

**UNIVERSITY OF EDUCATION, WINNEBA**



**OCCUPATIONAL HAZARDS EXPOSURE AND  
RISK PERCEPTION AMONG EMERGENCY  
MEDICAL TECHNICIANS OF THE NATIONAL  
AMBULANCE SERVICE IN GHANA**

**JOSHUA AMARH DOKU  
(MASTER OF PHILOSOPHY)**

**2022**



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EDUCATION**

**AUGUST, 2022**

## DECLARATION

I hereby declare that this thesis is my own research work, and it contains no information that has previously been published except for references to other authors' works which were duly acknowledged, and that it has neither in whole nor partially been presented for another degree in this university or elsewhere.

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Date

(Lead Supervisor)

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Certified by:

DR. RICHARD AMANKWA KUFFOUR

Signature

Date

(Second Supervisor)

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## DEDICATION

I dedicate this work to my late father Mr. David Doku Anang, my dear mother Madam Rebecca Tekor Martei who inspired, encouraged me throughout my study; also, to the management and staff of National Ambulance Service headed by the CEO Professor Ahmed Nuhu Zakariah, my family especially my brothers and my Love Michelle Akweley Nelson for their support in diverse ways in undertaking this research work.



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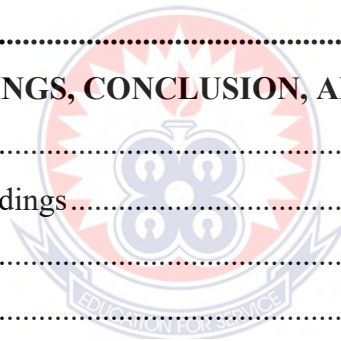
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## LIST OF ACRONYMS

CCOHS.....	Canadian Centre for Occupational Health and Safety
COVID-19.....	Coronavirus Disease-19
EMR.....	Emergency Medical Responder
EMS.....	Emergency Medical Service
EMT.....	Emergency Medical Technician
EOP.....	Emergency Operation Plan
HCW.....	Health Care Worker
HIRA.....	Hazard Identification Risk Assessment
HIV.....	Human Immune Virus
KAP.....	Knowledge, Attitude, Practices
MCI.....	Mass Casualty Incident
NAS.....	National Ambulance Service
NAEMT.....	National Association of Emergency Medical Technicians
NIOSH.....	National Institute for Occupational Safety and Health
NYCOSH.....	New York Committee for Occupational Safety and Health
OSH.....	Occupational Health and Safety
OHTA.....	Occupational Hygiene Training Association
OPIM.....	Other Potential Infectious Material
PHC.....	Pre-Hospital Care
PPE.....	Personal Protective Equipment
PSAPs.....	Public Safety Answering Points
PTSD.....	Post-Trauma Stress Disorders
PTSS.....	Post-Trauma Stress Syndrome
RTC.....	Road Traffic Crash
UNISDR.....	United Nations International Strategy and Disaster Reduction
WHO.....	World Health Organization

## ABSTRACT

Emergency Medical Technicians (EMTs) are the healthcare providers mandated to provide Emergency Medical Services (EMS) for patients with critical medical conditions outside a medical facility. This study assessed occupational hazards among EMTs of the National Ambulance Service (NAS) in Ghana. A descriptive cross-sectional study was carried out among EMTs to assess occupational hazards related to their work. The study used a multistage sampling technique; the country was clustered into Northern, Middle, and Southern; 7 regions (Ashanti, Greater Accra, Northern, Bono, Western, Oti, and Eastern regions) were purposively selected with all the service stations in these regions. A total of 59 NAS stations and 413 EMTs were recruited from February to November 2020. Participants self-administered a structured questionnaire based on different variables including their socio-demographic characteristics, occupational health, and injuries, health risk perception and knowledge in transporting Covid-19 cases. The data tool linked to a Google form was subsequently deployed onto the various WhatsApp platforms of the various NAS stations to download and self-administer and return same via entropic means for cloud storage. Out of the 400 respondents, 76.8% acknowledged occupational health hazards at work, 65.3% knew occupational hazards and 51% stated debriefing as their main coping strategy. Also, 71.2% and 77.75% of EMTs had good knowledge and attitude towards occupational health risks respectively. Meanwhile, 51.0% of EMTs had ever suffered injuries during work of which 83.2% indicated their health/body was affected and most 82.5% were diagnosed with back pain. Most 84.5% EMTs had training on transporting Covid-19 cases of which 77.0% had good knowledge in transporting Covid-19 cases. The study also showed a significant association between sex, marital status, religion, level of practice and educational level on knowledge of occupational risk ( $\chi^2=14.47$ ,  $p<0.001$ ), ( $\chi^2=33.86$ ,  $p<0.001$ ), ( $\chi^2=18.40$ ,  $p<0.001$ ), ( $\chi^2=12.83$ ,  $p<0.001$ ) and ( $\chi^2=41.65$ ,  $p<0.001$ ) respectively. The study thus concluded that most EMTs were aware of occupational health hazards issues in their work environment, and more than half had suffered from a form of occupational health hazard, mostly cuts and wounds, and stress.

**KEY WORDS:** Occupational hazard, Emergency Medical Technicians, Emergency Medical Services, National Ambulance Service.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background of the Study

Emergency Medical Technicians (EMTs) are healthcare providers mandated to provide Emergency Medical Services (EMS) to patients with serious medical conditions outside a health facility (Reichard *et al.*, 2017). Emergency Medical Technicians provide instant care to critically ill and seriously injured patients and transport them to an appropriate hospital for further care (Reichard *et al.*, 2017). According to the National Association of Emergency Medical Technicians (NAEMT), EMTs respond to calls involving individual patients as well as large disasters and mass casualty incidents (Goodwin & Trumbull, 2017). The services provided by EMTs in pre-hospital settings is unique with its operating environment and technical requirements. This, however, exposed them to numerous occupational exposure and hazards that put them in danger as they strive to provide the best of care to patients (Reichard *et al.*, 2017). A study shows that 88.6% of the health care workers had a risky occupational hazard (Tesfay & Habtewold, 2014).

Other studies showed Emergency Medical Service Technicians were exposed to a wide range of occupational hazards including transportation-related incidents (Reichard *et al.*, 2017), hand injuries, back injuries, (NIOSH, 2017b), violence, overexertion, and bodily reaction (NIOSH, 2017a), infectious diseases (Luksamijarulkul, Pipitsangjan, & Vatanasomboon, 2014), and stress (Kilic & Inci, 2015). A similar study carried out in İstanbul, Turkey, indicated that the most common cause of work-related injuries was road traffic crashes (81.4%) while on duty in an ambulance, (53.6%) the ambulance crashing with another vehicle (Gülen *et al.*, 2016). In Ghana, one of the leading causes of death is road traffic accidents. Road traffic crash cases are one of the largest proportions of

accidental injuries in Ghana. A report by Ogbordjor and colleagues, (2019) indicates that between 2011-2015, 774 Road Traffic Accidents (RTAs) were recorded with 1408 injuries along Asante Akyem segment stretch of Accra to Kumasi road (Ogbordjor *et al.*, 2019). Road Traffic Crash Statistics in 2016 also indicates 10438 injuries that occurred out of RTA. Meanwhile, medical emergency services were highly inadequate until recently, when 307 new fleets of ambulances were deployed to each constituency in the country. This was to help improve pre-hospital health care delivery. The presence of the 307 ambulances has helped increase the number of ambulance stations from 135 to over 288 stations.

EMTs who provide emergency care to all these victims on the scene and en-route to a nearby health facility to increase high survival rate thereby reducing case mortality rate are exposed to all forms of hazards such as biological hazards, physical hazards, ergonomic hazards, etc. The stress, work overload, long shift, victims with bleeding wounds couple with flashbacks are some of the hazards the EMTs go through after attending to Mass Casualty Incident (MCI). Natural disasters such as floods that affect the country in unplanned developed urban areas give rise to epidemics of water-related diseases, such as cholera, typhoid, and malaria. In 2014 and 2015 Cholera outbreaks affected Greater Accra, then the Brong Ahafo Region, and later, all the regions with morbidity of 28,975 cases. Apart from floods, fires outbreaks are some of the emergencies that the EMTs attend that expose them to various hazards such as the June 2015 flood and fire that occurred in Accra.

The tasks of EMTs involve scene management rescue and therefore requires competency skills in logistics, occupational hazards and risk perceptions, psychosocial coping strategies, etc., as part of pre-hospital emergency medicine (Wilson *et al.*, 2015).



