AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT

OCCUPATIONAL HEALTH HAZARDS AND THEIR ASSOCIATED RISKS AMONG MEDICAL EMERGENCY STAFF IN THE WESTERN NORTH REGION OF GHANA

PRINCE MANU

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DECLARATION

STUDENT'S DECLARATION

I, Prince Manu, now declare that except for references to the works of other researchers duly cited, this work is the result of my original research and that this thesis has neither in whole nor in part been presented for another degree elsewhere.

SIGNATURE: ……

DATE: …….

SUPERVISORS' DECLARATION

We declare that the preparation and presentation of this thesis were supervised by the guidelines for the supervision of the thesis as laid down by the Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development.

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DEDICATION

I dedicate this work to my father, Mr. John Maxwell Krampah, my mother, Mary Quansah, my best friend Thomas Obeng for their unfailing love and unrelenting support throughout my education and career.

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LIST OF ABBREVIATIONS

CF	Compassion Fatigue
ED	Emergency department
GHS	Ghana Health Service
HIV	Human Immunodeficiency Virus
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HCW	Health Care Workers
HSE	Health and Safety Executive
HRM	Human Resource Management
ILO	International Labor Organization
IOHA	International Occupational Hygiene Association
MOH	Ministry of Health
MDG	Millennium Development Goal
NHIS	National Health Insurance Schemes
NIOSH	National Institute of Occupational Safety and Health
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PCE	Percutaneous Exposure
STS	Secondary Traumatic Stress
SPSS	Statistical Package for Social Science
WHO	World Health Organization
MCE	Mucocutaneous exposure
OPIM	Other Potentially Infectious Materials

ABSTRACT

Healthcare workers, specifically medical emergency staff, are continuously exposed to disease-causing pathogens, especially blood-borne pathogens. Occupational health and safety adherence helps to prevent the risk of illness and death associated with exposure. Unfortunately, in most Sub-Saharan African countries including Ghana, there are problems with the limited healthcare workers, which has led to overuse of the workforce. This situation is worsened by the frequent shortage of surgical and other hazard-prevention equipment especially in high-risk settings such as the medical emergency ward. This study assessed occupational health and hazards and their associated risk among medical emergency staff in the Western North region of Ghana. This hospital-based cross-sectional study included 390 medical emergency staff working in either government or private hospitals in the Western North Region of Ghana. A well-structured questionnaire was used to collect data on socio-demographic, and occupational health hazard risks exposures and outcomes. Statistical analyses were done using SPSS version 26.0 and Graph-Pad prism 8.0. $p < 0.05$ was considered statistically significant.

This study found that, over ninety percent of participants wore personal protective equipment (PPE) in all procedures (99.5%), followed standard operating procedures (96.9%), reported exposure to occupational health hazards (91.5%) and rate good personal occupational health practice (91.5%) at the work place. Majority had good occupational health and safety practice representing a proportion of 71.0%. Regardless, over ninety percent (96.7%) had been exposed to occupational health hazards and this call for in-depth studies.

CHAPTER ONE

INTRODUCTION

1.1 Background

Healthcare workers, especially staff of the medical emergency departments (ED), play a critical role in disease management in patient care. Unfortunately, the lives, safety, and well-being of these workers are challenged by numerous occupational hazards (Mossburg *et al.,* 2019a). These hazards range from less severe physical hazards to life-threatening biological hazards such as exposure to Human Immunodeficiency Virus (HIV) (Kumar & Panigrahi, 2021).

The global annual estimate of occupational hazards and exposure among healthcare workers is 10% in developing countries, with the highest exposures (WHO, 2022).In Sub-Saharan Africa, the lifetime prevalence of needle stick injury, the most common occupational hazard among healthcare workers, ranges from 22% to 95% whilst the annual prevalence ranges from 39% to 91% (Mossburg *et al.,* 2019b).Moreover, the prevalence of Hepatitis B virus (HBV), Hepatitis C virus (HCV), and HIV infection among health workers is more severe and brings to light the disproportionate burden faced by health workers in Sub-Saharan Africa compared to developed countries (Atlaw *et al.,* 2021).

Approximately 3 million healthcare workers are at risk of occupational exposure to blood-borne viruses per year and 90% of these infections are from developing countries (WHO, 2022, Oyekunle *et al.,* 2020). Healthcare workers in developing countries often have to tolerate employment conditions that do not meet basic occupational health

standards. The lack of work safety / excessive workloads, and physical, chemical, and biological exposures result in occupational diseases, and injuries, with over 1.2 million fatalities each year (Tahmid, 2020). In East and South Africa, for example, occupational exposure accounts for 19.7% of HBV, HCV, and HIV infections among healthcare workers (Adal & Abebe, 2022; Atlaw *et al.*, 2021). The higher prevalence of infections among healthcare workers could partially be explained by the higher prevalence of blood-borne pathogens in the general population but can also be due to poor occupational health practices in sub-Saharan Africa (Atlaw *et al.*, 2021).

It has been established that 90% of these hazards and exposures are preventable via safety practices. The constitution of the International Labour Organization (ILO) stresses on the protection of the workers against infections and injuries resulting from employment as a basic element of social justice. Occupational health is a multidisciplinary area of healthcare that is concerned with allowing individuals to carry out their profession in a manner that causes the least harm to their health (Iavicoli *et al.*, 2018). The World Health Organization (WHO) has established guidelines to prevent exposure to occupational hazards such as local government support to enable the transition to exclusive use of safety injection devices and the extensive wearing of personal protective equipment (PPE) (WHO, 2022).

Limited studies conducted in Africa have associated these hazards and exposures with several factors that prevail in the African healthcare setting (Rothe *et al.*, 2013), especially in the medical emergency department where staff work under extreme stress and encounter frequent deaths, accident cases, and life-threatening conditions (van de

Ruit & Wallis, 2020). These factors include; lack of personal protective equipment (PPE), unsafe conditions in the healthcare environment, high provider-to-patient ratio, lack of occupational health and safety training, absence of occupational health and safety protocols in wards, improper waste management, and many more (Mossburg *et al.*, 2019a). In Ghana, reports from the Ghana Labour Commission indicate high annual work-related disorders of (8,692) cases that reported among workers in the informal sector (Amponsah-Tawiah *et al.*, 2015). The Ghana Health Services Institute of Occupational Health Policy in 2010 and since then, there has not been further amendment. It has also been established that the reporting and handling of hazards and exposures in the Ghanaian health sector has not received much attention (Amponsah-Tawiah *et al.*, 2011). In addition, there are limited studies that evaluated occupational health and hazards and their associated factors among emergency staff in Ghana. This study sought to assess occupational health and hazards among medical emergency staff in the Western North region of Ghana.

1.2 Problem Statement

Despite the frequent exposures to different types of hazards, healthcare workers have been regarded as one of the most isolated groups of workers concerning the monitoring of their occupational health status due to the lack of adequate laws and policies that regulate the workplace in developing countries like Ghana (Organization, 2015). The unconcerned neglect may be due to the misconception that healthcare workers know the dangers that are associated with their duties at work and thus can prevent themselves from those hazards, therefore, healthcare training usually excludes an understanding of occupational health, and this makes health workers mostly uncertain of their hazards.

Furthermore, handling and documentation of occupational health hazards in Ghana and Sub-Saharan Africa is another difficult issue. The staff of the emergency departments work under extreme stress and are obliged to handle frequent life-threatening accidents and critical cases. Moreover, there is no empirical study on occupational injuries, sickness, and death among medical emergency staff in deprived regions of Ghana such as the Western North Region. This study therefore seeks to assess occupational health and hazards among medical emergency staff in the Western North Region of Ghana.

1.3 Justification

Healthcare workers, specifically medical emergency staff are continuously exposed to disease-causing pathogens mainly blood-borne pathogens. Occupational health and safety adherence helps to prevent the risk of illness and death associated with unusual exposure. Unfortunately, in most Sub-Saharan African Countries, there is the problem of limited healthcare workers, which has led to overuse of the workforce. This situation is even worsened by the frequent shortage of surgical and other hazards prevention equipment especially in high-risk setting such as the medical emergency ward. Recently, medical emergency staff is experiencing increasing work-related stress from work overload and work pressure. This has at times made them vulnerable to hazards while trying to meet work demands. Exposure to these hazards has rapidly increased the number of illnesses among healthcare workers and impacted job outcomes. This condition is also worsened by the neglect of occupational health and safety of healthcare workers. However, more troublesome is the absence of data or records of the incidence of cases of commonly encountered health hazards and follow-up management based on occupational safety law. The record and reporting behavior are another major issue in

Ghana. Understanding the factors associated with occupational hazard exposure among medical emergency staff is also important and serves as the basic step to end these exposures. Ghana among other developing countries has not developed a good surveillance system for occupational exposure to health hazards in health institutions, hence limiting the estimation of the exact magnitude of such hazards. Development of standards and guidelines and the need for cost containment, health services research has become much more prominent in recent years. There were few published empirical studies on the work of OHS in this part of the continent. The result of the study will generate more insight into the gap that exists in meeting the occupational safety of health personnel in Ghana. The findings from this study and the methodology would be useful literature for other researchers following the publication to fill the existing gap.

1.4 Main Objective

The broad objective of the present study was to assess occupational health hazards and risks among medical emergency staff in the Western North region of Ghana.

1.4.1 Specific Objectives

Specifically, this study sought to:

1. Assess occupational health and safety practices among medical emergency staff in health facilities in the region.

a. Determine the prevalence of occupational hazard exposures and injuries among medical emergency staff in health facilities in the region.

b. Determine the socio-demographic factors associated with occupational health and safety practices among medical emergency staff in staff in health facilities in the region.
c. Determine health facility and individual predictor variables associated with good occupational health and safety practices among medical emergency staff.

1.5 Significance

The relevance of this study can be seen in diverse ways. At the end of this study, empirical data on occupational health and hazards among medical emergency staff in the study area will be established. In addition, the factors associated with exposure to occupational hazards would be well documented and understood among medical emergency staff in the Western North Region of Ghana. The study could provide a basis for the formulation of effective occupational health and safety policies in the emergency department for Ghana Health Services. This piece of work would also provide the opportunity for employees, employers, and other stakeholders to identify specific respective roles in health and safety issues. Findings from this study will also provide the basis for other health institutions in Ghana to adopt the recommendations in the formation of effective health and safety measures in their institutions as well. Data obtained from this study would be reference material for policymakers in making decisions concerning health and safety practices and policies.

1.6 Scope of the Study

The study and sample population were limited to medical emergency staff working in government and private hospitals within the Western North Region of Ghana. The

research administered questionnaires to participants at the medical emergency wards of the selected hospitals in all districts within the region. The study gathered data to assess occupational health and safety practices and perceptions among medical emergency staff in the Western North region of Ghana. The study also sought to estimate the prevalence of occupational hazard exposures and the factors associated with occupational hazard exposures among medical emergency staff in the Western North region of Ghana.

1.7 Conceptual Framework

The researcher constructed a model that describes the different factors that may be associated with occupational health hazard exposure. According to this model, exposure to occupational health hazards is associated with three interrelated factors. The first factor associated with occupational health hazard exposure is the socio-demographic characteristics of an individual (Gosselin *et al.,* 2020). According to the limited studies conducted in Sub-Saharan Africa, an individual's age, gender, level of education, and work experience are known to be associated with occupational health hazard exposure (Bede-Ojimadu & Orisakwe, 2020).

Hospital-related factors are also known to be associated with exposure to occupational health hazards. Hospital-related factors include the structure, arrangement, and practice within the job environment that are associated with occupational health hazard exposures. They include; the presence of occupational health and safety guidelines and the workplace, occupational health and safety training programs for staff, the working environment, provision of PPEs for staff, flexible working conditions, adequate number of staff (WHO, 2022). The individual factors constitute the third factor associated with

exposure to occupational health hazards. The individual factors are personal norms and working habits and individual development and utilization in the workplace. These habits if not managed, usually lead to occupational health hazard exposure. Some individual factors include frequent hand washing, wearing of PPE, working overtime, working in other health facilities, and following SOP. Figure 1.0 displays our model.

