate some of the logistical challenges (Boahen, 2021).

2.5 EMERGENCY SITUATIONS IN GHANA

Ghana experiences disasters like any other country, especially within the sub-region. About US$ 780,500,000 was estimated to be spent between 1968 and 2014 (Asumadu-Sarkodie *et al.,* 2015). Largely, the causes of these disasters are floods, drought and bushfires (Okyere *et al.* 2013). Sasu (2022) observed that during 9 years from 2011, 49 natural disasters (from storms and floods) have led to the destruction of property, displacement of people and deaths. According to

Pulse.com.gh 2022, The six worst disasters in the history of Ghana are; the Accra Sports Stadium catastrophe on May 9 2001, which took place at the Ohene Djan Stadium in Accra, Ghana. It was the deadliest stadium disaster to ever occur in Africa, taking the lives of 126 people. On June 3, 2015, a government-owned fuel station close to the Kwame Nkrumah Interchange, at Circle, a suburb of Accra, caught fire with nearby people and automobiles. Aggravating the development was a heavy downpour that gradually accumulated around the area. Due to the markets' flooding situation that kept commuters and residents stranded, there was high vehicular traffic on the roads and interrupted business operations. The 37 Military Hospital received the bodies of around 200 people who were presumed dead. The hospital later declared that they could not accommodate any more bodies. Also on March 20, 2017, a big tree fell at the Kintampo Waterfalls following a storm, resulting in 28 deaths and further injuries. The waterfalls were shut down following the incident. On March 22, 2019, there was a head-on collision between two buses at Kintampo that led to the death of at least 60 people. The buses blazed in fire resulting in 60 deaths and several others being injured. On November 7 2021, over 3,000 people in Keta municipality had their homes swept off and submerged as a result of sea waves. The residents were displaced, while livestock, farmlands, and buildings among other properties were also destroyed. Furthermore, on the 20th of January 2022, at least 13 people were reported to have died and 59 others sustained various degrees of injury when there was an explosion caused by a collision of a motorcycle and a vehicle conveying mining explosives at Apiate in the Bogoso District of the Western Region on. The entire community was destroyed by the resultant effect of the explosion (Kojo, 2022). The table below summarizes other disaster cases in Ghana from 1900 to 2014.

TABLE 2: SUMMARY OF MAJOR DISASTER OCCURRENCES IN GHANA FROM 1900 TO 2014

Disaster	No. of times	No. of people killed	Total no. of People Affected	Damages US$
Drought	3	-	12,512,000	100,000
Flood	17	409	3,884,990	780,500,000
Epidemic	19	875	33,799	
Wildfire	1	4	1500	
Earthquake	1	17	-	

Source: EM-DAT 2014 (Adapted from Asumadu-Sarkodie et al, 2015).

Road traffic accidents constitute yet another major cause of disaster aside from flooding in the country. Kingsley Hope reported in the Ghanaian Times newspaper that, available records from the National Road Safety Authority (NRSA) indicate that 2,934 people died in road accidents while 13,048 injuries were recorded in 2021 (Kingsley, 2022). These deaths and injuries were recorded out of about 15,972 road traffic accident cases. The records of the 2021 traffic-related cases appear not to be much different from those of previous years. COVID-19 presented yet

another major emergency in the country. As of June 2023, available records indicates a total of 171,657 and 1,462 reported corona virus cases and death respectively (Worldometer, 2023)

2.6 GHANA'S EMERGENCY RESPONSE SYSTEM

Generally, formal emergency systems are efficient in increasing the survival rate of severely injured or ill individuals (Jamison, 2018). The system allows a chain of survival linking pre-hospital care (measures used to care for seriously ill or injured patients before visiting the hospital) to definitive in-hospital care (Kobusingye et al. 2006). Emergency centres with trained staff can play an important role by providing such services that will help reduce fatalities. Ghana has seen a slight improvement in the emergency delivery service (Ministry of Health, 2011; Osei-Ampofo et al., 2013). Ghana like many other countries has seen the need to effectively deal with disasters. The National Disaster Management Organisation (NADMO), operating under the Ministry of Interior (Ministry of Interior), is mandated for the management of disasters as well as to enhance the capacity of society to prevent and manage disasters in Ghana (United Nations, 2023).

According to Oteng-Ababio (2013), in the early 1980s, the drive towards disaster management led to the establishment of the National Disaster Relief Committee (NDRC) with the sole purpose of supporting victims of disasters with relief items. With time, the committee metamorphosized into NADMO, established by an Act of Parliament, (Act 517 of 1996), to manage disasters and rehabilitate persons affected by such disasters (Oteng-Ababio, 2013). The main functions of the ACT include

- *Prepare National, Regional and District Disaster Management Plans for preventing and mitigating the effects of the disaster.*

- *Ensure the establishment of adequate facilities for technical training and institution of educational programs to provide public awareness, warning systems, and general preparedness for its staff and the general public.*
- *Coordinate local and international support for disaster or emergency relief services and reconstruction.*

The structure of NADMO allows it to be operational and represented throughout the country within the local governance system to ensure decentralization. One of the measures to manage disaster is to reduce the risk of the occurrence of disasters. Planning also helps to decrease vulnerability and ensures measures are outlined to prevent hazards from developing and posing as disasters (Dewald, 2011). Disaster risk reduction is central to disaster management and involves planning and acting in a manner geared towards reducing vulnerability and working to prevent hazards from taking the shape of a disaster. The vision of NADMO is to enhance the capacity of Ghanaian society to prevent and manage disasters and to improve the livelihood of the poor and vulnerable through effective disaster management, social mobilization and employment generation (Dewald, 2011).

Through coordination, NADMO mobilizes other agencies (government/ non-governmental/ private organisations) to develop the capacity of individuals and communities in the prevention, response and recovery from disasters (Ashbrook, 2014). Other government agencies help complement their work; the National Ambulance Authority, Ghana Police Service, Ghana National Fire Service and the Ghana Armed Forces.

All regional and district health facilities have a designated accident and emergency care unit that operates 24-hour service (Ministry of Health, 2011). The unit provides initial treatment for injuries and illnesses that require immediate care. For major referral cases in emergency cases,

37 Military Hospital, Korle-Bu Teaching Hospital, Komfo-Anokye Teaching Hospital, and Police Hospital serve as referral hospitals.

2.7 PREPAREDNESS OF GHANA'S EMERGENCY RESPONSE AGENCIES

An essential component of healthcare organizational preparedness is having a functional emergency preparedness strategy against naturally occurring crises and intentional acts of terror that may cause serious harm to the population (York & Don MacAliste, 2015). Emergency preparedness ensures that the necessary resources (human and material) are timely dissipated when the need arises. Due to the increased burden of acute injuries and endemic diseases in Africa, emergency response systems follow an upward adjustment to mitigate the trend. In most cases of disasters, the immediate response of countries within the sub-region is to assist victims with relief items. A supportive short-term measure that supports victims. However, that measure is not sustainable especially when there is a continuous focus on supporting victims rather than building a resistant and resilient emergency system (Twigg, 2004).

Aside from NADMO, other government agencies play a significant role in the management of emergencies in Ghana. Among these are, the National Ambulance Authority and National Fire Service. The National Ambulance Authority, formed in 2004, manages medical emergencies in the country. The authority is mandated to provide free emergency services to citizens. This is carried out nationally by trained medical technicians who use fleets of fully operational vehicles (ambulances) equipped with basic life support equipment. Recognizing the important role of the ambulance service in the provision of emergency response services, the government of Ghana in January 2020, provided the Ambulance Service with 307 ambulances. The government has

indicated its commitment to ensuring the realization of an effective Emergency Medical Service System, thereby boosting Ghana's emergency response system (Ministry of Health, 2020). In most cases of disasters in the country the Ghana National Fire Service, Ghana Armed Forces, and Ghana Police Service are key agencies that are called upon to provide emergency response services in disaster situations. When there is a fire outbreak, for example, personnel from fire services take charge of putting out the fire. The police usually provide security at disaster scenes. Personnel from the Ghana Armed Forces usually help in the evacuation of people especially, during the flood while the Ambulance Service helps to transport victims to the nearest hospital for emergency care services. At the hospitals, there are trained staff that are on standby to attend to the cases (Baidoo, 2018b).

2.8 GHANA HOSPITALS PREPAREDNESS TO RESPOND TO EMERGENCIES

Emergencies need a prompt and efficient response. A hospital's preparedness allows the hospital to be aware of capabilities, and/or recovery means that puts a significant strain on its patient care and operating systems (Kim, 2016). Critical areas include; pre-hospital emergency preparedness, in-house emergency response plans, adequate equipment/gadgets (including pharmaceutical products), human capacity, and the assessment of existing infrastructure in an emergency (Norman, Aikins, Binka, & Nyarko, 2012a). Emergency medical centers have been established in selected regions nationwide to attend to emergency cases (Osei-Ampofo et al., 2013). Per standard, all emergency units at the healthcare facilities should have readily available trained health personnel, appropriate and adequate equipment, medical/logistics, and infrastructure (Ghana Health Service, 2016). All agencies are required to ensure measures are in place to address emergencies.

2.9 CHALLENGES IN RESPONDING TO EMERGENCIES IN GHANA

Notwithstanding the interventions of disaster relief organizations in addressing disaster cases in Ghana, some constraints impede their efforts. The lack of effective planning cripples the success of responding to emergencies (Boin & McConnell, 2007). The different organizations that provide emergency response services in times of disaster function under different ministries. For instance, NADMO, the Police, and Fire Services fall under the Ministry of Interior, while the Ambulance Service falls under the Ministry of Health thereby, creating problems in the coordination, management and supervision of emergencies. Sometimes there appears to be a lack of leadership as there is a struggle to obtain vital intelligence with security staff, medical technicians, volunteers and other responders (WHO, 2006). This, compounds and draws back the ability of the response team to be effective and efficient with their response (Burroughs & Brown, 2017; CriticalArc, 2023). This situation does not help these organizations to effectively plan budgets and formulate policies that will enhance effective emergency response (NADMO, 2011; Strategic Partnership for Preparedness (SPP) Team, 2010).

One other challenge is the lack of funding and logistics in responding to emergencies. Ghana as a developing country is unable to meet the budgetary demands of the various agencies involved in emergency service provision. As a result, the various agencies are ill-resourced which harms their mandate. Ghana's quest to effectively respond to emergencies in the country has to do with the attitude of the citizens. Dealing with disaster situations requires a professional approach. But in most cases, ordinary citizens, who are always the first on disaster scenes, attempt to put out fires, evacuate accident victims, provide first aid, and many more. These actions, though well intended, end up killing victims, worsening injuries, and destroying the crime scene for

investigation purposes. Again, the issue of prank calls features prominently in the challenges facing emergency management in Ghana. According to the Ambulance Service, about 80% of calls received in 2021 were prank calls (Crowis, 2022). Such prank calls according to the service affect the timely response of the Service and might put people in genuine disaster situations at risk.

There is also a lack of proactiveness in terms of responding to emergencies. It appears disaster management organizations are not interested in the prevention of disaster but rather, in how to deal with the aftermath of a disaster. In its April 2021 editorial, the Ghanaian Times noted that "NADMO's approach to its task of disaster management across the country is ridiculous and it is about time it became proactive to ensure the safety of people rather than wait for people to be overwhelmed by disasters and go in to give them cups, buckets and such other items or raise tents for them" (Ghanaian Times, 2021). It is worth noting that disaster is best managed when there are early warning signals. Although disasters are renowned for their unpredictability, there should be some level of predictability in disaster management. According to Aboagye, and Danso (2019), Ghana does not have an effective and well-equipped system that can forecast disasters. This hampers proper planning and efficient response.

2.10 WAYS OF IMPROVING GHANA'S HEALTHCARE EMERGENCY RESPONSE SYSTEM

According to Perry, Lindell, and Tierney (2001), Effective disaster response is the ultimate objective of any disaster management agency. To this end, organizations involved in the provision of disaster services must be well-resourced (infrastructure, logistics, equipment, and

finances) to make them ready to deal with disasters as and when they occur. The managerial and technical capacities of disaster management organizations must be strengthened (Adamtey, Frimpong, & Dinye, 2015). Budgetary allocations to disaster management agencies should be adequate, timely, and regular. The government must commit to mobilizing the needed resources to fund the activities of disaster management agencies from the national budget to save the country from the debilitating impact of future disasters. Emergencies should be coordinated properly though there are multiple response teams and agencies. There should be a platform for team members to gather and share intelligence and work to achieve the objectives of the response (Asamani, Agyemang, Afful, & Asumeng, 2018). All the different agencies involved in the management of disaster should have a central commander. This will help with information sharing, command operations and the assembling of logistics. Disaster management should be included in the educational curriculum to help people acquire basic knowledge and skills in disaster-related issues. This will help change the attitude of the citizens towards disaster and its management-related issues. The world has become more unstable and unpredictable in terms of disasters (Prasad & Francescutti, 2016). The consequences of these disasters take the form of injuries, destruction of property, disruptions in the normal pattern of life and consequently death. Therefore, the need for an effective disaster management response system to cases of emergency is drear. To ensure this, a comprehensive risk assessment ought to be conducted and theoretical assumptions that underline measures to mitigate disasters need to be evaluated. Despite the mirage of challenges, the government is committed to ensuring emergency services are provided when the need arises. Through continued efforts, various agencies would be more effective in the management of emergencies.

2.11 THE CONCEPT OF EMERGENCY RESPONSE

Countries across the world have to deal with a wide range of disasters. Disasters come in the form of disease outbreaks, consequences of conflicts, transport accidents, floods, droughts, and fire outbreaks. Countries may suffer different disasters, but the impacts of disasters are similar. The consequences of disasters border on the health, socio-economic, and political life of the people.

While disasters cannot be averted, the response to disasters is critical. Countries are expected to build resilient and robust emergency response systems to take care of the aftermath of a disaster. A well-tailored response is needed to reinstate the health, political, and economic life of the people. Countries have designed frameworks for responding to disasters. "Progress has been made by countries to reduce the health and other consequences of emergencies. The most successful and cost-effective strategies often employ a comprehensive risk management approach that aims to prevent, mitigate, prepare for, respond to, and recover from emergencies"(World Health Organization, 2019). Countries, therefore, design appropriate emergency response mechanisms to deal with the kind of emergencies that confront them. Thus, any organized response to an unanticipated or dangerous event is considered an emergency response.

The overarching aim of a strategy for emergency response is to address/mitigate the effects of the incident on people and the environment (UNHCR, 2020). Emergency response can also be defined as some crucial tasks that are simultaneously undertaken during times of turmoil, instability, and fear (Prasad & Francescutti, 2017). According to Jensen, Emergency management is the interaction and management of risks, vulnerabilities, and events (such as emergencies, catastrophes, and complex humanitarian situations), primarily through preparedness,

response, recovery, and mitigation actions (Jensen, 2010; Dewald, 2011). Aiming to provide suitable responses that would preserve lives and improve the well-being of impacted populations. The form and extent of the response are unique to every emergency and frequently depend on the context of politics, the environment, culture, the economy, and the public health system (World Health Organisation, 2008). Emergency Preparedness on the other hand refers to the planning and actions taken to ensure the necessary resources and procedures are in place to effectively respond to disasters and emergencies (World Health Organization, 2017).

Emergency Preparedness can also be said to be a discipline of dealing with and avoiding risks, particularly those that have catastrophic consequences for communities, regions, or entire countries (Federal Emergency Management Agency, 2016). According to the International Society of the Red Cross, Emergency preparedness is the knowledge and capacities developed by governments, response and recovery organizations, communities, and individuals to anticipate, respond to, and recover from the impacts of likely, imminent, or current hazard events or conditions (International Federation of Red Cross and Red Crescent Societies, 2019). The Centers for Disease Control and Prevention also defines Emergency Preparedness as the actions and measures taken before, during, and after an emergency to ensure that an effective response to and recovery from the event can occur (Centers for Disease Control and Prevention, 2018). When emergencies occur, many actors get involved in dealing with them. Key sector players include; International Non-governmental Organizations, the International Committee of the Red Cross (ICRC), United Nations agencies, the International Red Cross and Red Crescent Movement, political leaders, academic and research institutions, and the media. The nature and scope of response are usually determined by the nature and severity of the emergency. Well-

informed planning and proper preparedness contribute to a successful and responsive emergency response (Prasad & Francescutti, 2017). For this study, the working definition for emergency response is any organized response to an unanticipated or dangerous event whilst eemergency preparedness is defined as the skills and capabilities developed by governments, relief and rescue organizations, communities, and individuals to anticipate, respond to, and recover from the effects of potential, imminent or current hazardous events or situations. How well a country is prepared in terms of logistics and personnel is important to emergencies. Countries, therefore need to invest a lot in building an effective emergency response system.

2.12 TOOLS USED TO ASSESS HOSPITALS PREPAREDNESS FOR EMERGENCIES

Assessing hospital preparedness can inform policymakers, planners, managers, and employees about their current preparedness status. In addition, hospital preparedness assessment can lead to the identification of weaknesses which may further lead to improving hospital capacities for effective response during emergencies and disasters (Boateng-Osei et al., 2023). Studies on hospital preparedness have generally focused on using the tool proposed by the World Health Organization (WHO) which is based on the "all hazards" approach and assesses the safety of hospitals in structural, non-structural, and functional dimensions. The WHO hospital emergency response evaluation toolkit comprises 92 priority action items grouped in 9 key components, such as triage, surge capacity and critical services. One limitation of this tool is the lack of measuring psychometric measures (reliability and validity criteria) for the tool. Another limitation is its inability to measure all structural, non-structural, and functional dimensions of hospital preparedness in disasters and emergencies (Ingrassia et al., 2016).

Nekoie-Moghadam et al. (2016) in a systematic review of evaluation tools and checklists for hospital disaster preparedness found that none of the evaluated checklists and tools included all dimensions required for an appropriate hospital preparedness evaluation. Therefore, the need to prepare a standardized tool to evaluate hospital disaster preparedness (Nekoie-Moghadam et al., 2016). Al-Hajj et al. (2020) designed and developed a Hospital Disaster and Emergency Preparedness (HDEP) tool comprised of key elements, selected based on their critical presence in any comprehensive and effective hospital preparedness plan and their potential to depict hospitals' level of preparedness accurately. These elements which were dispersed across the three phases of the emergency activation process thus; pre-event preparedness, response, and post-event recovery, encompassed the following; Hospital information (demographics, capacity, surge capacity), Preparedness (existing plan, mechanisms of activation, drills, trained personnel), Command - Incident Command System (ICS) (number of coordinators and roles, replacements, meeting area with a communication system), Communication (internal communication system and external communication with government and non-governmental agencies) and Management (resources, logistics, staff, facility, lab, blood bank, safety and security). This tool was used to systematically assess the emergency and disaster preparedness level at Lebanese hospitals and their readiness to deal with complex emergencies and humanitarian crises and was useful in identifying gaps in disaster preparedness (Al-Hajj et al., 2020). Alruwaili et al. (2023), also identified a 3-factor structure that provides an innovative approach to assist the operationalization of the concept of Hospital Disaster Preparedness (HDP) capacity building and service improvement.

The first factor was the most highly weighted factor, which included education and training (0.849), monitoring and assessing HDP (0.723), disaster planning (0.721), and command and control (0.713). The second factor included surge capacity (0.708), triage system (0.844), post-disaster recovery (0.809), and communication (0.678). The third factor represented safety and security (0.638) as well as logistics, equipment, and supplies (0.766). The 3-factor structure was identified as key predictors of HDP capacity as well as serve as a groundwork to further develop instruments for assessing HDP in future studies (Alruwaili et al., 2023). Safarpour et al. (2019) also explored a valid and reliable tool for the measurement of hospital preparedness in road traffic injuries with mass casualties. Their tool was designed based on nine dimensions of hospital preparedness, including command and control, infrastructure and medical equipment, information and communication systems, surge capacity, triage and medical services, safety and security, human resources management, coordination and cooperation, and training and exercise. They observed that extracted dimensions are more expansive and precise than similar tools for evaluating hospital preparedness in RTIs with mass casualties. Also, the tool included the part of specialized resources and equipment for managing trauma patients in RTIs with mass casualties, which was ignored in previous tools. The presence of these resources and equipment in hospitals is essential for managing trauma patients and affects hospital preparedness for managing injury cases in RTIs with mass casualties (Safarpour et al., 2022).

According to Safarpour et al. (2019), the content validity index and content validity ratio of the tool were 0.97 and 0.98, respectively. The reliability of the tool was 0.89 with the kappa coefficient, respectively. They therefore concluded that the tool has sufficient reliability and validity for measuring hospital preparedness in road traffic injuries with mass casualties. Thus,

this tool can be used for assessing the preparedness of hospitals for better planning, preparedness, and response to road traffic injuries with mass casualties. The reviewed risk assessment manual is divided into three main parts. The questionnaire, presented in a checklist format, will provide an overview of the health facility's present capabilities. This enables the researcher to deepen his awareness by delving into the details offered in succeeding sections. The second part, Assessment of General Emergency Preparedness, deals with aspects of preparedness at any level of emergency. Here, evaluation is to be done within the context of three basic elements: Structural vulnerability, Non-structural vulnerability, and Functional vulnerability. The third part, Assessment of Preparedness for Specific Emergencies, is the major addition to this updated edition. This section tackles specific emergencies that are becoming increasingly relevant (Field Manual for Capacity Assessment, 2020). In this case, Road Traffic Incidence was identified as the relevant emergency that presents at the hospitals in Ghana.

2.13 THEORIES UNDERPINNING THE STUDY

This section draws on relevant theories that underpin the studies. The disaster management theory and stakeholder's theory are discussed.

2.13.1 Emergency Management Theory

Emergency Management theory explains the 'how' to prevent, prepare, respond, and recover from disasters and emergencies. It draws on various disciplines, such as sociology, psychology, public administration, and engineering, to understand the causes, effects, and solutions of complex and uncertain situations (Pine & John C, 1994). To be able to appreciate the importance of emergency response, there is a need to explain what a disaster is. According to The United Nations Office for Disaster Risk Reduction (UNISDR), "disaster" is a serious disruption of the

functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts (UNISDR, 2017). Disaster management refers to the entire set of practices, policies, and procedures used before, during, and following a disaster. Disaster management aims to reduce these risks and prevent society from imploding in the wake of horrific devastation (Victoria, 2016). There have been many losses of lives and injuries following disasters. A significant number of these deaths and injuries are a result of the uncoordinated and haphazard nature of the response system. The emergency management theory, therefore, aims at improving the nature of the emergency response system. Disaster management aims to reduce the impact of disasters on the society. It is how best to restore society to normal functioning after a catastrophe.

Emergency Management Theory is not aimed at preventing disaster. The rationale is mitigating the different kinds of threats that arise due to the occurrence of a disaster and decreasing its accompanied damages. Although certain disasters cannot be predicted, others can be predicted even if not with accuracy. Therefore, systems and plans can be put in place to reduce the impact.

2.13.1.1 Elements of Emergency Management Theory

There are different emergency management strategies that countries may adopt for each type of disaster. However, there are basic elements that cut across in disaster management of different countries and different organizations. These elements establish/spell out a framework that serves as the foundation for creating a strategy. The five steps of emergency management theory are explained below.

Prevention: At this stage, disaster management aims at preventing the human hazard of the disaster. It is mostly used when you are dealing with terrorist attacks and natural disasters

(Victoria, 2016). Not all forms of disasters can be prevented, especially natural disasters. However, steps can be taken to reduce the risk of anyone losing his life or suffering a major injury. Prevention is a critical component of emergency management, aimed at averting incidents or minimizing their potential impact before they occur. This proactive approach involves identifying and reducing risks to minimise the likelihood of disasters. According to Smith (2016), effective prevention strategies can significantly decrease the frequency and severity of emergencies. Such strategies include implementing safety regulations, conducting risk assessments, and investing in infrastructure improvements to withstand natural disasters.

The importance of prevention is underscored by its ability to save lives and reduce economic losses. As highlighted by Jones and Roberts (2018), countries that invest in preventative measures, such as early warning systems and public education campaigns, experience fewer casualties and recover more quickly from disasters. Furthermore, Baker (2020) emphasizes the role of community involvement in prevention efforts. Engaging local populations in preparedness activities fosters resilience and ensures that communities are better equipped to handle emergencies. Despite its benefits, prevention faces challenges, such as funding constraints and political resistance. Brown (2019) notes that allocating resources to prevention can be difficult, especially when immediate needs seem more pressing. However, long-term investment in prevention is essential for sustainable risk management and the well-being of societies.

Mitigation: Mitigation aims to reduce the severity and impact of disasters and emergencies when they occur. The possibility of completely preventing a disaster is slim, but steps can be taken to prevent minor disasters from turning into catastrophes (prevention) or to reduce the impact and damage caused by disasters (mitigation) (Francescutti et al., 2016). Mitigation is a fundamental step in emergency management that focuses on reducing the severity of disaster impacts through

long-term strategies. According to Cutter (2016), mitigation measures include structural improvements, policy development, and community education aimed at minimizing potential damage. Structural improvements are a key component of mitigation. These measures involve reinforcing buildings, infrastructure, and other critical systems to withstand disasters. For instance, retrofitting buildings to be earthquake-resistant or constructing levees to prevent flooding are examples of structural mitigation strategies. As highlighted by Smith (2017), such improvements not only protect lives and property but also reduce recovery costs and downtime following disasters. Policy development is another crucial aspect of mitigation. Effective policies and regulations, such as zoning laws and building codes, are essential for guiding development away from high-risk areas and ensuring that new constructions are resilient to hazards (Jones & Brown, 2018). Moreover, land-use planning policies that incorporate hazard assessments can significantly contribute to reducing the vulnerability of communities to disasters.

Community education and engagement are vital for successful mitigation efforts. Educating the public about potential hazards and encouraging proactive measures can enhance community resilience. According to Anderson and Wood (2019), community-based mitigation initiatives, such as disaster preparedness training and public awareness campaigns, empower individuals to take actions that reduce their risk and increase their ability to respond effectively during emergencies.

Preparedness: This phase emphasizes the need to increase a community's ability to respond when a disaster occurs. It is about getting ready with the appropriate systems, resources and personnel to respond appropriately when there is a disaster. Emergency preparedness ensures that the necessary resources, human and material, are available in time to meet the anticipated emergency needs (Coppola, 2007). The aim of disaster preparedness is to ensure that a

community has the ability of setting up a system together so that it can be able to handle the consequences of the disaster if it occurs (Kapucu & Van Wart, 2006). Typical preparedness measures include developing mutual aid agreements and memorandums of understanding, training for both response personnel and concerned citizens, conducting disaster exercises to reinforce training and test capabilities, and presenting all-hazards education campaigns (Perry & Lindell, 2003; Wray et al., 2008).

Response: These are actions carried out immediately before, during, and immediately after a hazard, which are aimed at saving lives, reducing economic losses, and alleviating suffering. It has to do with taking actions that will reduce the negative effects of the disaster. Response actions may include activating the emergency operations centre, evacuating threatened populations, opening shelters and providing mass care, emergency rescue and medical care, firefighting, and urban search and rescue (Victoria, 2016).

Recovery: When a disaster occurs, there are disruptions in the normal way of life and destruction of properties in the community. The goal of the recovery stage is to take actions that will help the community to return to its normal life. Examples of recovery actions include debris clean-up, financial assistance to individuals who lost their properties during the disaster, paying off medical bills for those who sustained injuries, rebuilding of roads and bridges and key facilities, and helping to set up temporary shelters for those who might have been displaced during the disaster.

Emergency Management theory enables relevant institutions and organizations to help minimize the disruptions caused by disasters. Emergencies will surely occur; therefore, planning becomes essential. The effective response to catastrophes like the 9/11 terrorist attack, Hurricane Katrina, the Fukushima Nuclear Power Plant accident in Japan, and the huge flood in Thailand, among

others. Emergency Management theory in itself does not manage disasters. It depends on other factors for its practicality. Availability of resources, trained personnel and time are crucial for the management of emergencies. Due to the scarcity of resources, inadequate personnel and limited time frame, it is impossible to effectively manage every disaster situation. It is not about the plan but the factors necessary to execute the plan that has been put in place. Another limitation of this theory is how to effectively predict disasters. The current approach to emergency management is problematic since it is difficult to predict events in the medium- and long-term future (Victoria, 2016). Terrorist attacks, earthquakes, floods and many other disasters are becoming increasingly difficult to predict. It becomes difficult to plan a management model for an event when you do not know when and how it will happen.

Responding to a disaster is all about how effectively the disaster is managed. Knowledge of disaster management is needed to better understand disasters so that systems can be put in place to mitigate the hazards associated with them. Emergency Management Theory provides such knowledge. And helps in effective preparedness for emergencies. It is for this reason, the theory is relevant to the study.