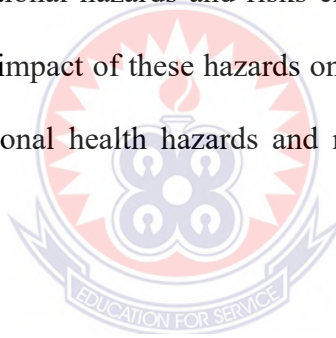
Notwithstanding these competency skills needed EMTs, the nature of services provided by EMTs expose them to several occupational hazards and injuries. Some occupational hazards EMTs may be exposed to include blood-borne pathogens (Oh & Uhm, 2016) or other potentially infectious material such as certain body fluids or tissues (Oh & Uhm, 2016). These occupational hazards could either be more natural or man-made disasters (EU-OSHA-Agency, 2011).

Ndejjo and colleagues in Kampala, Uganda reported that half of the respondents experienced occupational health hazards of which 39.5% biological hazards while 31.5% were non-biological hazards (Ndejjo *et al.*, 2015). Some occupational hazards affecting EMTs were injuries due to body motion 28%, or exposures to harmful substances 27% such as body fluids or chemicals (Reichard *et al.*, 2017). Other were slips, trips, falls, losses of balance 16%, motor vehicle incidents 8%, and assault or violence 7% (Reichard *et al.*, 2017). In Ghana, since the inception of the NAS, very little is known about occupational hazards, risks, and injuries among EMTs in the line of their services. This, thus, calls for the need to examine EMTs services cognizance of the inherent health hazards exposures in the NAS.

## **1.2 Problem Statement**

Emergency Medical Technicians are prone to occupational hazards and are at a higher risk for lost work-time due to occupational injuries from overexertion, transportation-related incidents, assaults, and falls (Reichard *et al.*, 2017). Moreover, assaults and motor vehicle crashes are the most frequently reported near-miss injury events among EMTs (Taylor *et al.*, 2015). Also, injurious exposures and knocks with objects and equipment are frequent contributors to injuries among EMS workers (Reichard *et al.*, 2017). Furthermore, in Ghana, there are no clear-cut actions to take or policy guidelines in the event an EMT

exposure to occupational hazards such as biological, airborne pathogens, etc. There is also improper documentation and reporting of occupational injuries, ambulance crashes, injuries, and other hazards related to pre-hospital setting tasks among EMTs in Ghana. This affects effective decision-making as there is no empirical available data to process for future planning concerning occupational health and safety in the pre-hospital setting. Also, most EMTs are ill-trained on occupational health safety to handle occupational health hazards and preventive measures. This promotes fear and panic among EMTs in the discharge of their duties coupled with inadequate Personal Protective Equipment (PPE) putting them in danger of hazards. Although there are several Labour Acts in Ghana, there is none particularly for EMTs in National Ambulance Service (NAS). It is, therefore, crucial to assess the occupational hazards and risks exposure among EMTs of NAS of Ghana and to determine the impact of these hazards on their job performance. There is a paucity of data on occupational health hazards and risk perceptions among EMTs in Ghana.



### **1.3 Justification**

There is a limited amount of information on the knowledge, attitudes, perceptions, and practice of EMTs on occupational hazards in Ghana. Most studies on occupational health and safety focused on in-hospital healthcare workers with little regard for EMTs of NAS. The lack of accurate data on workplace injuries and illnesses is of grave concern to the staff of the NAS. Policymakers rely on data to promulgate effective occupational health and safety legislation. Moreover, data would provide an understanding of the root causes and evaluate interventions to prevent and control work-related injuries and illnesses. The lack of good data impedes efforts to improve the health and safety of the workers. This study would provide up-to-date data on occupational hazards and injuries among EMTs to stimulate policy dialogue for resolving some associated hazards of NAS. The findings of

this study would provide empirical data for academic references on EMTs of the NAS in Ghana. This would add to academic knowledge and foster a good basis for policies formulation and direction on matters of occupational health and safety for EMS in Ghana at large.

#### **1.4 Research Questions**

The following questions were raised to elicit information for the study:

- 1 What are the occupational hazards experienced among Emergency Medical Technicians (EMTs)?
- 2 What is the attitude, perceptions, and knowledge among EMTs on occupational health risks in Ghana?
- 3 What are the effects of occupational hazards exposures and coping strategies among EMTs in the discharge of their duties?
- 4 How prepared, knowledgeable were EMTs and their attitude and health risk perceptions in transporting Covid-19 cases to a health facility for further care?
- 5 What is association between socio-demographic characteristics and knowledge, attitude towards occupational hazards risks among EMTs and transporting of Covid-19 cases in Ghana?

#### **1.5 Objectives**

The main aim of this study was to assess occupational hazards exposure and risk perception among EMTs of the National Ambulance Service (NAS) in the wake of the Covid-19 pandemic in Ghana.

##### ***1.5.1 Specific objectives***

The specific objectives of the study were to:

1. Assess occupational hazards among Emergency Medical Technicians (EMTs) during pre-hospital medical services in Ghana.

A structured questionnaire was delivered to each participant directly after a signed informed consent was obtained to solicit information from the respondents who self-administered the questionnaire. In addition, an electronic questionnaire on Google form was deployed to participants via WhatsApp for the respondent to download and complete by answering the questions and return via electronic means via cloud storage.

2. Assess the knowledge, attitude, and perceptions of occupational health risks among EMTs in Ghana.

Information on knowledge, attitude, and perceptions of occupational health risks among EMTs were collected from the study participants an electronic questionnaire on Google form were deployed to participants via WhatsApp just as in specific objective 1.

3. Examine the effects of occupational hazards exposures, compensations, and coping strategies for EMTs in NAS of Ghana.

The effects of occupational hazards exposure, compensations, and coping strategies for EMTs that were obtained from participants using a structured questionnaire and or an electronic questionnaire on Google form was deployed to participants unto WhatsApp platforms as in objective 1.

4. Assess the preparedness, knowledge, attitude, and health risk perceptions among EMTs transporting COVID-19 cases to a health facility for comprehensive care.

Information on preparedness, knowledge, attitude, and health risk perceptions among EMTs in response to transporting Covid-19 cases were gathered from

EMTs via the deployment of an electronic questionnaire on Google form for participants to self-administer.

5. Establish the association between socio-demographic characteristics and knowledge, attitude towards occupational hazards risks among EMTs and transporting of Covid-19 cases in Ghana.

### **1.6 Scope of the Study**

The study was limited to any EMT in the operation units of NAS stations with one year and above working experience in the selected seven (7) regions in Ghana; Ashanti, Greater Accra, Northern, Bono, Western, Oti, and Eastern region. This study excludes EMTs of the National Ambulance Service who had worked for less than one year in the service. Also, EMTs who were having their annual leave and who were critically ill during the data collection period were excluded from the study.

In addition, the study mainly focuses on the occupational hazards among EMTs in these seven regions.

### **1.7 Study Significance**

The findings of this study would reveal to EMTs of National Ambulance Service occupational hazards associated with their work. Again, the study would draw the attention of the Ministry of Health and NAS who are responsible for the training, licensing, regulation, and supervision of EMTs to identify acceptable control of occupational hazards food handling practices of their operation that need to be encouraged as well as areas of occupational hazards preventive measures that need more attention to train them to improve upon those practices. Furthermore, knowledge of EMTs on occupational hazards would be documented to educate them on what to look out for when attending to cases. The results would further provide empirical data on occupational hazards as a source of

information to relevant stakeholders such as the Ministry of Health, National Ambulance Service, Training Institutions, Ghana Health Service, NGOs among others. Information obtained from the study would serve as a relevant reference document for further research future researchers.

### **1.8 Organization of the thesis**

The study is divided into six chapters; the first chapter deals with the introduction to the study, statement of the problem, objectives, research questions, study significance, scope, and finally organization of the study. The second chapter discusses related literature on the study topic including theoretical and empirical studies on medical emergencies, occupational injuries, and risks, operational hazards, etc. The third chapter focuses on research methodology and this section describes the research design, study population, sample size, data collection instrument, data collection procedures, and data analysis. The fourth chapter deals with the presentation of the results from the data collected. Finally, the fifth and sixth chapters tackled the discussion of the results, summary of the findings, conclusion, and recommendations respectfully.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Introduction

This chapter reviews existing literature on occupational hazards and coping strategies among Emergency Medical Technicians (EMTs) during pre-hospital medical services, knowledge, attitude and perceptions of occupational health risks, the impact of occupational hazards exposures and compensations and preparedness, knowledge, attitude, and health risk perceptions among EMTs in response to transporting Covid-19 cases to an appropriate health facility for comprehensive care.