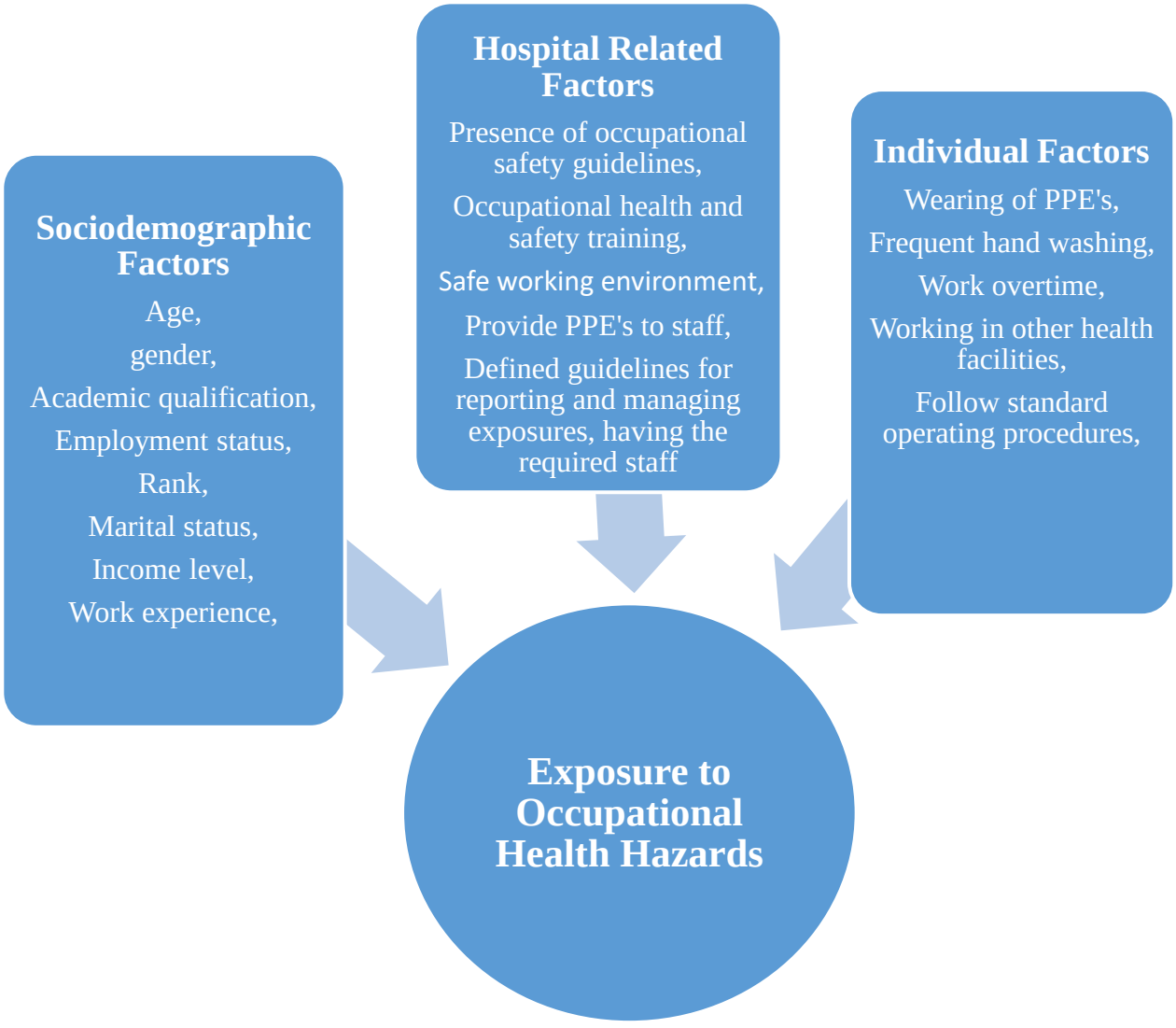

Figure 1.1: Factors Associated with Occupational Health Hazard Exposure

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review is a vital sum-up of research on a subject of interest, frequently prepared to put a research problem in context or to authenticate existing evidence. The literature review aided the researcher in identifying what other people have carried out and reported on the study problem. The main aims of the literature review are to place the present research inside the scheme of literature and to give context to the specific reviewer. A review of the literature affirms the study and also indicates that a problem exists and constitutes the need for the current research. The researcher used the literature review process to formulate a detailed apprehension of the topic. The literature review process assisted the researcher in identifying disparities in current knowledge levels and helped in assessing the occupational hazards in the hospital. The findings and perspectives of previous researchers were used to establish the intellectual discourse for aligning the research to other research, and this was done through the review of the literature. The literature review looked at journal articles, online resources, books, and reports that were related to occupational health and safety hazards in the hospital environment.

2.2 Hazards

Hazards are an inherent or integral property of a substance, agent, and source of energy or situation that has the potential to cause undesirable consequences (WHO, 2022). For example, chemical inhalation, slippery floors, and working while standing on a ladder can constitute a hazard. Hazard may also be defined as any source of possible

impairment, harm, or untoward health consequence on something or someone. The World Health Organization defines a health hazard as property damage, loss of livelihoods and services, and social, environmental, or economic disruption caused by any dangerous phenomenon, substance, human activity, or condition. Working conditions have a strong impact on the health and well-being of workers in hospitals. Hospitals that lack supportive working environments and those that do not take occupational health and safety into consideration; expose the healthcare workers to occupational health and safety hazards. In this respect, occupational hazards refer to all the activities that can cause or increase the risk of accident or illness in the work environment (Friend *et al.,* 2023). Occupational health hazards are the potential risks to health and safety for workers who work outside the home. Employees can develop health conditions or sustain injuries if exposed to these risks at the workplace.

Healthcare workers who do not get occupational health and safety training are susceptible to sharp injuries that give rise to blood-borne diseases. Symptoms of acute mental fatigue are often seen in healthcare workers particularly nurses who take on additional responsibilities. It is stated that healthcare workers who perform chemotherapeutic agents report an increased incidence of severe health signs like nausea, vomiting, headaches, and hair loss (Wahb *et al.,* 2020). Another further stated that there was an association between exposure to the drugs and adverse effects on reproductive health among female staff members, including infertility, pre-term deliveries, spontaneous abortions, fetal abnormalities, and small-for-gestational-age births (Bede-Ojimadu & Orisakwe, 2020). Healthcare workers are at a high risk of hazards such as needle stick injuries and blood-borne pathogens as they perform their daily duties

(Phillips *et al.*, 2012). As a result of sharp injuries and daily contact with blood and other bodily fluids, healthcare workers are vulnerable to blood-borne infections such as Human Immunodeficiency Virus (HIV), Hepatitis B, and Hepatitis C viruses (Ferrari *et al.*, 2015). Recapping, disassembly, and inappropriate disposal of hospital waste increase the risk of needle stick injury, especially in developing countries, where the prevalence of HIV infection is very high. Needle stick injuries were also reported as the most common occupational health hazard in a Nigerian teaching hospital (Iliyasu *et al.*, 2016).

2.3 Occupational Hazard

Occupational hazard refers to the endangerment, jeopardy, or danger as an outcome of the type or working conditions of a specific job (Marhavilas & Koulouriotis, 2021). It also means a work, equipment, substance, process, or condition that predisposes or can cause injury or disease by itself in the work environment. Occupational hazard refers to a work, material, substance, process, or situation that predisposes or causes accidents or disease, at a workplace (Nwankwo, 2019, Kowalczyk *et al.*, 2018;). In the 1950s, the first session of the joint International Labour Organization (ILO) and the World Health Organization (WHO) Committee on Occupational Health adopted a definition of occupational health. The definition was subs equently revised in 1995 and states "Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations". This means the protection of workers from hazards resulting from factors adverse to health and the maintenance of a safe working environment to meet their physiological and psychological capabilities (WHO, 2022).

Occupational health should target at the promotion and maintenance of the highest level of physical, mental, and social wellbeing of employees in all professions; the divergence from health among workers caused by their working conditions; their protection from risks resulting from factors antipathetical to health(Cooper & Cartwright, 2018; Proper & van Oostrom, 2019). Healthy healthcare workers are particularly important for successful healthcare practice and the well-being of the patient. Presently, occupational health and safety is seen by the World Health Organization (WHO) as a top agenda for health promotion in the 21st century (Hämäläinen *et al.*, 2011). The International Labour Organization (ILO) and the World Health Organization (WHO) reports showed that in the manufacturing sector, many employees suffer from work-related injuries and property loss resulting in economic loss (Driscoll *et al.,* 2014). Some studies have argued that the hazards can never be eliminated but minimized. However, it is difficult to minimize occupational health and safety practices when it focuses on less than 1% of organizational and national research issues (Sinclair *et al.,* 2020).

2.4 Types of Occupational Hazards

There are several types of occupational hazards. These hazards range from the less severe physical hazards to the life-threatening biological hazards such as exposure to Human Immunodeficiency Virus (HIV) (Kumar & Panigrahi, 2021). The classification of occupational hazards is a complex procedure due to the frequent emergence of new chemicals and pathogens. However, the commonly encountered occupational hazards can be categorized as biological, physical, chemical, and physical hazards.

2.4.1 Physical hazards

Physical hazards are described as extraneous matter or foreign objects and include any physical matter that may c ause illness (including psychological trauma) or injury to an individual (Schorn & Roma, 2020). Human beings are always exposed to physical hazards through the exposure of a foreign material on the skin or any other part of the body (Mhlongo *et al.*, 2020). In many fields of labour, exposure to physical hazards has been the major complaint with the majority leading to injury. One reason physical hazards are the most often reported complaint is that foreign objects provide tangible evidence of a product deficiency. Regulatory action may be initiated when agencies find. The main physical hazards of concern, their sources, and injury potential are listed including but not limited to accidental exposure or contact with; glass, knife, hair, dirt, paint and paint chips, rust, grease, dust, paper, etc. The sources of physical hazards include raw materials, water, facility grounds, equipment, building materials, and employee personal effects. Physical hazards may be added inadvertently during distribution and storage, or intentionally introduced (sabotage). Most often, falling and slipping may be there because of the emergency atmosphere, (i.e., high traffic and compact treatment spaces). Slips/trips/falls may be a specific concern for ED areas. There is a potential slip and fall hazard if water is spilled on the floor accidentally, electrical cords run across pathways, and/or if emergency equipment or supplies block the passageway (WHO, 2022).

Injury may occur to employees from improper training or use of equipment (e.g., defibrillators). Electric shock may also occur as a result of lack of maintenance or misuse of equipment and/or its controls. Oxygen-enriched atmospheres and water may

contribute to hazardous conditions. Employee exposure to electrical hazards including Electric shock, electrocution fires, and explosions. Damaged electrical cords can lead to possible shocks or electrocutions. A flexible electrical cord may be damaged by door or window edges, staples and fastenings, equipment rolling over it, or simply by aging (Omar *et al.,* 2015). The chief problem relating to ergonomics in nursing is musculoskeletal work-related disorders (back injuries, neck, shoulder, arm, wrist, and knee disorders). Low back pain is a persistent problem in the population of nurses (Dėdelė *et al.,* 2019). Methods involved in controlling physical hazards include raw material specifications and inspections along with vendor certification and guarantees. Various preventive measures are available to find and remove certain physical hazards. Metal detectors can be used to locate ferrous and nonferrous metals in foods; various foreign objects, especially bone fragments can be found through X-ray technology. Effective pest control and foreign object removal from plant environments are also essential. Preventive maintenance and sanitation programs for plants and equipment are necessary.

2.4.2 Biological hazards

Biological hazards are the most dangerous hazards, especially in the health sector. Biological hazards include cuts, wounds or lacerations, sharp related injuries, direct contact with contaminated specimens or biohazardous materials, bioterrorism, blood-borne pathogens, infectious diseases or infections, airborne diseases, vector-borne diseases, and cross contamination from soiled materials (Ndejjo *et al.,* 2015). Exposure to biological hazards usually leads to injuries relating to infectious diseases. Emergency Department (ED) workers are at particular risk for exposure to blood, OPIM, and blood-

borne pathogens because of the immediate, life-threatening nature of emergency treatment (Sharma, 2017). Percutaneous exposure (PCE), mucocutaneous exposure (MCE) to blood and blood-containing body fluids, and Venipuncture procedures also cause bloodborne pathogens (Hadaway, 2012). Blood-borne pathogens may be transmission by needle stick injury (PARSA-PILI *et al.,* 2013; Weldesamuel *et al.,* 2019). Infectious diseases, such as the immunodeficiency virus, hepatitis B, C & G viruses, and tuberculosis. The likelihood of being exposed in the emergency and triage setting compared to other (Salelkar *et al.*, 2010). The National Institute of Occupational Safety and Health (NIOSH) has recognized that occupational exposures to tuberculosis, SARS, and influenza are common among healthcare workers. Respiratory protection involves preventing exposure to communicable agents through proper donning, and isolation. Staff may be treating an emergency and be unaware of other pre-existing infectious conditions (Schill & Chosewood, 2013). Needle stick injuries are the single greatest reason for health occupational hazards among health care providers. The rate of exposure is high in the emergency department (19.2 %) as compared to other areas of the hospital. Among healthcare personnel Nurses are more exposed (65.8%) to needle stick injuries, than physicians (19.2 %) Technicians (9.6 %), and others (5.5 %) (Jahan, 2005).

Causes of most recent needle stick injuries among healthcare workers are Fatigue (50.4 %), lack of assistance (27 %), rushing (11.7 %) and 10.9 % couldn't have been prevented (Sharma *et al.,* 2010). Overall, 34.8 % of healthcare workers get needle stick injuries during their lifetime. Most of the needle stick injuries occurred during sharps disposal (31.7 %), operative procedures (21.6 %), while collecting blood samples (13.8 %), while starting an intravenous line (13.4 %), and while giving injections (13.2 %) (Salelkar *et*

al., 2010). Because of these needle stick injuries 37 % of the hepatitis B among Health Care Workers (HCWs)were the result of occupational exposure (Sharp injuries) whereas less than 10% of the HIV among health workers is the result of an exposure at work, needle stick injuries. But 95 % of HIV and Hepatitis occupational exposure is preventable with safe practical, low-cost measures(Auta *et al.,* 2017).