2.13.2. Theoretical Implications of Emergency Management Theory

The implication of Emergency Management as theory from the perspective of preparedness by the GAMS for emergency response can be explained as follows; In the first place, the Emergency Management theory give five steps to emergency management namely, prevention, mitigation, preparedness, response and recovery. This study focused on preparedness by the National Emergency Response Hospital of the GAMS to respond to emergencies. The theory answers the question of What constitutes the components for preparedness and outlines typical preparedness

measures to include developing mutual aid agreements and memorandums of understanding, training for both response personnel and concerned citizens, conducting disaster exercises to reinforce training and test capabilities, and presenting all-hazards education campaigns. Lensing through this view of the theory, the preparedness for emergency response can be achieved when the policy or rules governing emergency preparedness are well-followed. Thus, emergency preparedness measures must be undertaken by the actors involved. Hence, the actors (Deputy Chief of Staff Medical of the GAMS, Commander 37 Military Hospital and Hospital Administrators) must be given the latitude and resources to develop preparedness plans for the national emergency response hospital. This will reduce gap in developing mutual aid agreements and memorandums of understanding, lack of adequate training for both response personnel and concerned citizens, gap in conducting disaster exercises to reinforce training and test capabilities and lack of presenting all-hazards education campaigns. Addressing the above ensures the preparedness of the national emergency response hospital to deliver comprehensive, coordinated and sustained care delivery during national emergencies and disasters. But where the implementation of preparedness plans is interfered by resources and logistical challenges, the national emergency response hospital is likely to be negatively affected, thus, affecting their preparedness to respond to emergencies to ensure quality of care delivery.

Although the theory gives the five steps for emergency management and outlines the typical emergency preparedness measures, it failed to indicate clearly how the various stakeholders interrelate and must be coordinated for emergency preparedness. There is therefore a need for another theory to compliment the Emergency Management theory in terms of stake holder's engagement in a complex healthcare system.

2.14. The Stakeholders' Theory

Stakeholder theory posits that organizations should consider the interests of all their stakeholders in their decision-making processes. This theory was developed by R. Edward Freeman in his seminal work "Strategic Management: A Stakeholder Approach" (1984). It has evolved to become a central framework in understanding corporate responsibility and governance. This literature review explores the key concepts, critiques, and applications of stakeholder theory. The central premise of stakeholder theory is that organizations should consider the needs and interests of all their stakeholders in strategic decision-making (Freeman, 1984). This approach implies a more inclusive and ethical business model. Key concepts within stakeholder theory include stakeholder identification, stakeholder salience, and stakeholder engagement. Mitchell, Agle, and Wood (1997) advanced stakeholder theory by introducing the concepts of stakeholder salience. This considers the power, legitimacy, and urgency of stakeholders' claims. They proposed a framework to prioritize stakeholders based on these attributes, suggesting that managers should pay more attention to stakeholders with higher salience (Mitchell et al., 1997). The next concept of this theory is the stake holder engagement. Effective stakeholder engagement involves ongoing communication and dialogue with stakeholders to understand their needs and expectations (Greenwood, 2007). Engaging stakeholders can lead to better decision-making, improved trust, and enhanced corporate reputation (Greenwood, 2007). Another concept that was posited is the creation of shared value. Porter and Kramer (2011) introduced the concept of creating shared value (CSV), which aligns with stakeholder theory. They argued that businesses can generate economic value by addressing societal challenges, thereby benefiting both shareholders and stakeholders. CSV represents a strategic approach where societal needs are integrated into the core business strategy (Porter & Kramer, 2011).

Freeman (1984), who developed the stakeholder's theory suggests that organizations should account for the interests and influences of all parties affected by their operations. In the context of healthcare, especially in hospitals' preparedness for health emergencies, this theory emphasizes the need for a collaborative approach involving various stakeholders. In Ghana, the application of stakeholder theory to hospital preparedness is crucial, given the country's healthcare challenges and the frequent health emergencies it faces. This literature review examines how stakeholder theory has been applied to enhance hospitals' preparedness for health emergencies in Ghana. Stakeholders' theory in healthcare highlights the importance of considering the interests of all parties involved. These includes patients, healthcare providers, government agencies, and the community (Freeman, 1984). In Ghana, the healthcare system's complexity requires hospitals to engage multiple stakeholders to effectively prepare for and respond to health emergencies.

Identifying relevant stakeholders is the first step in applying stakeholder theory to hospital emergency preparedness. In Ghana's health delivery system, key stakeholders include patients, healthcare workers, administrative staff, suppliers, local communities, public health officials, and emergency responders as well as educators/campaigners. The relevance of the various key stakeholders is discussed below. Patients and their families are key to emergency preparedness by hospitals. Ensuring safety and well-being of patients and their families is paramount. This calls for effective communication which is critical in managing their expectations and cooperation during health emergencies (Aboagye, Degboe, & Obiri-Yeboah, 2017). Healthcare providers include Doctors, nurses, and other healthcare workers who remain crucial stakeholders in emergency preparedness. Their input is key in developing realistic and effective preparedness plans. Ensuring their safety, training, and resource availability is essential (Asamoah, 2019).

Hospital administrators and managers are responsible for coordinating preparedness efforts and ensuring resources are allocated efficiently. Their role includes policy development, resource allocation interdepartmental coordination, and liaising with external agencies (Kusi-Appiah, 2020). Reliable supply chains are critical for hospital operations during emergencies. Engaging suppliers and vendors in preparedness planning helps ensure the availability of essential medical supplies and equipment (Boateng, 2020). Local communities comprise the immediate to medium catchment area of the health facility. The community's role in emergency preparedness is vital. Community members can provide support and resources. Their cooperation and basic knowledge of what is expected of them are essential for the effective implementation of emergency measures (Agyepong, 2018).

Collaboration with public health officials and emergency responders is necessary for coordinated efforts during health crises. These stakeholders provide valuable expertise, resources, and logistical support (Amoako, 2018). Engaging stakeholders in the planning process is a core principle of stakeholder theory. This involves ongoing communication, consultations, and collaborative decision-making (Greenwood, 2007). In Ghana, hospitals must establish mechanisms for stakeholder engagement to ensure that diverse perspectives are integrated into emergency preparedness plans. Communication and Information sharing is very key in preparedness for emergencies. Effective communication channels must be established to keep stakeholders informed and involved. Regular updates, meetings, and feedback mechanisms help maintain transparency and build trust (Agyepong, 2018). Training is the bedrock of success. Joint training programmes and simulation exercises involving various stakeholders can enhance preparedness. This helps in identifying potential gaps and improving coordination (Asamoah, 2019). These exercises help stakeholders understand their roles and responsibilities, leading to a

more cohesive response during actual emergencies. Collaborative policy development ensures that the concerns and needs of all stakeholders are addressed. Inclusive policies are more likely to be accepted and adhered to by all parties involved (Freeman, 1984).

2.14.1 Critiques of Stakeholder Theory

Despite its widespread adoption, stakeholder theory has faced several critiques. One of the primary criticisms is its vagueness in defining who qualifies as a stakeholder and how to balance conflicting interests (Jensen, 2002). Jensen (2002) argued that without a clear prioritization of stakeholder interests, managers might struggle to make consistent and strategic decisions. Another critique is the potential for stakeholder theory to dilute the primary objective of businesses, which is often perceived to be profit maximization (Jensen, 2002). Critics argue that by focusing on multiple stakeholders, businesses may lose focus and efficiency, ultimately harming overall performance (Jensen, 2002). Additionally, stakeholder theory has been criticized for being idealistic and challenging to implement in practice. While the theory promotes ethical considerations and inclusiveness, translating these principles into actionable strategies can be complex and resource-intensive (Phillips, Freeman, & Wicks, 2003). While stakeholder theory offers a robust framework for hospital emergency preparedness, its application in Ghana is not without challenges. Coordinating multiple stakeholders with diverse interests can be complex and time-consuming (Boateng, 2020). Resource limitations, varying levels of commitment, and differences in priorities can also hinder effective collaboration (Kusi-Appiah, 2020). Limited resources can strain stakeholder relationships and affect the implementation of preparedness plans. Ensuring equitable distribution of resources and support is essential for maintaining stakeholder commitment (Amoako, 2018). There is also the challenge with stakeholder commitment. Achieving and sustaining stakeholder commitment can be challenging, particularly when interests conflict or when stakeholders do not perceive immediate

benefits (Greenwood, 2007). Continuous engagement and demonstrating the value of participation can help mitigate this issue. Furthermore, there is also a critique about ease of coordination and integration. Integrating the input and efforts of various stakeholders into a cohesive plan requires effective coordination and leadership. Establishing clear roles, responsibilities, and communication protocols is critical for successful integration (Boateng, 2020).

2.14.3 Theoretical implications of Stakeholder's theory

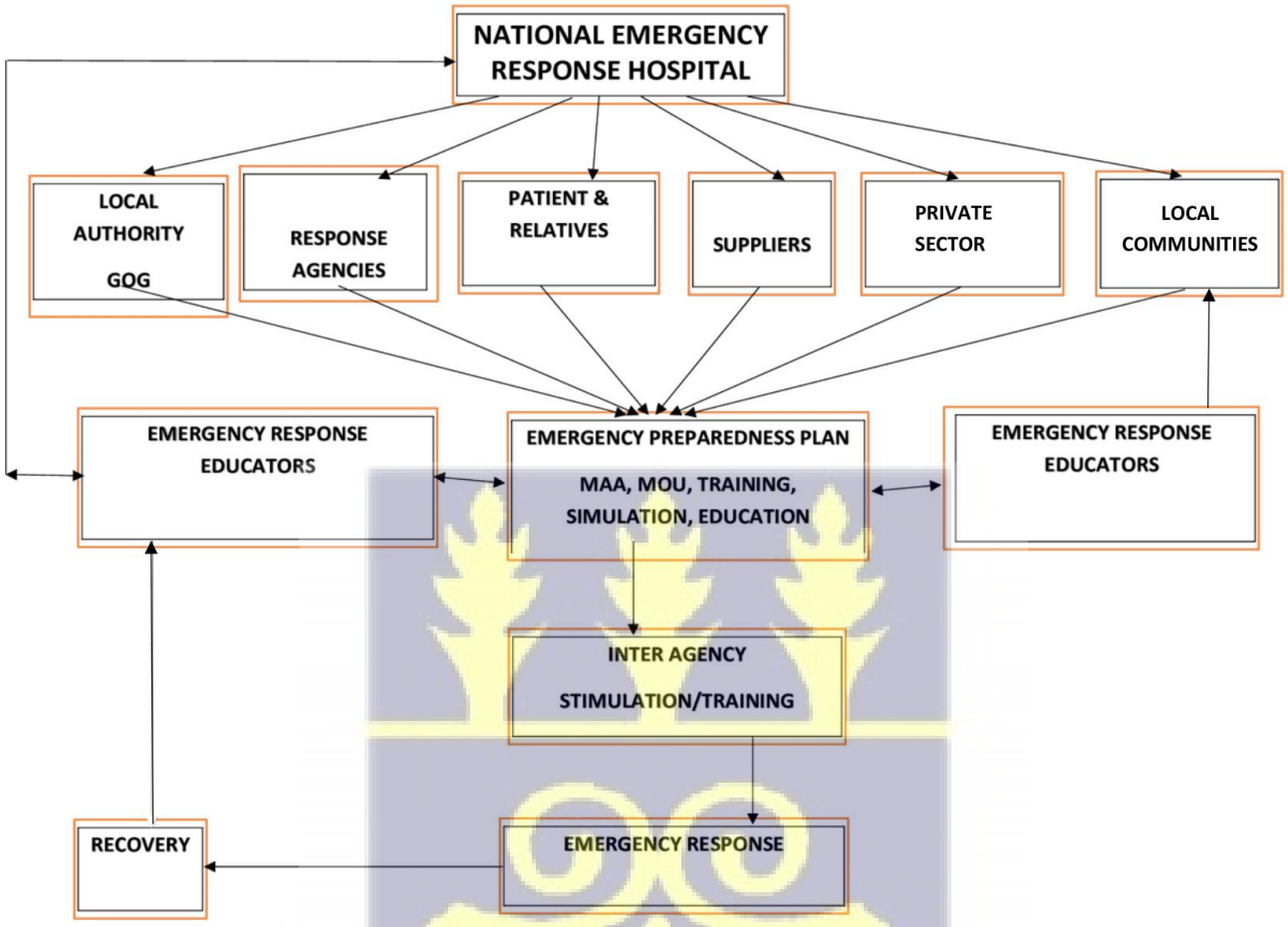
Emergency preparedness deals with a complex set of institutions with actors drawn from and beyond the hospitals. This is why the Stakeholder's theory is relied on in this research to answer the question of How stake holders interrelate for emergency response preparedness. Stakeholder's Theory explicitly focuses on identifying and addressing the interests and needs of all stakeholders involved in or affected by an organization's operations. Implicitly, the ability to properly implement or execute emergency preparedness plans requires state actors and technocrats at the various emergency response institutions who are more or much privy to their peculiar roles. Because involvement of all actors enhances effective and efficient preparedness for response. In light of this, preparedness for emergency response by the National emergency response hospital must be done with prior consultation and approval of the local government representatives at region, the relevant state institutions and the Ghana Armed Forces. Reflecting on Stakeholder's theory concept of ensuring that the perspectives of all relevant parties are considered in planning and decision-making processes, the stakeholders are the government representatives, the GAFMS, GHS, National Disaster Management Organisation {NADMO), Ghana National Fire Service (GNFS), Ghana Police Service (GPS), National Ambulance Service (NAS), the hospital command/administrators, healthcare workers, suppliers, emergency

responders, public health officials, patients, concerned citizens and emergency response educators/campaigners. More so, the complexity of health governance makes it blurring and challenging in tackling the social and economic issues of emergency preparedness. The reason for which the third sector, that is, the private and voluntary sectors of the nation must be involved in the management of emergency preparedness plan. By implication, Stakeholder's theory advocates for the participation of agencies beyond government to be involved in preparedness for emergency response. This will ensure the provision and distribution of state and non-state resources to address the challenge of limited resources for preparedness. Therefore, this concept places the emergency response hospital in a state of readiness for emergency response, making the facility remain resilient for the continuity of routine services and response to emergencies leading to a smooth recovery. The emergency response educators review the response process through after-action reports and make recommendations to the hospital command for continuous improvement of the preparedness plan.

2.15. Conceptual Framework of the Study

The conceptual theory of this study is constructed from the Emergency Management theory and the Stakeholder's theory. This shows how the complex systems in emergency healthcare preparedness are interdependent. It also demonstrates the flexibility and how it could be adjusted at one point to affect the entire system positively or negatively. In the current study of Ghana Armed Forces Medical Services' preparedness for emergency healthcare delivery, Ghana Armed Forces Medical Services uses its base hospital, the 37 Military Hospital as the designated National Emergency Response Hospital. The Hospital's Command is responsible for drafting an emergency preparedness plan. An effective plan can be drafted by involving stakeholders such as

the government representative, emergency response agencies, hospital staff, patients and relatives, local community, suppliers and private sectors. This coordination would lead to a thorough emergency preparedness plan accepted by all key stakeholders. The plan consists of developing mutual aid agreements and memorandums of understanding, training for both response personnel and concerned citizens, conducting disaster exercises to reinforce training and test capabilities, and presenting all-hazards education campaigns. The plan would be used by emergency response campaigners to educate the local community and at same time bring feedback to improve on the plan. The plan is tested through training and inter-agency simulation exercises. This plan is then ready to respond to emergencies when they occur. After the emergency response, the facility returns to a recovery state whilst lessons learned are picked by the emergency campaigners /educators and used to adjust the preparedness plan and feedback given to the hospital administration of the National Response Hospital for continuous engagement with the relevant key stakeholders to enrich the preparedness plan. The private sector is added to the framework to compensate for the lack of resources from the central government in preparedness plans to solve the resource critique that comes with the stakeholder's theory.



Conceptual Framework showing factors impeding GAFMS preparedness for emergency response

Source: Author's Own Construct, 2023

Figure 1: Conceptual Framework

The framework consists of several variables with arrows indicating how healthcare emergency preparedness is a complex, inter-dependent and inter-connected process. The framework shows that effective preparation for emergency response requires key stake holders' cooperation in ensuring the effectiveness of other variables in achieving effective emergency response outcomes in Ghana's health sector.

2.16. Empirical Literature Review

This section is an empirical literature review of studies conducted on Ghana's approach to emergency response using the above concept. Emergency management theory involves a systematic approach to managing emergencies through phases such as mitigation, preparedness, response, and recovery (Perry & Lindell, 2003). Several studies in Ghana have examined the application of this theory to enhance hospital preparedness. Preparedness and mitigation efforts are essential due to the frequency of disasters like road traffic incidence, floods, fires, and epidemics in Ghana. Owusu-Ansah, Berchie, and Twumasi (2019) found that hospitals in Ghana often lack comprehensive disaster preparedness plans. Their study highlighted the need for regular training and drills to improve readiness. Similarly, Adu-Gyamfi et al. (2020) emphasized the importance of infrastructure resilience, recommending the integration of emergency management principles into hospital design and construction. Agyei-Mensah and de-Graft Aikins (2017) studied the response strategies of hospitals during the 2014 cholera outbreak in Ghana. They reported that hospitals with pre-established emergency management protocols responded more effectively. Another study by Aboagye, Degbey, and Kwadwo (2021) highlighted the challenges hospitals faced during recovery, such as resource shortages and inadequate coordination among agencies. Stakeholder theory posits that organizations should consider the interests of all stakeholders in their decision-making processes (Freeman, 1984).

2.17 Hospitals Stakeholders

In the context of hospital emergency preparedness in Ghana, stakeholders include government agencies, healthcare workers, patients, and the community. Government agencies play a pivotal role in hospital emergency preparedness. A study by Bempah and Olaverri (2018) revealed that effective collaboration between hospitals and agencies like the National Disaster Management Organization (NADMO) enhances emergency response capabilities. They found that hospitals with strong government partnerships had better access to resources and support during emergencies. Also, healthcare workers are critical stakeholders in emergency preparedness. Danso, Boateng, and Osei (2020) explored the role of healthcare workers in emergency preparedness, finding that continuous training and involvement in planning processes are crucial. Their research indicated that hospitals with engaged staff were more resilient and better prepared for emergencies. Community involvement is another key aspect of stakeholder theory. Studies by Darko, Asante, and Adjei (2019) showed that hospitals that actively involve the community in preparedness efforts, such as awareness campaigns and emergency drills, have higher levels of readiness. The researchers noted that community trust and cooperation significantly enhance the effectiveness of hospital emergency response plans. Agyepong et al. (2021) identified issues such as inadequate funding, lack of infrastructure, and poor coordination among stakeholders. They recommended enhancing resource allocation, improving training programs, and fostering better collaboration between hospitals and external agencies.

2.18 Stakeholder Constraints in Emergency Response

An article published in the Texila International Journal of Management, Baidoo, (2018), assessed Ghana's emergency operations. The study sought to expose the constraints that continue to impede the smooth operations of agencies that provide relief operations to victims of disaster situations and the

strategies put in place to address the challenges. The study uncovered some constraints affecting disaster relief operations, key among these is inadequate and effective planning, inadequate logistics, and lack of coordination and cooperation (Baidoo, 2018b). The target population for the study included the United Nations High Commission for Refugees, United Nations Humanitarian Response Depot (UNHRD), World Vision Ghana, CARE International, Adventist Development Relief Agency (ADRA), National Disaster Management Organization (NADMO), Ghana National Fire Service, Ghana Police Service, National Ambulance Service (NAS) and St. John's Ambulance Service. Thus, this confirms the need to introduce stakeholder coordination, effective planning, resources allocation and inter-agency cooperation in the framework for emergency preparedness.

The Fire Service and NADMO have consistently cited human attitude as a major factor when it comes to responding to emergencies in the country (Ghana National Fire Service, 2018; National Disaster Management Organisation, 2019). Though people think disasters are not likely to occur, they ignore the warnings and the precautionary measures (Mensah & Agyapong, 2017). Another constraint during the mitigation phase is the lack of political willpower to execute disaster mitigation projects. Trailed by the lack of effective planning, common standards, funding and effective coordination and cooperation among disaster relief organizations leading to a leadership crisis (Aboagye & Danso, 2019; Yeboah & Fugar, 2010). Leadership's capacity to effectively coordinate a swift and effective response is hampered when they are unable to identify the available resources and relay crucial information to on-site security personnel, first responders, volunteers, and other responders. This reduces the likelihood of a successful outcome (CriticalArc, 2023). The study's findings were also highlighted during the preparedness phase.

The findings indicated that the main issues were a lack of early warning systems, coordination and collaboration between disaster relief organizations. Also, insufficient modern technologies, a lack of funding and inappropriate donations as well as people's perception and behaviour toward disasters. The study outlined other minor issues including inadequate infrastructure, a lack of knowledge of disasters and appropriate preparedness and haphazard firefighting methods. Another important challenge in the response phase was the lack of Human Resource capacity which was collaborated by Addai, Tulashie, Annan, and Yeboah, (2016).

At the response phase, a significant number of respondents indicated that their respective organizations often experience delays in responding to disaster relief operations. The Fire Service, for instance, has consistently come under criticism for arriving late anytime there is a fire outbreak (Ghana National Fire Service, 2018).

Poor infrastructure, lack of information, modern technologies, coordination and cooperation are some constraints inhibiting timely response to disasters (Baidoo, 2018a). Strategic Partnership for Preparedness (SPP) Team, (2010), hinted in its report that the emergency numbers are not as functional as they should have been. Hence, there should be a functional central emergency call number for the Ghana Police Service, Ghana Fire Service and National Ambulance Services. The reconstruction phase is marked by the dependency on aid and inadequate funding as major challenges constraining effective responses to the management of disaster in the country. This is not farfetched as the phenomenon of Aid Dependence is a major conundrum for developing countries. Sometimes, the country does not get the Aid it anticipates (Moyo, 2009; Easterly, 2006). This affects the budgetary allocations to ministries, departments and agencies, which includes the organizations that manage disasters in the country. Also highlighted in the study as constraints are delays, lack of common standards of operations, absence of legislation and lack of coordination and collaboration among disaster relief organizations. There is

therefore the need to have multi-agency simulation exercises as included in the framework for the current study to ensure harmonised standards of operations.

These findings are in line with the assertion that countries that rely on aid for emergency relief will have a challenge ensuring effective and efficient disaster management (Gooding et al., 2022). Baidoo (2018) posited that to address the challenges facing disaster and emergency response organizations, stakeholders in Ghana's disaster relief efforts need to work more closely together to create collaborative and thorough plans, methods, and strategies. Thus, ensuring that all the agencies will be more coordinated effectively and in a more efficient manner. To improve local preparedness and response capacity and lessen the impact of such disasters on lives and livelihoods, the region needs a more coordinated and coherent engagement of all relevant organizations (Gooding et al., 2022). The project "Strategic Partnership for Preparedness (SPP), Ghana" (2010), also recognizes the need for coordination among the various agencies that provide relief services in times of disaster. The report said, "To enhance the roles and responsibilities, assess the efficiency of coordination mechanisms and information management, review operation ability of sectorial response plans, joint simulation exercises should be systematized" Strategic Partnership for Preparedness (SPP) Team, (2010). Baidoo, (2018a), also recommends the capacity building of individuals who are assigned or assume disaster management role(s) or responsibilities. Organisations should encourage the staff to upgrade their knowledge and skills in the space. There should be frequent organization of stimulation exercises among relief organizations. Thus, ensuring an improvement in relief response. Consequently, this leads to effective, efficient and robust response delivery.

2.19 Advantage of Stakeholder Engagements

During the Ebola outbreak in West Africa, Ghanaian hospitals engaged various stakeholders, including public health officials and community leaders, to enhance preparedness. Collaborative efforts in training, resource allocation, and communication were crucial in managing the potential crisis (Agyepong, 2018). Furthermore, the COVID-19 pandemic emphasized the need for stakeholder engagement in emergency preparedness. Ghanaian hospitals that maintained open communication channels and collaborative planning with various stakeholders, including government agencies and the private sector, demonstrated more resilient responses (Asamoah, 2019). Prior to the COVID-19 outbreak, Ghana used to frequently face cholera outbreaks. Hospitals that engaged local communities, public health officials, and non-governmental organizations in preparedness and response planning were more effective in controlling outbreaks and reducing mortality rates (Amoako, 2018). Stakeholder theory therefore provides a valuable framework for enhancing hospitals' preparedness for health emergencies in Ghana. This justifies the utilisation of stakeholders theory in developing a framework for emergency response preparedness. By identifying relevant stakeholders, engaging them in planning and decision-making, and addressing challenges, effective preparedness plans could be achieved. Collaboratively, hospitals can develop more effective and inclusive emergency response strategies. Despite the complexities involved, the integration of stakeholder theory into emergency preparedness, planning can lead to improved outcomes and resilience in the face of health crises.

Disaster relief operations, in general, are carried out by relief agencies in collaboration with security agencies such as the military, focusing on the transportation of food, first aid material, equipment, and rescue personnel from supply points to many destination nodes geographically dispersed over the disaster region (Raillani et al., 2020).

2.191 **Evidence of Stakeholder and Emergency Management Theory Application**

Ghana has suffered several disasters, ranging from flood, fire, and road traffic accidents to pandemics (WHO, 2016). These disasters sometimes overwhelm the country. The aftermath of these disasters led the country to conduct an assessment of the nature, causes and management of these disasters using similar frameworks (Mensah & Ahadzie, 2020). The application of emergency management theory and stakeholder theory provides valuable insights into improving hospital emergency preparedness in Ghana. Empirical studies underscore the importance of comprehensive planning, stakeholder engagement, and continuous training to enhance readiness and response capabilities. Addressing the identified challenges through targeted interventions can significantly improve the resilience of Ghanaian hospitals in the face of emergencies.

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2.192 Summary of the Chapter Chapter

This chapter focused on the preparedness of Ghana's health system in complex emergencies. It reviewed key literature about the study, it provided the conceptual framework and also defined key concepts and the application of the framework to emergency response in Ghana.

CHAPTER THREE

METHODOLOGY

3.0 Chapter Overview

The methodology used to carry out this investigation is presented in this chapter. It started with the research philosophy, which outlines the study's worldview or the lens through which the study's justification and scientific interpretation should be viewed. This chapter presents the research design, sampling techniques, sample size determination, data gathering strategies, data analysis process, and study settings. It contains both the scoping review and the empirical qualitative approach used for this study.

3.1 Methods for the Systematic Review

The study followed a systematic and bibliometric review proposed by (Liedong *et al*., 2020; Bashir *et al*., 2021). In the design of the framework of the study, a review protocol was developed aforehand to document the scope of the study, eligibility criteria, and the analytical methods to be employed for the data set. Shariff, et al. (2019) refers to eligibility criteria as predefined unambiguous guidelines for conducting a systematic review consisting of the characteristics of the studies that should be included or excluded from the review. The following paragraphs dilate into the pre-specified conditions for the inclusion and exclusion of literature obtained from the database search. The following conditions were used as inclusion criteria for the literature used in this review. Primarily, the review considered only peer-reviewed (journal) articles within the literature that resulted from the keyword searches without limitation to any timespan or journal. Secondly, only articles at the final stage of publication were considered; thirdly, only articles pertaining to decision sciences, engineering, and computing were considered. Finally, the review considered only

articles initially published in English. Also, articles that resulted from the database search were excluded where their titles significantly veered off the subject area. Articles were further excluded where they were found not to contain any notable keywords/phrases or focused on the emergency response or surge capacity preparedness, except where they had direct reference or inference to the key variables.

3.1.1 Data Sources

The literature used was identified through a comprehensive search within the Scopus database using specific keywords. The study used Scopus database to search for relevant studies focusing on emergency response efforts and surge capacity. The study chose only Scopus database due to its wide coverage and indexing of essential journals (Gupta *et al.*, 2020). And because of its formal structure, reliable research sources, and software compatibility (Bellucci *et al.*, 2022). The study adopts the terms ("emergency response efforts*" OR "emergency response*") AND ("surge capacity" OR "surge capacity preparedness") based on existing research (Gooding et al., 2022). The study also made use of Web of Science, and Science Direct.

3.1.2 Study Selection Cateria and Collection Process

By using these search strings, we retrieved 1018 papers from Scopus (March 2024 as the effective date) covering the periods 1997 to 2023. The study used 1997 to 2024, as no period limit was set during the search. To obtain the final data for analysis, the study used the following inclusion and exclusion criteria:

1. The study narrowed down the initial 1018 articles to include only publications in the final stage, which are peer-reviewed journal articles written in English to avoid language bias, leading to 193 articles.
2. This implies the study excluded 825 papers that do not focus exclusively on emergency

response efforts and surge capacity preparedness. For example, papers that focused on emergency response to hurricane Dorian: emergent volunteer groups and public-private partnerships (Thomas et al., 2021).

After reading the abstracts of these papers, those that do not meet the inclusion criteria #2 were eliminated to ensure only relevant articles on emergency response efforts and surge capacity preparedness were retained (McAndrew *et al*., 2021). Applying these criteria resulted in the selection of 39 articles. The study retrieved these papers and read them thoroughly. After this check, the researcher eliminated 20 papers, leaving 19 papers. To include all relevant articles, the researcher also used snowball search (Greenhalgh & Peacock, 2005; Liedong *et al*., 2020), which involves scanning through all identified reference lists of articles for essential papers. The researcher used bibliometrics R package (version 3.1.4) and VOSviewer (version 1.6.18) for the bibliometrics analysis and content analysis for systematic reviews. In the case of content analysis, to look for key findings and data estimation techniques, two authors cross-check each other's coding, and the third author is consulted for clarity in cases of discrepancy. Finally, 19 articles were analyzed through a scoping review. **Figure 2** shows the flow of the article selection process.