#### 2.2 Occupational Hazards

Occupational hazards refer to workplace factors, which have the potential to cause harm, injury, or ill health. These occupational hazards might be physical, chemical, mechanical, Ergonomic, biological, or psychosocial (Okefor & Alamina, 2018). Hazard is an inherent property of a substance, agent, source of energy, or situation that has the potential of causing undesirable consequences while the risk is the probability that damage to 'life, health, and or the environment may occur from a hazard. In this regard, occupational hazards refer to workplace activities that have the potential to cause/increase the risk of injury or ill health (Ghana Health Service, 2010). Occupational safety is the control of hazards in the workplace to achieve an acceptable level of risk, while workplace safety generally refers to the process of protecting the health and safety of staff while on the job, irrespective of vocation (Oluwagbemi, 2011).

A study conducted in Kampala among emergency medical technicians revealed that 50% of medical technicians experienced occupational health hazards, among these, 39.5% experienced biological hazards while 31.5% experienced non-biological hazards. This shows that emergency medical technicians should be educated more on occupational hazards (Ndejjo *et al.*, 2015). Another cross-sectional study conducted in Uganda among healthcare workers in a tertiary hospital reported needle stick injuries prevalence of 67.8% and cuts from sharp related objects of 31.7%. In this regards working conditions of the EMTs should be critically assessed to eliminate the most preventable occupational hazards that put the lives of EMTs at risk (Ziraba *et al.*, 2010). EMTs who drive the Ambulance during emergency calls are at higher risk of road accidents. These are serious problems that lead to injury and death to emergency responders (Hsiao *et al.*, 2018).

According to WHO (2006), health-care workers (HCWs) need protection from these workplace hazards yet, because their job is to care for the sick and injured, they are often considered as “immune” to injury or illness. Their patients come first. They are often expected to sacrifice their well-being for the sake of their patients. Indeed, protecting healthcare workers has the added benefit of contributing to quality patient care and health system strengthening (WHO, 2006).

### **2.3 Types of Occupational Hazards**

There are numerous occupational health hazards faced by EMTs at their workplaces. Several studies have reviewed different types of occupational hazards faced by healthcare workers such as EMTs (Piruznia, 2017). A wide range of occupational health hazards EMTs are exposed to in their work include chemical, physical, biological, ergonomics, and psychological hazards (Asumeng *et al.*, 2015). EMTs as part of healthcare workers



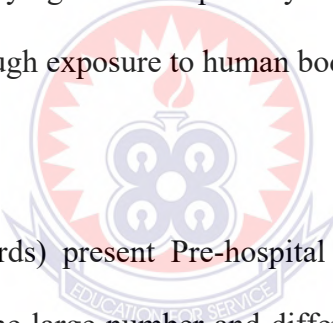
operate in an environment/setting that is considered to be one of the most hazardous occupational settings (Ndejjo *et al.*, 2015). Also, EMTs encounter diverse occupational hazards due to their work-related activities. Exposure to these occupational hazards leads to morbidity and mortality among health workers which EMTs are inevitable which leads to loss of trained personnel (Ndejjo *et al.*, 2015). Another research conducted by Zakaria (2015) stated that the main ways to control a hazard include: Elimination (including substitution): removing the hazard from the workplace. Engineering Controls: includes designs or modifications to plants, equipment, ventilation systems, and processes that reduce the source of exposure. Administrative Controls: controls that alter the way the work is done, including the timing of work, policies and other rules, and work practices Personal Protective Equipment: equipment worn by individuals to reduce exposure such as contact with chemicals or exposure (Zakaria, 2015).

### **2.3.1 Chemical hazards**

EMTs are exposed to a wide range of chemical hazards as they carry out their day-to-day activities by providing medical care to their patients. EMTs may be exposed to chemical hazards in various forms such as liquid, gas, and solid. Some of these chemical hazards that may be a threat to EMTs when exposed include disinfectants, cleaning components, latex, etc. (Chhabra, 2016). Cleaning and disinfecting products used by EMTs contain some chemical hazards that can cause or exacerbate asthma because of their sensitivity or irritant properties (Casey *et al.*, 2017). These chemicals include quaternary ammonium compounds, ethanolamines, chlorhexidine, glutaraldehyde, ortho-phthalaldehyde, hexachlorophene, and chloramine-T (Casey *et al.*, 2017). Several studies have identified cleaning as an occupational risk factor for asthma among health care workers (Caridi *et al.*, 2019). An occupational allergic agent such as latex can cause irritant dermatitis.

### **2.3.2 Biological hazards**

Biological hazards refer to organisms or organic matters produced by these organisms that are harmful to human health. Biological hazards comprise pathogenic micro-organisms, toxins (from biological sources), spores, and bio-active substances. Biological hazards can also be considered to include biological vectors or transmitters of disease (CCOHS, 2021; Safe Work Australia, 2011). The principal role of an EMT as part of HealthCare Workers (HCW) is to care for sick and injured patients and victims, which can expose them to a variety of diseases, injuries, and conditions (Banerjee & Singru, 2018). EMTs get exposed to human body matter as they care for their victims and patients (Safe Work Australia, 2011). They may also have a variety of health effects ranging from skin irritation and allergies to infections in carrying out their primary role of taking care of the sick and injured (CCOHS, 2021) through exposure to human body matter.



Biological hazards (biohazards) present Pre-hospital care professionals (EMTs) with complex challenges due to the large number and different kinds of potential agents and their effects. Health care workers are exposed to biological hazards such as SARS, Hepatitis B&C virus, HIV, bacteria and parasites (Rim & Lim, 2014) which EMTs are part of. Other biological hazards that EMTs are exposed to include blood borne and airborne pathogens (Riyadh, 2017). EMTs as frontiers of healthcare providers get exposed as a result of a splash of blood-borne viruses from their patients and victims (Konlan *et al.*, 2017), also from contaminated surfaces from objects such as vacuum splints, stretchers, and stair case-chair. A study carried out shows that more than 70% of healthcare workers most get exposed to biological hazards (Safe Work Australia, 2011). Biohazardous waste which is also known as biomedical waste or infectious waste is any waste containing infectious material or potentially infectious substances such as blood that are deemed a

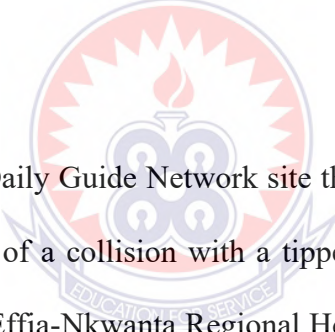
threat to public health or the environment (Diego, 2020). The biohazardous waste consists of human blood and blood products, human body fluids, pathological waste, microbiological waste, and sharps waste (Biohazardous Waste Disposal Policy, 2015). EMT may be exposed when getting in contact with these biohazard waste such as needles, blades, bedspread, gauze bandages, gauze pads, springe, giving sets, paper tissues that are contaminated.

### ***2.3.3 Ergonomic hazards***

By the nature of daily activities, EMTs exposed themselves to various degrees of ergonomic hazards. A study carried out in Bulgaria by Samuneva-Zhelyabova *et al.*, (2020) showed that work among Ambulance workers is related to the various risks of which ergonomics is the main. A study cited by (HIGNET, 2015) indicates that EMTs perform many tasks that expose them to musculoskeletal risks including adopting awkward postures, moving patients from a bed/trolley to a stretcher, and transporting patients downstairs. A study carried out by Queensland Ambulance Service indicated that musculoskeletal injuries account for >80% (Paul & Hoy, 2018). EMTs can develop musculoskeletal disorders from ergonomic hazards exposure. The effect of Ergonomic hazards on EMTs include musculoskeletal injuries such as muscle aches/strains/strains muscles, tendons, nerves (Piruznia, 2017). Over the years EMTs have suffered low back pain and carpal tunnel syndrome because of exposure to ergonomic hazards. A study conducted by (Friedenberg *et al.*, 2020) indicated that the annual prevalence of back pain suffered by EMTs ranged from 30% to 66%, and back injuries and contusions from 4% to 43%.

#### **2.3.4 Physical hazards**

Potentially, physical exposures in the pre-hospital setting that the EMTs face consist of excessive noise (Hansen *et al.*, 2017), patient handling, slip, falls due to wet floors of stairways, needle stick injuries (Chhabra, 2016), Ionizing radiation from x-ray, cold, electric and magnetic field from MRI. Ionizing radiation poses threat to EMTs as they carry patients to radiological and radiotherapy departments (Soglo, 2012). Radiation which is used in the medical field for both investigation and therapeutic purposes tends to expose the EMTs in the medical use of radiation. Road Traffic Crash (RTC) is also another hazard that EMTs face as they try getting their victims and patients to a definite healthcare facility for further management. A study cited by (Hsiao *et al.*, 2018) indicated that ambulance crashes have been documented as a serious problem.