2.4.3 Chemical hazards

Chemical hazards exist when an employee is exposed to any chemical preparation in the work environment of any kind, whether; solid, liquid, or gas. Some chemical hazards are safer than others, however, some employees are more sensitive to chemicals, and even common solutions can cause illness, skin irritation, or breathing problems (Friend *et al.,* 2023). Healthcare workers are susceptible to different variety of chemical hazards that are used in hospitals and other health facilities. These hazards include anesthetic agents, disinfectants, chemical sterilizing agents, drugs, and cytostatic or laboratory reagents. Most of these substances irritate the skin affect the respiratory tract and can cause allergy. Others, like ethylene oxide, formaldehyde, and hexachlorophene, are known mutagens, teratogens, and human carcinogens. Among the occupational allergic agents, latex, acrylic, and epoxy chemicals in orthopedics and dentistry, laboratory chemicals such as formaldehyde, chromium, cobalt, and organic solvents can cause irritant dermatitis.

Substances such as animal protein and antibiotics; especially the penicillin category: are well-known allergic agents that may cause not only asthma but also dermatitis and conjunctivitis. It is significant to establish that once an allergy has occurred, it is very

hard to keep the exposure levels minimal enough to prevent exacerbation of the disorder. Hence, it is very essential to prevent or minimize exposures in the first place (Friend *et al.,* 2023; Tahmid, 2020). Conjunctiva exposures are happening because of lack of eye protection and it is most frequently associated with pathogen transmission among all types of blood exposure. HCWs should wear eye and face protection during invasive procedures. Eyeglasses aren't enough. Eye protection should incorporate a seal above the eyes to prevent blood from dripping from the forehead into the eyes (WHO, 2022).

Gloves must be worn frequently in the ED, because of occupational exposure to blood and OPIM, creating a potential for employees to develop latex allergy from wearing latex gloves. Healthcare workers exposed to hypoallergenic latex gloves are at risk for developing latex sensitization (Phaswana & Naidoo, 2013). It is the reaction to certain proteins when HCWs change the gloves (skin rash; flushing; itching; nasal, eye, or sinus symptoms; asthma & shock). Healthcare workers reported symptoms consistent with latex allergy (Kulchania, 2021). Antineoplastic agents may be prepared and distributed in a variety of health facilities. A lot of studies have been written on the dangers of cytotoxic drugs to healthcare workers who work in hospitals. These chemicals have been associated with mutagenic, teratogen, and carcinogenic effects as well as untoward consequences such as irritation of the skin, eyes, and mucous membranes or acute allergic reactions (Alston & Okorie, 2023). Poor handling as a result of mixing these agents can lead to exposure. Another study established that cyclophosphamide was seen in urine specimens of two oncology healthcare workers who were involved in the preparation of this drug.

The finding of this study raises the probability that high absorption of the drug by the two oncology workers could have taken place. It was proposed that the high levels of mutagenicity seen in urine specimens of the oncology health workers might have arisen in part from metabolites of cyclophosphamide. In respect to the known side-effects of cytotoxic, such as second malignancies, this finding is essential to health workers, especially nurses (Tran & Vu, 2020). Increased frequencies of sister chromatid exchanges in the lymphocytes of healthcare workers handling cytostatic drugs have been reported (Mohammad, 2014). Workers who are mostly exposed to cytostatic agents for long periods had significantly increased numbers of chromosome-type breaks in their lymphocytes as against those with a reference group of unexposed laboratory workers and hospital administrative staff (Laitinen and Päivärinta, 2010).

A related study, involving twenty-four (24) oncology nurses and pharmacists and an equal number of matched referents found that the frequency of in vivo mutations in lymphocytes was significantly high in the former and appeared to be associated with the length of exposure (Rhule, 2012). Such findings put more weight on the suspicion that these drugs pose a potential carcinogenic danger to healthcare workers particularly, exposed nurses. Yet, the absences of a prospective study indicate a clear-cut neoplastic effect on exposed healthcare workers is a challenge. As a result of the potential adverse effects, care must be exercised in handling both these drugs and the waste products of patients undergoing cytotoxic chemotherapy. The urine of patients receiving cisplatin contained appreciable amounts of the drug (Geller and Robinson, 2015).

2.4.4 Psychological Hazards

Psychosocial hazard occurs when the interactions between job content, work organization, and management, as well as other environmental and organizational conditions, on one hand, and the workers' competencies and needs on the other (Amponsah-Tawiah, 2013). Hence, psychological hazards can be defined as the several kinds of workplace interactions that have a risky exposure to employees' health through their perceptions and experiences (ILO, 2010). A psychological hazard is any hazard that influences the mental well-being or mental health of the employee and may have physical consequences by overpowering the individual's coping mechanisms and impacting the employee's ability to work in a healthy and safe condition. psychosocial hazards refer to those aspects of the design and management of work, and the social and organizational contexts of work that have the possibility of causing psychological or physical danger (Chirico *et al.,* 2019). Substantial changes in the work environments lately are closely associated with the organization and management of work have ensued in emerging hazards and new challenges in the area of occupational health and safety. Work-related stress and workplace violence are widely accepted as major psychological hazards that bring up tremendous setbacks to occupational health and safety (Zirzow, 2023). Psychological hazard is an issue in EDs because of the crowded and emotional situations that can occur with emergencies. ED patients could be involved with crimes, weapons, or violence from other people which could put the ED employee at an increased risk of workplace violence. Approximately 25 % of Nurses had experienced physical violence and verbal abuse more than 20 times within 3 years. HCWs who experience physical violence, or verbal abuse indicated fear of retaliation and lack of

support from hospital administration and ED management as barriers to reporting workplace violence (Gacki-Smith *et al.,* 2009; Hassankhani *et al.,* 2018).

In the USA, 74.9 % of Emergency physicians had Verbal threats at least once in the year. 28.1 % were victims of a physical assault, 11.7 % were confronted outside of the ED. Female emergency physicians were more likely to have experienced physical violence, but not other types of violence.76 % of emergency physicians were occasionally fearful of workplace violence, whereas 9.4 % were frequently fearful. Forty-two percent of emergency physicians sought various forms of protection as a result of the direct or perceived violence, including obtaining a gun (18 %), knife (20 %), concealed weapon license (13 %), mace (7 %), club (4 %), or a security escort (31%) (Gacki-Smith *et al.*, 2009). Factors responsible for violence in ED: Patients and their relatives were identified as the main perpetrators of this violence. The contributing factors to workplace violence identified are overcrowding, lack of resources, staff shortages, and the absence of effective antiviolence policies (Dafny & Beccaria, 2020). Occupational stress is a recognized problem in HCWs. Nurses were found to be one of the occupations that had a higher-than-expected incidence of stress-related health disorders (Schill & Chosewood, 2013). Studies suggest work stress may increase a person's risk for cardiovascular disease, psychological disorders, workplace injury, and other health problems. Early warning signs may include headaches, sleep disturbances, difficulty concentrating, job dissatisfaction, and low morale. Emergency Department nurses are in a position that is expected to deal with additional stressors. These include; unexpected numbers of patients at any time, unexpected rapid changes in patients' situations, and response to distressing or traumatic incidents such as - sudden death, patient violence, inappropriate attendees, and physical or verbal abuse daily (Gholamzadeh *et al.,* 2015). Emergency nurses often

care for persons exposed to traumatic events. In the presence of empathetic caring, nurses exposed to such stressors over time can suffer from Secondary Traumatic Stress (STS) or Compassion Fatigue (CF). STS symptoms (intrusion, avoidance, and arousal) may lead to job dissatisfaction or burnout (Ratrout & Hamdan-Mansour, 2020).

2.5 Occupational Health and Safety

Health is a positive concept that includes social and personal resources as well as physical capabilities. It has been conceptualized as the ability to have and reach goals, meet personal needs, and cope with everyday life. The WHO defines health as not just the absence of disease but as a state of complete physical, mental, and social well-being (WHO, 2022). A joint definition of occupational health endorsed by the ILO and WHO states that: "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the workers in an occupational environment adapted to their physiological and psychological capabilities; and, to summarize: the adaptation of work to man and of each man to his job"(WHO, 2022). Thus, occupational health has gradually developed from a monodisciplinary risk-oriented activity to a multidisciplinary and comprehensive approach that considers the individual's physical, mental, and social well-being, general health, and personal development. The above understanding coupled with the fact that at the core of every business is the man whose output is partially dependent on his state of health, an

appreciation of the concept of occupational health and safety becomes imperative to the success of any organization (WHO, 2022).

Occupational health and safety (OHS) is a multidisciplinary concept touching on issues relating to such disciplines as medicine, law, technology, economics, and psychology (Amponsah-Tawiah & Dartey-Baah, 2015). As a broad-based concept, occupational health and safety encapsulates the mental, emotional, and physical well-being of the worker in the conduct of his work. This therefore makes it an important discipline contributing to the success of any organization. However, considering the multiplicity of disciplines subsumed in it, it has been treated as a throw-away subject with all the other disciplines such as law, economics, medicine, technology, and psychology among others feasting on it when hungry. Thus, not only do the various disciplines focus on aspects of the concept but they also refer to it only during critical situations. For instance, the law discipline refers to the concept only when employers are to pay compensations for health and safety failures.

Traditionally, the focus of OHS initiatives has been on chemical, biological, and physical exposures or hazards, diseases, disorders, and injuries related to or affecting work, while psychosocial risks at work are still largely neglected and their causes and consequences still insufficiently understood especially as they pertain in the developing country context (Houtman & Jettinghoff). However, health issues involving the physical space of work; types of occupation and their effect on health; job stress, work schedules, and other psychosocial issues in the work environment affecting work are all being given some attention in recent OHS initiatives, particularly in developed countries. According to the

WHO, all workers have the right to healthy and safe work and to a work environment that enables them to live a socially and economically productive life (WHO, 2022). This statement puts human life at the center of all productive activities, which must not be compromised at any cost.

2.5.1 Importance of Occupational Health and Safety.

It is in the interest of workers and their representatives to earn a living and also to reach old age in healthy conditions. These interests are not contradictory but complementary to company interests. Organizations have traditionally evaluated their health in terms of the bottom line. However, with past research uncovering enormous financial and human costs associated with unhealthy organizations, human resource professionals have begun to position healthy workplace programmers and activities as a source of competitive advantage to curtail increasing healthcare costs; and assist in the attraction, acquisition, and retention of employees; better manage the employer-employee relationship; meet the needs of an increasingly diverse workforce, and boost employee morale (Friend *et al.,* 2023). The goal of many organizations has been to avoid being unhealthy as opposed to optimizing health. There is, however, a growing recognition that financial health correlates with investments in employee well-being a condition that is gradually putting health and safety issues at the front end of work, job, and organizational design efforts (Hammoudi Halat *et al.,* 2023). Indeed, the costs of unsafe, stressful, and unhealthy workplaces are horrific in personal, economic, and social term and therefore require immediate attention (Hammoudi Halat *et al.,* 2023; Lazarus, 2020).

The past decade has witnessed an increasing number of publications addressing interventions aimed at preventing work-related illness and injury and employee health. The rising interest and investment in workplace health promotion raise no questions as a cost-benefit analysis of the subject matter is more likely to go in its favor - an affirmation of the assertion that many business scholars are recognizing the importance of healthy organizations and healthy people. For instance, a 2007/2008 survey by the Health and Safety Executive (HSE) on work-related illness estimated 34 million lost work days; 28 million due to work-related illness, and 6 million due to workplace injury (Health and Safety Executive, 2009). Translating this in monetary terms means an erosion of a chunk of the profit margins of organizations. Organizations can no longer can afford to lose experienced and committed employees through ill-health caused by unhealthy working conditions as the cost of recruiting, selecting, developing, motivating, and retaining new employees who take over from experienced employees lost through work-related ill-health remains incalculable. OHS therefore remains an important consideration for all organizations, particularly organizations engaged in high-risk operations like the mining, logging, and construction industries. Good OHS practices not only provide a safer working environment but also improve worker morale and productivity (Funmilayo, 2014). By pursuing good OHS practices, businesses face fewer workplace injuries and benefit from higher employee retention rates and enhanced corporate image. This reduces the costs associated with production delays, recruiting new staff, and replacing equipment and avoids the resulting uncertainty and workload pressure placed on co-workers (Funmilayo, 2014). Businesses that strive to improve their OHS performance create safer workplaces, which benefit not only employers and employees but their families, their communities, and their economies at large.

This is evidenced by the effect of the Longford gas explosion in 1998, which left the state of Victoria in Australia without its primary gas supplier for 20 days. As natural gas was widely used in houses in Victoria for cooking, water heating, and home heating, many families endured 20 days of cold showers and cold nights. Further loss to industries as a result of the crisis was estimated at around 1.3 billion Australian dollars (Hopkins, 2002). The growing importance of the concept has led to some scholars advocating for it to be considered as a performance variable much like production, profits, sales, quality control, or customer complaints. Considering that working adults spend at least a quarter to a third of their waking life at work and the fact that job satisfaction is estimated to account for a fifth to a quarter of the satisfaction in adults, OHS issues in organizations, include the emotional, physical, chemical and biological exposures of work should be of interest to all employers (WHO, 2022). National economies also enjoy the benefits of a thriving OHS policy as the benefits accrued to industries tend to trickle down in the form of taxation and a reduction on other social services (e.g., health care facilities, and social support benefits). A high standard of OHS correlates positively with high GNP per capita. The countries investing most in occupational health and safety show the highest productivity and strongest economy, while the countries with the lowest investment have the lowest productivity and the weakest economies (WHO, 2022). Thus, active input in occupational health and safety is associated with the positive development of the economy, while low investment in occupational health and safety is a disadvantage in economic competition.