The various locations of the 19 articles analysed through the scoping review are discussed subsequently. (Blankson et.al., 2019), and (Belardo, Karwan and Wallace, 1984). did a Universal comprehensive review whilst (Caldera and Wirasinghe, 2022), (Mensah and Ahadzie, 2020) is a review of Ghana emergency response systems. The rest of the locations were; various healthcare facilities across Ghana (Daniels and Abuosi, 2020), various hospitals and prehospital care settings across Ghana (Oteng, et al., 2018), sub-Saharan Africa, with a specific focus on Ghana (Mould-Milman et al., 2014), Asin North district of Ghana (Afari et al., 2014), Upper East Region of Ghana (Awoonor-Williams et al., 2015), Upper East Region of Ghana (Gborgbortsi et al., 2022), rural areas of Ghana (Amu and Nyarko 2016).

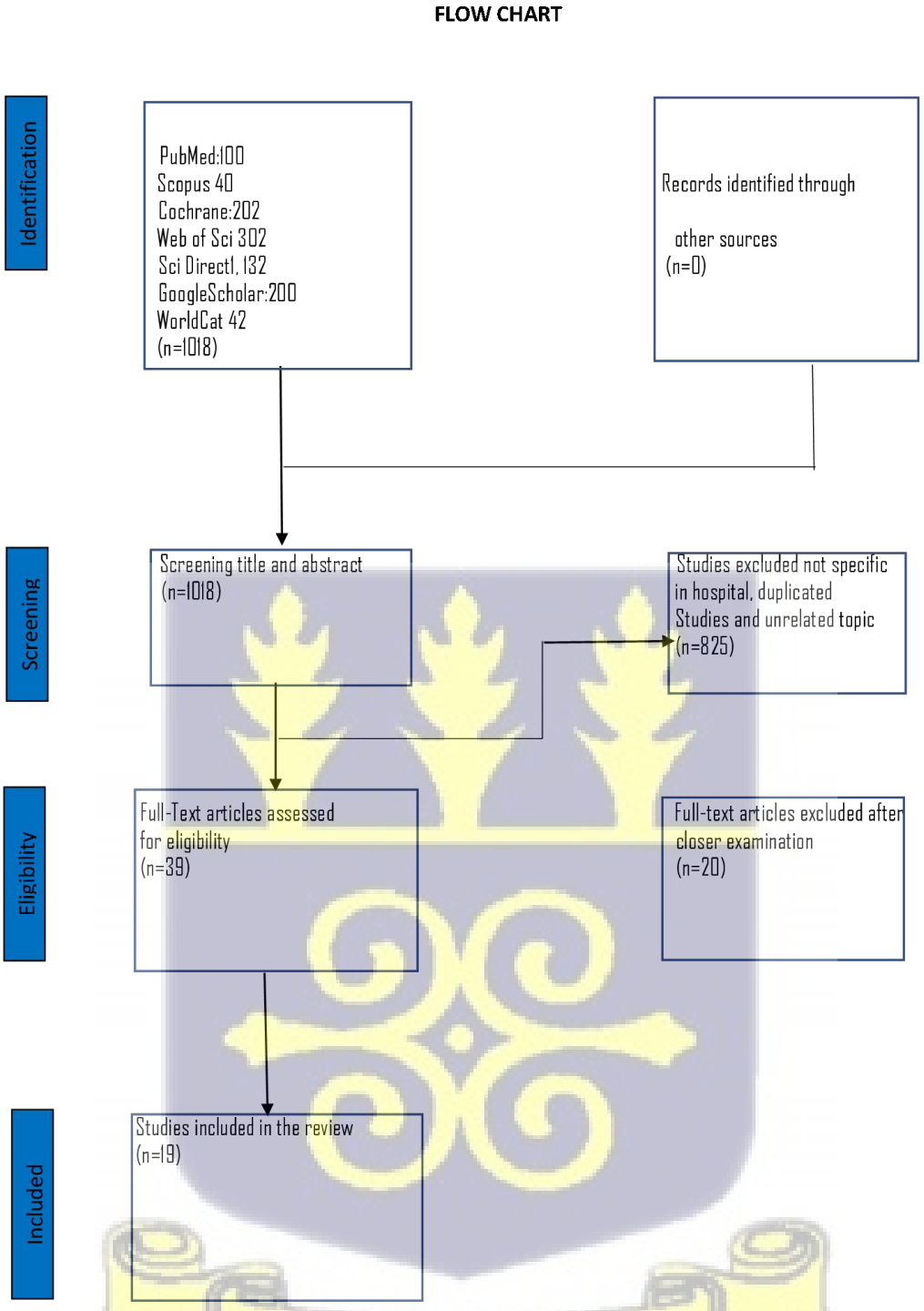

Figure 2: The flow of the process of selecting the articles

3.1.3 Spotlight on Ghana's Emergency Response Research Evolution

Appendix 3 highlights all the 19 articles included in the review which focus on emergency response efforts and surge capacity preparedness in Ghana, which has progressively evolved, with a strong emphasis on addressing road traffic incidents as a significant public health concern. It captures the progression of research over the years, emphasizing the growing interest in addressing road traffic incidents and other critical emergencies. The visual illustrates a steady increase in publications, reflecting heightened awareness and scholarly attention to this vital aspect of public health and disaster management. This trend underscores the evolving efforts to strengthen emergency response systems in Ghana. Early studies, such as Belardo, Karwan, and Wallace (1984), explored the potential of microcomputers to enhance disaster management, identifying trauma and injuries, burns, and cardiovascular emergencies as critical areas of focus. This laid the foundation for further research into emergency preparedness and response mechanisms. Asante and Zwi (2009) delved into the factors influencing resource allocation within Ghana's health system, emphasizing RTIs, malaria, maternal and child health, and cardiovascular emergencies as key priorities. Norman, Aikins, Binka, and Nyarko (2012) conducted a cross-sectional study across 22 health facilities, revealing gaps in preparedness for various emergencies, including RTIs, obstetric complications, infectious diseases, and cardiovascular emergencies.

Subsequent studies are built on these findings, highlighting the growing burden of RTIs and related challenges. Ampofo et al. (2013) used retrospective hospital data to examine the public health implications of road traffic injuries, emphasizing their high incidence in Ghana. Mould-Milman et al. (2014) extended the focus to barriers in prehospital care for acute coronary syndrome, emphasizing the need for efficient emergency medical services. Similarly, Afari et al. (2014) explored healthcare providers' perspectives on emergency obstetric referrals in rural districts,

identifying obstructed labor and postpartum hemorrhage as key challenges. Awoonor-Williams et al. (2015) investigated barriers to accessing emergency obstetric and newborn care in the Upper East Region, while Adamtey, Frimpong, and Dinye (2015) assessed the state of emergency healthcare delivery in the Bibiani District, identifying RTIs, obstetric, pediatric, and medical emergencies as primary concerns.

Later studies focused on refining emergency response strategies and addressing specific types of emergencies. Whiteside et al. (2012) conducted a retrospective review of paediatric non-fatal injuries in urban emergency departments, emphasizing the prevalence of RTIs. Daniels and Abuosi (2020) used mixed methods to examine the challenges of emergency healthcare delivery in Ghana, highlighting RTIs, obstetric emergencies, cardiovascular conditions, and infectious diseases as critical issues. Gborgbortsi et al. (2022) explored factors influencing the utilization of emergency obstetric care, identifying complications during childbirth and neonatal emergencies as significant barriers. Ofori-Asenso and Garcia (2016) reviewed cardiovascular disease data, emphasizing the burden of myocardial infarction, stroke, and hypertensive emergencies, while Mensah and Ahadzie (2020) systematically reviewed the impact of floods, identifying trauma, injuries, and waterborne diseases as major consequences.

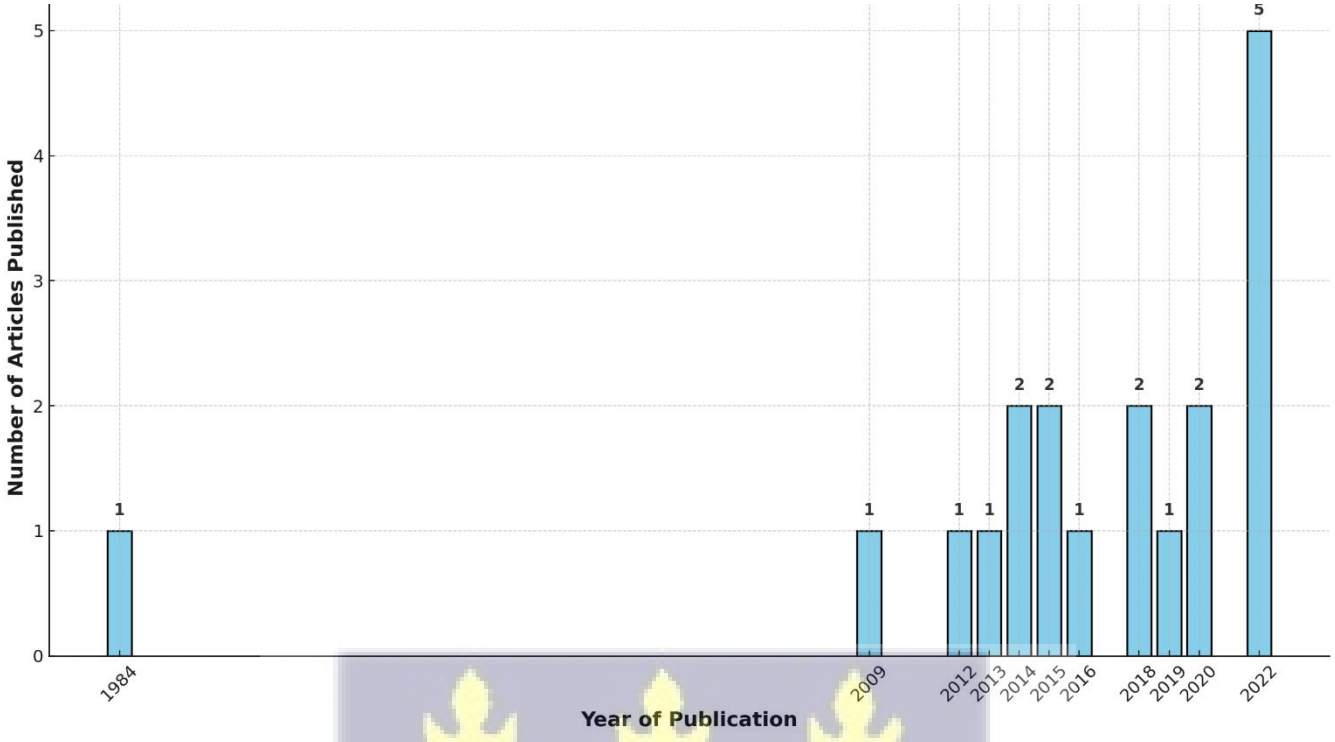

Figure 3: Spotlight on Ghana's Emergency Response Research Evolution

3.2 Data Analysis for the Systematic Review

The data analysis for this study's systematic review followed a rigorous and structured approach to ensure the reliability, validity, and consistency of findings. The process was informed by the Arksey and O'Malley (2005) framework, which provides a comprehensive method for synthesizing and analyzing data in systematic reviews. This framework emphasizes standardization, enabling researchers to extract, categorize, and analyze information systematically, thereby enhancing the credibility of results. In this study, the analysis focused on identifying key trends, patterns, and findings related to emergency response efforts and surge capacity preparedness from the selected literature. The first step in the analysis involved data extraction. Articles selected through the inclusion and exclusion criteria were subjected to a structured review process where relevant details such as authorship, publication year, study location, methodologies, and key findings were documented. This process used standardized

templates to ensure uniformity in data collection, as recommended by Shariff et al. (2019). Extracted data were then mapped to the study's objectives, enabling the researcher to categorize information under themes such as emergency response strategies, surge capacity planning, inter-agency collaboration, and resource allocation. Arksey and O'Malley (2005) highlight that standardizing the data extraction process reduces errors and biases, ensuring that the review comprehensively addresses the research objectives.

Following extraction, the study utilized bibliometric analysis to examine publication trends and identify influential authors, institutions, and journals. The bibliometric tools R (version 3.1.4) and VOSviewer (version 1.6.18) were used for this purpose. Bibliometric analysis allowed the researcher to quantify the progression of research on emergency response efforts and surge capacity preparedness over time, offering insights into the development and direction of the field. Empirical studies such as Gupta et al. (2020) and Bellucci et al. (2022) have validated the effectiveness of these tools in systematic reviews, noting their capability to provide visual representations of citation networks, co-authorship patterns, and thematic clusters. This analysis revealed key areas of focus and collaboration within the literature, further guiding the synthesis of findings.

For the content analysis, the selected 83 articles underwent detailed thematic coding to identify recurring themes, methodologies, and findings. Two authors independently coded the data, ensuring inter-rater reliability, while a third author reviewed and resolved discrepancies. This triangulation process is recommended by Braun et al. (2021) as it enhances the validity of qualitative analyses by reducing subjective bias. Themes identified during this process included the top four emergencies commonly presented at Ghanaian health facilities: road traffic accidents, maternal health emergencies, infectious disease outbreaks, and cardiovascular incidents. These findings were derived through an iterative process of coding and validation, aligning with the study's objectives to provide actionable insights into Ghana's healthcare preparedness.

The final step involved synthesizing and summarizing the results. Key findings from the content analysis were integrated with bibliometric insights to develop a cohesive narrative about the evolution and priorities in emergency response research. This synthesis enabled the researcher to identify gaps in existing literature and propose recommendations for future research and policy development. For example, the analysis highlighted the underrepresentation of studies addressing rural healthcare systems' preparedness for emergencies, suggesting a need for targeted research in this area. Arksey and O'Malley's (2005) emphasis on summarizing findings into actionable outcomes was critical in guiding this process.

3.2 Qualitative Methods (Interview)

3.2.1 Philosophical Underpinnings of the Study

The research is based on the constructivist method, which comes under the interpretivism philosophy (Schwandt, 2015). This approach focuses on comprehending a phenomenon from the perspective of individuals who experience it first hand and interpret it according to their own personal interpretation. (Berryman, 2019). Constructivists use ontological, epistemological, axiological, and methodological lenses to view how society constructs a phenomenon's reality. (Al-ababneh, 2020). From the ontological standpoint of this study, the reality of 'what' emergencies are commonly attended to at the National Emergency Response Hospital of the Ghana Armed Forces Medical Services and 'how' they are prepared to respond to national emergencies depends on the experience and understanding of individual staff and key appointment holders serving in the emergency centres and administering the facilities. It also depends on the experience and understanding of stakeholders involved in the emergency preparedness process. Hence, reality is narrowed to individuals, settings, period and group within a status quo (Matta, 2021). Therefore, the reason(s) accounting for the type of emergencies frequently

attended to and how the facility is prepared for emergencies exist in the individual staff mind. Such reality can also be obtained from the Commanders, Administrators, Emergency Response Officers and key stake holders of emergency response because of their involvement in the emergency response preparedness process.

From the epistemological perspectives, constructivists believe that knowledge is subjective because it is socially constructed and mind dependent (Chowdhury, 2014). Thus, the truth about how prepared the national emergency response hospital is for emergency response and its implications on quality healthcare delivery lies within the participants of the study experiences. In the same vein, participants of the study's accounts and claims of what emergencies they frequently attend to and how prepared they are for emergency response, is genuine knowledge because they lived it. On the other hand, constructivists' axiological assumption that, since reality is mind constructed and mind dependent and knowledge is subjective, social inquiry is in turn value-bound and value-laden. Implicitly, these assumptions informed the choice of a research paradigm, research issue, methods of data collection, analysis and interpretation of findings and how the findings are reported.

Methodologically, constructivists aim at understanding people's experiences in their natural setting where their varied experiences on the phenomenon under study is shared. This explains why data collection pertaining to this study was done in the participants working environment where the investigator had the opportunity to observe the realities shared by participants in their own context. The multiple realities that are shared by participants of the study equally led to reframing of the of research tool. Also, sensitive issues were addressed through self-detachment (not trying to feel for participants but remain resolute). The Positivists philosophy, on the other hand, is opposed to subjective opinions, experiences and perceptions (Hjørland, 2016). The paradigm argues for any field of inquiry to be narrowed to certain key facts or hard truth (Bakken & Dobbs, 2016). For the positivists, a study must

make good use of well-structured questions that can be used to measure a phenomenon (Jurgilevich, 2021). But the critical realism, nevertheless, recognises the possibility of one identifying and addressing questions of what can be done within a particular environment or setting (Hultin, 2019). But these paradigms have fallen short because they lack interpretation of the subjective views of reality (Bakken & Dobbs, 2016). Thus, the reason for which interpretive paradigm is preferred for this study.

3.2.2 Research Approach

The approach that was adopted in this study is the qualitative research approach. Teddlie and Tashakkori (2011) posit that the qualitative approach, unlike the quantitative, deals with respondents' views since it involves a rich grounded knowledge related to their observable behaviour and through a detailed description of their engagements. The qualitative approach is usually rooted in conversations; hence, Tashakkori and Teddlie (2014) discuss that researchers using this approach relate to the efforts to understand, describe and interpret the meanings of their actions in a natural space. This was further posited by Creswell and Poth (2017) that, unlike the quantitative approach, the focus of the qualitative approach is not influenced by a particular hypothesis or a solid framework but rather more focused on emerging themes and individual descriptions. Otani (2017) discusses the characteristics and what describes the qualitative approach as natural, its interpretation and simplification, in-depth and hypothesis drive. Moreover, one main characteristic of a qualitative approach is that the research objectives aim to produce an in-depth understanding of participants through gaining knowledge from participant experiences, material circumstances, values, and precedents in the social world of research (Creswell, 2015; Percy et al., 2015). Also, Leedy and Ormrod (2005) discusses that qualitative research is known for its sample size as small and is usually chosen or focused based on significant measures. Unlike the quantitative approach, qualitative research involves interaction with participants, typically

one-on-one, that is, interviews, group interviews, and observations; hence it explores developing issues (Chorba, 2011; LaMarre & Chamberlain, 2022; S. Lewis, 2015). Creswell and Poth (2017) posit that a researcher using a qualitative approach does not try to be manipulative of events within a framework since this approach demands a naturalistic method focused on gaining understanding in a specific context in the scenery.

Unlike the quantitative approach, the findings and results of qualitative research are not by statistical or quantification means, thus calculations, causal determination, and generalizing findings, but instead through exploration of findings from the real-social world where events happen naturally and are clarified, understood, and reasoned by comparing situations (Ackoff et al., 2010; Merriam, 2009; Patton, 2002). Some methods used in the qualitative approach, such as interviews, do not have a restriction or are not limited to detailed questions and are conducted by the researcher in real time; moreover, this might result in other information emerging which can be reviewed and added to the research framework (Neuman, 2014; Saunders et al., 2009). The qualitative approach usually involves the presence of the researcher or an interaction with the participants face-to-face, which is unavoidable; hence researchers argue that this may affect participants' responses and cause confidentiality and anonymity problems during the presentation of the findings. Nonetheless, this approach is also classed as difficult and time-consuming since it is usually characterized visually and in-depth in nature; sample sizes are therefore small and causes suspicion of the researcher influencing the findings due to personal partialities and individualities (Kothari, 2014; Marshall & Rossman, 2011; Mark Saunders et al., 2012).

The study aims to evaluate the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services (GAFMS) in managing road traffic incidents, employing a qualitative research approach to achieve a deep understanding of the subject matter. Road traffic accidents remain a critical public health challenge globally, with severe consequences in developing

countries like Ghana (WHO, 2018; Asogwa, 2020). Using qualitative methods, this study delves into the lived experiences, behaviours, and perceptions of GAFMS personnel, allowing for a rich exploration of how organizational structures, resource allocation, and coordination mechanisms influence their emergency response efforts (McEntire, 2015; Creswell & Creswell, 2018). The qualitative approach is particularly suited for capturing the complexities of their interactions with civilian medical services, road safety authorities, and other stakeholders during emergency scenarios (Braun et al., 2021; Patton, 2002).

Through in-depth interviews and observations, the study focuses on uncovering the strategies GAFMS employs to address surge capacity demands, highlighting how they adapt to resource constraints and scale operations in response to peak traffic emergencies (Marshall & Rossman, 2011; Kothari, 2014). By examining the qualitative dimensions of these emergency responses, such as decision-making processes, emotional resilience, and collaborative practices, the research provides a naturalistic account of how GAFMS functions in real-world contexts (Patton, 2015; Neuman, 2014). This approach also facilitates the identification of emerging themes and insights that quantitative methods may overlook, making it an invaluable tool for understanding the underlying factors shaping emergency preparedness and response (Otani, 2017; Ackoff et al., 2010). Ultimately, this study contributes to policy and capacity-building initiatives, demonstrating how qualitative research can offer an in-depth perspective on emergency response efforts and surge capacity preparedness of Ghana Armed Forces Medical Services.

3.2.3 Research Design

The research design for this study is rooted in qualitative exploratory research, which serves as an adaptable and comprehensive framework for systematically investigating the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services (GAFMS) in addressing

road traffic incidents. Bell and Bryman (2019) define research design as the structured framework that outlines the plan, strategy, and structure of a study, ensuring coherence between research questions, objectives, and methodology. Research design, as Bell and Bryman (2019) argue, establishes the foundation for structuring data collection and analysis to address research objectives effectively. Exploratory research design is particularly suited to qualitative studies as it provides flexibility in uncovering new insights, understanding complex phenomena, and investigating issues with limited prior research (Merriam, Sharan; Tisdell, 2016). This study explores the attitudes, perceptions, and lived experiences of GAFMS personnel, focusing on their operational strategies, challenges, and resource mobilization during emergencies. The qualitative exploratory approach aligns with the objective of capturing real-world complexities and providing insights into the preparedness and response systems of the GAFMS, which operate within unique socio-political and logistical contexts.

The exploratory research design employed in this study leverages qualitative methods such as in-depth interviews, participant observations, and reflective journaling, which are central to capturing the depth and breadth of human experiences in natural settings. These methods enable researchers to explore how participants perceive and navigate their roles in real-time emergency scenarios (Creswell & Poth, 2017; Patton, 2015). In qualitative research, the exploratory design offers the flexibility to probe deeply into underexplored topics, such as the operational challenges, resource mobilization, and strategic preparedness of GAFMS in the context of Ghana's road traffic emergencies. This design allows for an iterative and adaptable research process, aligning with the qualitative tradition of uncovering complex, context-specific realities (Kothari, 2004; Tisdell, 2016; Merriam, 2009). This adaptability is crucial in studies where emerging data may reveal new areas of inquiry, as seen in this research. A core characteristic of the exploratory design in qualitative research is its reliance on methods such as in-depth interviews, participant observations, and reflective journaling. These techniques enable the researcher to

capture the lived experiences, perceptions, and emotions of participants in a naturalistic setting, offering a rich, detailed understanding of their experiences (Creswell & Hirose, 2019; Patton, 2015). In this study, in-depth interviews were conducted with GAFMS personnel and other stakeholders to explore their attitudes and behaviors during emergency responses. Observations further enhanced the depth of data collection by documenting real-time interactions, logistical challenges, and resource utilization. Such methods are essential in exploratory research, as they facilitate the capture of phenomena that cannot be quantified or measured through statistical means (Kahlke, 2014). Additionally, these methods emphasize the importance of reflexivity, as the researcher must critically examine their influence on the research process and the interpretations drawn from participant responses (C. Marshall & Rossman, 2011).

The flexibility inherent in qualitative exploratory designs is vital for navigating challenges such as limited prior research or evolving phenomena. In the context of this study, the exploratory design allowed for iterative adjustments to the research process, ensuring that the inquiry remained aligned with emerging insights. For example, the discovery of additional systemic barriers to surge capacity preparedness, such as inter-agency coordination gaps, led to further probing in subsequent interviews and observations. Kothari (2014) emphasizes that exploratory research accommodates such iterative processes, enabling researchers to refine their focus as new dimensions of the studied phenomenon emerge. This adaptability was particularly beneficial in understanding the unique challenges faced by GAFMS, as it operates in a dual-role capacity of military discipline and civilian service integration. By allowing for open-ended data collection, the study could address complex and multidimensional aspects of emergency preparedness that may not have been initially anticipated.

Another critical aspect of qualitative exploratory design is its reliance on non-standardized data collection techniques, which prioritize depth over breadth. Unlike quantitative research, which often employs rigid, pre-determined instruments, qualitative research values flexibility in the questioning

process, allowing participants to guide the direction of the conversation (Neuman, 2014; Patton, 2015). This study utilized semi-structured interviews, which allowed participants to share their experiences without being constrained by fixed questions. This approach is particularly effective for exploring participants' perspectives on sensitive topics, such as the emotional toll of emergency response and the ethical dilemmas encountered during resource-constrained situations. Moreover, qualitative data collection methods often require the researcher to build rapport and trust with participants, which is critical in ensuring authentic and meaningful responses. While this can be time-consuming and labour-intensive, it enhances the richness and credibility of the data collected (Burkholder et al., 2020).

Lastly, qualitative exploratory research designs often face challenges related to validity, reliability, and researcher bias, but these issues are addressed through methodological rigor (S. Lewis, 2015). Triangulation, which involves using multiple data sources or methods to validate findings, was employed in this study to enhance credibility. For instance, data from interviews were cross-checked with observational notes and reflective journals to ensure consistency and reliability. Reflexivity, a hallmark of qualitative research, was also integral to this study, as the researcher maintained a reflective diary to document their biases and assumptions throughout the research process (Creswell & Poth, 2017). This practice mitigates the risk of researcher influence on data interpretation, ensuring that the findings accurately reflect participants' realities. Furthermore, the exploratory design accommodates the complexity of real-world phenomena, making it an indispensable tool for addressing multifaceted issues like emergency response and preparedness. By combining these methodological strengths, this study provides a robust understanding of the GAFMS's surge capacity preparedness and contributes significantly to both academic knowledge and practical policy development.

3.2.4 Study Settings

The complete set of cases from which a sample is taken is the population (Lewis et al., 2016). According to Saunders and Thornhill (2009), a population is a group of individuals, persons, objects, or items from which samples are taken for measurement. The Ghana Armed Forces Medical Services (GAFMS) was selected for this study because its base hospital, the 37 Military Hospital, is the designated or de facto national emergency response hospital in Accra, Ghana. The other 12 Medical Reception Stations across the country were also considered for assessment. However, the Kumasi Military Hospital and the Ghana Armed Forces Critical Care and Emergency Hospital, which are the other major hospitals under GAFMS, were not selected for this study due to their status as newly created facilities that had not been fully operationalized at the time of this research, limiting the availability of data. In addition to GAFMS, purposive interviews were conducted with selected staff from the National Disaster Management Organization (NADMO), National Ambulance Service (NAS), Ghana National Fire Service (GNFS), and the Ministry of Health (MoH), as these institutions were also part of the target population. These organizations were selected because of their critical roles in Ghana's emergency response framework: NADMO serves as the lead agency in coordinating disaster and emergency responses nationwide, the Ministry of Health oversees health policies and healthcare systems, and the NAS and GNFS are the primary agencies responsible for pre-hospital care and fire-related emergency response under the Ghana Health Service and the Ministry of Interior, respectively. By including these key stakeholders alongside GAFMS, the study ensured a comprehensive assessment of the emergency response ecosystem in Ghana, focusing on collaboration, resource allocation, and operational effectiveness across multiple agencies involved in road traffic emergency preparedness and management.

3.2.3.1 The Ghana Armed Forces Medical Services

The GAMS is the health service arm of the Ghana Armed Forces. It operates through the military hierarchy and falls under the political administration of the Ministry of Defence. It is categorized under the Ghana Association of Quasi Government Health Institutions. By its military posture, it is among the few essential service institutions in Ghana that does not go on industrial action (strike). Hence their services are available 24/7 all year through. The GAMS administers over 16 Medical Reception Stations and Medical Centres nationwide. In the Greater Accra Region, the GAMS has the 37 Military Hospital, the GAF Critical Care and Emergency Hospital, the Arakan Medical Centre, The Duala Medical Centre, Kpeshie Medical Centre, Kpeshie Maternity and No.1 Medical Reception Station in Michel Camp. The rest are; No.1 Medical Reception Station (Michel Camp), No.2 Medical Reception Station(Takoradi), No.3 Medical Reception Station (Sunyani), No.4 Medical Reception Station (Kumasi), No.6 Medical Reception Station (Tamale), No.7 Medical Reception Station (Ho), Airborn Force Medical Centre and Airforce Medical Centre in Tamale. The GAMS has responded to many national emergencies and disasters such as the Accra Stadium disaster, June 3 water and fire disaster, Atomic Gas explosion, Cargo Air crush at Elwak, Takoradi Gas Explosion and numerous Road Traffic Accidents. It also established the COVID-19 field hospital and Ebola centre among others. It is headed by a Major General with the designation as the Deputy Chief of Staff Medical. (GAMS Annual Review Conference, 2023).