It has been reported on the Daily Guide Network site that an EMT driver was found in a critical condition as a result of a collision with a tipper truck when transporting a sick person from Dixcove to the Effia-Nkwanta Regional Hospital in Sekondi (Opoku, 2018). Noise is one of the most common physical hazards present in the occupational setting and a major occupational hazard in the field of EMTs. EMTs are said to be at risk of occupational hearing loss due to excessive noise exposure. (Hansen *et al.*, 2017) cited in their study that the use of a siren that produces a high pitch of sound affects the hearing of EMTs operating in ground ambulances. It was also cited by (Hansen *et al.*, 2017) in their study that when the sirens were on, all noise values measured inside the cabin of Ambulance exceeded the national occupational health regulation of 85 dB(A) as a mean of 96 dB(A) was measured. A study done by (Hansen *et al.*, 2017) indicated that the overall pre-hospital noise exposure during emergency responses with ambulances exceeds the threshold defined in the E.U. Regulative for Noise (>80 dB(A)). It was concluded in a

study in Brazil that the sound pressure levels to which workers are exposed during working hours in ambulances are high and beyond compared to what is established by the Brazilian standard 85 dB (A) (Oliveira *et al.*, 2015). Another study carried out on noise exposure during pre-hospital emergency physicians' work on Mobile Emergency Care Units and Helicopter Emergency Medical Services by (Hansen *et al.*, 2017) indicated that noise exposure affected the outer hair cell function of the inner ear, thus potentially reducing the hearing ability.

### **2.3.5 Psychosocial hazards**

Psychosocial hazards are hazards that go hand in hand with the experience of work-related stress (Leka & Jain, 2010) Psychosocial hazards include workload demands, workplace violence, intensity and or pace at work, social support/relations, and sexual harassment (Asumeng *et al.*, 2015). Other psychosocial hazards include poor interpersonal relationships, assault from patient relatives, and job dissatisfaction/boredom (Okeafor & Alamina, 2018). Psychosocial hazards by (International Labour Office, 1986) are the various forms of workplace interactions that have hazardous influence over employees' health through their perceptions and experience. Psychosocial hazards may disturb the mental well-being or mental health of the worker and may have physical effects by devastating the individual coping mechanisms and impacting the workers' ability to work healthily and safely (GOA, 2017). A study on work-related psychosocial hazards among emergency medical responders (EMRs) in Mansoura City reviewed that EMTs as part of Emergency Medical Respondents experience traumatic events 88.57%, followed by dealing with serious accidents 87.8% and young victims 87.14% as the most severe acute stressors (Khashaba *et al.*, 2014). World Health Organisation report as cited by Chhabra, 2016 indicated that workplace violence affects every workplace and every professional group such as EMTs. Workplace violence has been dissembled by many occupational

health researchers as one of the most complex and dangerous hazards for healthcare workers (Chhabra, 2016). A study carried indicates that there is an increasing prevalence of stress, bullying or harassment, and violence among workers in Europe (Cockburn *et al.*, 2012).

## **2.4 Control of Occupational Hazards**

EMTs in pre-hospital settings may be exposed to various degrees of occupational hazards in the process of performing their duties. The most essential way of addressing occupational hazards in the pre-hospital setting is to ensure a healthy work environment that requires an effective assessment of the hazards at the workplace. Risks are unavoidable in any complex workplace. Risk management has gradually become an important part of occupational health and safety. For effective control of hazards at the workplace, one needs to carry out Hazard Identification Risk Assessment (HIRA) (Rout & Sikdar, 2017). HIRA is a process of defining and describing hazards by characterizing their probability, frequency, and severity and evaluating adverse consequences, including potential losses and injuries (SMDHU, 2017). In the pre-hospital setting proper assessment must be conducted to reveal hazards and risks. This might help to recognize EMTs who might be at risk, and determine where control measures are needed to prevent illness and injury (Safesite, 2020). Risks at the workplace are unavoidable. The management of risk has gradually become an important part of the occupational health and safety of organizations (Arimbi *et al.*, 2019). Controlling hazards in the pre-hospital setting must be done with a purpose. This will help to determine what hazard to control at a particular point in time (Society, 2015). Controlling exposures to occupational hazards in the pre-hospital setting is the essential method of protecting EMTs. The hierarchy of controls includes Elimination, Substitution, Engineering control, Administrative control, and Personal Protective Equipment (PPE) (Society, 2015; NIOSH, 2015b).



*Source: NIOSH, 2015*

## Figure 2.1 Hierarchy of controls

With the hierarchy of control, the most effective control appears on top of the pyramid while the least effective is the one at the bottom (NIOSH, 2015b).

### 2.4.1 Elimination

Elimination as part of the hierarchy of control is the most effective and efficient control. It physically removes the hazard from the workplace (NIOSH, 2015b). Elimination leads to being the most difficult to complement in an existing process or project. When the process or project is still at the design or development stage, elimination of hazards may be inexpensive and less complex (sample) to implement (NIOSH, 2015b). Elimination control of hazards in an existing process or project, equipment, and procedures may require major changes in design (NYCOSH, 2012).

### 2.4.2 Substitution

As it is impossible to eliminate all occupational hazards (Rout & Sikdar, 2017) there is the need to use other methods possible to control those that cannot be eliminated. The second-



best way to control a hazard is to substitute something else in its place that would be non-hazardous or less hazardous to workers (CCOHS, 2021). Substitution as cited by (Lissner & Romano, 2011) is “the replacement of one substance by another to achieve a lower level of risk”. This type of hazard control focuses on replacing the occupational hazard with something that serves the same purpose, thereby reducing the risk (Analysis, 2016). In protecting workers where necessary hazardous substances or processes are replaced using substitution, as far as its practical.

### ***2.4.3 Engineering***

Engineering control is preferably any essential part of a piece of apparatus directed at preventing or minimizing exposure of workers to hazards rising from the apparatus use (OHTA, 2017). It focuses on separating the individual from the hazards, by this means of reducing the risk. These are designed to eradicate hazards at the source in a workplace before they come into interaction with the workers (CCOHS, 2021). Workers can be guarded against occupational hazards by applying highly effective and efficient engineering control (NIOSH, 2015a).

### ***2.4.4 Administrative control***

It expresses how the relations among coworkers and process/operation are planned. If much attention is needed to safeguard those procedures and once adopted are observed. (OHTA, 2017). Administrative Control will require a worker to do things that reduce their exposure to risk (NIOSH, 2015b). It also focuses on reducing of exposure of workers to hazards through appropriate procedure, training, postings (OHTA, 2017). In existing processes or projects where hazards are not mostly well-controlled engineering control is used. These may be relatively inexpensive to establish. That over the long term can be very costly to sustain (NIOSH, 2015b).



#### **2.4.5 Personal Protective Equipment (PPE)**

PPEs focus on protective measures (Cheng *et al.*, 2020) to safeguard the worker. With this type of control, work is expected to put on protective wear when working with known or potential hazards (USDIBR, 2015). Preferably PPEs are used when engineering controls are not obtainable and/ or to enhance existing engineering control. Fact sheet (NIOSH, 2015a). The use of PPEs is to focus on protective measures than preventive measures of workers (USDIBR, 2015). PPEs include eye and face protection (safety glasses, goggles, or face shields), foot protection (wellington boots and safety shoes), hand protection (gloves), head protection (hard hats), and hearing protection (Sehsah *et al.*, 2020). PPEs are normally significant to be last resort (OHTA, 2017). PPEs when used correctly help to protect workers against accident, injury, and illness (Anigbogu, 2012). At times PPEs need to be implemented initially while longer-term, or more appropriate controls are researched, designed, and implemented. PPEs shouldn't remain as a long-term solution. Careful consideration must be given to the choice of the PPEs device. Regular maintenance is vital for many types of PPE if effective protection has been obtained. PPE management programs need to be adopted whenever the option of PPE use is deemed necessary and very proactive ongoing support to the program will be required (OHTA, 2017).