2.6 The Healthcare System in Ghana

Healthcare in Ghana is mainly rendered by the state and largely managed by the Ministry of Health (MOH) and Ghana Health Service (GHS). The healthcare system has five levels of providers: health posts which are first-level primary care for rural areas, health centers and clinics, district hospitals, regional hospitals and tertiary hospitals. The healthcare sector is epitomized by the government health facilities that serve most of the population and a growing private sector that serves about 40 percent of healthcare needs. The healthcare sector is displaying positive growth as the body. MOH is investing more resources into the revival of all public health institutions. The National Health Insurance Scheme (NHIS) implemented by the government through MOH has made healthcare delivering more affordable and accessible to Ghanaians (MOH/GHS, 2018).

2.6.1 The Role of the Health Sector in Health Delivery

The government is improving the healthcare industry in Ghana. This is because the sector plays a vital role in any economy and its activities are also important to the success of the socio-economic growth of the country. Among the social and economic priorities, the health sector is one of the major concerns confronting government and policymakers. The health sector was at the forefront of the Millennium Development Goals (MDGs) which was attained in 2015 (Rhule, 2012). The public health system however is experiencing a variety of challenges that include shortages of staff, and funding, as well as inadequate distribution of health personnel in the regions of the country (Oleribe *et al.,* 2019).

2.6.2 Public Health Care System in Ghana

The public health care system in Ghana is run through the NHIS, which allows other three kinds of insurance schemes (Saeed *et al.,* 2012). Trends in the utilization of outpatient departments (OPD) by holders of NHIS for the whole population indicate a rise from 2005 forward, compared to stable and lower patronage in the past. The timing and pattern of this rising trend agree with the increasing levels in the National Health Insurance Scheme (NHIS) patronage (Witter & Garshong, 2015). The Network of Mutual Health Organizations in 2009 approximated an average of 1.4 to 1.5 million attendants by NHIS members annually, showing that there has been an expected rise in the utilization of health services by NHIS holders (Badu *et al.,* 2018). Therefore, it is apparent that the enforcement of the NHIS for rendering healthcare services in public hospitals in Ghana has led to the rise in client's access to these facilities.

2.6.3 Challenges of the Healthcare System in Ghana

The healthcare system in totality, despite massive efforts by the government to resource health facilities, the health care system is still characterized by low funding, brain drain, or lack of personnel. This led to the Ghana Health Service admitting that there is an "urgent need for additional health facilities and more qualified health personnel, especially in rural communities" (Asnake & Bishaw, 2012; Friedman E., 2008).

2.7 Occupational Health and Safety Hazards in Ghana

Occupational health and safety are an essential challenge due to the high rates of morbidity and mortality that affect workers. It is estimated that about 100,000 workers lost their lives as a result of occupational accidents and illnesses, and over 400,000 new

cases of occupational illness or diseases are diagnosed annually (Bell *et al.*, 2013). This has an impact on the lives of employees in several professions due to their exposure to varied kinds of hazards at different levels in the workplace. However, research shows that employees in the farming, general contracting, steel, automobile, truck driving, and nursing industries record higher exposure to high-risk occupational and safety hazards (Bell *et al.*, 2013).

Occupational health and safety should be dealt with in a holistic manner that will ensure the full well-being of the worker on the job. The World Health Organization defines occupational health to include activities for occupational medicine, occupational hygiene, occupational psychology, safety, physiotherapy, ergonomics, rehabilitation, and so on. Safety on the other hand includes the security of people from physical injury(WHO, 2022). The International Occupational Hygiene Association (IOHA) broadly defines occupational health and safety (OHS) as the science of anticipation, recognition, evaluation, and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (Rebman, 2009). Hence, occupational health and safety must be perceived to be concentrating on the promotion and maintenance of the highest level of physical, mental, and social welfare of employees in all professions (WHO, 2022). Ghana is in the process of becoming a middle-income country, and this modification is leading to exposure of a great number of the workforce to different health and safety hazards in the work environment.

The Annual Report of Ghana Labor Commission(Amponsah-Tawiah, 2013) stated that a total of 8,692 work-related disorders were reported to the Department for compensation claims. However, in the year 1999, the rate of work-related disorders stood at 4,088. This figure excludes those occurring in the informal sector (Amponsah-Tawiah, 2013). The constitution of the International Labour Organization (ILO) highlights on the protection of the workforce against sickness, diseases, and injury arising out of the job as a fundamental element for social justice. Occupational safety and health human rights and decent work promote safe work (WHO, 2022). "People at work face a variety of hazards owing to chemicals, biological agents, physical factors, adverse ergonomic conditions, allergens, a complex network of safety risks, and many and varied psychosocial factors. Occupational injuries or accidents may have great consequences on the mental health of employees and those present at the scene of the accident. The safety and health of workers in the work environment are expensive to the individual workers as well as their families, employers, and the country at large(WHO, 2022). In addition, there is fiscal significance for the workers who are injured, as well as the employer. The Ghana Workmen's Compensation Law 1987 (PNDC 187), requires that the employer pays all medical expenses related to any workplace-related accident, and in addition, pays some compensation to the accident victim. The occurrence of an accident at the workplace can also have serious implications for the organization's profile (Awino, 2015).

2.8 The Work Environment of Hospital Workers

The work environment in hospitals varies from one setting to the other, and these variations make hazards inherent in the healthcare industry. Comparatively, hazards in work settings also varied contingent on the activities done in a specific work

environment. Hospitals are workplaces in which healthcare is rendered to patients and includes treatment, diagnosing, antenatal care, prenatal care, family planning services, and many other primary healthcare services. Healthcare settings have been recognized as the most hazardous occupational settings as a result of the activities carried out and the various hazards encountered in these environments (Burzoni *et al.,* 2020).

The healthcare settings are unique from other work environments. This is because healthcare workers are more vulnerable to occupational health and safety hazards similar to other work environments; for instance, manual handling of patients and loads as well as noise are some hazards that cut across most occupations (WHO, 2022). In addition, some hazards are regarded as unique to the healthcare industry. For example, biological hazards that are transmitted through exposure to infectious pathogens and inhalation of poisonous chemicals are common in the healthcare sector (Wafula, 2015).

2.9 Disposal of Medical Waste Practices in Hospitals

Every health facility must ensure that waste generated is disposed of safely to protect healthcare workers from potential exposure and harm to the clients and the environment. Hospitals must engage environmental officers who will be responsible for waste management and have a sanctioned place for dumping waste. All healthcare staff are expected to have a plan of action and guidelines for waste disposal. All hospitals should establish a waste management scheme to ensure that all relevant regulative demands are met. Waste management programs must also be established as part of the overall scheme.

2.10 Healthcare Workers as High-Risk Employees

Healthcare workers refer to all people engaged in actions whose primary intent is to enhance health. They make important contributions and are critical to the functioning of most health systems (Kaushal, 2013). Healthcare workers are at high risk of exposure to occupational health and safety illness or disease if not properly protected against exposure to hazards. The healthcare worker has been recognized to be among the most neglected category of workers in monitoring their occupational health status, and has also proven that the safety of the health workforce does not receive the necessary recognition that it deserves (Mitchell, 2000). Below are the reasons that have been attributed to that:

- The first reason is the misconception that healthcare workers know the dangers that are associated with the performance of their duties at work and thus can prevent themselves from those hazards. This misconception has, however, been proven to be false.
- The second reason is that healthcare training generally excludes an understanding of occupational health, and this makes health workers mostly uncertain of their hazards. In an unpublished work by (Mitchell, 2000), indicated that nineteen (19) hazards in hospitals were identified to be present. However, professional nurses were only able to identify 4 of those hazards (range 0-9). This finding agrees with the international research findings which state that healthcare workers were asked to identify three chemicals that go into the body through the respiratory tract. 1.9% of respondents selected ethylene oxide, 11.8% selected glutaraldehyde, and 44% selected waste anesthetic gases.

2.11 Management of Occupational Hazards in Hospitals

Healthcare workers at any health facility may be exposed to different kinds of workplace hazards in the process of rendering their services to clients. The first step for addressing health and safety in the hospital environment is to ensure a healthy work setting in the hospital and this requires effective assessment of the hazards. The major component of an effective health and safety management programme in the hospital is to identify and assess the hazards that exist at the various workplaces in the hospital, and then determine appropriate measures to deal with them. The risk assessment procedures can be used in the identification and control of hazards in the workplace (WHO, 2022).

Risk assessment has been defined by Corrao *et al.* (2012) as a consistent examination of the work undertaken to see what could cause injury or harm, whether the hazard could be removed or eliminated, and if not, prophylactic or protective measures are, or should be in place to control the risk. Tombs and Whyte (2013) also defined risk assessment as; 'nothing more than a careful examination of what, in your work, could cause harm to people, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm. The aim is to make sure that no one gets hurt or becomes ill.

2.12 Steps in Risk Assessment in the Hospital

This study adopted the steps for health and safety assessment from "The Guidance in Tackling Work-related Stress (Health and Safety Executive, 2009) and Alberta's Best Practice Volumes (5) (Alberta G.o., 2011).

2.12.1 Management commitment and leadership

Management must make the hospitals safe for their employees to work by eliminating, minimizing, or controlling hazards in the work setting and also put measures in place to extenuate the impacts of hazards when they happen. The hospital management requires assessing the environment identifying existing or possible hazards, and preparing a written and dated hazard assessment report (Kable *et al.*, 2011). Management must do periodic reviews of hazard assessments when changes are made to healthcare workers assigned to a task, equipment, or work environment of the hospitals. Safety performance will be high when the management of hospitals takes steps to involve the health workers in the hazard assessment and control procedures, to ensure that staff as well as contractors; (people or organizations that are hired by hospitals to undertake some work or projects) are taught about the hazards and the methodology used to remove or control them (Kable *et al.,* 2011).

2.12.2 Look for the hazards

The persons appointed to do the assessment are required to walk around the hospital environment searching for any hazard that could reasonably be expected to endanger or harm the workers. It is important to list all work-related tasks and activities. The health workers themselves or their representatives must be included because they might observe things that are not so noticeable from the beginning. Manufacturers' instruction manuals or data sheets can also help recognize possible hazards. Identify potential biological, chemical, physical, ergonomic, and psychological hazards associated with each task (Carayon *et al.*, 2015). Decide who might be at risk and how Different groups of employees are potentially to go through a wide- range of different degrees and kinds of

harm. For example, youthful health workers, trainee nurses, new and expectant mothers, cleaners, contractors, maintenance workers, visitors, and community members from nearby organizations might be hurt by your activities (Bhardwaj *et al.,* 2013). The hospitals should assess the risk of the hazard by viewing at the badness of the effects of the vulnerability and the likelihood that the exposure will happen as well as how often the task is carried out. The evaluation also involves determining if the current precautions are sufficient enough, or if more are required to be carried out in the two hospitals where the study was done (Faiella *et al.*, 2018).

2.12.3 Communication and Collaboration

It is important to communicate the hazard assessments and the needed control measures to all the healthcare workers working in the Hospitals as they perform their tasks. Effective communication and a cooperative move are vital for a successful risk assessment program in hospitals. The involvement of the healthcare workers in all facets of program development is a fundamental feature of a prosperous occupational injury and illness-averting program (Aw *et al.*, 2007).

2.13 The Basis for Occupational Health and Safety at Workplace

Safety comprises vital human needs, as postulated by Abraham Maslow in the theory of needs hierarchy. The feeling of safe work is the most essential factor in job satisfaction. To attain results, certain companies incorporate into their policy framework, guaranteeing workers' safe work performance under a condition capable of ameliorating physical, mental, and emotional conditions. Institutional policy of this kind is often categorized under health and safety (Khraisat *et al.,* 2014). Employees' health is the

absence of illness or disease resulting from the interaction of workers and the work environment. health means a state of complete physical, emotional, mental, and social ability of an individual to cope with his environment, and not merely the absence of disease or infirmity. Health is the art and science of preventing disease, control of infections, and organization of health services (WHO, 2022).

Safety is the process of freedom from the incidence or danger of illness or loss of life. It depicts industrial or employee safety as the protection of the employees from the risks of industrial accidents. Safety can be referred to absence of injuries resulting from the interaction of the worker and the work setting. Therefore, safety rules and regulations may include policies targeted at either minimizing or total elimination of hazardous conditions capable of inflicting bodily injuries (Torresin *et al.,* 2018). Institutional safety policy must indicate the organization's safety purposes and designates the roles and authority in attaining those achievements. He continued that such policy statement should unquestionably state four fundamental points that include; the safety of workers as well as their clients, ensuring safety precedence over expediency, making all efforts to ensure that managers, supervisors, and employees in establishing and implementing safety policies, laws and seeing its compliance (Hale *et al.,* 2010). Occupational health and safety in organizations have also been described as part and parcel of human society and as a basic human right. According to Driscoll *et al.* (2014) organizational health and safety should concentrate on the establishment of particular interventions and policies, targeted at protecting workers in the course of doing their responsibilities to increase productivity and better the overall organizational performance.