3.2.3.2 The 37 Military Hospital

The 37 Military Hospital was established and began operation on 4th July 1941 by the colonial powers during the Second World War. It is named "37" because it was the 37th General Hospital within the British Empire. It has since then developed to become a teaching hospital. The hospital is a 600-bed general hospital situated in the heart of Accra with a combined working population of approximately 7000 Military and civilian personnel. It is 4 kilometres from the Kotoka International Airport, Accra

central road (Liberation Road). It is the most convenient health facility in the country by its proximity to the Kotoka International Airport. The hospital is made up of these departments; Medical, Surgical, Obstetrics and Gynaecology, National Accident/Emergency centre, Medical Emergency Unit, Gynaecology Emergency Unit, Paediatric Emergency Unit, Dental Department and the Ophthalmology Department. The rest are; Post-Graduate School, Nurses and Midwifery Training College, School of Anaesthesia, Physiotherapy Department, Paediatric Division, Veterinary, Radiology/Magnetic resonance Imaging, Public Health, Anaesthesia/Intensive care unit and Health Information System. There is also the Neuro Surgical Unit, Ear, Nose and Throat (ENT), Wellness and Therapy Unit, Medical and Electronic/Light Aid Detach, Pharmacy, Chemist, Medical store and Equipment Depot, Polyclinics, Pathology Division, Dietetic and Nutrition Unit, Laundry Unit, Transport Unit and Engineer Detachment. The 37 Military Hospital consistently receive RTA cases. (The Study's Desk Review Report, 2022). The 37 Military Hospital, being the only functional military base teaching hospital in Accra, is designated as the National Emergency Response Hospital. It is an accredited teaching hospital by Ghana Health Service. 37 Military Hospital is chosen for this research because of its resource value and also, its importance as a national facility. (GAMS Annual Performance review, 2023).

3.2.3.3 The Emergency Response Agencies

Emergency response agencies are essential in Ghana when it comes to handling different public health and safety issues. The Ghana National Fire Service (GNFS), the National Ambulance Service (NAS) and National Disaster Management Organisation are the principal organizations engaged in emergency response. According to Ampofo, Torpey, Kumingah, and Sabi (2013), these organizations are in charge of reacting to medical emergencies, fires, and other calamities around the nation. Nationwide emergency medical response coordination and ambulance operations are handled by the National Ambulance

Service (NAS) (Ampofo et al., 2013). The Ghana National Fire Service (GNFS), on the other hand, is concentrated on emergency rescue operations, firefighting, and fire prevention (Ampofo et al., 2013).

The National Disaster Management Organization (NADMO) plays a pivotal role in emergency response and preparedness efforts. NADMO is responsible for coordinating disaster response activities, including natural disasters such as floods and droughts, as well as industrial accidents and other emergencies (Ampofo, Torpey, Kumingah, & Sabi, 2013). NADMO's role includes early warning systems, disaster mitigation strategies, and post-disaster relief and recovery efforts (Ampofo et al., 2013). The organization collaborates closely with other government agencies, NGOs, and international partners to ensure effective emergency management across the country. Through its proactive approach to disaster preparedness and response, NADMO aims to minimize the impact of disasters on communities and enhance resilience in Ghana (Ampofo et al., 2013). This integrated approach underscores NADMO's critical role in safeguarding lives and property during emergencies. These organizations work together with other relevant parties especially the Ministry of health during Medical Emergency situations to improve emergency response and readiness with the goal of enhancing public health outcomes and safety in Ghana as a whole. Relevant officials of these state agencies were contacted to provide their perspective to the objectives of this study.

3.2.4 Sampling and Sample Size

3.2.4.1 Sampling Technique

The selection of parts of the components in a population and concluding a study about the entire population based on the sample selected is known as sampling (DR Cooper & Emory, 2003; Suri, 2011).

However, it is also a subset of the populace and a percentage of the population in a study (Ackoff et al., 2010; Marshall et al., 2020). This is justified by Anderson (2010), who posits that gathering information from everyone in public is impossible to get a conclusive result. Still, in a small sample, it is possible to collect data from all. The sampling technique guides researchers in determining who to observe, interview, or analyse (Lindlof & Taylor, 2011). The purposive sampling technique, also called judgment sampling, is the deliberate choice due to the participant's qualities. It is a non-random technique that does not need underlying theories or a set number of participants (Yin, 2014). According to Teddlie and Tashakkori (2006), the purposive sampling technique involves selecting certain units or cases based on a specific purpose rather than randomly. Simply put, the researchers decide what needs to be known and sets out to find people who can and are willing to provide the information by knowledge or experience (Yin, 2014). It is typically used in qualitative research to identify and select the information-rich cases for the most proper utilization of available resources (Patton, 2002).

The purposive sampling approach was particularly advantageous for this study because it allowed the selection of key stakeholders with specialized knowledge and experience in emergency response systems. These stakeholders included emergency response officers, medical doctors, nurses, paramedics, and administrators within the GAFMS health facilities, as well as representatives from external agencies such as the National Disaster Management Organization, National Ambulance Service, Ghana National Fire Service (GNFS), and the Ministry of Health. According to Saunders et al. (2019), purposive sampling is effective when researchers seek to address specific research questions that require input from individuals with relevant expertise. For instance, emergency response officers of the GAMS, which serves as Ghana's de facto national emergency response hospital, were selected to provide insights into the hospital's operational strategies, resource allocation, and surge capacity preparedness. Similarly, medical personnel and paramedics were included due to their direct involvement in delivering

emergency care, which is critical for understanding the hospital's preparedness to manage road traffic incidents. This targeted approach ensured that the study captured diverse perspectives from key informants, enabling a comprehensive assessment of emergency preparedness.

One of the significant benefits of purposive sampling is its focus on obtaining detailed and reliable data by targeting participants who can articulate their experiences and knowledge. Neuman (2004) emphasizes that purposive sampling is particularly useful in qualitative research when researchers aim to identify and select information-rich cases for in-depth investigation. In this study, the selection of respondents from GAFMS was guided by their roles in managing road traffic emergencies, ensuring that the data collected was highly relevant to the study's objectives. Additionally, representatives from NADMO, NAS, GNFS, and MoH were purposively selected to provide insights into inter-agency collaboration and national-level preparedness efforts. These agencies play pivotal roles in Ghana's emergency response framework, and their inclusion in the study was essential for understanding how GAFMS integrates with other stakeholders to manage emergencies effectively. This approach aligns with Patton's (2002) assertion that purposive sampling is most effective when researchers aim to explore the experiences and perspectives of individuals who are directly involved in the phenomenon being studied.

Another advantage of purposive sampling is its flexibility and ability to adapt to the specific needs of the research. Unlike random sampling methods, which may include participants with limited relevance to the study, purposive sampling ensures that all selected respondents contribute meaningfully to addressing the research questions Saunders et al., 2016). In this study, the purposive sampling technique allowed the researcher to focus on respondents who were directly involved in emergency preparedness and response operations. For example, directors and administrators at the 37 Military Hospital were selected for their strategic roles in resource planning and policy implementation. Similarly, medical

officers and paramedics were chosen for their hands-on experience in managing road traffic emergencies. By focusing on these key informants, the study was able to explore critical aspects of emergency response, such as the preparedness of GAMS health facilities, the types of emergencies commonly encountered, and the challenges associated with surge capacity preparedness. This targeted approach ensured that the data collected was both comprehensive and context-specific, providing valuable insights into the operational dynamics of GAMS.

Again, the use of purposive sampling in this study ensured that the selected participants were not only knowledgeable but also willing and able to share their experiences effectively. Djamba and Neuman (2002) highlight the importance of selecting respondents who can provide articulate, expressive, and reflective accounts of their experiences. In this study, participants were engaged through both in-person interviews and follow-up phone calls, allowing for the collection of detailed data. Additionally, the inclusion of member checks, where key informants validated findings, enhanced the credibility of the data. This method ensured that the findings accurately reflected the perspectives and experiences of the participants, contributing to the reliability and validity of the study. By focusing on purposive sampling, the study was able to achieve its objective of assessing the emergency response efforts and surge capacity preparedness of GAFMS, ultimately providing valuable insights into the preparedness of Ghana's emergency response systems for road traffic incidents. This approach underscores the importance of purposive sampling in qualitative research, particularly when studying complex phenomena that require input from experienced and knowledgeable participants.

3.4.2 Sample Size

In qualitative research, determining an appropriate sample size is guided by the principle of data saturation, which occurs when no new information, themes, or insights emerge from further data

collection (McCusker & Gunaydin, 2015; Moser & Korstjens, 2018). Saturation ensures that the data sufficiently addresses the research objectives without unnecessary redundancy. Unlike quantitative research, which relies on statistical power or representativeness, qualitative research focuses on information richness and the depth of insights obtained from participants (Ravitch & Carl, 2016). For this study, which seeks to assess the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services for road traffic incidents, a sample size of 23 participants was deemed sufficient. This sample size ensured comprehensive coverage of the study objectives while adhering to the principle of data saturation. The decision to conclude data collection after 23 interviews was informed by the replication strategy within case study research. According to Yin (2014), case studies require a sufficient number of cases to confirm or disprove emerging patterns. Similarly, Ravitch and Carl (2016), argues that qualitative case study designs do not depend on representative sampling but instead prioritize rich, detailed data. The study employed a purposive sampling technique to select participants, ensuring that emergency response officers, medical personnel, administrators from GAFMS, and representatives from related agencies such as NADMO, GNFS, and NAS were included. These participants were chosen for their direct involvement in emergency preparedness and response operations, ensuring the relevance and richness of the data collected. While Ravitch and Carl (2016) suggest saturation is often achieved between 8 and 11 interviews, the expanded sample size ensured a broader representation of diverse perspectives, strengthening the findings.

Empirical evidence supports the flexibility of qualitative sample sizes. Boeren (2017) notes that saturation can be achieved with sample sizes ranging from 5 to 50 participants, depending on the complexity and scope of the study. This research, including 23 participants, ensured both diversity and depth in the data, aligning with established guidelines for qualitative studies. The final sample comprised emergency response officers, Deputy Chief of Staff Medical, NADMO representatives,

commanders and administrators at the 37 Military Hospital, Regional Fire Officers, and medical personnel such as doctors, nurses, and paramedics. This variety of roles provided a comprehensive understanding of preparedness and response efforts, confirming emerging themes and offering a robust basis for analysis. The study's approach to sample size determination was consistent with the principle of literal replication, which involves selecting cases to test the reliability of observed patterns (Yin, 2014). By including diverse participants, the study validated findings from the scoping review while ensuring perspectives on emergency preparedness and response efforts were captured. By the 23rd interview, no new information emerged, confirming that saturation had been achieved. This justified the decision to stop data collection, ensuring the data was sufficient to address the research questions and objectives comprehensively.

The sample size of 23 participants was determined based on the principles of data saturation, information richness, and replication strategy. Saturation, achieved when additional data collection yields no new insights, is a widely accepted benchmark for qualitative research (McCusker & Gunaydin, 2015; Moser & Korstjens, 2018). The study's focus on engaging participants with relevant expertise ensured the data was both detailed and comprehensive (Ravitch & Carl, 2016; Merriam & Tisdell, 2016). Additionally, the replication strategy validated observed patterns, while adherence to established guidelines, such as Boeren's (2017) recommended range of 5 to 50 participants, confirmed the sufficiency and robustness of the sample size. By ensuring that the sample size aligned with qualitative research principles, the study effectively captured the preparedness and response efforts of GAFMS for road traffic incidents.

3.3.4 Source of Data

The study primarily relied on primary data, collected directly from key stakeholders and personnel involved in emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services. Primary data, as noted by Saunders et al. (2019), is firsthand information gathered from original sources, ensuring that the data is specific, relevant, and reflective of the realities under investigation. This was crucial for the study as it aimed to provide in-depth insights into the preparedness and operational challenges faced by GAFMS in managing road traffic emergencies. The decision to use primary data was guided by its ability to capture real-time experiences and perspectives from individuals directly involved in emergency responses. Neuman (2014) emphasizes that primary data is essential for answering specific research questions and obtaining data that is contextually grounded. To ensure comprehensive coverage, the study collected data from personnel at the 37 Military Hospital, the de facto national emergency response hospital in Ghana, as well as staff from 12 Medical Reception Stations under GAFMS. This inclusion ensured that the data reflected the scope and diversity of emergency response operations within GAFMS. However, newly established facilities like the Kumasi Military Hospital were excluded due to their lack of operational data at the time of the research.

In addition to GAFMS, purposive interviews were conducted with representatives from NADMO, NAS, GNFS, and the Ministry of Health. These agencies were included because of their pivotal roles in Ghana's emergency response framework, providing perspectives on inter-agency collaboration and resource allocation. Ravitch and Carl (2016) argue that involving multiple stakeholders enhances the richness of qualitative data, ensuring a holistic understanding of the studied phenomenon. The selection of these agencies ensured a multi-faceted assessment of the emergency response ecosystem. Empirical evidence supports the use of primary data in qualitative research as it enables the collection of rich, detailed, and specific insights. For instance, McCusker and Gunaydin (2015) highlight that primary data

facilitates the exploration of complex and context-specific issues, which is essential for studies involving emergency preparedness.

3.4 Data Collection Method and Data Collection Procedure

3.4.1 Data Collection Method

This study employed semi-structured interviews as the primary method for collecting qualitative data, ensuring the capture of rich, detailed, and context-specific information about the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services for road traffic incidents. Semi-structured interviews are widely recognized as effective in qualitative research for their adaptability and depth (Qu & Dumay, 2011; Saunders et al., 2019b). They allow researchers to design a set of predefined questions based on the study's objectives while maintaining the flexibility to explore emerging themes or adapt to the flow of the conversation. This flexibility is particularly useful in studies involving complex systems like emergency response, where participants' experiences may reveal unexpected yet crucial insights. The semi-structured interview method is supported by empirical evidence, with Lewis (2015) highlighting its ability to capture perspectives that enrich the understanding of multifaceted phenomena. Similarly, Haradhan (2018) emphasizes that semi-structured interviews enable researchers to uncover the meaning behind participants' experiences, providing a deeper understanding of the topic.

The primary research instrument's interview guide was meticulously developed to align with the study's objectives. Questions were grouped under key themes such as resource allocation, operational readiness, inter-agency collaboration, and surge capacity challenges. These themes were based on preliminary research and insights from existing literature, ensuring comprehensive coverage of the study's focus areas (McKim, 2017; Otani, 2017). The inclusion of open-ended questions encouraged participants to

provide detailed narratives while probing questions allowed the researcher to clarify and expand on responses. For instance, participants were asked to describe specific scenarios where surge capacity was tested, followed by questions exploring how these experiences shaped their perspectives on preparedness. Saunders et al. (2019a) I argue that open-ended questions are instrumental in qualitative research. They facilitate the collection of detailed and meaningful data, enabling researchers to capture the full complexity of participants' experiences.

Empirical studies further underscore the value of semi-structured interviews in qualitative health and emergency research. Moen and Middelthon (2015) highlight their effectiveness in capturing the lived experiences of participants, providing insights into real-world challenges and decision-making processes. This adaptability was critical for this study, as the context of emergency preparedness often involves dynamic and unpredictable scenarios. By using semi-structured interviews, the researcher was able to delve into the unique challenges faced by GAFMS personnel and other stakeholders, ensuring that the data reflected the intricacies of their roles. This method also facilitated the inclusion of participants' unique perspectives, enriching the study's findings with insights that extended beyond the initial scope of inquiry.

In addition to its flexibility, semi-structured interviews are known to foster rapport between researchers and participants, encouraging open and honest communication. Corbin and Strauss (2012) argue that building trust during interviews is crucial for eliciting authentic responses, particularly when discussing sensitive or complex topics. This was especially relevant for this study, as participants were asked to share detailed accounts of operational challenges, resource constraints, and inter-agency dynamics. Establishing the rapport enabled the researcher to obtain candid and comprehensive responses, ensuring that the data was both reliable and reflective of participants' realities. By employing semi-structured

interviews, this study achieved a holistic understanding of the emergency response efforts and surge capacity preparedness of GAFMS, contributing valuable insights to the field of emergency management.

3.4.2 Data Collection Procedures

The data collection procedures for this study were meticulously planned to ensure reliability, credibility, and ethical integrity. The process began with the development of an interview guide, which underwent pretesting to ensure that the questions were clear, relevant, and aligned with the study's objectives. Pretesting involved conducting pilot interviews with a small subset of the target population, allowing the researcher to identify and address potential challenges, such as ambiguous wording or logistical issues (Saunders et al., 2019). This step was critical in refining the guide to enhance its effectiveness during the main data collection phase. Ethical approval was obtained from the GAMS institutional review board, ensuring adherence to ethical research standards. Informed consent was sought from all participants, who were briefed about the study's purpose, objectives, and procedures. This step emphasized the voluntary nature of participation, ensuring that participants felt comfortable sharing their experiences (J. McMillan & Schumacher, 2014). Participants were purposively selected to ensure that they represented key stakeholders in Ghana's emergency response framework. This included personnel from GAMS, such as emergency response officers, medical staff, and administrators at the 37 Military Hospital, as well as representatives from NADMO, NAS, GNFS, and the Ministry of Health. According to Neuman (2014), purposive sampling is ideal for qualitative research as it targets information-rich respondents who can provide detailed insights. The selection process focused on individuals with direct involvement in emergency preparedness and response, ensuring the data collected was relevant and comprehensive. Before the interviews, participants were briefed on the study's objectives and assured of confidentiality, fostering trust and encouraging them to share their experiences candidly.

The interviews were conducted in person to facilitate rapport and allow the researcher to observe non-verbal cues, which can provide additional context to participants' responses (Saunders et al., 2019a). Each interview lasted approximately 20–30 minutes, a duration that balanced the need for detailed responses with respect for participants' time constraints. The interviews were audio-recorded with participants' consent to ensure the accuracy of the data. This also allowed the researcher to focus on the interaction rather than extensive note-taking, creating a more natural and engaging environment for the conversation. Observational notes were taken alongside recordings to capture contextual details, such as participants' emotional responses or body language, which enriched the data and provided additional layers of understanding. To validate the data collection process, member checks were employed, allowing participants to review and confirm the accuracy of their responses. This technique minimized the risk of misinterpretation and ensured that the findings accurately reflected participants' perspectives (Ravitch & Carl, 2017). Probing questions were used to clarify ambiguous responses and explore emerging themes, ensuring that the data was both comprehensive and meaningful. This systematic approach to data collection ensured that the study captured an understanding of GAMS's emergency response efforts and surge capacity preparedness, providing a strong foundation for subsequent analysis and interpretation. By adhering to best practices in qualitative research, the study ensured that the data collection procedures were rigorous, reliable, and aligned with its objectives.

3.4.1 Piloting the Study

A pilot study was conducted as a crucial preliminary step to refine and validate the research instruments and methodologies for assessing the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services. The pilot study utilized the World Health Organization, Field Manual for Assessing Preparedness for Emergency Response, which was tested across four GAMS

health facilities. Commanding Officers, Senior Medical Officers, and Emergency Response Officers from each of these facilities were selected to review and model the manual to their specific contexts. This phase of the research was essential to ensure that the study's objectives and methods were contextually relevant, feasible, and capable of producing high-quality results. According to van Van-Teijlingen and Hundley (2002), pilot studies play a critical role in identifying and rectifying potential issues in research design, improving the reliability and validity of the findings in the full study. The pilot study focused on evaluating the appropriateness of the WHO Field Manual as the primary research instrument. Feedback from participants highlighted the need to adapt the manual to the unique operational and structural dynamics of GAMS facilities. This aligns with the recommendation by Kothari (2004) that pilot studies allow researchers to fine-tune instruments to align with local contexts and objectives. For example, during the pilot, several probes included in the initial in-depth interview guide were found redundant as participants naturally provided detailed information about their facilities, experiences, and operational challenges. Removing these probes enhanced the clarity and focus of the instrument, ensuring it captured the most relevant data. The process of tailoring the manual and interview guide demonstrated the importance of pilot studies in aligning research tools with the realities of the field.

Empirical evidence supports the necessity of piloting research instruments to enhance their effectiveness. Kim (2011) notes that pilot studies help assess whether research questions are comprehensible to participants and whether the data collection instruments can reliably capture the required information. In this study, the pilot phase allowed the researchers to identify ambiguities, test the feasibility of the data collection process, and assess the participants' willingness to engage with the research instruments. Feedback from the pilot participants was integral to developing a revised WHO Field Manual tailored to the specific needs of the GAMS health facilities. This adaptation ensured that the manual provided a

comprehensive framework for assessing preparedness while reflecting the unique operational contexts of the facilities. Upon completing the pilot study and refining the research instruments, the full study commenced with ethical clearance from the Institutional Review Board of the 37 Military Hospital. Ethical approval ensured that the study adhered to international research standards, including respect for participants' confidentiality, informed consent, and voluntary participation (McMillan & Schumacher, 2001). The pilot study's outcomes not only validated the appropriateness of the research tools but also enhanced the credibility and reliability of the data collected in the full study. This approach aligns with best practices in qualitative research, emphasising the iterative refinement of instruments to ensure rigor and alignment with the study's objectives (Saunders et al., 2019). Through this process, the pilot study established a solid foundation for the comprehensive investigation of GAMS's emergency preparedness and surge capacity efforts, contributing significantly to the study's overall success.

3.4.2 Validity and Reliability Issues of the Study

In qualitative research, ensuring validity and reliability is essential for establishing the credibility and trustworthiness of findings. For this study, which employed in-depth interviews, meticulous processes were adopted to enhance data accuracy and validity. Audio recordings of the interviews were played twice before transcription to familiarize the transcriber with the participants' tone, emphasis, and speech patterns. This practice aligns with Vaivio (2012) assertion that audio reviews are necessary to capture the and context of participants' responses. The transcriptions were initiated immediately after each interview and completed within 7 to 14 days. Prompt transcription minimizes the risk of memory decay, allowing researchers to incorporate non-verbal cues such as gestures and expressions into the analysis. Braun et al. (2021) I emphasize that nonverbal cues are crucial for interpreting participants' responses in qualitative research, as they add depth to the verbal data. A systematic verification process followed

transcription, where audio recordings were played twice while the transcripts were reviewed to ensure that the written data accurately represented the spoken content. This rigorous approach minimized errors, improving the reliability of the study findings.

The study also validated the WHO field assessment manual, an essential tool for data collection, to ensure its suitability for assessing emergency preparedness and surge capacity within the Ghana Armed Forces Medical Services (GAMS). The manual's data collection processes were cross-checked in the field to confirm consistency and authenticity. Additionally, phone calls were made to department heads of health facilities to verify the accuracy of the information collected. Saunders et al. (2019) stress the importance of cross-verifying data with multiple sources in qualitative research to enhance validity and reduce potential biases. This iterative validation process ensured that the WHO manual was contextually relevant and aligned with the operational realities of GAMS. By refining the manual based on field feedback, the researchers ensured they could collect accurate and consistent data, thereby contributing to the study's reliability. This thorough validation ensured that the manual remained a robust tool for assessing preparedness.

The study employed member checking to further enhance validity, a process where preliminary findings were shared with participants for confirmation and feedback. Kimberlin and Winterstein (2008) identify member checking as one of the most effective techniques for ensuring the credibility of qualitative research findings. Participants from the 13 health facilities involved in the study were contacted to review and validate the themes identified during the analysis. The themes were explained in detail, and participants were invited to provide feedback or suggest corrections. This process ensured that the findings accurately reflected the participants' perspectives and experiences. Moreover, member checking reinforced the transparency of the research process, building trust between the researcher and participants. Creswell and Poth (2018) argue that achieving data saturation, where no new information

emerges during member validation, is a critical indicator of robust and reliable findings. In this study, the absence of new information during member checking confirmed that the data had reached saturation, demonstrating the validity and comprehensiveness of the findings.

3.5 Method of Data Analysis – Thematic Analysis

The raw data obtained from research is useless unless it is transformed into information for decision-making (Cooper & Schindler, 2006). According to McMillan and Schumacher (2010), data analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. Data analysis was developed to deal with the manipulation of the information that was gathered to present the evidence. The data collected was edited to check contradictions and ensure consistency. During data processing and analysis, qualitative data collected through the interviews was checked well to ensure that all items on the interview guide were captured. Each datum collected was numbered to facilitate effective processing and analysis of the data. Transcription of recorded tapes and notes was taken during the period the interviews was carried out to ensure that all issues are effectively captured in the study (Yin, 2014). According to Creswell (2009) anytime data is retrieved from the field, the researcher must first make meaning of the bulk data that has been collected in the form of pictures and scripts. The scholar goes on to say that a researcher must also prepare the data for analysis before delving further and deeper into the data to fully grasp it. In this study, the researchers did a thorough reading of the whole data set to discover the wider themes and patterns in which the participants discussed the issues under investigation. Following that, codes were allocated, and themes were produced. The researchers adopted the thematic analysis approach in analysing the responses provided by the respondents. Yin (2014) states that thematic analysis is the appropriate method in qualitative research as it is used in identifying, analysing, and reporting patterns within data.

Also, they posit that thematic analysis allows for rich, detailed, and complex descriptions of data collected. In this context, the thematic analysis was done manually by categorizing and compiling data collected from respondents into sub-themes. The thematic analysis goes beyond simply counting phrases or words in a text and identifying implicit and explicit ideas within the data. As the name implies, the thematic analysis relies on inductive reasoning, in which themes emerge from the raw data through repeated examination and comparison.

The analysis of empirical data for this study employed thematic analysis, a qualitative method widely recognized for its flexibility and effectiveness in identifying patterns and themes within datasets (Braun & Clarke, 2013). The initial step involved organizing data from voice recordings into categories based on participants' health facilities, roles, and responsibilities. This categorization ensured that the context of each response was understood, laying a solid foundation for subsequent thematic analysis. Braun and Clarke (2013) emphasize that thematic analysis is suitable for any qualitative dataset and adaptable to various research contexts, making it ideal for this study on emergency response efforts and surge capacity preparedness. The organization of data by units and roles allowed the researcher to recognize relationships between the participants' contexts and their perspectives, enhancing the depth and precision of the analysis. For instance, perspectives from emergency response officers were categorized separately from those of administrative personnel, enabling an understanding of their distinct challenges and contributions to preparedness efforts.

The second phase of analysis focused on familiarizing them with the data, where voice recordings were listened to repeatedly, and transcripts were thoroughly read. This immersion allowed the researcher to develop initial impressions and note potential themes relevant to the research objectives. As recommended by Nowell et al. (2017), familiarization is critical for identifying both explicit and implicit meanings within qualitative data. During this stage, the researcher also recorded non-verbal cues and

contextual details, such as pauses, tone variations, or emotional responses, which added depth to the analysis. This process ensured that the study captured not only the content but also the subtext of participants' responses, providing richer insights into the challenges and dynamics of emergency preparedness. By thoroughly familiarizing themselves with the data, the researcher laid the groundwork for identifying themes that accurately reflected the participants' realities.

The next step involved coding the data to identify meaningful segments directly related to the study's objectives. Using an inductive approach, codes were derived from the data without being influenced by pre-existing theories or frameworks. This method aligns with Clarke and Braun's (2017) suggestion that inductive coding fosters a deeper understanding of context-specific phenomena. Codes such as "resource limitations," "inter-agency coordination," and "preparedness challenges" emerged during this phase, reflecting the core issues participants raised. Each code was systematically categorized under broader themes to provide structure to the dataset. Boyatzis (1998) emphasizes that effective coding is essential for identifying patterns and relationships within data, serving as the foundation for subsequent thematic exploration. This phase also involved reviewing and refining codes to ensure clarity and relevance, which is critical for maintaining the validity of the analysis. Cross-checking of codes by co-researchers further enhanced reliability and minimized bias in the coding process.

In the fourth phase, the researcher focused on identifying and reviewing themes that captured the essence of the data. Themes such as "preparedness challenges," "resource allocation," and "collaborative dynamics" were refined and validated through iterative analysis. According to Braun and Clarke (2013), this phase requires researchers to ensure that themes are cohesive, distinct, and directly aligned with the research questions. For example, the theme "preparedness challenges" encompassed sub-themes like training inadequacies and equipment shortages, offering a detailed view of the obstacles faced by health facilities. The iterative review of themes, combined with regular discussions among co-

researchers, ensured that the identified themes were both comprehensive and representative of the dataset. This step reinforced the credibility of the analysis, ensuring that the themes provided a meaningful framework for interpreting the data.

The integration of themes into the findings involved synthesizing the results into a coherent narrative that addressed the research questions. Each theme was described in detail, supported by direct quotes from participants to maintain authenticity. Braun and Clarke (2013) note that thematic analysis excels at providing in-depth descriptive accounts, making it particularly useful for studies requiring insights. For example, the theme "inter-agency coordination" highlighted the complexities of collaboration between the Ghana Armed Forces Medical Services and external agencies, offering practical insights into improving emergency response efforts. By integrating themes into a cohesive narrative, the study presented a robust and detailed analysis of the emergency response system. This approach ensured that the findings were not only theoretically grounded but also actionable, contributing valuable knowledge to the field of emergency management. The qualitative data conducted with all other categories of respondents was analysed manually by making summaries of the respondents' views. The analysis was organized under themes derived from the data and the research questions that guided the entire investigation. The researchers assign IDs to each respondent, listens to all interview recordings to become familiar with each interview's content, and notes the meanings of responses relevant to the study. The researcher then clusters the meanings of responses with the same content, condenses them into themes, and discuss the themes that come out until an agreement is reached on the interpretation of the data. The responses were coded **R1** to **R23,** where **R1** to **R23** represents the first respondent to the last respondent respectively.