#### **2.5 Occupational health risk**

Professionally, EMTs attend to casualties and patients through a variety of preventive and curative services. Though their attention is focused on providing emergency care, they are vulnerable to the occupational health risk that could be harmful to their health and well-being (Olufemi *et al.*, 2016). Some of these health risks include exposure to noise (Nyarubeli *et al.*, 2020), injurious exposures, and others such as contact with objects and equipment were other common contributors to injuries (Reichard *et al.*, 2017), blood-borne pathogens (Oh & Uhm, 2016) which are transmitted through blood or other

potentially infectious material (OPIM) such as certain bodily fluids (semen, breast milk) or tissues (Oh & Uhm, 2016), airborne pathogens, transportation-related incidents infectious diseases and assault or violence (Reichard *et al.*, 2017),

### **2.5.1 Knowledge**

It's always good for every employee to have an idea or knowledge of occupational health risk that comes with his/her job. This normally helps both the employee and the employer on what best preventive measures to apply. By so doing injuries and exposures are reduced thereby promoting good occupational health and safety. A descriptive cross-sectional study conducted among two hundred and ninety health care workers in Nigeria reported that 89% of the respondents were knowledgeable about hazards at health care facilities (Olufemi *et al.*, 2016). The report concluded that this could be due to pre-placement and routine training of staff on safety practices and adequate reinforcement of staff capacity. Another descriptive survey that assessed the level of knowledge on predisposing factors to occupational hazards among nurses at health facilities were showed 96.2% of nurses knew about occupational health work. The researcher attributed the high awareness of occupational hazards among the study participants to be the result of their educational status (Amosu *et al.*, 2011).

### **2.5.2 Attitude**

Employees knowing occupational health risks is not enough in dealing with occupational hazards. But having the right attitude in following the implementation of preventive measures is a sure way of promoting good occupational health and safety in the workplace. Another cross-sectional study conducted among two hundred and forty-six health workers at the Accra Regional Hospital revealed a positive attitude towards occupational safety practices. However, there was a presence of occupational injuries and illnesses among

healthcare workers. The study concluded with a recommendation that the development and implementation of an effective occupational health policy to guide hospital workers is imperative (Nyame-Annan, 2017). Another descriptive cross-sectional study conducted among three hundred and thirteen Nigerian healthcare workers on the knowledge, attitude, and perceptions of occupational hazards and safety practices found 80% positive attitudes towards occupational hazards, the study concluded that the protocol of the safety training and drills should be responsive to evidence-based emerging and sectorial safety challenges (Chiou *et al.*, 2013).

### **2.5.3 Perceptions**

It is always best for every employee to ascertain what they believe when it comes to occupational health and safety at their workplace. This helps in the implementation of preventive measures at the workplace and educating the employees. A descriptive cross-sectional study conducted by Olufemi (2016) among 290 healthcare professionals found that most respondents 96.2% believed they were at risk of occupational hazards while about two-thirds perceived the risk as high, the researcher concluded that measures aimed at promoting safety practices and, minimizing exposure to hazards such as; provision of safety equipment, pre-placement and routine training of staff on safety practices and adequate reinforcement of staff capacity and capability through drills in all health care facilities should be institutionalized and made mandatory (Olufemi *et al.*, 2016).

Another descriptive cross-sectional study conducted in Nigeria on the topic Assessment of the Knowledge, Attitudes, and Perception of Potential Occupational Hazards by Healthcare Workers in a Tertiary Healthcare Facility in Lagos found high perceptions to potential health hazards, no statistically significant association was observed between

socio-demographic characteristics and perception of occupational hazards, the researcher recommended regular training on safety guidelines and enforcement of standard/universal safety practices by healthcare workers to reduce incidences of occupational injuries (Obono *et al.*, 2019).

## **2.6 Impact of occupational hazards exposure**

Facing this critical situation, health care workers on the front line who are directly involved in the diagnosis, treatment, and care of patients with COVID-19 are at risk of developing psychological distress and other mental health symptoms. The ever-increasing number of confirmed and suspected cases, overwhelming workload, depletion of personal protection equipment, widespread media coverage, lack of specific drugs, and feelings of being inadequately supported may all contribute to the mental burden of these health care workers (Lai *et al.*, 2020). In addition, repetitive overexposure to other occupational hazards such as physical hazards, violence, and situations that increase the risk of burnout may also have important health and wellbeing consequences in Emergency Physicians. Post-traumatic stress symptoms and post-traumatic stress disorders are common among rescue and ambulance personnel. It is well known that exposure to traumatic events and/or occupational hazards may have a whole range of psychological consequences such as nightmares, recurrent thoughts, flashbacks, sleeping problems, irritability, depression, lack of interest in daily life, anger, loss of concentration, restlessness, burnout, and clinical levels of depression. Lack of adequate social support may contribute to the aggravation and persistence of these consequences. These stress consequences may also cause reduced job satisfaction and commitment, absenteeism, and turnover in emergency care personnel and negatively influence the quality of care (Somville *et al.*, 2016).

A cross-sectional study conducted among emergency medical service workers recorded body motion injuries as 90%, this was attributed to lifting, carrying, or transferring of a patient or equipment. Exposure to harmful substances and radiation were the second leading event (24,900, 95% CI 11,700 – 37,100) (Reichard *et al.*, 2018). Another cross-sectional study conducted in Nigeria among 119 participants found that respondents (92.0%) believed that the occupation is hazardous. Among those that ever-had injuries (26.6%), cuts and bruises accounted for (66.0%); followed closely by needle pricks (64.2%) and skin irritation/allergy (22.6%). Only 50.8% and 10.1% of respondents always wear hand gloves and protective boots, respectively. A significant association ( $P < 0.05$ ) was found as those that have had training sustained fewer injuries than those who have not had training; also, awareness about hazards is more among respondents with high educational status; those that have had training and those that have spent more years at work.

### ***2.6.1 Compensation for EMT***

Compensation which may achieve several purposes is a systematic approach to providing monetary value to employees in exchange for work performed. Compensation may have the purpose of assisting in recruitment, job performance, and job satisfaction (Patnaik & Padhi, 2012). Compensation which is seen as an issue of human resource function has an important effect on employees' satisfaction, both economically and psychologically. Workers' job satisfaction and motivation depend deeply on the influence of the compensation system (Fogleman & McCorkle, 2011). Compensation packages or systems go a lot further which can be considered as total rewards systems that contain non-monetary, direct, and indirect elements. Non-monetary compensation deals with any benefit a worker receives from his/her employer or job that does not involve tangible value.

This includes career and social rewards such as job security, flexible hours, and opportunity for growth, praise and recognition, task enjoyment, and friendships.

Direct compensation is an employee's base wage. This can be an annual salary or hourly wage, plus any performance-based pay an employee receives, such as profit-sharing bonuses. Indirect compensation is far more varied, which includes everything from legally required public protection programs such as Social Security to health insurance, retirement programs, paid leave, childcare, or moving expenses. A cross-sectional study conducted on the topic: Compensation of Emergency Medical Technician (EMT)-Basics and Paramedics found out that, over 60% of EMT-Basics reported being either compensated or non-compensated volunteers in the 2004-2008 period. This was substantially and significantly greater than the proportion of EMT-Paramedic volunteers (<25%). The EMT-Paramedics earned significantly more than EMT-Basics, with differentials of \$11,000-\$18,000 throughout the study (Studnek., 2016). The major source of earnings disparity was the type of organization: respondents employed by fire-based EMS agencies reported significantly higher earnings than other respondents, at both the EMT-Basic and EMT-Paramedic levels. Males also earned significantly more than females, with annual earnings differentials ranging from \$7,000 to \$15,000 (Studnek., 2016).

### ***2.6.2 Coping Strategies***

Coping strategies refer to “cognitive and behavioural efforts to modulate internal and external demands appraised as exceeding personal resources” (Smith *et al.*, 2016). The nature of work carried out by EMTs exposes them to a lot of occupational hazards. These hazards are associated with occupational stress which affects EMTs in many ways (Nordin & Bin, 2016). It has been revealed in other studies on occupational stress which indicated

that workers are exposed to acute and chronic stressful events at work. This sometimes affects the psychosocial wellbeing and physical health of the workers (Maran *et al.*, 2015). A study by (Nordin & Bin, 2016) in Klang Valley, Malaysia indicated that significant occupational stressors were impracticable objectives, incompetent boss, time pressure and deadlines, work pressure, homework interface, performance pressure. Other studies also revealed that excessive workload, long working hours, insufficient number of staff, competition in career development and progression (Mohd & Hassim, 2010), and role ambiguity (Syed Ismail *et al.* 2014; Lloyd 2014) are some of the occupational stressors workers face. Another study also reviewed that the absence of support from coworkers and supervisors of the workers, depression, anxiety, and use of avoidance coping were found to be sources of stress of workers (Mukosolu *et al.*, 2015). Stress, as experienced by workers from their related jobs, have a negative impact on their performance at their workplaces which include absenteeism, inefficient work performance, decreased work performance, decreased work motivation, job satisfaction, and a problem with public relation (Mohd & Hassim, 2010). In an event where there is a lack of intervention measures to occupational stressors coping plays an integral role (Nordin & Bin, 2016). However, the efficiency and effectiveness of any given coping strategies may depend on several factors, such as perceived controllability of the stressor, availability of sufficient coping resources, nature of the outcomes (Smith *et al.*, 2016), maybe the only actions accessible in the organization (Nordin & Bin, 2016).