2.14 Challenges of Good Occupational Health and Safety Practices

The difficulties relating to Health and Safety practices have been categorized into three main and overlapping aspects; people, process, and technology (WHO, 2022). The 'people' challenges comprise the danger of employees' emotional or psychological stress, minimization of loyalty to loss of internal expertise, and the fact that there is absence of commitment among workers to provide and be each other's keepers to reduce industrial injury and illness. Hale *et al.* (2010) accepted this by adding that the lack of cooperation; among employees themselves bestows among others industrial accidents and diseases. The 'process' meanwhile consists of two classifications; incompatibilities between the authority (government safety department in charge of health and safety in organizations) and the institution itself, and the failure of institutions to efficiently enforce their decision to comply with health and safety regulations. Authorities should among other things in industrial health and safety programs implement broad health and safety issues applicable to all organizations and companies but not take into recognizance specific company need (Abdullah *et al.*, 2009). At the same time, (Khraisat *et al.*, 2014) established that most institutions have commenced health and safety practices without any laid down procedure or guidance. There is a lack of progressive and innovative human resource management (HRM) policies, and procedures, (including a proactive and collaborative approach) thereby exercising health and safety on an ad hoc basis.

Furthermore, unprofessional safety inspectors engaged to administer the health and safety concerns in most organizations have been the nemesis of industrial fatalities and accidents thereby resulting in gratuitous or needless industrial injuries, illness, and

mortality. There is also the absence of routine, frequent, and seasonal training programs on safety management for workers to acknowledge the need for occupational health and safety precautions(WHO, 2022). Finally, government control is absent and monitoring activities to visit institutions particularly mining companies to unravel whether these companies comply with certain minimum safety standards.

CHAPTER THREE

METHODOLOGY

3.1 Study Design

This was a hospital-based cross-sectional study which assessed the occupational health hazards and risks exposures and outcomes among medical emergency staff in the Western North Region of Ghana. The study examined occupational health hazards and risks encountered and suffered by health care staff at the medical emergency departments in the region.

3.2 Study Setting

The study was conducted at the medical emergency departments in both government and private health care facilities in the Western North Region of Ghana. The Western North Region is one of the 16 administrative regions and one of the six (6) newly created regions in 2019. The region has nine (9) districts, with Sefwi Wiawso as the regional Capital. The 2021-projected population of the Western North Region was 880,921. The Western North Region is among the highest rainfall regions Ghana (Boye *et al.,* 2011), with majority of its residents being farmers. There are several small and large-scale gold mines companies in the region. Each district has one to four government or private hospitals and numerous health centers. The region has about 400 registered medical emergency staff (Regional Health Directorate) in over 20 health facilities.

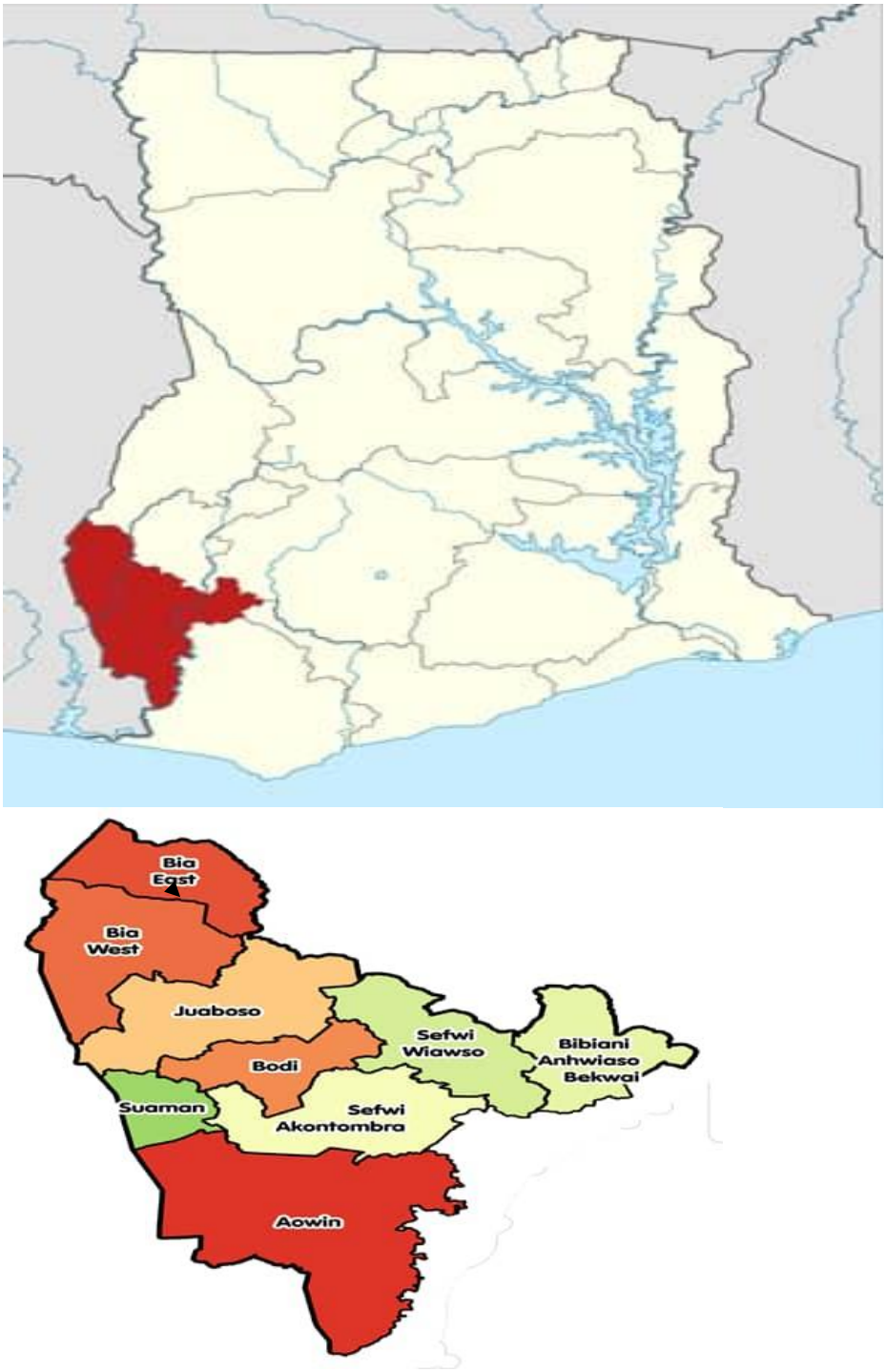

Figure 3.1: Map of the Western North Region of Ghana

Source :*(https://www.meteo.gov.gh/gmet/regional-weather-western-north-region/)*

3.3 Study Population

The study population included all registered medical emergency staff working in either government or private hospitals in the Western North Region Ghana.

3.4 Inclusion and Exclusion Criteria

a. Medical emergency staff who have worked in the emergency department for at least one year was included for this study.
b. Medical emergency staff who have worked in the emergency department in less than a year, students and recent graduates on either clinical internship or nursing rotation were excluded from the study. Also, medical staff who failed to sign an inform concern was excluded.

3.5 Sample Size Estimation

The sample size for this study were 400 which constituted the the entire population of the registered medical emergency staff; including emergency physicians, emergency nurses and emergency medical technicians, who work in both private and government hospitals in the Western North Region of Ghana.

3.6 Sampling

A simple census was employed in this study. All eligible registered medical emergency staffs were surveyed for the study.

3.7 Data Collection Tools

A well-structured questionnaires were used as the data collection instrument to solicit information from respondents selected for the study. The first section of the questionnaire constituted the respondents' demographic characteristics while the remaining sections were based on the study's specific objectives (occupational health practices, lifetime exposure to occupational hazards, individual and health facility factors). The data collection were transformed into an electronic version using Google form.

3.8 Pilot Study

A pilot study was conducted at the medical emergency department of the Sefwi Bekai private hospital to test the data collection techniques and tools for this study. This enabled the researcher to identify possible challenges that may arise during data collection such as difficulties in understanding and answering some question in the data collection instrument which enabled the researcher made appropriate corrections prior to the start of the survey.

3.9 Data Collection Procedures

The electronic data collection version, Google form were deployed unto the Social Media platforms of the all participants. The Primary data were collected from study participants by self-administering the questionnaire using the electronic version, Google Form. However, participants who were not able to use this form used the hard copy. Data were collected from staff at the medical emergency department of the various hospitals after signing an informed concern form.

3.9 Scoring and Grading of Occupational Health and Safety Practices

To assess the occupational health and safety practices among registered medical emergency staffs, a total of 11 structured questions were used. All questions were based on validated questions obtained from literature (Appiagyei *et al.*, 2021; Awudu, 2018). Participants were given scores based on their response to the questions. A right response attracted a score of 1 and a wrong response attracted a score of 0 for the first 10 set of questions that involved dichotomous answers. The 11^{th} question was rate 0-2. The maximum score for occupational health and safety practice was 12. The participants were classified as having poor occupational health and safety practice if they had a score of 1-9 (≤ 75.0%), and participants that had scores 10-12 (>75.0%) were classified as having good occupational health and safety practices.

3.10 Data Management and Statistical Analysis

3.10.1 Data management

The electronic data downloaded from the Google were coded, edited, and cleaned in Microsoft Excel 2016. The cleaned dataset from the Excel file were imported into Statistical Package for Social Science (SPSS) version 26.0 software and GraphPad Prism Version 8.0 for statistical analysis.

3.10.2 Statistical Analysis of the Data

Relevant data obtained from respondents were analyzed by employing descriptive and inferential statistics. Categorical variables were presented as frequency and percentages whilst parametric continuous variables were presented as means and standard deviations. Bar charts were used to represent the proportions of occupational health and safety

practices and exposure to occupational health hazards. Chi-square test and logistics regression and prediction models were used to determine factors associated and independent predictors of occupational health and safety practices among study participants. A *p*-value of less than 0.05 and 95% confidence interval were considered as statistically significant.

3.11 Ethical Consideration

Before the commencement of the study, ethical approval was sought from the Committee on Human Research, Publication and Ethics, School of Medical Sciences, Kwame Nkrumah University of Science and Technology (CHRPE/SMS/KNUST). Written and informed consent was also obtained from study participants, the regional health directorate and the management of all hospitals included in the study, prior to data collection. Thorough explanation of the study protocol and assurance of anonymity was made to the subjects that they were going to be represented by codes rather than their names.

CHAPTER FOUR

RESULTS

4.1 Sociodemographic Characteristics of Study Participants

Table 4.1: Socio-demographic Characteristics of Study Participants

Variable	Frequency (n=390)	Percentage (%)
Age Group (Years)		
20-29	129	33.1
30-35	186	47.7
36-39	60	15.4
40-46	15	3.8
Gender		
Male	143	36.7
Female	247	63.3
Marital Status		
Single	106	27.2
Widow	29	7.4
Divorced	17	4.4
Married	238	61.0
Academic Qualification		
Post-secondary certificate	96	24.6
Diploma	198	50.8
Bachelor's degree	94	24.1
Masters	2	0.5
Staff Category		
General nurse	194	49.7
Enrolled nurse	158	40.5
Medical emergency technician	38	9.7
Working Experience		
1-2.	156	40.0
3-4.	176	45.1
≥ 5	58	14.9
Employment Status		
Part time	39	10.0
Full time	351	90.0
Monthly Income (Gh₵)		
< 1000 Gh₵	23	5.9
1000-2000 Gh₵	279	71.5
> 2000 Gh₵	88	22.6

(Source: Field Data, 2023)

Table 4.1 shows that, out **o**f the 390 registered medical emergency staff included in the study, most were within 30-35 years (47.7%) and 20-29 years (33.1%). Majority were females (63.3%) and were married (61.0%). Half of the participants had diploma qualification (50.8%), and about one-quarter had post-secondary certificate (24.6%) and bachelor's degree (24.1%). Moreover, nearly half were general nurses (49.7%) and 40.5% were enrolled nurses. Many (45.1%) of the participant had worked for 3-4 years whereas40.0% of them for 1-2 years (and few had worked for more than or equal to 5 years (14.9%). Majority were full time workers (90.0%) with average monthly income of Gh₵1000.00 to Gh₵2000.00**.**

4.2 Occupational Hazards and Safety Practices among Medical Emergency Staff

Table 4.2: Occupational health and safety practices among medical emergency staff

		Gender		
Variable	***Total (n=390)***	***Male (n=143)***	***Female (n=247)***	***p-value***
Occupational health practices				
Wear PPE in all procedures	*388 (99.5)*	*141 (98.6)*	*247 (100.0)*	*0.062*
Frequent hand washing	*322 (82.6)*	*127 (88.8)*	*195 (78.9)*	***0.013***
Report exposure to occupational health hazards	*357 (91.5)*	*133 (93.0)*	*224 (90.7)*	*0.428*
Document exposure to occupational health hazards	*338 (86.7)*	*120 (83.9)*	*218 (88.3)*	*0.224*
Frequent breaks	*167 (42.8)*	*56 (39.2)*	*111 (44.9)*	*0.266*
Correct sitting position at workplace	*300 (76.9)*	*107 (74.8)*	*193 (78.1)*	*0.454*
Follow standard operating procedures	*378 (96.9)*	*136 (95.1)*	*242 (98.0)*	*0.114*
What do you do when expose to hazards on duty				*0.654*
Ignore it	*48 (12.3)*	*19 (13.3)*	*29 (11.7)*	
Document, report and take preventive actions	*342 (87.7)*	*124 (86.7)*	*218 (88.3)*	
Have occupational health guidelines in department	*330 (84.6)*	*118 (82.5)*	*212 (85.8)*	*0.382*
Ever received training on occupational health hazard	*262 (67.2)*	*102 (71.3)*	*160 (64.8)*	*0.184*
Rate personal occupational health practice				*0.528*
Bad	*11 (2.8)*	*5 (3.5)*	*6 (2.4)*	
Fair	*22 (5.6)*	*8 (5.6)*	*14 (5.7)*	
Good	*357 (91.5)*	*130 (90.9)*	*227 (91.9)*	

Data presented as frequencies and percentages, p-values computed by Chi-square test, p-values < 0.05 and bolded means statistically significant

In **Table 4.2,** over ninety percent of participants responded wear personal protective equipment (PPE) in all procedures (99.5%), follow standard operating procedures (96.9%), report exposure to occupational health hazards (91.5%) and rate good personal occupational health practice (91.5%) at the work place. Moreover, majority responded document, report and take preventive actions when exposed to hazards on duty (87.7%), had occupational health guidelines in the department (84.6%), practice frequent hand washing (82.6%) and had correct sitting position at workplace (76.9%). However, less than half of participants had frequent breaks (42.8%). This study further found that, frequent hand washing was significantly different between gender of participants (p = 0.013) with 88.8% of males whilst 78.9% of females who practice frequent hand washing at the work place **(Table 4.2)**.