3.6 Ethical Consideration

Ethical considerations are a cornerstone of qualitative research, ensuring the rights, dignity, and well-being of participants are respected throughout the research process. For this study, the researchers adhered to rigorous ethical standards to safeguard the interests of participants and maintain the credibility of the findings. Ethical clearance was obtained from the Institutional Review Board of the 37 Military Hospital, Accra (37MH-IRB IPN 162/2018), confirming that the study met the required ethical protocols. Additionally, approval was sought and granted by each department and institution involved in the study to ensure that institutional guidelines and expectations were met. These approvals provided legitimacy to the research process and reassured participants of the study's adherence to ethical standards (Arshed & Danson, 2014). To ensure informed consent, eligible participants were provided with detailed information about the study, its objectives, and the scope of their involvement. A participant consent form was presented, outlining their rights, the voluntary nature of participation, and their ability to withdraw from the study at any time without repercussions. According to McMillan and Schumacher (2010), informed consent is a critical component of ethical research, as it ensures participants clearly understand their role and the potential risks and benefits associated with the study. Participants were given ample time to review the consent form, ask questions, and make an informed decision about their participation. Consent was documented through the participants' signatures, which served as formal evidence of their agreement to take part in the study.

The study also prioritized confidentiality and privacy to protect participants' identities, and the sensitive nature of the data collected. Data collected during the interviews, including audio recordings and transcriptions, were securely stored and accessible only to the research team. Identifiable information was anonymized during the transcription and analysis phases to prevent any breach of confidentiality. Creswell and Poth (2017) emphasise that maintaining confidentiality is essential for fostering trust

between researchers and participants, particularly in qualitative research involving sensitive topics like emergency preparedness. The study minimized the risk of unauthorized access or disclosure of participants' information by anonymizing data and implementing secure storage protocols. Furthermore, the researchers adopted a culturally sensitive approach to ensure that the study respected the participants' and institutions' norms and values. This approach involved consulting with institutional representatives and local stakeholders to align the study's procedures with culturally appropriate practices. Ethical research requires not only adherence to formal protocols but also a recognition of the sociocultural context in which the research is conducted (Sekaran & Bougie, 2016). By engaging with local stakeholders and institutional representatives, the researchers ensured that the study was both ethically sound and contextually relevant.

3.7 Chapter Summary

This study adopted a qualitative research approach to assess the emergency response efforts and surge capacity preparedness of the Ghana Armed Forces Medical Services in managing road traffic incidents. The qualitative methodology was selected for its ability to provide in-depth insights into complex phenomena, focusing on the experiences, perceptions, and operational strategies of key stakeholders. The study employed a systematic and bibliometric review, supported by semi-structured interviews, to capture comprehensive data. The systematic review followed the Arksey and O'Malley (2005) framework, incorporating eligibility criteria, data extraction, and thematic analysis to synthesize findings from 83 peer-reviewed articles. Semi-structured interviews were conducted with purposively selected participants, including emergency response officers, medical personnel, and administrators within GAFMS, as well as representatives from NADMO, NAS, GNFS, and the Ministry of Health. This purposive sampling approach ensured the inclusion of information-rich respondents directly involved in emergency preparedness and response operations (Saunders et al., 2019). Data collection was guided by

a carefully developed interview guide aligned with the study's objectives and themes. Ethical clearance was obtained from the 37 Military Hospital Institutional Review Board, and informed consent was secured from all participants. Thematic analysis, as outlined by Braun and Clarke (2013), was used to analyze the qualitative data, enabling the identification and interpretation of patterns and themes related to resource allocation, inter-agency coordination, and operational challenges. Rigorous measures, including member checking and triangulation, were implemented to ensure the validity and reliability of findings, contributing to a robust understanding of GAFMS's preparedness and response capabilities in addressing road traffic emergencies.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

4.0. CHAPTER OVERVIEW

This chapter of the study discusses the results in three parts. The first part is the scoping review results on ‘what’ emergencies are presented to the various health facilities in Ghana. The second part also deals with the results of ‘what’ is the topmost emergency presented at the national emergency response hospital. The third part concerns itself with ‘how’ the national emergency response hospital is prepared to respond to the topmost emergency that presents to the facility. These findings were put into themes for the discussion. The last part presents the chapter summary of the study.

4.1 ANALYSIS AND DISCUSSION OF SCOPING REVIEW FINDINGS

4.1.1 WHAT CASES REQUIRE EMERGENCY RESPONSE BY HEALTH FACILITIES IN GHANA

From the scoping review, it was found that Road Traffic Accidents, Pregnancy and Child-birth complications, Cardiovascular conditions, Injuries, Infectious diseases or Public Health emergencies are the commonest cases that require emergency response by health facilities in Ghana.

4.1.2 Road Traffic Accidents

From the gathered data, it was obvious that road traffic accidents were among the usual forms of emergencies reported at health facilities in Ghana. In a study by Norman et.al., (2012) to examine the preparedness of health facilities in dealing with emergencies, it was found that health facilities are largely confronted with emergencies involving victims of road accidents. Norman et.al. adopted the cross-sectional survey and collected data from 22 regional and district hospitals across the then 10 regions of Ghana. According to the researchers, although other emergencies were brought to these facilities, burns and casualties resulting from vehicular accidents were among the commonest emergencies. Similarly, Adamtey et.al. (2015) ranked motor traffic accidents as the highest occurring emergency health situation reported across hospital facilities in the Bibiani District of Ghana. Based on the study, it was revealed that recklessness by drivers contributed significantly to the rise in motor traffic accident cases being brought into health centres in the district. The aforementioned finding and assertions were premised on data collected from the hospitals over a 10-year period, in essence, between the period of 2003 and 2014.

Mahama et.al. (2018), also established that road traffic accidents are among the leading number of cases that require emergency responses by hospitals and health facilities across Ghana. In another study by

Mould-Milman et.al. (2015), it was again identified that road accidents make up a large number of situations that require emergency care by health professionals in the Ashanti Region of Ghana. According to Mould-Milham et.al., the Ashanti Region is one of the regions in Ghana that records high rates of vehicular accidents or road traffic collision with victims presented to emergency centres for immediate medical attention. Whiteside et.al. (2012) also indicated that road traffic injuries were the commonest form of injuries presented to the Komfo Anokye Emergency Unit. In their study, Whiteside et.al. (2012) established that whereas majority of these injuries were presented by people involved as a result of car crashes, there were also injuries presented by pedestrians, motorcyclists and their passengers and users of bicycles. Ampofo et.al., (2013) in an examination of emergency health cases in Ghana, found road traffic accidents as a burdensome emergency phenomenon that requires critical care in emergency units of Ghanaian health facilities. Ampofo et.al. (2013) indicated that the increasing number of emergencies presented at health facilities in the country can be linked to road traffic injuries. According to the aforementioned scholars, this phenomenon could be alluded to bad road networks and reckless driving. Oteng et.al., (2018) also conducted a cross-sectional study to assess emergency cases presented to urban emergency centres in Ghana and found out that road traffic injuries were among the commonest forms of injuries presented to emergency units. In their study, Oteng et.al. (2018) revealed that road traffic injuries reported to emergency units in urban areas were as a result of car crashes, motorcycles collusion with cars, and riders falling-off their motorcycles. Some injuries were also reported by pedestrians somehow were knocked down by vehicles or motorcycles.

In a related study by Blankson et.al., (2019) to ascertain injury cases at the Accident Centre of Korle Bu Teaching Hospital, it was found that road traffic accidents made up majority of injury cases in the accident unit. According to the aforementioned study, out of 17,860 recorded injuries at the facility, road traffic related injuries alone accounted for 39.1%. Blankson et.al., (2019) also found that 2,838 of the

road traffic injuries involved passengers of commercial vehicles, 2,668 of the recorded injuries were sustained by pedestrians, and 1,478 were motorists and occupants of privately-owned vehicles. Another fascinating finding from their study is that the highest number of injuries were presented during weekends. From the review of the aforementioned studies, it was found that emergencies as a result of road traffic accidents could be burns, broken limbs, and head injuries, among others. It is also worth mentioning that some of these road traffic accidents occur in the forms of collisions and pedestrians being struck down.

4.1.3. Pregnancy and Birth-Related Complications

From the scoping review of literature around medical cases that require emergency responses in Ghanaian hospitals, it was found that complications as a result of pregnancies and childbirths were some of the leading exigencies that hospital staffs needed to attend to with immediacy. According to Adamtey et.al., (2015) cases of "pregnancy and birth-related complications" are mostly brought to hospitals in the Biabini District for emergency medical care. In their study, Adamtey et.al., (2015) hinted that maternity-related health issues are one of the commonest emergency cases in hospitals throughout the country. A similar finding was reported by Afari et.al., (2014) based on data collected on emergency obstetric referrals in the Assin North District. In their study, it was revealed that obstetric cases were among emergency health care issues in hospitals in that district.

Among many other scholars, Kyei-Onanjiri et.al., (2018), Daniels & Abuosi (2020), also mentioned that birth related complication and obstetric cases are critical health emergencies that require emergency care by hospitals and specialist centres across the country. In their study Mould-Milham et.al., (2014) similarly found that obstetric cases make up one of the commonest emergency cases presented to hospitals and emergency health facilities in the Ashanti Region. According to the aforementioned research study, some emergency obstetric complications presented to Komfo Anokye Teaching Hospital

(KATH) include, post-partum hemorrhage and arrested labour. Others are also presented for emergency medical attention due to sepsis, shock, acute respiratory and diarrhea-related emergencies. Ampofo et.al. (2013) indicated that health emergencies recorded at some Ghanaian health facilities were largely obstetrics and pregnancy-related. Based on another study by Ampofo et.al. (2016), it was established that pregnant women are sometimes presented for emergency medical attention due to injuries they have sustained.

In this study, it was found that pregnant women were sometimes victims of road traffic accidents, falls, and poisoning. Others were also presented for emergency care as a result of assault-related injuries. In another study by Afari et al. (2014), it was indicated that emergency obstetric cases are among some alarming health emergencies presented to hospitals in the Assin North district of Ghana. Based on the study, the critical nature of some of these cases requires extreme cautiousness and immediacy in referring such patients to more equipped health facilities to save their lives. Similarly, Awoonor-Williams et al. (2015) reported that maternal emergencies were among the dominant emergency cases reported to hospitals and health facilities in Northern Ghana. In another study by Amu and Nyarko (2016), it was established that health facilities in Ghana are mostly confronted with emergency cases that has to do with pregnancies. According to Amu and Nyarko (2016), although advancements have been made to tackle maternal mortality across the world, life-threatening emergencies are still recorded at health facilities in the country. In Ghana, pregnancy-related emergencies can include complications such as: Hemorrhage: excessive bleeding during delivery or after delivery; Eclampsia, a condition in which a woman with pre-eclampsia (high blood pressure and protein in the urine) develops seizures; Preterm labour; labour that begins before 37 weeks of pregnancy; Obstructed labour: labour that is not progressing normally due to a blockage of the birth canal; and Ruptured uterus: a tear in the uterus that

can lead to life-threatening bleeding (Amu & Nyarko, 2016; Awoonor- Williams et al., 2016; Daniels & Abuosi, 2020).

4.1.4. Other Acute Medical Issues

This study operationalises acute medical conditions to be sudden and severe health complications that require emergency attention. Health emergencies grouped under this theme include diarrhea cases, malaria, cholera and excessive vomiting. Adamtey et.al. (2015) recorded excessive vomiting, cholera and diarrhea as some critical cases that are presented to hospitals and health facilities across Ghana for emergency attention. According to Adamtey et al. (2015) there are situations and periods when health facilities witness a surge in such cases and need to be proactive in containing these health emergencies. In another study, Gborgbortsi et al. (2022) also indicated that health facilities in Northern Ghana regularly record health emergencies associated with cholera and diarrhea cases. These studies have revealed that malaria is one of the most common ailments in most parts of the country and people who fail to manage this disease at the onset get to be presented to health facilities for emergency attention when their situation worsens. It was also revealed that diarrheal diseases such as cholera and fever could be critical in some patients and these situations ardently require emergency health attention, especially when they are presented to health facilities (Gborgbortsi et al., 2022). Adamtey et al. (2015) also indicated that snake bites are among some acute emergency cases presented to health facilities especially in rural Ghana.

4.1.5. Cardiovascular Condition

From reviewed studies, it is evident that patients with cardiovascular or heart-related conditions were also rushed to hospitals for emergency care. Mould-Millham (2015) for instance indicated that the Komfo-Anokye Teaching Hospital in Kumasi has recorded a significant number of emergency cases in relation to heart conditions. Studies by African Check (2015) as well as Ofori-Asenso and Garcia (2016)

point to the fact that there is a growing number of heart-related conditions and emergencies in the country. According to Ofori-Asenso and Garcia (2016), the rate at which people are being rushed to hospitals as a result of cardiovascular ailments is alarming and remains a major health concern that must be critically addressed. Norman, Aidoo, and Boateng (2012) also found that hospitals in Ghana record emergency cases on heart-related emergencies. Another study by Anto-Ocrah (2020) revealed that cardiovascular conditions are becoming increasingly common in a country such as Ghana and there are a lot of heart-related cases presented to health facilities across the country for emergency medical attention. Similarly, Doku *et al.* (2022) found that cardiovascular disorders such as arrhythmia is among some leading emergency cases at hospitals within Accra. The aforementioned scholars (Ofori-Asenso & Garcia, 2016; Doku et al. 2022) revealed that Sub-Saharan Africa is by far one of the regions experiencing a mammoth rate of cardiovascular conditions in the world. Based on the literature, cardiovascular conditions in Ghana that require emergency attention cuts across myocardial infarction, hypertension, stroke, chest pain, coronary artery diseases, heart failure, thrombosis, and cardiac arrhythmia, among others. From the foregoing, it could be suggested that heart-related medical conditions are being recorded as one of the leading health conditions that require emergency medical care in health facilities in Ghana.

4.1.6. Other Domestic Accidents and Injuries/ Other Types of Injuries

This study qualifies and operationalises domestic injuries as sudden health problems and traumas that occur in homes or dwelling places of victims or patients. These injuries could include burns, fractures, cuts, lacerations, bruises, bites and sprains. From the analysis, it was found that some of these situations required emergency assistants especially when sent to hospitals. Domestic injuries, also known as home injuries, refer to injuries that occur in or around the home and are a leading cause of death and disability

worldwide. According to the World Health Organization (WHO), over one-third of all injury-related deaths occur in the home, and children, older adults, and people with disabilities are at higher risk of experiencing a domestic injury. Common causes of domestic injuries include falls, burns, poisonings, and drowning.

In the Ghanaian context, Adamtey et al. (2015) mentioned that domestic-related injuries were among the leading emergency cases recorded at health facilities across the country. In their study, it was revealed that snake bites were among some conditions that needed emergency care in the Bibiani Anhwiaso Bekwai District. Ampofo et al. (2013) also established that there are significant numbers of domestic injuries recorded at emergency units of health centres in Ghana. According to Ampofo et al. (2013), the rate of domestic and other various types of injuries presented to hospitals for emergency attention is quite alarming and must be checked. Similarly, Mould-Milham et al. (2014) indicated that injury-related emergencies are one of the most rampant emergency cases presented to the Komfo Anokye Teaching Hospital in the Ashanti Region of Ghana. Oteng et al. (2018) found that some significant numbers of domestic injuries were recorded at urban emergency units across Ghana, many of which occurred as a result of falls, fights and assaults. According to Oteng et al. (2018), some injuries were also intentional. The study also established that whereas some injuries occurred at home, others were work-related. According to the studies above, domestic injuries reported to emergency units constituted head injuries, chest, limbs and other parts of the body. Additionally, it was revealed that most of the injuries reported by the victims as assaults and fights were inflicted by strangers. A relatively smaller number were however reported as self-harm.

In another study conducted by Blankson et al. (2019) to examine the types and patterns of injuries recorded at the Korle Bu Accident Centre, it was found that injuries sustained as a result of falls, assaults and burns were among the common types of injuries that were presented for emergency medical

attention. Some other injuries discovered by Blankson et al. (2019) include injuries from interpersonal violence, domestic violence related injuries, occupational injuries, animal bites, falling objects, collision with objects, and stepping on sharp objects. Additionally, smashed fingers, sexual assaults, and self-inflicted injuries were also presented to for emergency medical attention. In an earlier cross-sectional survey conducted by Whiteside et al. (2012) at the Komfo Anokye Emergency Unit, it was established that some paediatric patients presented for emergency care needed treatment for injuries. According to the aforementioned researchers, apart from road traffic related injuries, other injuries presented for emergency attention were as a result of falls. There were also injuries connected to assaults, fights, burns and lacerations. Okyere et al. (2019) also did a study at the Komfo Anokye hospital to examine injuries that require emergency medical attention. The study indicated that thoracic impalement injuries were among the critical health emergencies presented to the facility which required immediate surgeries.

4.1.7. Emerging Infectious Diseases Outbreak /Public Health Emergencies

Extant research has suggested that one of the emergency health issues that require urgent attention from health personnel is emerging and infectious diseases. These strands of emergencies are mostly categorised as public health emergencies because anyone in society could be a victim (Asiedu-Berkoe et al. 2022; Okoroafor et al. 2022). In Ghana, disease outbreaks such as epidemic cholera trigger public health concerns since it leads to a large number of people trooping into health facilities to seek emergency care. Other emerging and infectious diseases such Covid-19 has been among one of the most troubling health emergencies at health facilities in the country which has drawn considerable research attention to the public health emergency structure of the country (Adachi et al. 2022; Asiedu-Berkoe et al. 2022; Sarkodie et al. 2021).

4.1.7. Disasters (Flood related cases and Fire outbreaks)

Studies have indicated that there are several disasters that occur in Ghana which require immediate response from emergency health practitioners in order to salvage human lives. Hospitals across the country are likely to admit or cater for victims of disasters such as floods, fire outbreaks, collapsed buildings, and drought among others (UNDP Reports, 2017). Some of the infamous disasters in the country over the years include the northern flood in 1999, the Swedru floods in 2010; and the Dompoase mine collapse in 2009, among others (Asumadu-Sarkodie et al., 2015; Yin et al., 2022). In Accra for instance, there have been scores of natural disasters ranging from sporadic fire outbreaks, floods, and other human induced and natural disasters that led to grave casualties, loss of lives and properties. Some typical examples of these occurrences include the Achimota Melcom Disaster in 2012, the June 3rd 2015, Circle Disaster, the gas station explosion at Atomic in 2017; and other perennial floods that led to fatalities and loss of human lives. Obviously, all these occurrences required emergency medical response from health facilities and personnel within the capital. In their study to assess the state of emergency care in Ghana, Ampofo et.al., (2013) indicated that the occurrence of natural and unforeseen disasters has significantly swelled up the rate of emergency medical cases presented to hospitals and other health facilities. Perennial floods in some part of Ghana due to heavy rainfall patterns have been identified to be triggers of emergency cases. Flooding is recorded the most incessant natural disasters in Ghana, and this has been a major worry to policymakers, health professionals and citizens as a whole. Studies have suggested that heavy rainfalls sometimes pose emergency risk to people living in flood-prone areas and those who accidentally get affected by these floods (Dotse-Gborgbortsi et.al. 2022). Flood related cases could include injuries and even deaths. Based on their studies on emergencies focusing on Ghana, flood-related/induced injuries and casualties are among cases that require emergency response in health facilities across the country, particularly in areas where dangerous and intense flooding occur. Studies

reveal that flooding in areas such as Accra leads to road accidents, vehicles getting submerged in water, pedestrians falling into drains and the collapse of building/infrastructure. In cases like this, victims who are injured, traumatized/shocked or comatose are rushed to the health facilities for urgent medical attention. In some cases, affected people who do not have or show any evidence of medical issue also need urgent medical assessment to detect and manage any possible case of internal bleeding (Acheampong & Anokye, 2020). It has also been identified that heavy rainfall and resultant floods are causal agents of outbreaks of acute diarrhoeas in some parts of the country (Kumi et al., 2019). Disasters can have a significant impact on the functioning of hospitals and the delivery of emergency health services. During a disaster, hospitals may become overcrowded, leading to difficulties in providing adequate care to all patients (Mensah et al., 2021).

Disasters in Ghana can have a major impact on the delivery of emergency health services and can lead to significant public health challenges. Natural disasters such as floods and earthquakes can damage infrastructure, disrupt transportation and communication networks, and make it difficult for healthcare providers to reach those in need. Health facilities can also be damaged or destroyed, leaving communities without access to essential health services. In addition to the immediate health impacts of disasters, they can also have long-term consequences for public health in Ghana. For example, disasters can exacerbate pre-existing health problems such as poor sanitation and hygiene, leading to outbreaks of communicable diseases (Asare & Nyarko, 2022).

4.2 WHAT CASES REQUIRE EMERGENCY RESPONSE BY THE NATIONAL EMERGENCY RESPONSE HOSPITAL

This objective sought to answer the 'what' questions of administrators, bio-statisticians and health personnel herein referred to as the respondents on cases that required emergency response in their health facility. From the findings of the study, road traffic accidents, pregnancy and child-birth complications, cardiovascular conditions, sudden health problems and traumas, infectious diseases or public health emergencies emerged as major themes and are the commonest cases that required emergency response by health facilities under the Ghana Armed Forces Medical Services. The reason been that, it is the top-most cases recorded in their facility for a consistent period of time. These cases according to the interviewees have remained consistent with road traffic accidents mostly topping the list and the others alternating in their number of frequencies yearly.

4.2.1. What cases require emergency response

4.2.1.1 Road Traffic Accidents

Listening to the narratives of the respondents, road traffic accident, is the topmost case that are presented at the Trauma and Surgical Emergency Unit of the 37 Military Hospital.

> *"For the past 15 years that I have been working at the biostatistics unit, RTA is mostly the number one emergency that this facility responds to. Atleast that's what is captured in our electronic medical records also since its inception about 7 years ago." (BSTAT37-1).*

> *"The most frequent emergency case I mostly attend to in this Trauma and Surgical Emergency Unit is RTA, maybe because of our proximity to the motor way and the N1-Highway." (EMD-1)*

Another key respondent from the emergency response unit confirmed the above statement

"RTI constitute the major emergency cases we're normally called upon to respond to followed by pregnancy related emergencies and occasionally distress calls on cardiovascular emergencies" (ERU-IC)

Further revelations pointed to the fact that sometimes the NAS struggles with which facility to send RTI mass casualty cases.

"The facilities sometimes get overwhelmed at their EDs and keep diverting us from one facility to the other when we pick up RTI case (NAS)"

The issue of scarcity of paediatric colts in EDs during mass RTIs casualty involving children also came to light

"The ED has only two colts at the emergency unit to cater for children involved in RTIs. We're most times forced to treat them on adult beds when we get overwhelmed (EMD-2)"

Another key respondent revealed the difficulty in getting paediatric surgeons to handle paedics involved in RTI

"Another area of concern is the waiting time of the paedics at the emergency before getting the visiting paediatric surgeon to review and admit to the ward "(EN-3)

A respondent confirmed that there was no permanent paediatric surgeon on their strength.

"We have one doctor in training pursuing paediatric surgery. In the meantime, we have a visiting paediatric surgeon on locum basis." (HRM-37)

4.2.1.2 Pregnancy and Childbirth

The respondents of the study reported that the next emergency their facility responds to frequently aside the RTA is pregnancy and child-birth emergencies. The facility is a referral centre surrounded by many primary health centres both public and private such as; the Nima Government Hospital, Mamobi Polyclinic, Nyaho Clinic and Akai House Clinic among others. Further interactions with the study respondents reveal that, aside the hospital's own huge obstetrics cases, the surrounding health facilities often refer emergency cases of pregnancy and child-birth.

> *"As a midwife, I have been working at the Gynaecology Emergency for 10 years. We are mostly overwhelmed with pregnancy and child birth related emergencies, especially from our nieghbouring facilities." (MW-1)*

The above statement was confirmed in an interview with a key respondent.

> *"Our records show a high number of pregnancy and child birth emergency cases to our Gynaecology division. This type of emergency cases comes second to the RTA in order of frequency" (BSTAT37-1)*

Further revelations have showed that sometimes the maternity department gets overwhelmed with the number of emergency cases referred to them, which compels the administration to intervene.

> *"I actually make calls at times to neighbouring facilities to stop referring maternity cases to us and redirect to other facilities because our gynaecology emergency and the main maternity get*

overwhelmed at times with high numbers of pregnancy and child-birth related emergencies." (Admin37).

On the contrarily, some participants are of the opinion that, pregnancy and child birth related emergencies are not peculiar to the 37 Military Hospital alone, as the places they perform locum at also get overwhelmed at times with similar cases, necessitating referrals to other facilities.

"Pregnancy and child-birth emergencies are common in other facilities that we perform our locum though 37 Military Hospital is bigger and sees more cases, the other private facilities around also experience similar situations." (MW-2)

Another participant expressed concern about the size of the gynaecology emergency unit, which is just a 4-bed capacity making it difficult in times of surge in emergencies.

"To be honest, our GEU is an afterthought and though it serves a good purpose, it is too small and unbefitting of a facility like the 37 Military hospital. It has only 4 beds and a congested reception area for triaging and consulting" (MW-1)

4.2.1.3 Cardiovascular Conditions

The respondents of the study reported that cardiovascular conditions is among the top emergencies that the facility responds to on daily basis.

"We attend to a number of cardiovascular emergency conditions on a daily basis. Most them who get here early are able to recover from other associated complications and ultimately avoid death." (EMD-2)

> *"Our records confirm that cardiovascular conditions accounts for the top 3 emergency cases that this facility responds to." (BSTAT-2)*

This assertion was reiterated as one of the leading emergencies that the facility responds to;

> *"A lot of cardiovascular cases are received here on daily basis as emergencies. Sometimes some are brought in dead (BID), other times some can be revived others too barely make it because they report too late." (EN-1)*

> *"Sometimes we receive SOS calls to pick up patients who have had "heart attacks" from outside the hospital to the hospital. When we arrive at the scene we offer emergency care to the patient within the ambulance until we hand them over to the hospital" (EMT-1)*

4.2.1.4 Sudden Health Problems and Traumas

This study categorises domestic injuries as sudden health problems and traumas that occur in the homes or dwelling places of victims or patients. These injuries could include burns, fractures, cuts, lacerations, bruises, bites and sprains.

> *"We receive several other cases here such as burns, fractures, cuts, lacerations, bruises, bites and sprains" (EN-2)*

Another respondent shares experiences of other emergency cases they receive at the TSEU;

"we receive cases such as burns, lacerations cuts bruises and sprains most of which are as a result of domestic accidents or sports related injuries." (EMT-2)

"We receive other emergencies which are sustained as a result of falls, assaults and burns. These are among the common types of injuries treated at the TSEU." (EMD-2)

Interviews with the biostatisticians confirmed that these other cases also form part of the frequent cases they recorded in the EMR.

".....when we queried the EMR these other cases forms a significant number of cases reported at the TSEU as emergencies over the period." (BSTAT-2)

4.2.1.5 Emerging Infectious Diseases Outbreak /Public Health Emergencies

Majority of the respondents suggested that one of the emergency health issues that require urgent attention from health personnel are emerging and infectious diseases. They categorised these as public health emergencies because anyone in society could be a victim.

"One other emergency that we all need to pay attention to is what I term the emerging infectious diseases. Sitting here at the emergency unit, I see this trend gradually building up, even after the height of COVID-19. These are serious public health concerns." (EMD-1)

"Here, it is compulsory for patient and relatives to wear nose masks because there are infectious diseases in the air that we can't even be sure of and day in day out we receive such cases even after covid." (EN- 1)

"*the pregnant women come with other underlying conditions which are mostly infectious diseases. I don't know if the covid-19 is coming again. So we make sure everyone is in a mask here ooo. At times, I dey fear self." (*MW-2)

4.2.1.6 Disasters (Flood related cases and Fire outbreaks)

Hospitals throughout the nation are likely to admit or provide care for victims of disasters such as floods, fire outbreaks, collapsed buildings, and drought among others. The scoping review have shown that several disasters occur in Ghana that require an immediate response from emergency health practitioners in order to save human lives. The results showed that the GAMS responded to a number of disaster related emergencies.

"Being the designated national emergency and disaster response hospital, we have responded to several disaster cases such as the stadium disaster on 9 May 2001, the Melcom disaster on 7 Nov 2012, the 3 Jun 2015 water and fire disaster at Nkrumah Circle, the Trade Fair gas disaster on 22 Dec 2016, the Takoradi gas explosion on 9 May 2017, the Atomic junction gas disaster on 7 Oct 2017, Appiatse explosion on 20 Jan 2022 amongst others. In all of these casualties were received at our TSEU and treated." (Admin37)

"The emergency unit receive and treat several cases of flood and gas disaster victims from all part of the country. Those from outside Accra are airlifted by the airforce and received by our ambulance at our Helipad to the TSEU" (Comd 37)

"The Ghana Armed Forces Medical Services has Medical Reception Stations (MRS) across the country which respond to disaster and emergencies nationwide in collaboration with other stakeholders. Cases that need specialized care beyond the region or district affected are Air MEDEVAC to the military base hospital at the 37 Military Hospital Accra for specialist care". (DCOS(Med-GAMS)

"We receive emergency and disaster cases from all over the country through Air MEDEVAC or Ambulance services to the TSEU. Some of them are victims of building collapse, gas explosions, fire incidents, flood-related complications among others." (EMD-3)

4.3 HOW IS THE GHANA ARMED FORCES MEDICAL SERVICES PREPARED FOR EMERGENCY RESPONSE

The results of the preparedness of the GAMS in responding to emergencies are presented in 4 categories and represented in tables 4 to 4.3. The 4 categories include preparedness programmes and surge capacity planning, equipment and Supply, manpower and Ambulance Service consistent with W.H.O. standards and recommended best practices.