A systematic review by Chew and colleagues (2020) on psychological and coping responses of health care workers toward emerging infectious disease outbreaks, found that clear communication between healthcare workers 80.1% was helpful in coping strategy. The researcher recommended increasing supervision and feedback among senior and



junior health professionals in containing occupational health hazards (Chew *et al.*, 2020). Another cross-sectional study conducted in Saudi Arabia on burnout and coping methods among emergency medical service professionals revealed that the most frequently used coping strategy among emergency medical technicians was talking 87.4% (Almutairi & Mahali, 2020).

## **2.7 Coronavirus**

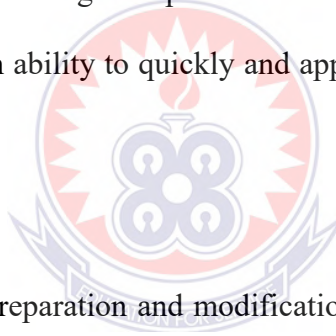
In Dec 2019, a considerable number of patients developed pneumonia of unknown cause in the capital city Wuhan of Hubei province in China (Shuja *et al.*, 2020). The World Health Organization on January 30, 2020, and on March 11, 2020 announced Coronavirus disease (COVID-19) as a pandemic and a public health emergency of international (Farfan-Cano, 2020). Coronavirus disease (COVID-19) is an acute respiratory infectious disease caused by the novel coronavirus. The disease was renamed severe acute respiratory syndrome coronavirus (SARS-CoV-2). The incubation period of the virus was 2–14 days with 80% of the patient having mild symptoms that did not require medical intervention (Wahed *et al.*, 2020). COVID-19 is characterized by fever (83% - 98%) as the most common symptom, followed by fatigue 70%, dry cough 59%, anorexia 40%, myalgias 35%, dyspnoea 31% expectoration 27%, diarrhea 4% although some patients have a typical symptom (Sharma *et al.*, 2020); (Farfan-Cano, 2020). COVID-19 is mainly spread from person to person by close contact (within about 6 feet) through the respiratory secretions in coughs or sneezes, speaking, or by touching virus-contaminated surfaces or objects (Wahed *et al.*, 2020).

### **2.7.1 Preparedness**

Many countries across the world have been affected diversely by the COVID-19 pandemic. This can be seen in three common defining characteristics as Speed and Scale,



Severity, Societal and economic disruption. In the fight against the covid-19 pandemic, there is the need to establish a Strategic Response and Preparedness Plan (SRPP) to help tackle the spread of the disease (WHO, 2020). Preparedness is defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as knowledge, capabilities, and actions of governments, organizations, community groups, and individuals “to effectively anticipate respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.” (Chan & Ho, 2018). Disaster preparedness could also be seen as actions that ensure requisite resources necessary to carry out an effective and efficient response that are available before a disaster, or they can be obtained promptly when needed (Fatemi *et al.*, 2017). Preparedness in disaster response is a key element of the overall mitigation process. The main goal of preparedness is to be ready, which is labeled as an ability to quickly and appropriately respond when required (Stikova, 2016).



Disaster preparedness was preparation and modification such as storing food and water, preparing a household emergency operation plan, preparing an emergency kit, and other activities that reduce the risk of injury and damage (Fatemi *et al.*, 2017). Disaster preparedness is a health-protective behavior, where the behavioral approaches have taken center stage as a means of it (Fatemi *et al.*, 2017). To have an effective and efficient preparedness it must base on the early and initial risk assessment. The preparedness process would be created as a general preparedness such as all-hazard preparedness or specific hazard's related preparedness process (Stikova, 2016). According to the responsibility for implementation and the possible recipient/user, any preparedness action must have two components which include governmental and population-based preparedness. Governmental preparedness is composed of five main categories of

activities such as planning (development of the Emergency Operation Plans – EOPs), resources/equipment, training, exercises, and statutory authority (Stikova, 2016).

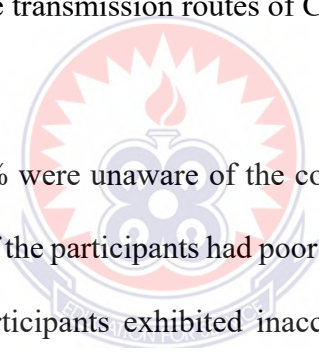
To stop or fight against the spread of covid-19, several guidelines were adopted by governments, health institutions, agencies to help curb the high rate of disease. Some of these preventive measures included social distancing (Ayenigbara *et al.*, 2020); proper use of personal protective equipment (PPE), including face masks usage, face shields, gloves, etc., hand hygiene including hand washing and sanitizing (Ahmad *et al.*, 2021) and respiratory hygiene (Wahed *et al.*, 2020).

### **2.7.2 Knowledge**

In preparation for the fight against covid-19, it was very appropriate for EMTs to know the origin of the disease, causes, diagnosis, transmission, prevention, and its treatment, as they needed to respond quickly and closely to COVID-19 patients in a narrow area within the ambulance (Vatan, 2020). Also, since the main activities of EMTs involved the transportation of the sick, it would help in having knowledge on a particular ambulance to use and its design, how to clean, disinfect the ambulance, and other equipment in the ambulance. This would help in reducing the spreading of the disease. EMTs as part of the frontline of covid-19 pandemic defense might be exposed not only to covid-19 infection due to possible frequent exposure confirmed cases (Vatan, 2020), but also the emotional distress, extensive working hours, physical violence, and fatigue.

The spread of covid-19 among EMTs was inflated by overcrowding, contaminated environment, and is possibly improved by insufficient knowledge and awareness of infection control practices amid EMTs. Lack of knowledge of EMTs could directly

influence practices and lead to delayed patient care and transport, poor infection prevention and control practice, and spread of disease (Wahed *et al.*, 2020). A study (Vatan, 2020) indicated that 96% and above of the respondents had sufficient knowledge about the transmission routes of COVID-19 with social media and television being the highest common sources of knowledge. A study by Wahed and colleagues (2020) showed that 80% of the respondents knew general information, ways of spread, common symptoms, and measures to prevent the spread of Covid-19. A cross-sectional study conducted in Turkey among 275 emergency medical service workers on knowledge and attitude towards COVID-19 found that the highest common sources of knowledge about COVID-19 were social media and television 88%. Overall, > 96% of the participants had adequate knowledge about the transmission routes of COVID-19.



Among the respondents, 36% were unaware of the correct hand washing or scrubbing technique. In addition, 78% of the participants had poor knowledge about floor and surface disinfection. Most of the participants exhibited inaccurate attitudes toward the use of personal preventive equipment. More than half of EMS workers 52% agreed that a surgical mask was not enough during the procedures that did not generate aerosol. Moreover, a significant proportion of the participants 66% perceived that an N95 mask was required. This called for advanced training in many areas (Vatan, 2020). Another cross-sectional study conducted in Egypt among Healthcare workers on the topic: Assessment of knowledge, attitudes, and perception of Health Care workers regarding COVID-19 found that the overall knowledge level of HCWs was generally good especially among physicians. A positive attitude was detected among allied health professionals more than physicians. Risk perception was high among HCWs. Causes of increased risk perception needed to be considered by the government and the Egyptian Ministry of Health. The study

revealed unavailability of personal protective equipment (PPE), fear of transmitting the disease to their families, and social stigma as the most frequently reported reasons for increased risk (Wahed *et al.*, 2020).

### **2.7.3 Attitude**

EMTs knowing the disease was not enough when caring for a covid-19 patient. It was always best for EMTs to portray the right attitude as they provide emergency health care to covid-19 cases as a positive attitude leads to positive patient care. EMTs as frontline workers needed to have the right attitude towards the use of personal protective equipment (Vatan, 2020), care of a patient, cleaning, and disinfection of the ambulance. EMTs also needed to have the right attitude towards infection prevention and control practice. Giao and colleagues (2020) showed that more than 90.0% of the respondents made up of health care workers answered positively toward COVID-19. The same study also showed that 92.7% of the respondents, responded that covid-19 could be prevented by washing hands with soap frequently and 98.2% responded that the prevalence of covid-19 could be reduced by the active participant of health care workers (Giao *et al.*, 2020).