4.2.1 Proportion of Occupational Health and Safety Practices among Medical Emergency Staff

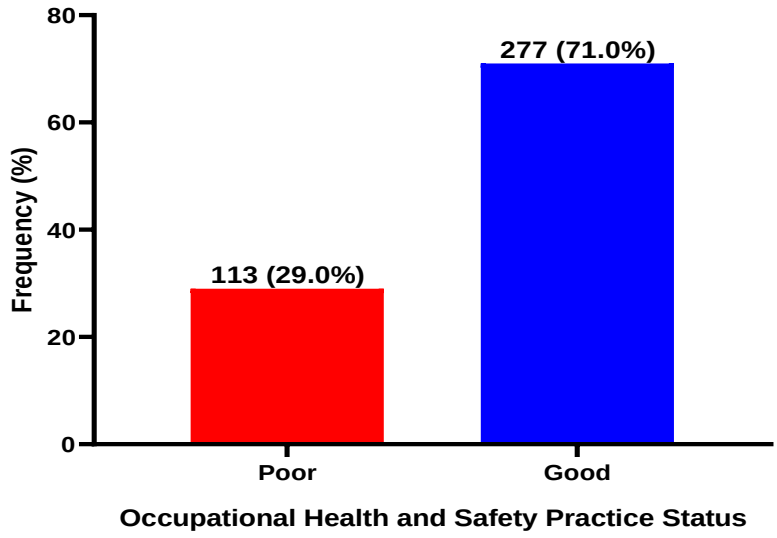

Figure 4.1: Proportion occupational health and safety practices

Figure 4.1 shows scores of occupational health and safety practices among the study participants. Acceding to 75.0% cut off point, 277 of the participants had good occupational health and safety practice representing a proportion of 71.0% whilst the remaining 29.0 had poor occupational health and safety practices (**Figure 4.1**).

4.3 Occupational Health Hazard Exposure and Injuries among Emergency Medical Staffs

4.3.1 Prevalence of occupational health hazard exposures

Figure 4.2 indicated that, 96.7% of the participants had been exposed to occupational health hazards whilst 3.3% had not been exposed to any occupational health hazards at the work place

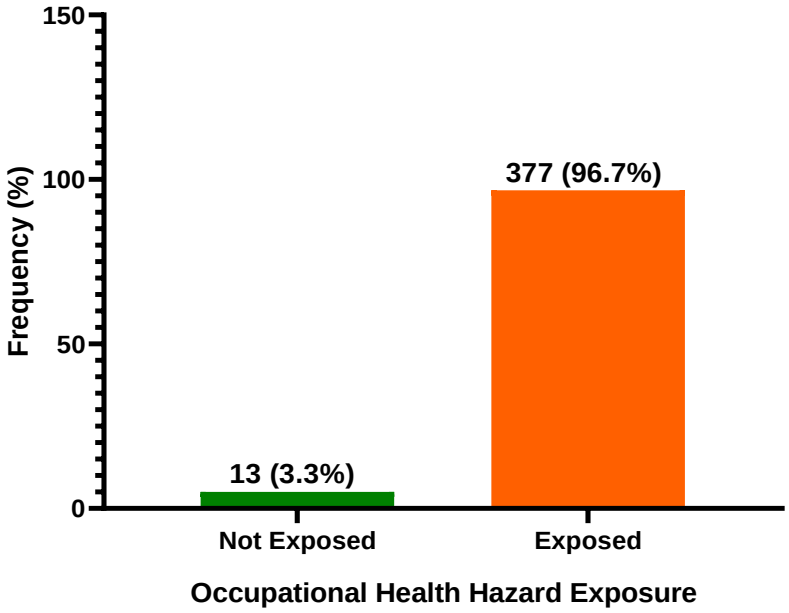

Figure 4.2: Occupational Health Hazard Exposure among Medical Emergency Staffs

4.3.2 Types of occupational hazards and associated injuries among medical emergency staff

Table 4.3 shows that, of the total participants, 98.9% were exposed to biological hazards predominantly needle sticks and sharps (83.4%), blood and blood products (64.3%), with a major injury was cuts and wounds (61.4%). Most (82.2%) were exposed to chemical hazards such as chemotherapeutics agents (61.3%), anesthetics substances (54.1%), disinfectants/antiseptics (52.5%); 93.6% had been exposed to physical and other hazards mainly such as verbal abuse (76.9%), stress (66.3%), slips, trips and falls (64.7%), and musculoskeletal injuries (62.9%). Further testing for association, this study found that, exposure to occupational hazards such as needle sticks and sharps ($p < 0.0001$), cuts and wounds ($p < 0.0001$), chemotherapeutics agents ($p = 0.0020$), antiseptics ($p = 0.0470$), verbal abuse ($p < 0.0001$), stress ($p = 0.0060$) and musculoskeletal injuries ($p = 0.0470$) were significantly associated with occupational health and safety practices among study participants **(Table 4.3)**.

Table 4.3: Occupational hazard exposures and injuries among medical emergency staff

Variable	Total (n=377)	Occupational Health and Safety Practices Poor (n=106)	Good (n=271)	*p*-value
Biological Health Hazards Exposure	373 (98.9)	106 (100.0)	267 (98.5)	0.2090
Blood and blood products	240 (64.3)	63 (59.4)	177 (66.3)	0.2120
Needle stick and sharps	311 (83.4)	73 (68.9)	238 (89.1)	< **0.0001**
Direct contact with biohazardous materials	155 (41.6)	35 (33.0)	120 (44.9)	**0.0350**
Biological Hazards Injuries				
Cuts and wounds	229 (61.4)	47 (44.3)	182 (68.2)	< **0.0001**
Airborne diseases	85 (22.8)	23 (21.7)	62 (23.2)	0.7520
Infectious diseases	21 (5.6)	4 (3.8)	17 (6.4)	0.3270
Exposure to Chemical Hazards	310 (82.2)	90 (84.9)	220 (81.2)	0.3950
Disinfectants	198 (52.5)	60 (56.6)	138 (50.9)	0.3210
Antiseptics	198 (52.5)	47 (44.3)	151 (55.7)	**0.0470**
Chemotherapeutics agents	231 (61.3)	52 (49.1)	179 (66.1)	**0.0020**
Anesthetics substance	204 (54.1)	51 (48.1)	153 (56.5)	0.1440
Chemical Hazards Injuries				
Allergies	211 (68.1)	56 (62.2)	155 (70.5)	0.1580
Eye Irritation	145 (46.8)	34 (37.8)	111 (50.5)	**0.0420**
Nausea/Vomiting	176 (56.8)	49 (54.4)	127 (57.7)	0.5960
Skin problems	110 (35.5)	13 (14.4)	97 (44.1)	< **0.0001**
Respiratory problems	188 (60.6)	35 (38.9)	153 (69.5)	< **0.0001**
Exposure to Physical Hazards	353 (93.6)	102 (96.2)	251 (92.6)	0.1970
Slips, trips or falls	244 (64.7)	68 (64.2)	176 (64.9)	0.8850
Noise or vibrations	46 (12.2)	15 (14.2)	31 (11.4)	0.4700
Electric shock	137 (36.3)	38 (35.8)	99 (36.5)	0.9010
Extremer radiations	178 (47.2)	49 (46.2)	129 (47.6)	0.8100
Radiation	72 (19.1)	18 (17.0)	54 (19.9)	0.5130
Injuries from physical hazards				
Musculoskeletal injuries	237 (62.9)	75 (70.8)	162 (59.8)	**0.0470**
Burns	127 (33.7)	21 (19.8)	106 (39.1)	< **0.0001**
Stress	250 (66.3)	59 (55.7)	191 (70.5)	**0.0060**
Verbal abuse	290 (76.9)	68 (64.2)	222 (81.9)	< **0.0001**

Data presented as frequencies and percentages, p-values computed by Chi-square test, p-values < 0.05 and bolded means statistically significant

4.5.1 Occupational health and safety practices among medical emergency staff

In Figure 4.3, the results showed that, 97.8% (271) of the participants exposed to occupational health hazards had good health and safety practices whereas 93.8% (106) exposed to occupational health hazards had poor health and safety practices indicating a significant association (p = 0.044).

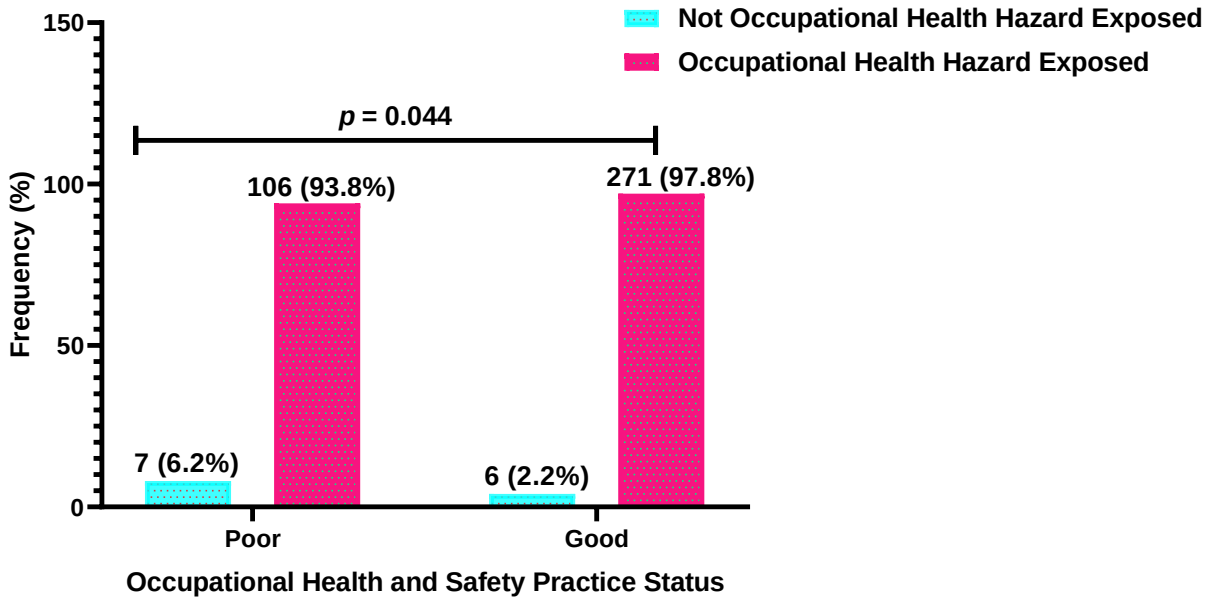

Figure 4.3: Association between knowledge of safety practices versus exposure occupational health hazard status

4.5.2 Socio-demographic Characteristics Associated with Occupational Health and Safety Practices Among Medical Emergency Staff

Table 4.4A and B show that, age group of participants (p = 0.014), working experience (p = 0.026), and employment status (p = 0.034) were significantly associated with occupational health and safety practices. However, no significant association was found between gender (p = 0.920), marital status (p = 0.085), academic qualification (p = 0.236), staff category (p = 0.960), monthly income (p = 0.619) and occupational health and safety practices **(Table 4.4 A&B).**

Table 4.4A: Socio-demographic Characteristics Associated with occupational health and safety practices among medical staff

		Occupational Health and Safety Practices			
Variable	**Total (n=390)**	**Poor (n=113)**	**Good (n=277)**	***χ2-value***	***p*-value**
Age Group (Years)				**10.587**	**0.014**
20-29	129 (33.1)	41 (36.3)	88 (31.8)		
30-35	186 (47.7)	61 (54.0)	125 (45.1)		
36-39	60 (15.4)	7 (6.2)	53 (19.1)		
40-46	15 (3.8)	4 (3.5)	11 (4.0)		
Gender				0.920	0.920
Male	143 (36.7)	41 (36.3)	102 (36.8)		
Female	247 (63.3)	72 (63.7)	175 (63.2)		
Marital Status				6.625	0.085
Single	106 (27.2)	37 (32.7)	69 (24.9)		
Widow	29 (7.4)	11 (9.7)	18 (6.5)		
Divorced	17 (4.4)	7 (6.2)	10 (3.6)		
Married	238 (61.0)	58 (51.3)	180 (65.0)		
Academic Qualification				4.246	0.236
Post-secondary certificate	96 (24.6)	34 (30.1)	62 (22.4)		
Diploma	198 (50.8)	50 (44.2)	148 (53.4)		
Bachelor's degree	94 (24.1)	29 (25.7)	65 (23.5)		
Masters	2 (0.5)	0 (0.0)	2 (0.7)		
Staff Category				0.083	0.960
General nurse	194 (49.7)	55 (48.7)	139 (50.2)		
Enrolled nurse	158 (40.5)	47 (41.6)	111 (40.1)		
Medical emergency technician	38 (9.7)	11 (9.7)	27 (9.7)		