4.3.1 Preparedness Programmes and Surge Capacity Planning

Table 4 below covers the preparedness programmes and surge capacity planning for interventions in RTI cases within the Ghana Armed Forces Medical Services facilities evaluated. The following descriptors indicate whether facilities preparedness was Advanced (A), In Progress (IP), Below Average (BA) or Non-Existent (NE) thus: IP is 50%= In Progress, A is above 50% = Advanced, BA is 10–49% = Below Average, NE is ≤10%=Non-existent.

The facilities obtained A status for the following areas; availability of emergency preparedness plan and documented emergency plan, scoring 80% and 79.5% respectively. The assessment of institutional support for training and education of staff for RTI victims revealed that 89.1% of the facilities were Advanced (A). 34% of them had financial support for victims of RTI which is below average (BA). A total of 99.1%, (representing A) of the facilities offered free treatment for victims of RTI in the first 48 hours before relatives showed up. In terms of payment of treatment for disaster victims, 29% payments were made which is a below average (BA) performance. Although the National Health Insurance is supposed to pay for all such victims, either claims are not properly processed for reimbursement in some of the facilities or they are processed but experienced extreme delays in reimbursement. An advanced performance (A) of 69% was recorded for availability of protocols in management of RTI cases. In terms of the availability of dedicated wards for the management of RTI cases, 85.8% (A) of the facilities reported having one. The details are shown in Table 4 below.

TABLE 4. PERCENTAGE DISTRIBUTION OF PREPAREDNESS PROGRAMMES AND SURGE CAPACITY PLANNING

Procedures	37 Military Hospital	Medical Stations (n=7)	Reception Medical Centres (n=4)	Total (n=12)

Availability of emergency preparedness plan	65		15	80
Documented emergency plan	75	-	4.5	79.5
Institutional support, training & education	80	-	9.1	89.1
Financial support	34	-	-	34
Free disaster treatment for victims	90	9.1	-	99.1
Availability of RTA management protocol	78	4.5	4.5	87
Paid disaster treatment victim	25	-	4	29
Availability of protocol for management of RTI cases	65	4	-	69
Availability of dedicated ward for management	85	-	-	85

of RTI cases

4.3.2 Emergency Preparedness Response Programmes

In assessing the general emergency preparedness programmes of the Ghana Armed Forces Medical facilities, the following scores were obtained: 75% (A) of the facilities reported having external disaster experience. Another 93% (A) of them reported the existence of emergency preparedness plan staff directory. An advanced (A) score of 95% was recorded for availability of emergency planning group. About 79% (A) had disaster organizational charts with 100% having incident disaster organizational charts that were recommended by their respective Incident Command tructures. A total of 90% (A) of the facilities had on-site disaster response team, whilst 85% (A) of the facilities had pre-assigned victims' reception area. The facilities scored 90% (A) for availability of staff assigned to security & crowd control. In the aspect of regular drills or simulation exercises, the facilities scored 95%(A). However, it was noticed that no external drills were conducted in collaboration with other organisations such as neighbouring health facilities, fire service and national ambulance service during the time of visit. Most of the internal drills conducted addressed general trauma disaster response. None of the drills covered severe epidemic and decontamination scenarios. The emergency preparedness contained drills for setting up mobile level I&II field hospitals to increase its surge capacity when the main facility is overwhelmed. Also, 79% (A) of the facilities had emergency educators for continuous education of both staff and communities. Of those facilities assessed, only 26% of them had effective emergency communicators, which is a below-average (BA) performance. Details of the assessment are provided in Table 4.1below.

TABLE 4.1 PERCENTAGE DISTRIBUTION OF EMERGENCY PREPAREDNESS RESPONSE PROGRAMMES

Preparedness Efforts	**37 Military Hospital**	**Medical Reception Stations (n=7)**	**Medical Centres (n=4)**	**Total (n=12)**
External disaster experience	70	5	-	75
Emergency preparedness plan staff directory	80	9	4	93
Emergency planning group	80	10	5	95
Disaster organizational chart	70	5	4	79
HEICS recommended organizational chart	90	5	5	100
On-site disaster response team	80	5	5	90
Pre-assigned victims reception area	70	10	5	85

Staff assigned to security & crowd control	80	5	5	90
Regular drills	85	5	5	95
Emergency Educators	75	2	2	79
Emergency Communicator	20	3	3	26

4.3.4 Equipment and Supplies

In assessing the percentage distribution of equipment and supplies of the Ghana Armed Forces Medical facilities, the various facilities obtained advanced score in areas of Emergency kits, standby generators, availability of anaesthesia machines, respirators, ventilators, extra beds, blood storage facilities and suitable water storage. However, 50% which is in progress score (IP) of the facilities reported not having ultrasound machines. There was also no functional hydrotherapy pool, MRI and CT scan machines found in any of the facilities which is a BA score. Furthermore, 61% of the facilities had no functional x-ray which resulted in a below average score of 39%. Details are shown in Table 4.2

TABLE 4.2 PERCENTAGE DISTRIBUTION OF EQUIPMENT AND SUPPLIES

Equipment/Supplies	**37 Military Hospital**	**Medical Stations (n=7)**	**Reception**	**Medical Centres (n=4)**	**Total (n=12)**
Emergency kits	59.1	9.1		4.5	72.7

Equipment/Supplies	37 Military Hospital	Medical Stations (n=7)	Reception Medical Centres (n=4)	Total (n=12)
Generator Sets	65	15	5	85
X-ray equipment	35	4	-	39
CT Scan	20	-	-	20
Ultrasound	45	10	-	55
Hydrotherapy pool	10	-	-	10
Respirators	50	5	5	60
Ventilators	60	10	10	80
Anaesthesia machine	60	2	-	62
MRI machine	10	-	-	10
Extra beds	65	5	5	75

Equipment/Supplies	37 Military Hospital	Medical Stations (n=7)	Reception Medical Centres (n=4)	Total (n=12)
Blood storage facility	75	5	5	85
Suitable water storage facility	70	10	10	90

4.3.5 Distribution of Essential Emergency Personnel

In terms of human resources for emergency services provisions such as all categories of surgery and medical interventions, the facilities had Advanced to In Progress score. In area of Cardiothoracic surgery, though there is only one qualified cardiothoracic surgeon in the main referral facility, a lot of progress has been achieved. The facility reported 100% capacity for Obstetrics and Gynaecology, Urology and laboratory personnel, which is an advanced score. There was however no permanent Paediatric Surgeon. One comes in on a locum basis and an additional one is a permanent staff but a resident in training. It was observed that there was no protocol for paediatric surge capacity, shelter for displaced paediatrics during emergencies as well as protocols for reconnecting displaced paediatrics to their families. The details are as shown in table 4.3 below. In the analysis of the survey instrument, it was found that the estimated percentage distribution of resident trauma doctors in the facilities is advanced, mostly because the 37 Military Hospital is a teaching hospital. It was also found that in times of emergency, the military

hospital has a robust protocol for assembling all its essential staff to the Trauma and Surgical Unit to assist with the emergency response. This includes reaching out to all its personnel off duty and on leave to report to work. The study also found that there were no hospital Mutual Aid Agreements, (MAA) between the Military health facilities and the government and private hospitals in their areas of operation to share supplies and equipment during disaster. It was discovered that the Military hospital has MoUs with private diagnostic centres to provide MRI and CT scan services on a post-paid basis. However, these MoUs did not cover other health facilities to accept adult and paediatric patients from their emergency department when no beds were available. The military health facilities have effective referral systems from all the medical centres including protocols for conducting air medical evacuations which the GHS facilities lack and ought to tap into through MAA.

TABLE 4.3 PERCENTAGE DISTRIBUTION OF ESSENTIAL EMERGENCY PERSONNEL

Area of Specialty	37 Military Hospital	Medical Stations (n=7)	Reception	Medical Centres (n=4)	Total (n=12)
Emergency medicine	60	10		10	80
General Surgery	80	10		-	90
Cardiothoracic Surgeon	50	-		-	50
Obstetrics and	80	10		10	100

Area of Specialty	37 Military Hospital	Medical Stations (n=7)	Reception	Medical Centres (n=4)	Total (n=12)
Gynaecology					
Internal medicine	70.0	10		10	63.6
Pulmonologist	50	-		-	50
Paediatrician	65	-		-	75
Paediatric Surgeon	50	-		-	50
Anaesthesiologists	60	-		-	70
ENT specialist	70	-		-	70
Ophthalmologists	60	10		10	80
Orthopaedics	75	10		10	95
Urology	80	10		10	100
Laboratories	80	10		10	100
CRA	75	10		10	95

4.3.6 Ambulance Services Diversion

Ambulance diversions should be implemented once emergency services reach capacity. Therefore, the number of hours per year that an emergency department diverts an ambulance, or the amount of time a hospital diverts trauma or critical care, reflects the hospital's ability to admit new patients during mass

casualty as well as during emergency surgery. There was no records of ambulance diversion for any of the major incidents that occurred up to 2022 when visited. There was also no trace of any written-out protocol for ambulance diversion during mass casualty incidents or routine hospital operations. The practice observed on site was the referral facility calling the receiving facility to confirm availability of bed before an ambulance takes off. In cases of non-hospital transportation, the ambulances get to the nearest health facility before they are diverted. The 37 Military hospital operates two layers of ambulance services, the Emergency Response Unit (ERU) Ambulances are responsible for emergency response and inter-facility patient movements. The second layer is the hospital's routine ambulances responsible for providing medical support for all military exercises and national activities. There is also what we call the Community Emergency Transport System, (CETS) where private citizens use their private cars or hire commercial vehicles to transport the sick, injured, or acute cases in need of immediate medical emergency assistance. The military health facilities use its ambulances or Ghana Airforce aircraft in cases of air medical evacuations. These are manned by qualified Emergency Medical Technicians, Certified Registered Anesthetists and or, a doctor as the case may require.

EMS in Ghana Armed Forces Medical Service facilities consist of well-trained Basic Life Support, (BLS) and Advance Cardiac Life Support, (ACSL) teams. This is attributable to the African Peacekeeping Rapid Response Partnership (APRRP) centre setup at the 37 Military Hospital. The centre constantly trains personnel to build, strengthen, and institutionalize capabilities to respond rapidly to Ghana's and the African sub-region crises. Basic life support services (BLS) are pre-hospital and inter-hospital urgent and emergency care, including airway management, cardiopulmonary resuscitation (CPR), shock and bleeding control, and fracture splinting (Macfarlane, 2004). Advance Life Support (ALS) services include basic life support, cardiac monitoring, cardiac defibrillation, electrocardiography, intravenous therapy, administration of medications, drugs and solutions, use of assistive medical devices,

trauma care, and other approved techniques and procedures (Briggs, 2007). The study revealed that the GAMS has a well-structured medical referral system across all its facilities. Since GAMS is a unit under the Ghana Armed Forces, they have well-established protocols in requesting for Air Medical Evacuation. This protocol, however, does not exist in the GHS facilities. Establishing MoUs or MAA with GHS facilities will aid in smooth air medevac requests nationwide as and when the situation demands.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Chapter Overview

In this chapter the evolving issues from the findings of the study are discussed. The broad objective of the thesis was to examine the preparedness of the GAMS for emergency response. Specifically, scoping review of the top emergency cases that report to various health facilities in Ghana, empirical validation of the scoping review outcome at the national emergency response hospital and assessing how the GAMS health facilities are prepared in terms of surge capacity to respond to the validated outcome (RTA).

5.1 Road Traffic Accident

The findings of the study indicated that road traffic accident is the most frequent emergency that presents to the health facilities in Ghana. it was also confirmed that the same trend existed at the 37 Military Hospital which is the designated national emergency response hospital. The reviewed studies clearly align with findings from earlier research conducted in other jurisdictions which suggest that road traffic accidents are part of global health emergencies presented to emergency health facilities (Hamim et al., 2020; Jamshidi et al., 2019; Mascarenhas et al., 2016). Based on a study conducted in Brazil by Mascarenhas et al. (2016), it was posited that road traffic accidents which result in injuries and burns are crucial public health emergencies throughout the world. Jamshidi et al., (2019) similarly indicated that road traffic accidents have increasingly been one of the most reported emergency cases presented to health facilities in several jurisdictions. According to Jamshidi et al. (2019), this phenomenon which

sometimes results in death and disability, can be classified as a global issue. On their part, Hamim et al. (2020) asserted that road traffic clashes are widespread emergency health issues which continuously affect the economic condition of low-income countries. Hamin et al. (2020) established this when they conducted a study on road traffic clashes in Iran. From the foregoing arguments, it can be concluded that this emergency health situation is not limited to the Ghanaian context only and it is common in other parts of the world.

5.2 Pregnancy and Birth-Related Complications

The findings of the scoping review revealed that complications as a result of pregnancies and childbirths were the second leading exigencies that hospital staffs needed to attend to with immediacy in most Ghanaian hospitals. This finding was also consistent with the empirical study conducted at the national emergency response hospital. Though the cited literature are phenomena from Ghana, the case of pregnancy-related health emergency is a global health issue with recorded cases in hospitals and health facilities throughout the world (Peterson et al., 2019; Nekkanti et al., 2020). According to Peterson et al. (2019), there are large number of deaths associated with pregnancies which were presented to emergency medical facilities across the United States. As found in some studies conducted in Ghana (Ampofo et al., 2016; Mould-Milham et al., 2014), Peterson et al. (2020) also hinted that obstetric emergency in the United States cut across hemorrhage, infections, amniotic fluid embolism, thrombotic pulmonary, hypertensive disorders, anaesthesia complications, heart diseases, and injuries among others.

5.3 Other Acute Medical Issues

This study operationalised acute medical conditions to be sudden and severe health complications that required emergency attention. Health emergencies grouped under this theme include diarrhea cases, malaria, cholera and excessive vomit. These conditions were recorded as the third commonest emergencies that presented to most hospitals in Ghana. Similar phenomena were validated at the national emergency response hospital. Apart from findings from Ghana, diseases such as malaria, and diarrheal emergencies, are considered public health emergencies in other parts of the world, particularly in the African region or some other subtropical regions (Caraballo & King, 2014; Ferrara et al., 2018; Tesfahunugn, 2019; Weng et al., 2019). In a study conducted by Ferrara et al. (2018) in Barcelona, Spain, it was found that travellers are sometimes susceptible to be affected by the malaria parasite requiring them to seek emergency medical attention. According to Caraballo and King (2014), malaria cases sometimes require emergency medical attention. The World Health Organisation (2013) considers such diseases as some critical public health emergencies that require emergency attention. On their part, Tesfahunugn (2019) referred to such diseases as public health emergencies which need critical attention. Similarly, Weng et al. (2019) indicated that malaria, cholera, diarrhea and typhoid are life-threatening health emergencies that are usually presented to health facilities for expert medical attention.

5.4 Cardiovascular Condition

From reviewed and empirical studies, it is evident that patients with cardiovascular or heart-related conditions were also rushed to hospitals for emergency care. These constituted the fourth commonest emergency cases that presented to health facilities in Ghana. Cardiovascular diseases (CVDs) are a leading cause of death and disability worldwide (WHO, 2021). According to the World Health Organization (WHO), CVDs account for over 17 million deaths each year, representing 31% of all

deaths globally. The most common types of CVDs include coronary artery disease, stroke, and hypertension. Risk factors for CVDs include unhealthy diet, tobacco use, physical inactivity, harmful use of alcohol, and high blood pressure. Apart from the case of Ghana, studies in other parts of the world indicate that there is increasing rate of cardiovascular emergencies presented to health facilities for immediate medical care (Enache et al., 2020; Lu, 2020; Marcolino, 2017) Eneche et al. (2020) indicated that in March 2020 alone, 346 cardiovascular emergencies reported to health facilities in Monaco. Lu (2020) also pointed out that cardiovascular emergencies are one of the most rampant life-threatening emergencies recorded at hospitals. According to Lu (2020), these types of emergencies can be classified as the topmost deadly emergency cases across the world.

5.5 Other Domestic Accidents and Injuries/ Other Types of Injuries

The study findings grouped domestic accidents and injuries as the next common emergencies that presented to health facilities in Ghana as well as the national emergency response hospital. This study qualified and operationalised domestic injuries as sudden health problems and traumas that occur in homes or dwelling places of victims or patients. These injuries could include burns, fractures, cuts, lacerations, bruises, bites and sprains. According to the World Health Organisation (WHO) (2021), the rate of domestic and other types of injuries varies widely across the world and is influenced by a range of factors such as age, gender, socioeconomic status, and access to healthcare. The WHO estimated that about 5 million people die each year from injury-related causes, with over 90% of these deaths occurring in low- and middle-income countries. Injuries also result in an estimated 40 million people living with long-term disabilities. It is important to note that these estimates are likely to be an under-representation of the true burden of injury, as many injury-related deaths and disabilities are not recorded or reported accurately (WHO, 2021). The WHO recommends implementing a combination of individual and

community-level interventions to prevent and control domestic injuries, such as providing education on safe home practices, improving home design, and creating safe environments for children and older adults.

5.6 emerging infectious diseases outbreak/public health emergencies

This study found that emerging and infectious diseases have become the current emergency health issue that required emergency response across the hospitals in Ghana and the national emergency response hospital. These strands of emergencies are mostly categorised as public health emergencies because anyone in society could be a victim (Asiedu-Berkoe et.al., 2022). The outbreak of COVID-19 pandemic shook the core foundation of hospitals and emergency health facilities in Ghana as more and more trooped into health centres for immediate medical attention. The volume of academic literature produced about the Covid-19 pandemic in Ghana is enormous. Every literature described this phenomenon as a critical health emergency that required tactical handling by health facilities in the country (Adachi et.al., 2022; Asiedu-Berkoe et.al., 2022; Kenu et al., 2020; Owusu-Fordjour et al., 2020; Sarkodie et.al., 2021). According to the aforementioned studies, COVID-19 has had a significant impact on Ghana since the first cases were reported in March 2020. As of February 6, 2023, Ghana had reported over 246,000 confirmed cases and over 4,300 deaths related to COVID-19 (WHO, 2023). According to the World Health Organisation, the country has seen fluctuations in case numbers, with some periods of lower transmission and others of higher transmission. It is important to note that the actual number of cases and deaths in Ghana is likely to be higher than reported, due to limited testing and reporting capabilities. The pandemic had some heavy effects on hospitals in Ghana, leading to an increased demand for medical care and putting a strain on healthcare systems. This phenomenon actually led to overcrowding in hospitals across the country (Fosu & Edunyah, 2020; Tagoe et al., 2023). In essence, health facilities have struggled to keep up with the increased demand for medical care due to the pandemic, leading to

overcrowding and long wait times for patients. There is therefore the need to learn lessons and prepare adequately to enhance the surge capacity of health facilities for any future pandemic.

5.7 Disasters (Flood-Related Cases and Fire Outbreaks)

The study found emergencies resulting from disasters such as flood and fire outbreaks as the seventh commonest cases that report to health facilities in Ghana and confirmed at the national emergency response hospital. The findings indicate that disasters, particularly flooding, significantly affect healthcare delivery, leading to challenges such as overcrowded hospitals, damaged infrastructure, and increased incidences of communicable diseases. These challenges are not unique to Ghana but are prevalent across many developing nations and even in some developed countries under severe disaster conditions. In many African countries, similar challenges are observed, particularly in regions where natural disasters such as floods, droughts, and epidemics are common. For example, flooding has been reported to disrupt healthcare services in Nigeria, leading to an increase in waterborne diseases like cholera and diarrhea, much like the situation in Ghana (Adetunji et al., 2019). Similarly, in Mozambique, the impact of Cyclone Idai in 2019 caused extensive damage to health infrastructure, leading to overcrowded hospitals and a spike in infectious diseases, reflecting the experiences noted in Ghana (ReliefWeb, 2019). Like Ghana, many African countries also face the dual challenge of under-resourced health systems and frequent natural disasters. This combination often results in inadequate preparedness and response capacities, exacerbating the public health impact of such events (WHO, 2018). The vulnerability of healthcare systems in these regions is often linked to limited infrastructure, a shortage of medical personnel, and inadequate emergency planning and resource allocation.

Globally, the impact of disasters on healthcare systems shows both similarities and differences when compared to Ghana and other African countries. In developed nations, such as the United States or Japan,

the healthcare systems tend to be better resourced and more robust, allowing for a more effective response to disasters. However, even in these countries, severe disasters can overwhelm healthcare systems. For instance, during Hurricane Katrina in 2005, hospitals in New Orleans were severely affected, leading to overcrowding, a lack of essential medical supplies, and difficulties in providing care to all patients (Schultz & Stratton, 2007). Similarly, the 2011 earthquake and tsunami in Japan caused significant damage to health facilities and led to a surge in demand for emergency medical services (Nakamura et al., 2017).

In contrast to Ghana, where floods are a primary concern, other parts of the world face different disaster risks, such as earthquakes, wildfires, or hurricanes, each posing unique challenges to healthcare delivery. For example, in California, wildfires have caused disruptions to health services, leading to evacuations of hospitals and the interruption of care for patients with chronic conditions (Jones et al., 2020). While the specific nature of the disasters may differ, the overall impact on healthcare systems such as overcrowding, infrastructure damage, and increased disease transmission, remains consistent across different contexts.

Comparing Ghana's experience with those of other countries highlights the importance of disaster preparedness and the need for resilient healthcare systems. Countries like Japan have developed robust disaster preparedness strategies, including building earthquake-resistant hospitals and conducting regular disaster drills, which could serve as models for Ghana and other African nations (Nakamura et al., 2017). Additionally, integrating technology, such as early warning systems and mobile health units, has effectively mitigated the impact of disasters in countries like India, where cyclones frequently disrupt healthcare services (Patnaik & Swain, 2020). To improve disaster preparedness and response, Ghana and similar countries could benefit from adopting these best practices, including enhancing infrastructure

resilience, improving resource allocation, and fostering international partnerships to strengthen healthcare systems before disasters strike.

5.8 HOW THE GAMS IS PREPARED FOR EMERGENCY RESPONSE IN TERMS OF SURGE CAPACITY FOR RTA

The state of preparedness of the Ghana Armed Forces Medical Service facilities to respond to emergencies would give a national idea of how the other Ghana Health Service facilities are prepared for emergencies. This assumption was based on the rationale articulated by Reason (2000) that in any given industry, practices tend to be similar even within dissimilar structures. The biggest challenges facing the hospitals in their emergency intervention are lack of emergency financing, lack of diagnostic imaging equipment, non-existing mutual aids- agreements and below-average emergency communication. There are also under developed paediatric surgical units and a lack of ambulance and trauma diversion protocols. These challenges are part of broader systemic issues seen across many low and middle-income countries.

5.8.1 Lack of Emergency Financing

In emergency cases brought to the GAMS health facilities, a total of 99.1% (representing Advanced score) of the facilities offered free treatment for victims of RTI in the first 48 hours before relatives showed up. In terms of payment of treatment for disaster victims, 29% of payments were made which is a below-average (BA) performance. This means that the internally generated funds of the hospital is spent in treatment for emergencies without the requisite reimbursement to the facilities. This aligns with Adusei, (2020) findings that insufficient financial resources lead to military hospitals often struggling to maintain adequate supplies and equipment for emergencies. Norman et al.,(2012) also had similar findings and posited that the National Health Insurance Scheme is to provide for hospitals to treat emergency cases whether the patient is a registered member or not. This is inconsistent with National

Health Insurance Regulations (NHIR) 2004 (L. I. 1809), Schedule II, Part I: Regulation 19(1): Minimum health care benefits, section 6 (a), (b), (e) and (f). It is difficult to determine what national, regional or district emergency status is or when it is declared. This mirrors findings in other African countries, such as Nigeria, where limited financing hampers the ability to respond swiftly to health emergencies (Adetunji et al., 2019). The reason for defining what constitutes an emergency as an international standard is that the offer of free medical care must take place in situations where a national or regional authority has issued a formal declaration of emergency under local or national law. In Ghana, the leading articles are Articles 31 to 33 of the 1992 Constitution. In the case of road traffic accidents and other medical needs mentioned in L. I 1809 NHIR, the law excludes emergency circumstances that allow the provision of medical services without a formal declaration of a state of emergency.

Therefore, Schedule II, Part I, sub-section 6 of L. I. 1809 appears to be an exception to the standard rule, the non-compliance of which may result in prima facie case of negligence. Norman et al., further observed that the hospital system in Ghana is in need of reparation for both routine healthcare delivery and for emergency situations and recommended an amendment for the nation to meet the broader objectives of the Sustainable development Goal and UHC.

5.8.2 Lack of Diagnostic Imaging Equipment

There was Non-existent and below average performance in terms of therapeutic physiotherapy and diagnostic imaging. There was no functional hydrotherapy pool, MRI and CT scan machines found in any of the facilities during site visit. 61% of the facilities had no functional x-ray machine which resulted in a below average score of 39%. The national emergency response hospital has resorted in signing MoUs with 4 diagnostic centre which are within a maximum of 2km distance and about 10 mins ambulance drive. This is not good for a national emergency response facility. The absence of functional

hydrotherapy pools, MRI, and CT scan machines underscores a critical gap in advanced diagnostic and therapeutic infrastructure. This finding aligns with earlier studies indicating systemic inadequacies in the healthcare infrastructure of Ghanaian military health facilities (Boateng, 2022; Darkwah, 2021).

The reliance on external diagnostic facilities is suboptimal for a national emergency response facility, as timely diagnosis and treatment are crucial for effective emergency care (Kwarteng & Poku, 2020). Previous findings have similarly noted the challenges faced by healthcare facilities in Ghana in maintaining functional diagnostic equipment. For instance, Frimpong and Osei (2019) highlighted the frequent breakdowns and maintenance issues plaguing medical equipment in public hospitals, which adversely affect the quality of healthcare delivery. This situation is exacerbated in emergency settings where the prompt availability of diagnostic tools is critical. Furthermore, the lack of essential diagnostic tools such as MRI and CT scan machines hinders the ability of the 37 Military Hospital to provide comprehensive care. This gap does not only compromise the quality of care but also places additional strain on the already overburdened healthcare system, as patients must be transported to other facilities for necessary diagnostic procedures (Asamoah, 2023). The reliance on external diagnostic centres also raises concerns about the continuity and coordination of care. Transporting patients to external facilities can lead to delays, miscommunication, and potential complications during transfers, which are detrimental in emergency situations (Mensah et al., 2021). This finding underscores the need for significant investments in healthcare infrastructure to ensure that critical diagnostic and therapeutic tools are readily available within the hospital premises.

5.8.3 Non-Existing Mutual Aids- Agreements

There was a below average performance in terms of mutual aid-agreements. Mutual-aide Agreements are based on specialization and personnel, proximity and existing regulatory authorities, medical malpractice legislation and requirements, and immunity provisions. The competition between military

hospitals and Ministry of Health hospitals, as well as the competition between public and private hospitals. Scarce resources in emergency situations as well as competitions among doctors, makes it difficult to cooperate in the allocation of human resources. During the atomic junction gas explosion incident, though the 37 Military Hospital had no resident plastic surgeon, it had no MAA to engage a specialist from any of the nearby health facilities. They had to recall and engage a specialist on terminal leave. The Ghana Medical and Dental Council does not have a stated position on MAAs, nor does the Health Facilities Regulatory Authority nor the Ministry of Health or the Ghana Health Service have a stated position on MAAs. The position of the law and the insurance industry on MAAs in terms of professional liability and cost sharing is also unclear. This is due to the initial lack of a national policy on MAA. The National Emergency Response Hospital does not routinely conduct system-wide simulation studies. Simulation exercises are a good way for facilities to identify bottlenecks in their internal preparedness plans and routine emergency standards in the emergency room (ER) and hospital triage.

5.8.4 Below-Average Emergency Communication

Among the facilities assessed, only 26% of them had effective emergency communicators, which is a below-average (BA) performance. This low score could be attributed to the military's strict procedures for its members communicating with the media. This result is concerning, as effective communication is crucial in emergency management for ensuring timely and accurate dissemination of information to both internal and external stakeholders (Smith & Jones, 2021). In previous studies, the importance of robust communication systems in emergency response has been extensively highlighted. For instance, Linton (2020) emphasizes that efficient communication channels are vital for coordinating responses, sharing information, and mobilizing resources quickly. The military's restrictive communication policies,

designed to maintain operational security and control information flow, can inadvertently hamper the effectiveness of emergency responses. This tension between operational security and the need for open communication is a common challenge in military settings (Williams & Patterson, 2019).