Some studies showed that health care workers have a positive attitude and good practice concerning precautionary measures which include wearing gloves, protective clothing, goggles, and a facemask (Saqlain *et al.*, 2020). This was an indication of a positive attitude towards patient care. There was the need for EMTs to show a willingness to follow the government of Ghana and NAS guidelines of COVID-19 as indicated in a study carried out (Roy *et al.*, 2020). EMTs' knowledge about the disease was not enough when caring for the covid-19 patient. It was always best for EMTs to portray the right attitude as they provide emergency health care to covid-19 cases as a positive attitude leads to positive

patient care. EMTs as frontline workers needed to have the right attitude towards the use of personal protective equipment (Vatan, 2020) care of a patient, cleaning, and disinfection of the ambulance. EMTs also needed to have the right attitude towards Infection Prevention and Control practice. A study showed that more than 90.0% of the respondents made up of health care workers answered positively toward COVID-19 (Giao *et al.*, 2020). The same study also showed that 92.7% of the respondents responded that covid-19 can be prevented by washing hands with soap frequently and 98.2% responded that the prevalence of covid-19 could be reduced by the active participation of health care workers (Giao *et al.*, 2020). Some studies showed that health care workers have a positive attitude and good practice concerning precautionary measures which include wearing gloves, protective clothing, goggles, and a facemask (Saqlain *et al.*, 2020). This was an indication of a positive attitude towards patient care. There was the need for EMTs to show a willingness to follow the government of Ghana and NAS guidelines of COVID-19 as indicated in study (Roy *et al.*, 2020).

#### **2.7.4 Health risk perception**

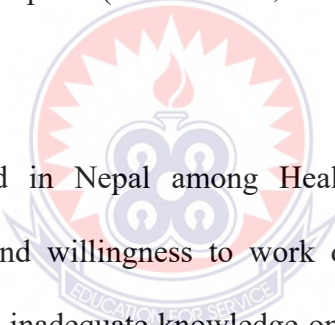
EMTs as part of front liners in the awake of COID-19 pandemic are faced with a high risk of contracting the disease, which has already killed other healthcare workers {Formatting Citation}. EMTs are faced with several occupational hazards in their line of duty as they transport COVID-19 cases from one place to the other. To help control these hazards it was better to understand EMTs' perception of occupational health risk which showed a key role in the adoption of these actions, in people's feelings, and their daily habits (Zanin *et al.*, 2020).

### ***2.7.5 Transport of COVID-19 cases***

When preparing for and responding to patients with confirmed or possible coronavirus disease 2019 (COVID-19), close coordination and effective communications are important among 112 Public Safety Answering Points (PSAPs)-- commonly known as 112 call centers, the EMS system, healthcare facilities, and the public health system. Each PSAP and EMS system should seek the involvement of an EMS medical director to provide appropriate medical oversight." enclosed space during transport. If a patient with an exposed history, signs, and symptoms suggestive of COVID-19 requires transport to a healthcare facility for further evaluation and management (subject to EMS medical direction), the following action should have occurred during transport: EMS clinicians should notify the receiving healthcare facility that the patient has an exposure history, signs and symptoms suggestive of COVID-19.

This may help the receiving facility inappropriate infection control precautions to be taken before patient arrival. Also to keep the patient separated from other people as much as possible (Vatan, 2020). A cross-sectional study conducted in Turkey among 275 Emergency Medical Service workers on the topic: Knowledge and Attitude towards COVID-19 found that the highest common sources of knowledge about COVID-19 were social media and television 88%. Overall, > 96% of the participants had adequate knowledge about the transmission routes of COVID-19. Among the respondents, 36% were unaware of the correct hand washing our scrubbing technique. In addition, 78% of the participants had poor knowledge about floor and surface disinfection. Most of the participants exhibited inaccurate attitudes toward the use of personal preventive equipment. More than half of EMS workers 52% agreed that a surgical mask is not enough during procedures that do not generate aerosol. Moreover, a significant proportion of the

participants 66% perceived that an N95 mask was required. The researcher recommended a need for postgraduate training in many subjects (Vatan, 2020). Another cross-sectional study conducted in Egypt among Healthcare workers on the topic: Assessment of knowledge, attitudes, and perception of Health Care workers regarding COVID-19 found that the overall knowledge level of health care workers was generally good especially among physicians. A positive attitude was detected among allied health professionals more than physicians. Risk perception was high among health care workers. Causes of increased risk perception need to be considered by the government and the Egyptian Ministry of Health, the study revealed unavailability of personal protective equipment (PPE), fear of transmitting the disease to their families, and social stigma as the most frequently reported reasons for increased risk perception (Wahed *et al.*, 2020).



Another research conducted in Nepal among Healthcare workers knowledge and perception of COVID-19, and willingness to work during the COVID-19 pandemic revealed that 17.2% reported inadequate knowledge on COVID-19, 63.6% reported that they perceived the government response as unsatisfactory, and 35.9% showed an unwillingness to work during the pandemic, these results suggest that prompt actions are required to improve healthcare workers knowledge of COVID-19, address negative perceptions of government responses, and motivate them through specific measures to provide healthcare services during the pandemic (Dipak *et al.*, 2020).

## **2.8 National Ambulance Service**

In 2004, the National Ambulance Service (NAS) of Ghana was established and became fully operational in 2006. The impetus for the formation of NAS was a result of the 9th May 2001 stadium disaster (Zakariah *et al.*, 2017). The field operations of NAS began on

a pilot phase in 2004 with 69 trained EMTs, 9 ambulances, and 7 stations (Zakariah *et al.*, 2017). This was subsequently scaled up to cover about 81% of Ghana, with a total staff of 1,698, 199 ambulances, and 128 stations in 2014 (Zakariah *et al.*, 2017). NAS provides pre-hospital care to the sick while conveying them to health facilities. National Ambulance Service desire to improve accessibility and quality of health care, the Paramedic and Emergency Care Training School was established at Nkenkaasu in the Ashanti Region



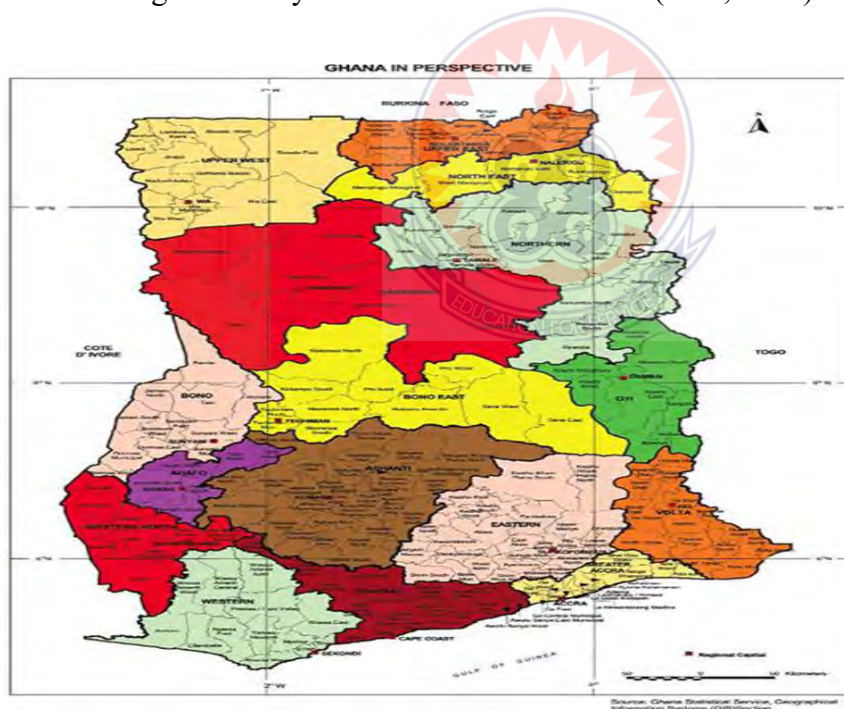


## CHAPTER THREE

### 3.0 METHODOLOGY

#### 3.1 Study Area

Ghana is an independent country that shares a border with Togo to the east, to the west with Ivory Coast, and north Burkina Faso (Migiro, 2018). Ghana covers a landmass of 238,535 km<sup>2</sup> (92,099 sq. mi) (World, 2020). Ghana has 16 regions; Greater Accra, Ashanti, Central, Western, Eastern region, Volta, Oti, Bono East, Bono, Ahafo, Western North, Northern, Savannah, North East, Upper East, and Upper West regions as shown in the map Ghana. Ghana's population was estimated at 30.42 million in the 2019 Population and Housing Census by Ghana Statistical Service (GSS, 2019).



(Source: GSS, 2020)

Figure 3.1 Map of Ghana

### **3.1.1 Study Sites**

This study was carried out at the various National Ambulance Service Stations in seven (7) regions of Ghana including Ashanti, Greater Accra, Northern, Bono, Western, Oti, and Eastern regions. These regions were purposively selected due to the high numbers of EMTs and functional ambulances.