Data presented as frequencies and percentages, p-values computed by Chi-square test, p-values < 0.05 and bolded means statistically significant

Table 4.4B: Socio-demographic Characteristics Associated with occupational health and safety practices among medical staff

		Occupational Health and Safety Practices			
Variable	**Total (n=390)**	**Poor (n=113)**	**Good (n=277)**	***χ2-value***	***p*-value**
Working Experience				**7.287**	**0.026**
1-2.	156 (40.0)	37 (32.7)	119 (43.0)		
3-4.	176 (45.1)	63 (55.8)	113 (40.8)		
≥ 5	58 (14.9)	13 (11.5)	45 (16.2)		
Employment Status				**4.498**	**0.034**
Part time	39 (10.0)	17 (15.0)	22 (7.9)		
Full time	351 (90.0)	96 (85.0)	255 (92.1)		
Monthly Income (Gh₵)				0.958	0.619
< 1000 Gh₵	23 (5.9)	7 (6.2)	16 (5.8)		
1000-2000 Gh₵	279 (71.5)	77 (68.1)	202 (72.9)		
> 2000 Gh₵	88 (22.6)	29 (25.7)	59 (21.3)		

Data presented as frequencies and percentages, p-values computed by Chi-square test, p-values < 0.05 and bolded means statistically significant

4.5.3 Sociodemographic Predictor Variables of Good Occupational Health and Safety Practices among Medical Emergency Staff

Table 4.5 A and 4.5B show a univariate logistics regression prediction model of participants within 20-29 years, those in higher age group of 36-39 years (cOR: 3.53, 95% CI: (1.48-8.43); p = 0.005) was significantly associated with 4-odds increased likelihood of good occupational health and safety practices. However, participants who were single (cOR: 0.60, 95% CI: (0.37-0.99); p = 0.045) and part time employed (cOR: 0.49, 95% CI: (0.25-0.96); p = 0.037) were significantly associated with 40.0% and 51.0% respectively decreased chances of good occupational health and safety practices.

In a multivariate logistics regression model, after adjusting for potential cofounders, age group of 36-39 years (aOR: 3.83, 95% CI: (1.37-10.73); p = 0.011) was independent predictor of increased good occupational health and safety practices. Besides, divorced (aOR: 0.22, 95% CI: (0.06-0.74); p = 0.014) was an independent predictor of decreased good occupational health and safety practices **(Table 4.5).**

Table 4.5A: Socio-demographic predictor variables of occupational health and safety practices among medical emergency staff

	Good Occupational Health Practice				
Variable	**(n=277)**	**cOR (95% CI)**	***p*-value**	**aOR (95% CI)**	***p*-value**
Age Group (Years)					
20-29	88 (31.8)	1.00	-	1.00	-
30-35	125 (45.1)	0.96 (0.59-1.54)	0.850	0.76 (0.44-1.32)	0.330
36-39	53 (19.1)	3.53 (1.48-8.43)	**0.005**	3.83 (1.37-10.73)	**0.011**
40-46	11 (4.0)	1.28 (0.39-4.27)	0.686	0.77 (0.21-2.88)	0.695
Gender					
Male	102 (36.8)	1.02 (0.65-1.61)	0.920	1.13 (0.69-1.85)	0.624
Female	175 (63.2)	1.00	-	1.00	-
Marital Status					
Single	69 (24.9)	0.60 (0.37-0.99)	**0.045**	0.61 (0.35-1.08)	0.088
Co-habitation	18 (6.5)	0.53 (0.24-1.18)	0.120	0.64 (0.27-1.52)	0.309
Divorced	10 (3.6)	0.46 (0.17-1.26)	0.132	0.22 (0.06-0.74)	**0.014**
Married	180 (65.0)	1.00	-	1.00	-
Academic Qualification					
Post-secondary certificate	62 (22.4)	1.00	-	-	-
Diploma	148 (53.4)	1.62 (0.96-2.75)	0.072	-	-
Bachelor's degree	65 (23.5)	1.23 (0.67-2.25)	0.504	-	-
Masters	2 (0.7)	885905.00 (0.00-inf)	0.999	-	-
Staff Category					
General nurse	139 (50.2)	1.00	-	-	-
Enrolled nurse	111 (40.1)	0.93 (0.59-1.48)	0.774	-	-
Medical emergency technician	27 (9.7)	0.97 (0.45-2.09)	0.941	-	-

p-values computed by logistics regression prediction model, p-values < 0.05 and bolded means statistically significant

Table 4.5A: Socio-demographic predictor variables of occupational health and safety practices among medical emergency staff

		Good Occupational Health Practice			
Variable	**(n=277)**	**cOR (95% CI)**	***p*-value**	**aOR (95% CI)**	***p*-value**
Working Experience					
1-2.	119 (43.0)	0.93 (0.45-1.91)	0.841	-	-
3-4.	113 (40.8)	0.52 (0.26-1.03)	0.062	-	-
≥ 5	45 (16.2)	1.00	-	-	-
Employment Status					
Part time	22 (7.9)	0.49 (0.25-0.96)	**0.037**	0.60 (0.29-1.23)	0.166
Full time	255 (92.1)	1.00	-	1.00	-
Monthly Income (GhȻ)					
< 1000 GhȻ	16 (5.8)	1.12 (0.42-3.03)	0.818	-	-
1000-2000 GhȻ	202 (72.9)	1.29 (0.77-2.16)	0.334	-	-
> 2000 GhȻ	59 (21.3)	1.00	-	-	-

***p*-values computed by logistics regression prediction model, *p*-values < 0.05 and bolded means statistically significant**

4.6 Health Facility and Individual Factors Associated with Occupational Health and Safety Practices among Medical Emergency Staff.

Table 4.6 revealed that, the average working hours per day was significantly associated with occupational health and safety practices ($p < 0.0001$) with participants who had longer working hours of 8.77 practicing poor occupational health and safety hazards. Moreover, availability of safety guidelines at emergency department ($p < 0.0001$), availability of reporting protocol for hazard exposure ($p < 0.0001$), and facility department engage occupational health training staff ($p < 0.0001$) safe working environment ($p < 0.0001$), and availability of infection prevention and control committee ($p < 0.0001$) were significantly associated with occupational health and safety practices **(Table 4.6)**.

Table 4.6: Health Facility and Individual Factors Associated with Occupational health and safety practices among medical staff

	Occupational Health and Safety Practices			
Variable	**Total (n=390)**	**Poor (n=113)**	**Good (n=277)**	***p*-value**
Average work days per month (π ±SD)	24.53 ±3.57	24.31 ±4.31	24.62 ±3.23	0.4900
Average work hours per day (π ±SD)	7.53 ±3.35	8.77 ±4.48	7.02 ±2.60	< 0.0001
Average number of patients per daily (π ±SD)	4.55 ±1.78	4.54 ±1.96	4.55 ±1.71	0.9500
Work in other facilities	178 (45.6)	45 (39.8)	133 (48.0)	0.1410
Health facilities provide PPE	383 (98.2)	111 (98.2)	272 (98.2)	0.9810
Safety guidelines at the department	363 (93.1)	92 (81.4)	271 (97.8)	< 0.0001
Hazard exposure Reporting protocol at facility	361 (92.6)	84 (74.3)	277 (100.0)	< 0.0001
Training of staff on occupational health	297 (76.2)	53 (46.9)	244 (88.1)	< 0.0001
Work overtime	261 (66.9)	68 (60.2)	193 (69.7)	0.0710
Frequency of hand washing	370 (94.9)	99 (87.6)	271 (97.8)	< 0.0001
Usage of PPE	375 (96.2)	110 (97.3)	265 (95.7)	0.4350
Safe working environment	347 (89.0)	90 (79.6)	257 (92.8)	< 0.0001
High stress at the emergency department	361 (92.6)	102 (90.3)	259 (93.5)	0.2690
Infection prevention and control committee	358 (91.8)	87 (77.0)	271 (97.8)	< 0.0001
Rate practice of occupational health at facility				
Bad	10 (2.6)	10 (8.8)	0 (0.0)	
Fair	34 (8.7)	16 (14.2)	18 (6.5)	< 0.0001
Good	346 (88.7)	87 (77.0)	259 (93.5)	

Data presented as frequencies and percentages, p-values computed by Chi-square test, p-values < 0.05 and bolded means statistically significant

4.7 Health Facility and Individual Predictor Variables Associated with Good Occupational Health and Safety Practices Among Medical Emergency Staff.

Table 4.7 shows a univariate logistics regression prediction model that increasing average working hours per day (cOR: 0.86 95% CI: (0.80-0.93); $p < 0.0001$) was significantly associated with 14.0% decreased chances of good occupational health and safety practices. On the contrary, availability of safety guidelines at emergency department (cOR: 10.31, 95% CI: (4.04-26.33); $p < 0.0001$), facility department engagement with occupational health training staff (cOR: 8.37, 95% CI: (4.99-14.06); $p < 0.0001$) and availability of infection prevention and control committee (cOR: 13.50, 95% CI: (5.38-33.87); $p < 0.0001$) were significantly associated with 10, 8, and 14-odds increased fold of good occupational health and safety practices.

Moreover, frequent hand washing (cOR: 6.39, 95% CI: (2.39-17.08); $p < 0.0001$) and safe working environment (cOR: 3.28 95% CI: (1.72-6.26); $p < 0.0001$) were significantly associated with over 6 and 3 odds respectively increased likelihood of good occupational health and safety practices. **Table 4.7** reveals that after adjusting for possible confounders in multivariate logistics regression model, increasing working hours per day (aOR: 0.89, 95% CI: (0.82-0.96); $p = 0.001$) was an independent predictor for decreased good occupational health and safety practices.

Besides, facility engagement with occupational health training staff (aOR: 5.95, 95% CI: (3.25-10.89); $p < 0.0001$), availability of infection prevention and control committee (aOR: 3.46, 95% CI: (1.08-11.11); $p = 0.0370$), frequent hand washing (aOR: 6.63, 95% CI: (2.06-21.32); $p = 0.001$) and safe working environment (aOR: 2.53, 95% CI: (1.06-

6.02); $p = 0.036$) were independent predictors of good occupational health and safety practices.

Table 4.7: Health facility and individual predictor variables of occupational health and safety practices among medical staff

		Good Occupational Health Practice			
Variable	**(n=277)**	**cOR (95% CI)**	***p*-value**	**aOR (95% CI)**	***p*-value**
Average working days per month (π ±SD)	24.62 ±3.23	1.02 (0.96-1.09)	0.435	-	-
Average working hours in the day	7.02 ±2.60	0.86 (0.80-0.93)	**< 0.0001**	0.89(0.82- 0.96)	**0.004**
Average number of patients cared for daily	4.55 ±1.71	1.00 (0.89-1.14)	0.95	-	-
Work in other facilities	133 (48.0)	1.40 (0.80-2.18)	0.141	-	-
Health facilities provide PPE	272 (98.2)	0.98 (0.19-5.13)	0.981	-	-
Availability safety guidelines at work	271 (97.8)	10.31 (4.04-26.33)	**< 0.0001**	2.88(0.83-0.92)	0.095
Reporting protocol for hazard exposure	277 (100.0)	5327222517.0(0.00-inf)	0.998	-	-
Occupational health training for staff	244 (88.1)	8.37 (4.99-14.06)	**< 0.0001**	5.95(3.25-0.89)	**< 0.0001**
Work overtime	193 (69.7)	1.52 (0.96-2.40)	0.071	-	-
Frequent hand washing	271 (97.8)	6.39 (2.39-17.08)	**< 0.0001**	6.63(2.06-21.32)	**0.002**
Wear PPE	265 (95.7)	0.60 (0.17-2.18)	0.439	-	-
Safe working environment	257 (92.8)	3.28 (1.72-6.26)	**< 0.0001**	2.53 (1.06-6.02)	**0.036**
High stress in the emergency department	259 (93.5)	1.55 (0.71-3.40)	0.272	-	-
Infection prevention and control committee	271 (97.8)	13.50 (5.38-33.87)	**< 0.0001**	3.46(1.08-11.11)	**0.037**
Rate practice of occupational health at facility					
Bad	0 (0.0)	0.00 (0.00-inf)	0.999	0.00 (0.00-inf)	0.999
Fair	18 (6.5)	0.38 (0.19-0.77)	**0.008**	0.36 (0.15-0.86)	**0.021**
Good	259 (93.5)	1.00	-	1.00	-

p-values computed by logistics regression prediction model, p-values < 0.05 and bolded means statistically significant

CHAPTER FIVE

DISCUSSION

5.1 Summary of Findings

Healthcare workers, specifically medical emergency staff are continuously exposed to disease causing pathogens especially blood borne pathogens. Occupational health and safety adherence help to prevent risk of illness and death associated with unusual exposure. This study assessed occupational health and hazards among medical emergency staff in the Western North region of Ghana.

This study found that majority of the participants wore personal protective equipment (PPE) in all procedures, follow standard operating procedures, reported exposure to occupational health hazards and rated good personal, occupational health practice at the workplace.

The majority had good occupational health and safety practices yet had been exposed to occupational health hazards.