Moreover, the low score in emergency communicators aligns with findings from other regions where similar constraints have been observed. A study by Martin and Lewis (2018) noted that military health facilities often struggle with integrating civilian emergency communication protocols due to their hierarchical and controlled communication structures. This gap can lead to delays in information dissemination, impacting the overall efficiency of emergency responses. The implications of this finding are significant for emergency preparedness and response. Effective communication systems are critical for real-time situation awareness, coordination among response teams, and providing the public with accurate information (Bennett et al., 2019). In the context of the Ghana Armed Forces, improving emergency communication capabilities requires a balance between maintaining necessary security protocols and enhancing transparency and efficiency in communication during emergencies. Addressing this issue involves adopting more flexible communication strategies that can adapt to the dynamic needs of emergencies without compromising security. Training programmes focusing on emergency communication, combined with investments in modern communication technologies, could enhance the readiness and responsiveness of these facilities (Anderson, 2022).

5.8.5 Under-Developed Paediatric Surgical Units

The results from the administered questionnaire and the site visits revealed that none of the GAMS facilities had a tracking system for accompanied and unaccompanied children. There was also no protocol for the reunification of children with families, with no guidelines for increasing paediatric surge capacity. There was also no plan for acquiring supplies to shelter healthy displaced children. Tracking

systems for accompanied and unaccompanied children are crucial in emergency settings, especially during mass displacement events such as natural disasters or conflict. The absence of these systems in GAMS facilities mirrors similar gaps in other African countries. For instance, a study conducted in Uganda found that during crises, children were often separated from their families, with no systematic tracking mechanism to ensure their reunification or safety (Nabukeera et al., 2019). Globally, developed countries have implemented robust child-tracking systems as part of their emergency response plans. In the U.S., for example, hospitals and emergency services use tracking software that allows them to identify and locate children separated from their families during disasters, a practice that proved essential during events like Hurricane Katrina (Zenteno et al., 2015). This system helps ensure that children are accounted for and cared for in emergency shelters or medical facilities.

The absence of a protocol for the reunification of children with their families in GAMS facilities highlights a critical weakness in disaster management for paediatric populations. Family reunification is a core component of emergency response in many parts of the world. For example, the National Child Identification Program in the U.S. supports the reunification of children with their families during emergencies, which proved successful during the response to the 9/11 attacks (Feinberg *et al*., 2016). Similarly, in Japan, where natural disasters such as earthquakes and tsunamis are frequent, there are well-established protocols to ensure that children are reunited with their families after displacement (Nakamura *et al.,* 2017). In many African countries, however, such protocols are either non-existent or underdeveloped. A study in Kenya showed that during the 2007-2008 post-election violence, there were no structured protocols for child reunification, leading to long-term separation of children from their families (Lind, 2020). This lack of preparedness exacerbates the vulnerabilities of children during crises.

The failure to develop guidelines for increasing paediatric surge capacity during emergencies is another significant challenge. This issue is not unique to Ghana. Across Africa, many healthcare systems lack

pediatric-specific surge capacity plans. For example, during the Ebola outbreak in West Africa, hospitals in Sierra Leone, Liberia, and Guinea struggled to handle the surge of pediatric cases due to a lack of planning and resources tailored to children's healthcare needs (Martinez et al., 2015). Similarly, in Nigeria, healthcare systems are often overwhelmed during outbreaks of infectious diseases, with no specific surge capacity for pediatric care (Oleribe et al., 2019). In contrast, countries like the U.S. and Australia have developed pediatric surge capacity guidelines as part of their broader disaster management plans. These include provisions for expanding pediatric care units, increasing medical personnel trained in pediatric care, and securing additional supplies specific to children's healthcare needs (Waseem & Lam, 2019). Implementing such guidelines in Ghana could significantly improve the ability of GAMS facilities to manage pediatric patients during emergencies.

Furthermore, the absence of plans to acquire supplies for sheltering healthy displaced children in GAMS facilities is a critical shortfall in disaster preparedness. Children are particularly vulnerable during emergencies, and having the necessary supplies such as food, water, shelter, and medical care is essential for their survival and well-being. Research have shown that this issue is common in many low-income countries where emergency preparedness plans often focus on adult populations, neglecting the specific needs of children. In Zimbabwe, for example, disaster response plans lack provisions for paediatric-specific supplies. This led to inadequate care for displaced children during the 2019 Cyclone Idai (Mukwada & Manatsa, 2020). Similarly, in Ethiopia, displaced children often face poor living conditions in temporary shelters due to the lack of pediatric-focused emergency supplies (Deribew et al., 2019).

In contrast, countries like Sweden and Canada have integrated paediatric care into their disaster response plans. During emergencies, these countries ensure that shelters are equipped with child friendly supplies such as paediatric food, clothing, toys, and medical supplies (Stavrou & Braun-Lewensohn, 2019).

Incorporating similar strategies in Ghana would help ensure that displaced children receive appropriate care during emergencies.

5.8.6 Lack of Ambulance Diversion Protocols

The study findings showed that there was no existing protocol for ambulance diversion and trauma and critical care diversion protocols. The goal of a good pedestrian public health programme in emergency response is to provide wide and evenly distributed patients to medical facilities across the nation. Ghana as at the end of June 2022 had 356 ambulances with at least one station in each of Ghana's 261 districts (Zachariah et al., 2024). The Ghana National Fire Service supports the work of the EMS team though it does not have its own fleet of ambulances. It collaborates with the NAS in times of emergencies. At the time of the visit to the military health facilities in this study in 2022, all of them had a dedicated ambulance to transport referral cases or respond to emergencies outside of the parameters of the hospitals. However, there is the need to have a protocol for ambulance diversion whenever their emergency units are full to capacity. There is the need to have trauma and critical care diversion. This issue has been observed in other parts of Ghana and Africa. For example, a study by Osei and Bonsu (2021) highlighted the challenges in the ambulance system in Ghana, particularly the lack of coordinated protocols between emergency services and hospitals. As a result, patients are often transported to hospitals that cannot provide timely care, worsening patient outcomes. Similarly, in Nigeria, a lack of ambulance diversion protocols led to overcrowded emergency departments during the 2014 Ebola outbreak, delaying critical care (Oleribe et al., 2019).

In contrast, developed countries have established protocols for ambulance diversion to ensure that patients are transported to the nearest available facility with the capacity to treat them. In the United States, ambulance diversion protocols are integral to the emergency medical services (EMS) system. For

example, in cities like Chicago, hospitals communicate in real-time with ambulances, allowing diversions to less crowded hospitals when emergency departments are full (O'Connor et al., 2020)

In addition to ambulance diversion, there is a pressing need for trauma and critical care diversion protocols in GAMS facilities. Trauma and critical care cases require immediate and specialized treatment and when emergency units are overwhelmed, the inability to divert such cases to appropriate facilities can result in adverse patient outcomes. In Ghana, trauma care is often hindered by inadequate infrastructure, limited specialist availability, and poorly coordinated referral systems (Tansley et al., 2017).

The challenges of trauma care in low-resource settings have been documented across Africa. In South Africa, for instance, despite having more advanced healthcare infrastructure than many other African countries, the lack of formalized trauma diversion protocols contributes to overcrowding in trauma centers, reducing the quality of care provided (Baloyi et al., 2019). Similarly, in Uganda, the absence of critical care diversion mechanisms means that many patients requiring intensive care are left untreated or delayed in receiving necessary interventions (Nabukeera et al., 2019).

Globally, well-established trauma and critical care diversion protocols exist in countries like the United Kingdom. The UK's National Health Service (NHS) has a well-coordinated system that ensures trauma patients are diverted to specialized trauma centers when local hospitals are unable to provide the necessary care. This system was particularly effective during the 2017 Manchester Arena bombing, where patients were rapidly transported to trauma centers based on capacity and expertise (Rimmer, 2018).

5.9 Methodological Consideration

As already stated in the methodological section of the study, this study used the interpretive paradigm which leans on the constructivists approach to obtain or understand the 'what' top emergency case present to the national emergency response hospital and the 'how' the GAMS is prepared in surge capacity to respond to the top emergency. The multiple-case study design was used. The multiple-case design was used to obtain the experiences of respondents on issues regarding emergency cases received at the GAMS health facilities, and how the 12 health facilities under the GAMS are prepared to respond to the top emergency. In line with qualitative approach of the multiple case, the data was collected in several ways; scoping review, pilot study, desk review, site visits and face-to-face interviews. The data was interpreted through qualitative lenses. One major strength of using the qualitative approach of interpretive paradigm is to obtain an in-depth knowledge or information about the rationale of the study. Viewing such experiences from this approach are credible evidence because they are coming from the participants own experiences and context. This is against a quantitative approach where figures alone cannot speak to the reality and unravelling what constitutes the epistemology of the study.

5.10 Summary

This chapter of the study discussed the study's findings and compared that with existing theoretical and empirical literature in the field of preparedness for trauma emergency response. The discussion drew attention to the top emergencies that were reported to the various hospitals in Ghana and the national emergency response hospital in particular and how the GAMS is prepared to respond to such emergencies. The discussion on what the topmost emergency reports to the facility, and how the GAMS is prepared to respond to such emergencies revealed RTA as the topmost emergency case that frequents most hospitals in Ghana including the national emergency response hospital. The shortfalls identified for

discussion were lack of emergency financing, lack of diagnostic imaging equipment, non-existing mutual aid- agreements and below-average emergency communication. There is also under developed paediatric surgical units and a lack of ambulance and trauma diversion protocols.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter presents summary of findings obtained from the study by giving snapshots of the key findings of the study and drawing conclusions based on the findings and thereafter make recommendation for implementation of the findings. The chapter will also make recommendations for further research related to this study. The chapter will also offer the contribution of the study to theory.

6.1 Summary of Key Findings

The findings identified three thematic areas namely, the major emergency cases that require emergency healthcare response in Ghana, the top emergency case that reports to the national emergency response hospital and how the GAMS is prepared in surge capacity to respond to RTA cases. The findings showed that the top 4 major emergency cases that reports to the health facilities in Ghana are Road Traffic Accidents, pregnancy and childbirth complications, other acute medical issues, cardiovascular conditions. It further confirmed that RTA is the topmost emergency case that reports to the national emergency response hospital. The key gaps identified in the preparedness efforts of the GAMS health facilities were lack of emergency financing, lack of diagnostic imaging equipment, non-existing mutual aids- agreements and below-average emergency communication. Others are underdeveloped paediatric surgical units and a lack of ambulance and trauma diversion protocols.

6.2 The Major Cases that Require Emergency Healthcare Response in Ghana

The study found that the main cases that require emergency response in Ghana's healthcare system are Road Traffic Accidents, pregnancy and childbirth complications, other acute medical issues, cardiovascular conditions, domestic injuries and other types of injuries, emerging infectious diseases outbreaks/public health emergencies and disasters (flood-related cases and fire outbreaks). The study also established that these trends also pertain to other African and global countries.

6.2.1. The Topmost Emergency that Presents at the National Emergency Response Hospital

Road traffic accidents, including vehicular accidents and injuries resulting from collisions, are common emergencies requiring immediate medical attention at the National Emergency Response Hospital. These accidents often result in burns, broken limbs, head injuries, and other traumatic injuries. The study revealed that the 37 Military Hospital trauma and surgical and emergency unit often get overwhelmed with emergencies as a result of frequent mass casualties from RTA cases.

6.2.2. Preparedness Programmes and Surge Capacity Planning

The study found that the GAMS has a robust emergency preparedness protocols and a surge capacity plan for RTA cases. However, it was revealed that they lacked adequate funding for their emergency protocols in taking care of RTA cases free of charge for the first 48 hrs before a relative showed up. Most of such piled-up bills have not been paid. This puts a strain on the facility's financial surge capacity to provide quality emergency care for victims. It was also revealed that none of the GAMS health facilities had a tracking system for accompanied and unaccompanied children. There was also no protocol for the reunification of children with families, with no guidelines for increasing paediatric surge capacity. There was also no plan for acquiring supplies to shelter healthy displaced children. Tracking systems for accompanied and unaccompanied children are crucial in emergency settings, especially during mass displacement events such as natural disasters or conflict. The study further revealed a lack

of mutual aids-agreements among the various health facilities and also with other state agencies. It was revealed that there is no clear-cut policy on MAA.

6.2.3. Equipment and Supply

The study found that there was no functional hydrotherapy pool, MRI and CT scan machines found in the national emergency response hospital at the time of site visit. The other 12 facilities also had no functional X-ray departments. The facilities had MoUs with diagnostics centres to provide these services. The reliance on external diagnostic facilities is suboptimal for a national emergency response facility, as timely diagnosis and treatment are crucial for effective emergency care.

6.2.4. Manpower

The findings showed that the facility had adequate man power in terms of specialist orthopaedic surgeons and resident surgeons. The adequate number of surgeons was attributed to the existence of a post-graduate college for residency training. There was however a huge gap in paediatric surgeon. There was only one permanent staff in training and a visiting paediatric surgeon on locum. This affects the waiting time for children that requires surgery thereby reducing the quality of care. The findings also showed lack of satisfactory emergency communication from GAMS health facilities during national disasters. This low score could be attributed to the military's strict procedures for its members communicating with the media. However, this also affects efficient communication channels which are vital for coordinating responses, sharing information, and mobilizing resources quickly.

6.3 Conclusion

The study revealed that road traffic accidents (RTAs) are the most pressing emergencies requiring healthcare response at Ghana's National Emergency Response Hospital. These incidents frequently

result in severe injuries such as burns, fractures, and head trauma, leading to mass casualty scenarios that overwhelm the 37 Military Hospital's emergency units. This finding aligns with global data, particularly in developing nations, where RTAs remain a significant public health issue. The hospital's central role in emergency response underscores its strategic importance, yet the growing demand for trauma and surgical services requires enhanced infrastructure and resource allocation. Without these improvements, the ability of the hospital to efficiently handle increasing emergency cases remains constrained. Addressing this burden requires a coordinated effort to strengthen the hospital's trauma care system and integrate preventive measures into national road safety initiatives.

The study identified robust emergency preparedness protocols within GAMS but also revealed substantial financial and systemic challenges. The provision of free initial care for RTA victims places significant strain on the hospital's financial resources due to unpaid medical bills. This financial pressure compromises the hospital's capacity to maintain quality emergency care, especially during surge periods. Additionally, the lack of specific preparedness plans for pediatric cases and the absence of tracking systems for accompanied and unaccompanied children highlight gaps in the hospital's emergency protocols. The lack of mutual aid agreements (MAAs) between facilities and state agencies further limits coordinated emergency responses. These challenges underline the urgent need for targeted funding, comprehensive preparedness planning, and strengthened inter-agency collaboration to optimize emergency response effectiveness.

Equipment deficits pose another critical barrier to emergency care delivery. The lack of functional MRI and CT scan machines at the 37 Military Hospital, coupled with the absence of operational X-ray departments in other GAMS facilities, reflects systemic resource constraints. The reliance on external diagnostic facilities through memoranda of understanding (MoUs) delays patient diagnosis and management, undermining the quality of care. For a facility of national significance, the unavailability

of critical diagnostic equipment is suboptimal. Addressing these equipment shortages is essential for enhancing the hospital's diagnostic capabilities, ensuring timely and effective treatment of emergency cases. Investments in infrastructure, particularly diagnostic and therapeutic equipment, must be prioritized to meet the growing demands of emergency healthcare in Ghana.

The study also highlighted a mixed picture of manpower capacity. While the availability of orthopedic and resident surgeons is commendable, the lack of sufficient pediatric surgeons is a significant gap. The limited availability of pediatric surgical services leads to prolonged waiting times, affecting the quality of care for children requiring urgent medical attention. Moreover, inadequate communication protocols within GAMS during national disasters were noted as a significant challenge. The military's strict communication procedures inadvertently hinder timely information dissemination and resource mobilization, which are critical during emergencies. These findings emphasize the importance of strengthening human resource planning, with a particular focus on specialized areas such as pediatric surgery, while also developing efficient emergency communication systems to facilitate timely and coordinated responses during national emergencies.

The study reveals critical strengths and weaknesses in the emergency healthcare system of the Ghana Armed Forces Medical Services. While existing preparedness protocols and manpower in some specialties are commendable, significant gaps in funding, pediatric care, equipment availability, and communication systems hinder optimal emergency response capacity. Addressing these challenges requires a multipronged approach, including securing sustainable funding, implementing robust pediatric and family tracking protocols, investing in diagnostic equipment, and developing efficient communication strategies. Strengthening these areas will not only enhance the hospital's ability to handle emergencies but also position it as a model for effective emergency response in Ghana and other developing countries. Through targeted interventions and sustained collaboration with key stakeholders,

GAMS can improve its resilience and operational capacity, ensuring the delivery of high-quality emergency care during both routine and large-scale emergencies.

6.4 Contribution to Theory

The findings of the study made contributions to the Stakeholder Theory and Emergency Management Theory. The study provides key theoretical contributions by deepening the understanding of emergency healthcare dynamics in Ghana and similar contexts. Both theories offer frameworks that can be used to assess how various actors (stakeholders) and systematic planning can contribute to improving emergency response and surge capacity in healthcare. The Stakeholder Theory, which emphasizes the roles and interests of different stakeholders in organizational performance, helped to analyze how various groups within and outside the healthcare system influence emergency response effectiveness. In the case of Ghana's healthcare system, stakeholders include healthcare providers in this case the GAMS health facilities, the NAS, GNFS NHIA, GPS, private diagnostic centres, patients, families, and donors. The findings reveal various critical contributions to the theory such as collaboration gap, financial strain and stakeholders' relationship. The study uncovers the lack of mutual aid agreements (MAA) among health facilities and between state agencies, highlighting the need for stronger collaborations and inter-organizational frameworks in emergency management. In Stakeholder Theory terms, this emphasizes the role of cross-sectoral collaboration in enhancing service delivery during crises. The absence of MAA weakens resource sharing, capacity building, and overall emergency response, suggesting that effective stakeholder management is key to enhancing emergency preparedness (Freeman, 1984). In terms of financial strain and stakeholder relationships, the finding that GAMS hospitals provide free emergency care for 48 hours without guaranteed payment, points to the complex financial relationships between healthcare providers and the public. Stakeholder Theory indicates that such financial strain is a result of

weak accountability mechanisms between patients and providers, implying that there is a need for revised policies to ensure sustainable financing for emergency services (Clarkson, 1995). Stakeholder Theory, in this context, shows how financial relationships between actors can impact surge capacity. On the other hand, the Emergency Management Theory, which focuses on preparedness, response, recovery, and mitigation of disasters, is critical in understanding the study's findings. This theory provides a structured way of analyzing how healthcare systems like GAMS prepare for and respond to emergencies such as road traffic accidents.

The study's findings on the GAMS hospitals' preparedness for road traffic accidents (RTAs) reflect the practical application of emergency management theory. While the health facilities have protocols and surge capacity plans, the lack of sufficient funding, tracking systems for children, and a clear-cut policy on mutual aid agreements exposes vulnerabilities in their preparedness strategies. The Emergency Management Theory highlights the importance of comprehensive and holistic planning, particularly in ensuring the financial sustainability of surge capacity operations and the inclusion of paediatric care considerations (Haddow, Bullock, & Coppola, 2013). Another key finding is the reliance on external diagnostic centers due to non-functional MRI and CT scan machines. This reliance negatively affects emergency management effectiveness, particularly for timely diagnosis during critical care situations. Emergency Management Theory emphasizes the role of adequate resources in ensuring successful response and mitigation. The inability of the national emergency facility to function independently reflects a resource gap that is critical for building resilient healthcare systems capable of responding to disasters (Fagel, 2013). The study reveals a shortage of paediatric surgeons and the resultant delays in care for children needing surgery. Emergency Management Theory would focus on the importance of human resource planning and the distribution of specialized personnel as a core part of preparedness. The theory contributes to understanding the necessity for a balanced distribution of specialists across all

fields, which is critical in providing holistic care during emergencies. The study also makes important contributions to theory by situating its findings within a broader global and regional context. For example, challenges related to surge capacity, emergency financing, and manpower are not unique to Ghana, but are also seen in other African countries and globally. Studies in Nigeria and South Africa also reflect similar issues of overcrowding and lack of equipment in emergency departments (Oleribe et al., 2019; Baloyi et al., 2019), while countries like the United States and UK have developed more robust surge capacity frameworks (O'Connor et al., 2020). These cross-country comparisons expand the application of Emergency Management Theory by showing how varying levels of economic development and resource availability impact the effectiveness of emergency response systems globally.

6.5 Policy Recommendations

Implementing these targeted policy recommendations based on the study findings will significantly enhance the emergency response and surge capacity preparedness of GAMS. These measures aim to address both systemic gaps and operational challenges, contributing to a more resilient healthcare system in Ghana. Based on the challenges identified in the study, the following recommendations are made:

The study identified road traffic accidents as the most frequent and critical emergencies managed at the National Emergency Response Hospital, the 37 Military Hospital. These accidents often lead to severe injuries such as burns, fractures, and head trauma, resulting in mass casualty incidents that overwhelm the facility's trauma and emergency units. To address the high volume of RTA cases, the government should establish a national road traffic safety policy emphasising preventive measures such as stricter enforcement of traffic regulations, public education on road safety, and establishing trauma centres along highways. Additionally, GAMS should collaborate with the Ministry of Health (MoH) to enhance

pre-hospital care through improved ambulance services and first responder training. Expanding the capacity of the 37 Military Hospital's emergency unit and establishing satellite trauma centres in key regions would help decentralise emergency care and reduce the burden on a single facility.

The study revealed that GAMS facilities struggle with financial sustainability due to unpaid bills for initial free treatments of RTA victims. This financial strain affects their ability to consistently provide quality emergency care. Government should introduce a dedicated emergency healthcare fund to cover the costs of initial free treatment periods. The government and insurance companies should collaborate to design emergency coverage schemes for uninsured individuals, ensuring prompt reimbursement of unpaid bills. Additionally, public-private partnerships could be explored to secure sustainable funding for emergency preparedness initiatives.

The study found no tracking systems for accompanied and unaccompanied children or protocols for family reunification during emergencies. Furthermore, there were no plans to acquire supplies to shelter displaced children. Develop and implement a paediatric surge capacity plan that includes tracking systems for children and reunification protocols. This should involve collaboration with child protection agencies, NGOs, and international organizations. Training for healthcare providers on paediatric emergency care and resource allocation for paediatric-specific supplies, such as temporary shelters and food, should also be prioritized.

The study highlighted significant equipment deficits, including non-functional MRI and CT scan machines at the National Emergency Response Hospital and the absence of operational X-ray departments in other GAMS facilities. The government and private sector should invest in upgrading diagnostic and emergency equipment across all GAMS facilities. Functional MRI, CT, and X-ray machines should be procured, and maintenance programmes established to ensure equipment reliability. Developing a strategic partnership with diagnostic centers for rapid access during equipment downtime

is also critical. Furthermore, a comprehensive inventory system for medical supplies should be established to prevent shortages during emergencies.

The study revealed the absence of mutual aid agreements among GHS facilities and GAMS health facilities and between GAMS and other state agencies, limiting coordinated responses during emergencies. There is the need to formalize and institutionalize MAAs among GHS facilities and GAMS facilities and external agencies like NADMO, NAS, and GNFS. These agreements should define the roles, resource-sharing protocols, and collaborative response mechanisms among stakeholders. Regular joint training exercises and scenario-based drills should be conducted to ensure preparedness and enhance inter-agency collaboration. These agreements must be reviewed periodically to adapt to emerging challenges and operational needs.

6.6 LIMITATIONS AND IMPLICATION FOR FURTHER RESEARCH

The study was constrained by time due to the objectives the study sought to achieve. It would have been ideal to do it over a longer time frame. However, like most academic research, there is a limited time to conduct the research and present the findings. Although the literature on the topic in general terms was widely available, there is not enough literature related to Ghana Armed Forces Medical Service's emergency response system. which impacted the study. Extending the study to include preparedness levels of the major teaching hospitals and regional hospitals in Ghana could have impacted on the significance of the study to specific facilities and help in policy direction to enhance emergency response systems in the Ghana healthcare system.

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APPENDIX ONE

ETHICAL

CLEARANCE

Institutional Review Board
37 Military Hospital
Neghelli Barracks
ACCRA

Tel: 059 1759506
Email: irbmilhosp@gmail.com

24 October 2023

AMENDED PROTOCOL APPROVED

37MH-IRB/PhD/162/2018

On 24 October 2023 the 37 Military Hospital (37MH) Institutional Review Board (IRB) approved your amended protocol.

TITLE OF PROTOCOL: Scoping review of Ghana's health care emergency response system: A case study of the 37 Military Hospital.

PRINCIPAL INVESTIGATOR(s): Richard Otchere Mintah

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid till 23 October, 2024

DR EDWARD ASUMANU
(37MH-IRB, Vice Chairman)

INSTITUTIONAL REVIEW BOARD
24 OCT 2023
37 MILITARY HOSPITAL, ACCRA

Cc: Brig Gen PK Ayibor (Jr)
Commander, 37 Military Hospital

APPENDIX TWO

INTERVIEW GUIDE

AN IN-DEPTH INTERVIEW GUIDE

Introduction

I am Richard Otchere Mintah, a final year PhD Candidate of the University of Ghana Business School, Legon. I am offering a PhD programme in Health Policy and Management. As part of the requirement for the award of Doctor of Philosophy, I am carrying out a study titled "A Review of Emergency Response Efforts and Surge Capacity Preparedness of the Ghana Armed Forces Medical Service for Road Traffic Incident: A Case Study of The 37 Military Hospital". I would therefore be grateful if you could provide me with information pertaining to this subject matter under investigation. This study is purely an academic exercise and any information provided remains solely in the academic domain for my assessment.

Preamble

Goal 3 of the SDGs specifically outlines measures that must be taken to help achieve good healthcare for the people. Central to the goal is to ensure healthy lives and promote well-being for all ages by 2030. A well-defined healthcare system is measured by several indicators. One key indicator of a nation's health system is its alertness and approach to emergencies. A situation that is deemed an emergency occurs when it is unexpected and requires an immediate measure to protect public health, safety, or

property. This aspect of the healthcare system has become crucial following the emergence of infections/diseases of public health significance. According to the World Health Organization, these threats are new or newly emerging diseases, whose release may be as a result of accidental/deliberate use of biological chemical or radio-nuclear agents, natural disasters, human-made disasters, complex emergencies, conflicts and other events with a potentially catastrophic impact on human health. It is for this reason that the emergency response system has become key to the health sector in Ghana. Ghana, like many other countries, has made considerable efforts to improve the healthcare system. The inadequate support facilities for the management of emergency medical services is a drawback within the Ghanaian healthcare system. In Ghana, there remain challenges with infrastructure and coordination of emergencies. This affects appropriate emergency response and care by the providers in the system and patient care outcome. To get around these challenges, in other jurisdictions, empirical studies are carried out to establish the lapses and find a sustainable remedy. The rationale is to ensure the effectiveness of emergency healthcare delivery is reflected in efficient care delivery. With this in mind, I would like to find out from you a few issues about emergency response systems, what are the common emergencies you receive at your facility, and how prepared is your facility to enhance emergency response in Ghana.

1. What are the common cases that require emergency response and how prepared is your facility in responding to these cases? (Main Question)

Sub-questions from the main question (For Purposes of clarity).

2. Please, my scoping review of the emergency response system in Ghana revealed that road traffic accidents, pregnancy and child-birth complications, cardiovascular conditions, injuries, infectious

diseases or public health emergencies are the commonest cases that require emergency response by health facilities in Ghana. What do you have to say about this? What is the situation in your facility?

3 I also discovered during the review that paediatrics and the youth form a huge number of persons involved in RTA, how prepared is your facility for paediatric RTA surge?

4 How well trained are you to handle RTA emergencies?

5. What strategies should be adopted to help mitigate the challenges in responding to emergencies?

Thank You

APPENDIX THREE

EMERGENCY PREPAREDNESS ASSESSMENT INTERVIEW GUIDE

MODIFIED WORLD HEALTH ORGANIZATION FIELD MANUAL FOR CAPACITY ASSESSMENT OF HEALTH FACILITIES PREPAREDNESS IN RESPONDING TO EMERGENCIES

I. General Information

1. What is the facility name and when was the health facility built? _____

2. What is the bed capacity? _____

3. How many operating rooms does your facility have?

_____ 1

_____ 2

_____ 3

_____ > 3, specify : _____

4. How many stretchers (used for transporting patients) does the facility have?

_____

5. Where are the stretchers placed when not being used? (Please check all applicable areas.)

_____ ER

_____ Waiting area

_____ Ward area

_____ Storage room

_____ Lobby

_____ Others, specify: _____

6. How many wheelchairs does the facility have? _____

7. Where are wheelchairs placed when not in use? (Please check all applicable areas.)

_____ Nurses' station

_____ Ward area

_____ Treatment room

_____ Storage room

_____ Lobby

_____ Others, specify: _____

8. Are there extra beds in the facility?

_____ Yes

_____ No

If you answered yes, please proceed to questions 8a-8b; otherwise go to question 9.

8a. Where are they located? (Please check all applicable areas.)

_____ Rooms

_____ Receiving areas

_____ Stock rooms

_____ In-patient areas

_____ Visiting rooms

_____ Others, specify: _____

8b. Are the beds secured in place?

_____ Yes

_____ No

If you answered yes, please proceed to question 9; otherwise go to question 10.