Age group of 36-39 years and divorced were independent predictors of good occupational health and safety practices. Furthermore, increasing working hours per day, facility engagement with occupational health training staff, availability of infection prevention and control committee, frequent hand washing

and safe working environment were independent predictors of good occupational health and safety practices.

5.2 Occupational Health and Safety Practices Among Medical Emergency Staff in the Western North Region of Ghana

The current study found majority of participants responded wore personal protective equipment (PPE) in all procedures, followed standard operating procedures, reported exposure to occupational health hazards and rated good personal occupational health practice at the work place. In consistent with this study findings, Alshalani *et al.,* (2019) reported most health care professionals had good occupational health and safety practices (Alshalani & Salama, 2019). This shows enhance occupational health and safety practices among medical staffs in the western north of Ghana. This study further demonstrated that, majority of medical staffs were found to document, report and take preventive actions when exposed to hazards on duty, had occupational health guidelines in the department, practice frequent hand washing and had correct sitting position at workplace. Overall, most medical staffs have good occupational health and safety practice. However, less than half of medical staffs have frequent breaks. This calls for adjustments in workers schedules for provision of adequate breaks in between working hours. This will enhance occupational safety for both medical professionals and patients visiting the hospitals.

5.3 Prevalence of Occupational Hazard Exposures (Biological, Chemical and Physical) and Health and Safety Practices Among Medical Emergency Staff

Every day, healthcare workers who strive to improve and protect the health of their patients encounter a range of biological, chemical, and physical hazards(Almost *et al.,* 2018; Che Huei *et al.,* 2020). In line with the current study, majority of medical emergency staff had been exposed to occupational health hazards. Of the registered medical emergency staff, this study found majority had been exposed to biological health hazards, predominantly needle sticks and sharps, blood and blood products and cuts and wounds.

Similar to this study's findings, Awudu et al.'s (2018) study in a few hospitals in Tamale City discovered biological and chemical risks for healthcare workers, including exposure to needle sticks and sharp objects, cuts and wounds, and irritation from disinfectants (Awudu, 2018). Additionally, previous studies (Najafi *et al.,* 2014; Boafo *et al.,* 2016; Elston & Gabe, 2016; Nagpal, 2017) have extensively documented the problem of violence and verbal abuse in the healthcare sector in developed and developing nations. According to Najafi *et al.* (2014), healthcare employees are 16 times more likely to experience workplace violence. The results of previous studies by Appiagyei*et al.* (2021) among healthcare workers at a public hospital in Ghana and Awudu *et al.* (2018) among healthcare workers in selected hospitals in the Tamale metropolis are also consistent with the physical hazards found, such as slips, trips, and falls, noise and vibration, and stress from work (Awudu, 2018 ;Appiagyei *et al.,* 2021;). This calls for strengthened measures to help reduce these common occupational hazards among medical staff in various hospitals.

5.4 Socio-demographic Factors Associated with Occupational Health and Safety Practices Among Medical Emergency Staff

This study found that a higher age group of 36-39 years was an independent predictor of increased good occupational health and safety practices. In accordance with the current study, Alshalani et al. (2019) showed a significant association between age group and the practice of occupational safety among medical staff in Governmental Hospitals in Saudi Arabia (Alshalani & Salama, 2019). The higher age could be attributed to the longer working experience of health care workers, which could possibly lead to exposure to any form of occupational health hazard for a lifetime and, as such, have adopted strict adherence to occupational health and safety practices. Besides, divorce was an independent predictor of decreased good occupational health and safety practices. This calls for further education among unmarried healthcare professionals about the importance of occupational health and safety practices and their long-term impacts.

5.5 Health Facility and Individual Factors Associated with Occupational Health and Safety Practices among Medical Emergency Staff

This study observed that increasing daily working hours was an independent predictor of decreased good occupational health and safety practices. This conveys significant information about healthcare professionals not working overtime to ensure good occupational health. Moreover, a previous study by Awudu et al. (2018) reported that poor maintenance of hospital items is an occupational health hazard among healthcare workers. Similarly, facility engagement with occupational health training staff, infection prevention and control committee availability, frequent hand washing, and a safe working environment were independent predictors of good occupational health and

safety practices. This study's findings show that hospital administrators must enforce adequate occupational health and safety measures.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Majority of medical emergency staffs have good occupational health and safety practices, although, over ninety percent have been exposed to occupational health hazards such as biological health hazards, chemical hazards, physical and other hazards. Age group of 36-39 years and divorced are independently linked with good occupational health and safety practices. Furthermore, increasing working hours per day, facility engagement with occupational health training staff, availability of infection prevention and control committee, frequent hand washing and safe working environment are independently associated with good occupational health and safety practices among medical emergency staffs. Besides, divorce was an independent predictor of decreased good occupational health and safety practices.

6.2 Recommendations

Based on the findings, several recommendations have been made to improve occupational health and safety among medical emergency staff.

i. Ghana Health Service/Ministry of Health

a. ***Strengthen Policy and Guidelines***: The Ministry of Health and Ghana Health Service should review and strengthen their occupational health and safety policies and guidelines. This includes ensuring the availability and accessibility of safety guidelines, reporting protocols, and the presence of an active infection prevention and control committee

ii. Educational /Training Institutions

a. ***Enhance Training and Awareness***: The educational and training institutions should ensure continuous education and training programs on occupational health and safety. Various strategies of creating awareness of occupational health training should be inculcated within the programs/curricular.

iii. **Heads of Health Facilities**

a. ***Monitor and Support of Staff***: The Heads of health facilities should monitor and support staff due to the high levels of stress and exposure to verbal abuse, heads of the various health facilities should implement strategies to monitor and support the mental health and well-being of their staff. Special focus should be given to younger and less experienced staff to foster a culture of safety from the beginning of their careers.

b. ***Facility Engagement****:* The facilities heads should encourage active facility engagement with occupational health training staff to ensure that all employees are regularly trained and updated on the latest occupational health and safety practices.

c. ***Promote a Safe Working Environment***: The Heads of health facilities should take proactive steps to create a safe working environment. This includes regular risk assessments, ensuring adequate supply and proper use of PPE, and implementing measures to reduce stress and prevent verbal abuse.

d. ***Adapt to Changing Work Conditions***: The Heads of health facilities should recognize the impact of long working hours in respect to

occupational health and safety practices and consider strategies to manage workloads effectively to prevent fatigue and burnout.

iv. Individual Staff

a. ***Encourage Individual Practices*****:** Individual practices such as frequent hand washing and the correct sitting position at work should be their priority or fostered. These practices should be emphasized in regular staff meetings and through visible reminders throughout the workplace.

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APPENDICES

Appendix 'A': Research Questionnaire

I am a postgraduate student of the School of Public Health, University of Education, Winneba, undertaking research on the topic; "**Occupational Health and Hazards and risk among Emergency staff in Western North Region of Ghana".** Please spare me a part of your time to answer the following questions in relation to this research. *The research is for Academic purpose only and information provided on this form will be treated with much confidentiality.* If you have any difficulties completing this form or wish to discuss any issues in a confidential setting, please contact the administrator of this form for advice.

CASE ID …… DATE COMPLETED…/……/……

SECTION 'A': SOCIODERMOGRAPHIC DATA

1. **Name of your health facility:**

2. **Staff Category**

Emergency Physician [ ]……..…...1

Emergency Nurse [ ]…….....2

General Nursing [ ]…….…..……3

Enrolled Nurse [ ]……..….…….4

Medical Emergency Technician [ ]…….5

3. **Age:……**

4. **Gender:** Male [ ]……..…….……1

   Female [ ]…….……...2

5. Marital Status
Married [ ]………………………………………………………………………..……..….1 Divorced [ ] ……………………………………….……………..….………….2 Single [ ]…………………………..………………..……………………….……..……3 Widow [ ]…………………………………………...…………………..….…....….4
6. Academic Qualification
Post-Secondary Certificate[ ]………………………………………………..………1 Diploma [ ]……………………………………….………………………………2
Bachelor's degree [ ]……………………………..……………………………..……….3 Masters[ ]…………………….………….…………………….…………………4
PhD [ ]…………………………………………………………………………..5 Other (Specify) …………………………………………………………..……7
7. Working experience in the emergency department (years):
8. Employment status
Full time [ ]………………………………………………………………….….1 Part time [ ]……………………………………………………………...……...2 Contract [ ]…………………………..…………………………………......…………3
9. Monthly Income
Less than GHC 1000 [ ]…………………………………………………….…….1
GHC 100-200 [ ]…………………………………………………………….….2
Greater than GHC 2000[ ]…………………………………………………..……..3

SECTION 'B': OCCUPATIONAL HEALTH PRACTICES AMONG STAFF

Answer Yes/No to the following questions

10. Do you wear personal protectives equipment (PPE) in all procedures

Yes [ ]……1

No [ ]……..…..0

11. Frequent hand washing:

Yes [ ]…….……1

No [ ]……..….0

12. Do you report exposure to occupational health hazards?

Yes [ ]…….……1

No [ ]……...…….0

13. Document/Write exposure to occupational health hazards:

Yes [ ]……..…….1

No [ ]……..……..0

14. Do you take frequent breaks at work?

Yes [ ]……...……1

No [ ]……....0

15. Do you stand or sit in the correct position at work (*to be checked by researcher)?*

Yes [ ]……..…….1

No [ ]……..……..0

16. Do you follow standard operating procedures?

Yes [ ]……...……1

No [ ]……...…….0

17. Do you have occupational health guidelines in your department?

Yes [ ]…….……..1

No [ ]…….……..0

18. Have you ever attended or received training on occupational health?

Yes [ ]…….……..1

No [ ]…….……..0

19. How will you rate your personal occupational health practice:

Good [ ]……1

Fair [ ]……...……...2

Bad [ ]……..…3

SECTION 'C': LIFETIME EXPOSURE TO OCCUPATIONAL HAZARDS

20. Have you ever been exposed to any occupational hazard?

Yes [ ]……..…….1

No [ ]…….……...0

*If '**No'** Please tick '**No'** for questions**21, 22 and 23 and 24.***

Which of the following hazards were you exposed?

21. Biological hazards

Yes [ ]……..……..1

No [ ]……0

If <u>yes,</u> specify the kind of biological hazard (s) below;

Blood and blood products [ ]…….……...…..….1

Needle stick and sharps [ ]…….…….….2

Cuts and wounds [ ]…….…….3

Direct contact with contaminated specimens/biohazardous materials [ ]…….…....4

Airborne diseases (TB, etc.) [ ]…….…….....5

Infectious diseases and/or infections (HIV, HBV, HBV, Syphilis, Coronavirus)[ ]…..….6

Others (Any blood borne pathogens or vector borne diseases)…….……..7

22. Chemical Hazards

Yes [ ]…….…….……1

No [ ]……..0

If yes Specify the kind of chemical you were exposed below;

Disinfectants [ ]……..1

Antiseptics [ ]……..……..……...2

Chemotherapeutic agents [ ]……...…….3

Anesthetic substances [ ]……..……....4

23. Did you experience and injuries from these chemicals were?

Yes [ ]…….…….….1

No [ ]…….…..0

If yes, specify the type of injury below;

Allergies from chemicals [ ] ……..…..……1

Eye Irritation [ ]……...……2

Nausea and Vomiting [ ] ……..……3

Eczema [ ]……..…..4

Respiratory problems (bronchitis/sinusitis/rhinitis/asthma) [ ]…….……..5

24. Physical and other hazards *(please tick the specific hazards below)*

Slips, trips and falls [ ]……...……..1

Musculoskeletal injuries [ ]……..……2

Electric shock [ ]……...……...3

Radiation [ ]……...……..4

Burns [ ]…….…….…….5

Stress [ ]……..…….……6

Noise and vibration [ ]……7

Extreme pressure from work [ ]…….……8

Verbal abuse from patients and other staff…….9

SECTION 'D' INDIVIDUAL AND HEALTH FACILITY FACTORS

25. Type of health facility

Government Hospital [ ]……..……1

Private Hospital [ ]…….…….……....2

CHAG [ ]……...…….3

26. Average working days in a month (monthly shift frequency) ……...……days

27. Average working hours in a day ……..……hours

28. Do you work in other facilities?

Yes [ ]……...……1

No [ ]…….……..0

29. Health facility or employer provide PPE:

Yes [ ]…….……..1

No [ ]……0

30. Average number of patients cared in daily shift: …….

31. Are there safety guidelines at the emergency department:

Yes [ ] ……...……..1

No [ ]……...……..0

32. Availability of reporting protocols for hazard exposure:

Yes [ ] …….……1

No [ ] ……..……0

33. Do your facility/department engage in occupational health training for staff?

Yes [ ]…….……1

No [ ]…….……...0

34. Do you work overtime?

Yes [ ]……...……1

No [ ]……...…….0

35. Frequent hand washing:

Yes [ ] ……1

No [ ]……0

36. Wear PPE:

Yes [ ]…….……0

No [ ]……...1

37. Safe working environment (good ventilation, spacing, large enough, enough beds for patients):

Yes [ ]…….……1

No [ ]……0

38. High stress or pressure in emergency department:

Yes [ ] ……1

No [ ]……0

39. Does your facility have Infection prevention and control team/committee in place?

Yes [ ] ……1

No [ ]……...0

40. How will you rate the occupational health practice of your health facility?

Good [ ]……...……1

Bad [ ]……..……0

Researcher collecting data from the respondents