9. If yes, how? (Please check all applicable methods.)

_____ Wheel lock

_____ Manually fastened

_____ With metal

_____ With wood

_____ With rope

_____ Others, specify: _____

10. Has the health facility experienced any form of disaster during the last 10 years?

_____ Yes

_____ No

11. Has the facility responded to an external disaster situation in the past?

_____ Yes

_____ No

If you answered yes, please fill in the table below; otherwise proceed to question 12

Nature of Disaster	Date of Occurrence	Total Number of Casualties

II. Assessment of Structural Vulnerability

12. Where is the health facility located? (Please check appropriate answer/s.)

_____ On a slope

_____ On a valley

_____ On top/close to active faults

_____ On a plain/flat land

_____ On a flood plain

_____ In a tsunami prone area

_____ On a highly elevated area

_____ Others, specify: _____

13. How many buildings does the institution have?

_____ 1

_____ 2

_____ 3

_____ >3, specify: _____

14. Are ramps present in appropriate areas of the health facility for moving bed patients and for use by people with disabilities?

_____ Yes

III. Assessment of Non-Structural Vulnerability

15. Which of the following are available in your institution?

(Please fill in the table below.)

Equipment	Present in the health facility?		No. of units	Percentage Score
	Yes	No		

Central Air-conditioning Unit				
Electric Generators				
X-ray Equipment				
Boiler				
CT-Scan Machine				
Hydrotherapy Pool				
MRI Machine				
Respirators				
Ventilators				
Anesthesia Machine				

16. Where are the following located? (Please put the number of units in the appropriate spaces.)

Equipment	Building location	Basement	Ground Floor	Second Floor	Third Floor	Above 3rd Floor
Central Air-Con Unit						
X-ray Equipment						
CT Scan Machine						
MRI Machine						

Electric Generator						
Boiler						
Hydrotherapy Pool						
Respirator						
Ventilator						
Anesthesia Machine						

IV. Assessment of Functional Vulnerability

A. Site and Accessibility

17. Is the health facility located in the town/city proper?

_____ Yes

_____ No

If you answered no, please proceed to questions 17a-17b; otherwise go to question 18..

17a. How far is the facility from the main town/city? _____

17b. Is the facility separated from the main town/city by a bridge?

_____ Yes

_____ No

18. Is the health facility located along the main street/highway?

_____ Yes

_____ No

If you answered no, please proceed to question number 18a; otherwise go to question 19.

18a. How far is the facility from the main street/highway? _____

19. How many roads lead to the health facility?

_____ 1

_____ 2

_____ 3

_____ >3, specify: _____

A. Areas in the Health Facility

20. What are the major areas of your institution? (Please check all applicable answers.)

_____ Administration

_____ Ambulatory Care Units (Outpatient)

_____ General Services

_____ Emergency Services

_____ In-patient Care Units

_____ Laboratory

_____ Pharmacy

_____ Radiology

_____ Operating Rooms

_____ Others, specify: _____

21. Where are the points of entry to the health facility? (Please check all applicable answers.)

_____ ER area

_____ Administration area

_____ OPD area

_____ Others, specify: _____

22. What comprise the General Services area? (Please check all applicable answers.)

_____ Boilers

_____ Kitchen area

_____ Laundry area

_____ Communication

_____ Machinery area

_____ Storeroom

_____ Others, specify: _____

23. Is the General Services area located in a separate building?

_____ Yes

_____ No

24. What specific areas of the health facility can be converted into spaces for

patients during disaster situations? (Please check all applicable answers.)

_____ Waiting areas/lobby

_____ Physician's offices

_____ Parking lots

_____ Physiotherapy room

_____ Park/ free area

_____ Outpatient consultation

_____ Diagnostic and treatment room

_____ Others, specify: _____

25. What provisions are located in these areas? (Please check all applicable answers.)

_____ Adequate lighting

_____ Electrical outlets

_____ Water supply

_____ Bathroom

_____ Telephone outlets

_____ None

B. Equipment and Supplies

26. Are there stocks of the necessary supplies and equipment in the health facility?

_____ Yes

_____ No

27. Is inventory of resources done by the institution?

_____ Yes

_____ No

If you answered yes, please proceed to questions 27a-27b; otherwise go to question 28.

27a. How often is the inventory conducted?

_____ Every month

_____ Quarterly

_____ Annually

_____ Others, specify: _____

27b. What benefits have been realized from this practice? (Please check all applicable answers.)

_____ Identification of resources needed for effective emergency management

_____ Identification of resources currently available within the community

_____ Identification of variation (shortfall/surplus)

28. Is there a detailed list showing the destination (intended use) of these supplies?

_____ Yes

_____ No

29. How many months of supplies (medical and surgical items, essential

medicines and other supplies) are stocked for use by the health facility?

_____ 1 month

_____ 2 months

_____ 3 months

_____ >3 months, specify: _____

30. Is there an arrangement with vendors regarding procurement of supplies and equipment during a disaster?

_____ Yes

_____ No

31. Does the health facility have a system in place for emergency procurement of supplies?

_____ Yes

_____ No

If you answered yes, please proceed to question 31a; otherwise go to question 32.

31a. How long does the procurement of supplies take under emergency conditions?

_____ 1 week

_____ 2 weeks

_____ 3 weeks

_____ Others, specify: _____

32. Is there an arrangement for sharing resources with other health facilities and / or potential emergency suppliers of resources?

_____ Yes

_____ No

33. Is rotation of items with expiry dates done?

_____ Yes

_____ No

34. Who coordinates resource allocation? (Please check all applicable answers.)

_____ Staff of emergency controller

_____ Administrative staff

_____ Volunteers

_____ Others, specify: _____

35. Does your health facility have an emergency kit?

_____ Yes

_____ No

If you answered yes, please proceed to questions 35a, otherwise proceed to question 36.

35a. Are the contents of your emergency kit consistent with the WHO's prescribed New Emergency Health Kit?

_____ Yes

_____ No

36. Does your health facility have the capacity to store blood products?

_____ Yes

_____ No

If you answered no, please proceed to question 36a; otherwise, proceed to question 37.

36a. Where do you get blood and other blood products? (Please check all applicable answers.)

_____ Commercial blood banks

_____ Other health facilities

_____ Blood donors

_____ Others, please specify: _____

C. Utilities

37. How is water supplied to the health facility? (Please check all applicable answers.)

_____ From a water company

_____ Deep Well

_____ Others, specify: _____

38. Does the health facility have suitable means of storing water?

_____ Yes

_____ No

39. Is there an alternative source/s for water in case the main supply gets cut off?

_____ Yes

_____ No

If you answered yes, please proceed to questions 39a-39c; otherwise proceed to question 40.

39a. What is the alternative source of water? _____

39b. How is the water from the alternative source treated? (Please check all applicable answers.)

____ Filtration

____ Chlorination

____ Sedimentation

____ Boiling

____ Water tablets

____ Not treated

39c. How long would the health facility continue to function using the alternative source of water? _____

40. How is electricity supplied?

Voltage : ____ 110 V ____ 220 V

Amperage: _____

Cyclage: _____

41. Where are the control panels and electric power distribution lines located?

_____

42. Is there an alternative source of electrical supply (emergency power generator)?

_____ Yes

_____ No

If you answered yes, please proceed to questions 42a-42c; otherwise proceed to question 43.

42a. What is the capacity of the emergency power generator? _____

42b. What fuel is utilized by the emergency power generator? _____

42c. What proportion (in %) of the facility's energy requirement can it supply? _____

42. Does the health facility have emergency lights (for use between periods of power interruption and restoration of electrical supply with generator set)?

_____ Yes

_____ No

If you answered yes, please proceed to questions 42a-42b; otherwise proceed to question 43.

42a. How are the emergency lights activated?

_____ Manual

_____ Automatic

42b. Where are they located?

_____ Nurses' stations

_____ Emergency room

_____ Wards

_____ Operating room

_____ Individual patients' rooms

_____ Laboratory

_____ Hallways

_____ Lobby

_____ Stairwells

_____ Others, specify: _____

42c. How are medical gases supplied?

_____ Main pipeline

_____ Individual tanks

_____Others, specify: _____

43. Are there safety measures to ascertain prevention of gas spills/leaks?

_____ Yes

_____ No

D. Security

44. Does the health facility have a security unit?

_____ Yes

_____ No

If you answered yes, please proceed to questions 44a-44b; otherwise go to question 45.

44a. Who provides the personnel for the security unit?

_____ Health Facility

_____ Private security agency

44b. What areas in the health facility are given top priority in terms of security especially during disasters? (Please check all that apply.)

_____ Entrance / Exit points

_____ Main thoroughfares

_____ Storage area for controlled substances

____ Storage area for high-value medical equipment

____ Others, specify: _____

E. Transportation and Communication

45. What forms of internal communication are being used by the institution? (Please check all the applicable answers.)

_____ Regular telephone

_____ Cellular telephone

_____ Pager

_____ Public address system

_____ Short-wave radio

_____ Intercoms

_____ Runners

_____ Others, specify: _____

46. What forms of external communication are being used by the institution? (Please check all applicable answers.)

_____ Telephone with landline

_____ Cellular telephone

_____ Pager

_____ Facsimile machine

_____ Short-wave radio

_____ Runners

_____ Others, specify: _____

47a. If the health facility is using telephones (whether landline or cellular), what are the alternative forms of communication in case the phone system breaks down? (Please check all applicable answers.)

_____ Short-wave radio

_____ Runners

_____ Others, specify: _____

48. What means of patient transport are used by the institution? (Please check all applicable answers.)

_____ Buses, minibuses and vans

_____ Ambulance

_____ Trucks

_____ Private vehicles

_____ Boats (if applicable)

_____ Aircraft (both fixed-wing and helicopters)

_____ Motorcycles

_____ Others, specify: _____

If your facility has at least one ambulance, please answer question 48a; otherwise, please proceed to question 49.

48a. What are the capabilities of your ambulance/s? (Please fill in the table below).

Ambulance capabilities	No. of ambulances in the facility	Personnel assigned to the ambulance			
		Driver	Paramedic	Nurse	Doctor
Purely for transport, No special equipment					
With supplies for Basic Life Support					
With supplies for both Basic Life Support and Advance Cardiac Life Support					
Others, specify:					

F. Public Information

49. Is there a public information centre in the institution?

_____ Yes

_____ No

If you answered yes, please proceed to questions 49a-49e; otherwise go to question 50.

49a. Who coordinates the public information centre? (Please check all applicable answers.)

_____ Social worker

_____ Administrative staff

_____ Volunteer

_____ Others, specify: _____

49b. Which personnel are tasked to staff the public information centre? (Please check all applicable answers.)

_____ Social workers

_____ Administrative staff members

_____ Volunteers

_____ Others, specify: _____

49c. What services are provided at the information centre? (Please check all applicable answers.)

_____ Information about patients admitted and discharged

_____ Finding addresses and whereabouts of family members of patients admitted to the health facility

_____ Assisting in the identification of victims

_____ Assisting family members to locate relatives

_____ Others, specify: _____

49d. Will the Public Information Centre continue to provide the abovementioned

services during disaster situations?

_____ Yes

_____ No

_____ Not sure

49e. Does the Public Information Center have the capacity to coordinate?

with the following external entities in the event of a disaster?

(Please check all that apply.)

_____ National emergency preparedness agency

____ Red Cross and other emergency management agencies

____ Other specialized health facilities in the vicinity

_____ Fire department

_____ Police department

_____ Local utility companies

_____ Transport companies (for external means of transporting patients)

_____ Local funeral homes (for temporary morgue facilities)

_____ Medical supply vendors

50. Are there means to create public awareness of the disaster

preparedness plan of the institution?

_____ Yes

_____ No

If you answered yes, please proceed to question 50a; otherwise go to question 51.

50a. What are these measures? (Please check all the applicable answers.)

_____ Posters

_____ Hanging signs

_____ Signboards

_____ Public meetings

_____ Labels on necessary equipment

_____ Labels on exit doors

_____ General evacuation route

_____ Others, specify: _____

51. How is the public informed of a disaster situation in your catchment area? (Please check all applicable answers.)

_____ Mass media

_____ Audible and visual signs

_____ Community network

_____ Loud speakers

_____ Door-to-door announcements

_____ Others, specify: _____

52. What methods are used to disseminate emergency plans to the public? (Please check all applicable answers.)

_____ Local press

_____ Radio

_____ Television

_____ Public meetings

_____ Visits to schools, offices, etc.

_____ Brochures

_____ Others, specify: _____

G. Assessment of Human Resources

A. Emergency Planning Group

53. Is there an existing emergency planning group in your institution?

_____ Yes

_____ No

If you answered yes, please proceed to questions 53a-53e; otherwise go to question 54.

53a. When was this group formed? _____

53b. Who are the members of this planning group? (Please check all applicable answers.)

_____ Commander (Health facility chief executive officer)

_____ Commanding Officer (Chief of medical personnel)

_____ Admin Officers (Medical & General) (Head of administration)

_____ Chief Nursing Officer/Director of nursing services

_____ Public Information Centre head

_____ Security services supervisor

_____ Maintenance chief

_____ Staff representative

_____ A health department representative

_____ Engineer

_____ Architect

_____ Other organizations with which the health facility may

interact in emergency management

_____ Others, specify: _____

53c. Are all members of sufficient seniority to commit the organization

to planning group decisions?

_____ Yes

_____ No

53d. Are they capable of contributing to the planning group's work?

_____ Yes

_____ No

53e. What activities are done by the emergency planning group?

(Please check all applicable answers.)

_____ Hazard/potential problem analysis

_____ Structural vulnerability assessment

_____ Non-structural vulnerability assessment

_____ Functional vulnerability assessment

_____ Determine operating capacity during disaster situations

_____ Plan for mobilization of resources

_____ Define roles and responsibilities of each member/group

____ Ensure training and education of personnel as required

____ Provide for a monitoring and evaluation system for the

emergency preparedness program

_____ Provide pre-disaster photographic documentation of facility buildings and equipment for insurance purposes

_____ Others, specify: _____

54. What type/s of disaster does the health facility prepare for?

_____ External disasters only

_____ Internal disasters only

_____ Both internal and external disasters

55. Does the health facility have an emergency preparedness plan?

_____ Yes

_____ No

If you answered yes, please proceed to questions 55a-55e; otherwise go to question 56.

55a. Is the health facility emergency plan documented in writing?

_____ Yes

_____ No

55b. How often do you evaluate your disaster preparedness plan?

_____ Semi-annually

_____ Annually

_____ Biannually

_____ Others, specify: _____

55c. How do you evaluate your disaster preparedness plan?

_____ By discussion

_____ By performing drills

_____ By performing simulation exercises

_____ Others, specify: _____

55d. When was the plan last updated? _____

55e. What is your evaluation of your most recent emergency plan?

_____ Effective

_____ Needs changes/improvement

56. Is there an existing/updated organizational chart for disaster situations?

_____ Yes

_____ No

If you answered yes, please proceed to question 56a; otherwise proceed to question 57.

56a. Does the organizational chart follow the structure recommended?

by the Hospital Emergency Incident Command System (HEICS)?

_____ Yes

_____ No

57. How are the members of the emergency planning group made aware of these management roles? (Please check all applicable answers.)

_____ Distribution of copies

_____ Regular meetings

_____ Others, specify: _____

58. How are the members encouraged to actively be involved in

preparedness, response or recovery? (Please check all applicable answers.)

_____ Meetings

_____ Drills/ exercises

_____ Others, specify: _____

H. Subcommittees

59. Is the emergency preparedness committee divided into subcommittees or subgroups?

_____ Yes

_____ No

If you answered yes, please proceed to questions 59a-59d; otherwise go to question 60.

59a. What are these subcommittees/subgroups? (Please check all applicable answers.)

_____ Health

_____ Rescue

_____ Transportation

_____ Communication

_____ Mutual assistance and welfare

_____ Engineering

_____ Others, specify: _____

59b. Are the roles and responsibilities of these subcommittees/ subgroups clearly defined by the planning committee?

_____ Yes

_____ No

59c. How are these responsibilities assigned to them?

_____ According to existing function

_____ According to assessed capability of a group

_____ By random selection

_____ By volunteerism

_____ Others, specify: _____

59d. What subcommittee/subgroup is directly involved among the following: (Please identify.)

TASKS/DUTIES	Name of Subcommittee or Subgroup
1 servicing and testing of emergency equipment regularly in accordance with relevant standards and manufacturers' recommendations	
2 providing advice to management regarding new equipment or existing safety equipment	
3 implementing a yearly plan of hospital hazard audits to determine that good housekeeping is being maintained and to identify remedial action	
4 planning & coordinating emergency planning group meetings	

5 disseminating emergency plans	
6 reviewing emergency planning at least once a year	
7 exercising emergency plans at least once a year	
8 providing all new, temporary and casual personnel, with a summary of emergency plans at the time of appointment	

I. Inventory of Personnel

60. How many doctors does your health facility have? (Please fill in the table below.)

Area of Specialty	No. of consultants	No. of Residents	No. of Interns
Ophthalmology			
Emergency medicine			
General Surgery			
Cardiothoracic Surgeon			
Obstetrics and Gynaecology			
Internal medicine			
Pulmonologist			
Paediatrician			
Paediatric Surgeon			
Anaesthesiologists			

ENT specialist			
Ophthalmologists			
Orthopaedics			
Urology			
Laboratories			
CRA			
Others, Please specify			

J. Mobilization of Personnel

61. How are alarms raised during disaster situation? (Please check all applicable answers.)

_____ Alarm

_____ Bell

_____ Megaphone

_____ Verbal

_____ Siren

_____ Others, specify: _____

62. Who may activate the alarm? (Please check all applicable answers.)

_____ Special committee

_____ Administrator

_____ Director of health facility

_____ Others, specify: _____

63. Does the administration have an updated list of addresses and telephone numbers of all staff involved in the emergency preparedness plan?

_____ Yes

_____ No

If you answered yes, please proceed to question 63a; otherwise, proceed to question 64.

63a. Is the list of addresses and telephone numbers of hospital staff always located in an accessible area?

_____ Yes

_____ No

64. Does the health facility have a diagram of the communication network?

_____ Yes

_____ No

65. Is there a pre-assigned emergency operations centre (EOC) in the institution?

_____ Yes

_____ No

If you answered yes, please proceed to questions 65a-65b; otherwise go to question 66.

65a Where is it located? _____

65b. Who is/are assigned to run the operation centre?

_____ Administrative personnel

_____ Physician

_____ Nurse

_____ All of the above

_____ Others, specify: _____

66. Does the health facility have an on-site disaster response team?

_____ Yes

_____ No

If you answered yes, please proceed to questions 66a-66b; otherwise go to question 67.

66a. Who are the members of the on-site disaster response team?

(Please check all applicable answers.)

_____ ER Physician-on-duty

_____ Family Medicine Resident-on-duty

_____ Surgery Resident-on-duty

_____ ER Nurse-on-duty

_____ Emergency Medical Technicians (EMTs)

____ Volunteers

_____ Others, specify: _____

66b. Which of the following are team members trained to do?

(Please check all applicable answers.)

_____ Analyze the magnitude of the disaster

____ Coordinate efforts of various hospitals/support groups

_____ Basic Life Support

_____ Advanced Cardiac Life Support

_____ Perform limited surgery when necessary (e.g. doing amputation to free trapped victims)

_____ Relieve pain and anxiety of the injured

_____ Indicate the order of how casualties must be rescued

according to medical condition (Initial triage)

67. Do you have a pre-assigned area for reception of victims at the health

facility?

_____ Yes

_____ No

If you answered yes, please proceed to question 67a; otherwise go to question 68.

67a. Where is the pre-assigned area for reception located?

_____ Inside the emergency room

_____ Outside the emergency room but inside the health facility

_____ Outside the health facility

_____ Others, specify: _____

68. Do you have a pre-assigned area for triage in the health facility?

_____ Yes

_____ No

If you answered yes, please proceed to questions 68a-68c; otherwise go to question 69.

68a. Where is the pre-assigned area for triage located?

_____ Inside the emergency room

____ Outside the emergency room but inside the health facility

_____ Outside the health facility

_____ Others, specify: _____

68b. Who is/are tasked with staffing the triage area? (Please check all applicable answers.)

_____ General Practitioners

_____ Surgeons

_____ Internists

_____ Physicians trained in traumatology

_____ Nurses

_____ Volunteers

_____ Paramedical personnel

_____ Others, specify: _____

68c. What functions are assigned to the triage team? (Please check all applicable answers.)

____ Classification of patients according to priority of treatment

_____ Referral of patient/s to the appropriate place within the health facility

_____ Referral of patient/s to other treatment centres following stabilization

_____ Updating the Health Facility Emergency Committee of the situation

69. Do you have an established system for proper categorization and tagging of patients/casualties e.g. color-coding)?

_____ Yes

_____ No

70. Are there specific people assigned to security and crowd-control?

_____ Yes

_____ No

If you answered yes, please proceed to question 70a; otherwise go to question 71.

70a. What are these people tasked to do?

____ Close off other points of entry that are not vital to the

emergency operations of the health facility

_____ Control the flow of people entering the health facility

____ Direct people to appropriate areas inside the health facility

_____ Act as marshals in case evacuation is necessary

_____ Others, specify: _____

K. Training and Drills

71. Does the institution support the training and education of staff members

for emergency preparedness?

_____ Yes

_____ No

If you answered yes, please proceed to question 71a-71d; otherwise go to question 72.

71a. What strategies have been tried? (Please check all the applicable

answers.)

_____ Workshops, seminars, conferences

_____ Self-directed learning

_____ Individual tuition

_____ Exercises

_____ Pamphlets, videos, media

_____ Informal/formal presentations

_____ Public displays, meetings

_____ Others, specify: _____

71b. What stages are involved in training? (Please check all applicable answers.)

_____ Analyze training needs

_____ Design training

_____ Develop instruction

_____ Conduct instruction

_____ Validate training

71c. How often does the institution conduct training?

_____ Biannually

_____ Annually

_____ As necessary

_____ Others, specify: _____

71d. How many attended the most recent training conducted by the institution?

_____ (actual number) _____ % (proportion of those who attended among those who need to be trained)?

72. Is there a regular drill/exercise being conducted in preparation for any disaster occurrence?

_____ Yes

_____ No

If you answered yes, please proceed to question 72a-72bb; otherwise go to question 73.

72a. How regular are these drills done?

_____ Quarterly

_____ Semi-annually

_____ Annually

_____ Others, specify: _____

72b. Who heads the drills?

_____ Special committee

_____ Administrator

_____ Director of health facility

_____ Others, specify: _____

73. Is there financial support for the training and drills mentioned above?

_____ Yes

_____ No

If you answered yes, please proceed to question 73a-73b; otherwise go to question 74.

73a. What are the sources of financial support? (Please check all applicable answers.)

_____ Donation

_____ Insurance

_____ Allotment from the health facility's budget

_____ Others, specify: _____

73b. How much is the budget for these preventive measures? _____/year

K. Health Facility Networking

74. Is your disaster plan coordinated with those of other health facilities in your area?

_____ Yes

_____ No

If you answered yes, please proceed to question 74a-74b; otherwise go to question 75.

74a. Is your coordination part of a formal agreement?

_____ Yes

_____ No

74b. Do you perform drills together?

_____ Yes

_____ No

L. Community Involvement

75. Does the institution take into consideration the characteristics of its community in responding to emergency situations?

_____ Yes

_____ No

If you answered yes, please proceed to question 75a; otherwise go to question 76.

75a. What characteristics of the community are taken into account?

(Please check all applicable answers.)

_____ Demography

____ Environment (plants, animals, waters, air and soil)

_____ Infrastructure

_____ Culture

_____ Economy

_____ Disease pattern

_____ Others, specify: _____

76. Does the local community have its own disaster preparedness plan?

_____ Yes

_____ No

If you answered yes, please proceed to question 76a;

76a. Is the health facility disaster preparedness plan coordinated with the community disaster preparedness plan?

_____ Yes

_____ No

100. Is there any other information you would like to share?.....

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Thank you.

APPENDIX FOUR

TABLE 4: CHARACTERISTICS OF DATA INCLUDED IN THE SCOPING REVIEW.

Author/Year of Publication	Study Location	Method	Aim of Study	Key Findin Emergencies
1.Adamtey, Frimpong, and Dinye (2015)	Bibiani District	mixed-methods	Assess the state of emergency healthcare delivery in the Bibiani Anhwiaso Bekwai District	1.RTA 2. Obstetric e 3. Medical Er 4.Paediatric
2. Asante and Zwi (2009)	across various locations in Ghana	qualitative research approach	identify and analyze the factors that influence resource allocation decisions within the health system of Ghana	1. RTA 2. Malaria 3. Maternal & 4. Cardiovasc
2. Ampofo et.al. (2013)	Ghana, with a focus on road traffic injuries as a public health concern.	retrospective analysis of hospital records	to examine the incidence, characteristics, and public health implications of road traffic injuries in Ghana.	1. RTA
3. Norman, Aikins, Binka, and Nyarko (2012)	22 district and regional health facilities including teaching hospitals participated in	cross-sectional study of purposively selected health facilities	evaluate the all-risk emergency preparedness of hospitals in Ghana.	1. RTA 2. Obstetrics 3.Infectious d 4. Cardiovasc

	the study. All 10 regions of the country were covered.			
4. Mahama, S. A., Kenu, E., Bandoh, D. A., Sackey, S. O., & Afari, E. A. (2018)	Greater Accra	cross-sectional study design	to determine the relationship between emergency response times and pre-hospital trauma survival rates.	1. RTA
6. Whiteside et al. (2012)	urban Ghanaian emergency departments	a retrospective review	investigate the prevalence and characteristics of non-fatal injuries among pediatric patients presenting to the emergency department in urban Ghana. .	1. RTA
7. Blankson et.al., (2019)	urban areas of Ghana	qualitative approach, using interviews and focus group discussions	analyze the effectiveness of emergency response strategies in urban Ghana, identifying strengths, weaknesses, and areas for improvement	1.RTA 2. Medical er 3. Industrial a
8. Caldera and	Universal	a review of	to develop and propose a universal	1. Trauma an

Wirasinghe (2022)	comprehensive review	existing literature and data analysis	severity classification for natural disasters	2. Respirat smoke or dus 3. Heat or col 4. Infecti compromised
9. Mensah and Ahadzie (2020)	Ghana	Systematic review	to understand the causes, impacts, and coping strategies of floods in Ghana	1. Trauma an 2. Waterborn 3. Respirator
Belardo, Karwan, and Wallace (1984)	Universal	Case Study Approach	to explore and demonstrate how microcomputers can be effectively used to manage the response to disasters.	1. Trauma an 2. Burns and 3 Cardiovascu 4. Dehydra Related Illnes
Daniels and Abuosi (2020)	Ghana, various healthcare facilities across the country.	mixed-methods approach	to identify key challenges in emergency healthcare delivery in low- and middle-income countries, using Ghana as a case study, and to propose strategies for improving the effectiveness and efficiency of emergency healthcare services	1. RTA 2. Obstetric e 3. Cardiovasc 4. Iinfectious
Oteng et al. (2018)	conducted in Ghana, focusing	retrospective cohort study	to assess the impact of prehospital care on trauma survival in a developing country,	1. RTA 2. Falls

	on various hospitals and prehospital care settings across the country.	design	using Ghana as a case study	3. Assault rel
Mould-Milman et al. (2014)	sub-Saharan Africa, with a specific focus on Ghana.	Mixed methods approach	to identify and understand the barriers to accessing prehospital emergency medical services for patients experiencing acute coronary syndrome in sub-Saharan Africa, specifically in Ghana.	1. RTA 2. Cardiac 3. General M
Afari et al. (2014)	Assin North District, Ghana	qualitative approach	to explore and understand healthcare providers' perspectives on emergency obstetric referrals in the Assin North District, with a focus on identifying barriers and strategies for quality improvement in the referral process.	1. Obstructed 2. Postpartur 3. Hyperten pregnancy, in 4. Sepsis and to childbirth
Awoonor-Williams et al. (2015)	Upper East Region, Ghana	mixed-methods approach	to identify and understand the barriers preventing women from accessing emergency obstetric and newborn care services in the Upper East Region of Ghana.	1. Complicati (e.g., postpar 2. Neonatal birth asphyxi 3. Maternal

				(e.g., hyper complication abortions
Gborgbortsi et al. (2022)	Upper East Region, Ghana	mixed-method approach	to identify and understand the factors that influence the utilization of emergency obstetric care services in the Upper East Region of Ghana	1. Comp childbirth hemorrhage, 2. Neonatal birth asphyxi 3. Maternal (e.g., hyper complication abortions)
Amu and Nyarko (2016)	rural areas of Ghana	cross-sectional study design	to identify and analyze the barriers that women in rural Ghana face in accessing healthcare services.	1. Maternal (e.g., com childbirth) 2. Infectiou respiratory ir 3. General m (e.g., injurie complication 4. Pediatric

				diarrheal dise
Gborgbortsi et al. (2022)	Upper East Region of Ghana	mixed-methods approach	to identify and understand the factors that influence the utilization of emergency obstetric care services in the Upper East Region of Ghana	1. Comp childbirth hemorrhage, 2. Neonatal birth asphyxi 3. Maternal (e.g., hyper complication abortions)
Ofori-Asenso and Garcia (2016)	reviewed cardiovascular disease (CVD) data from various sources related to Ghana	literature review and data analysis	to understand the burden of cardiovascular diseases in Ghana within the context of globalization.	1. Myocardia attack) 2. Stroke 3. Hypertensi 4. Heart failu 5. Arrhythmia