### **3.1.2 Economy of Ghana**

Ghana's economy is backed by the activities of manufacturing, petroleum, and natural gas production, industrial mineral mining, real estate, trade, and exports electricity generation sector, etc. In the first quarter of 2019 Ghana was estimated to have a gross domestic product (GDP) of 6.7% as compared with 5.4% in the same period of 2018 (Abeti, 2020). There was also a strong 6.0% non-oil growth. The comparatively, high quarterly growth was driven by a strong recovery in the services sector which produced 7.2% associated with 1.2% in 2018 (Chamber, 2021). The Ghana Cedi which is the currency for the exchange of goods and services came under considerable pressure in the first quarter of 2019, due to high demand, as importers were required to restock their supplies but, in the second quarter, the domestic currency market became comparatively calmer.

The Ghana cedi cumulatively depreciated by 8.2% in the year to July 18, 2019. Ghana's Economic growth is expected to increase to 7.6% in 2019. Non-oil growth is also anticipated to fast-track to 6% as the government's new policies in the agriculture sector and the promotion of agribusiness begin to take effect. Inflation is expected to remain within the Central Bank's target range of 6-10% over the medium term (Analyst, 2019). Ghana's economic freedom score is 59.2, making its economy the 101st freest in the 2021 Index (World). Its overall score has augmented by 1.9 points, facilitated by a higher fiscal

health score. Ghana is ranked 11th among 47 countries in the Sub-Saharan Africa region, and its overall score is well above the regional average and slightly below the world average (Heritage, 2021).

### ***3.1.3 Demography of the study area***

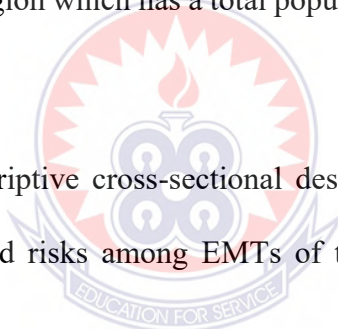
In 2019 Ghana's population was estimated to be 30.42 million as against 24.2 million in the 2010 Population and Housing Census (GSS, 2010).

### ***3.1.4 Study population***

The study population comprised of all EMTs in the operation units at the various NAS stations in the seven (7) regions of Ghana; Ashanti, Greater Accra, Northern, Bono, Western, Oti, and Eastern region which has a total population of about 1500 (NAS, 2020).

## **3.2 Study design**

The study employed a descriptive cross-sectional design to assess occupational health hazards exposure and related risks among EMTs of the National Ambulance Service, Ghana.



## **3.3 Sample size estimation**

A total of 59 NAS ambulance stations and 413 EMTs were estimated for this study based on an assumption of a 25% design effect at 95% confidence level and 5% non-response rate using Slovin's formula (Equation 1) (Yamane, 1967).

$$n = \frac{N}{[1 + N(e)^2]} \dots \dots \dots \text{Equation 1}$$

Where:

n = desired sample size

N = the study population

e = margin of error at 95% confidence interval

$$n = \frac{1500}{[1 + 1500(0.05)^2]}$$

$$n = 315$$

the 5% non – response rate will be calculated as follow:

$$0.05 * 315 = 15.75$$

$$n = 330$$

Adjusting for design effects of 25%.

A sample size (n) of 413 was used for the study to make up for the non-response and design effect.

### **3.4 Sampling Technique**

The multistage sampling technique was used in selecting the respondents from the various stations of the National Ambulance Service across the country. The regions in Ghana were clustered into three; Northern, Middle, and Southern Ghana. The purposive sampling technique was used to select the seven (7) regions from the three clusters based on the number of EMTs and ambulances available at those regions. Respondents in the operation unit from the various service stations of the seven regions were selected by using a simple random sampling technique.

### **3.5 Inclusion and Exclusion Criteria**

Any EMT working in the operation unit for at least one (1) year and consented to participate in the study was eligible for inclusion. Meanwhile, EMTs not working at operation unit, with less than one (1) year working experience, those sick or declined to partake in the study were excluded from the study.

### **3.6 Data Collection Tools**

A structured questionnaire was developed and subdivided into five (5) sections (A, B, C, D, and E) based on all the specific objectives. Section A was based on Socio-demographic

characteristics of respondents which included age, sex, marital status, educational qualification, years of experience in EMS, location of operation, etc. Section B focused on occupational hazards and exposures (source of knowledge, awareness of occupational hazards, knowledge on occupational hazards and their categories). Section C centered on KAP (knowledge, attitudes, perceptions of risks, compensations). Section D contained variables on impacts of occupational hazard exposure, compensation, and coping strategies (nature of injuries, body part injured, time of injury, knowledge of Workmen's Compensation Act 1987). Section E contained variables on COVID-19 (preparedness training, KAP). The questionnaire developed was subsequently transformed into an electronic tool using Google form.

### **3.7 Data Collection Procedures**

#### ***3.7.1 Pilot study***

The data collection tool was pre-tested using in-hospital EMS staff to check for validity and its sequence. The questionnaire linked to the electronic Google form was uploaded onto a WhatsApp platform and pre-tested with android phones among in-hospital EMS to finalize corrections and other input before the main study.

#### ***3.7.2 Data Collection Techniques***

The questionnaires linked to the electronic Google form were uploaded onto the respondents' WhatsApp platforms for the various operating stations. Participants with android phones downloaded the tool and follow the instructions answered the questions returned the filled questionnaire via electronic means for cloud storage. Where participants could not be reached through WhatsApp, the questionnaire was delivered to them to self-administer and subsequently collected by the researcher

### **3.8 Data Management and Analysis**

#### ***3.8.1 Data management***

The questions in the structured questionnaire were pre-coded and the responses from respondents were thus coded [Yes, the response was coded 1, and No response was coded 2]. Each section of the questionnaire was pre-coded, and each variable was given a numeric code. There were nine (9) questions on socio-demographic characteristics, five (5) questions on occupational health hazards and, twenty-four (24) questions on knowledge, attitudes, and perceptions of occupational health risks, twelve (19) questions on the effects of occupational hazards exposure, compensations, and coping strategies and twenty (20) questions on preparedness, knowledge, attitudes, and health risk perceptions among EMTs in responding to transporting Covid-19 cases. The data aggregated was downloaded from the cloud storage into Microsoft Excel cleaned, coded, and exported into Statistical Package for Social Sciences (SPSS) Windows version 21 for analysis.

#### **3.9 Data Analysis**

Knowledge, Attitude, and Perception (KAP) levels were scored using the questionnaire which was structured into three distinct sections/ modules. Respondents were asked 21 test items with a focus on knowledge of occupational health hazards and risks, and 12 and 15 questions on attitude and perception respectively. The knowledge, attitude, and perceptions scores were analyzed using the scalar-scoring method. In the questionnaire, there were two categories of questions; those with two optional answers were weighted 1 point for the correct answer and zero for the wrong answer.

Questions with multiple options had scored, 0, 1, and 3 for poor, fair, and good level of Knowledge, Attitude, and Perception respectively. The overall score for KAP was used to

rank the levels and subsequently used to analyze the qualitative ranking of high/good and low/poor scores. In the three sections, 21 test items were attributed to the knowledge section, 12 to attitude, and 15 to perceptions, and each was computed independently. If a respondent correctly answered all questions for each section, he or she was awarded all points. Respondents were ranked high/good if he/she obtained a KAP score of 50 and above or low/poor if scores were 49 or below. The overall mean score of attitudes towards occupational health was  $64.7 \pm 5.8$  ( $34.7 \pm 3.4$  to  $70.5 \pm 8.6$ ). Descriptive statistics such as frequencies, percentages were used to summarize baseline characteristics appropriately. Results were presented in pie charts, bar charts and tables. Bivariate cross-tabulation analysis using Chi-Square was used to establish associations between occupational health hazards among EMTs as well as knowledge, attitudes, and perceptions on preventive measures on occupational health hazards; their socio-demographic characteristics, and occupational health injuries experienced by EMTs.

### **3.10 Ethical Consideration/Issues**

Ethical clearance for the study was obtained from the Kwame Nkrumah University of Science and Technology (KNUST)/Komfo Anokye Teaching Hospital (KATH) Committee on Human Research, Publications, and Ethical approval number of (CHRPE/AP/349/20). Permission was also sought from the Ghana National Ambulance Service. Participants were fully informed about the purpose, procedures, and benefits of participating in the study, and their consents were thereof sought by signing or thumbprint informed consent form before selection. Information provided by the participants was handled with strict confidentiality and used purely for research purposes. Participants' responses were not shared with anybody.



## CHAPTER FOUR

### 4.0 RESULTS

This chapter presents the findings from the analysis of the data collected from study participants.

#### 4.1 Socio-demographic characteristics of respondents

**Table 4.1: Sociodemographic characteristics of study participants**

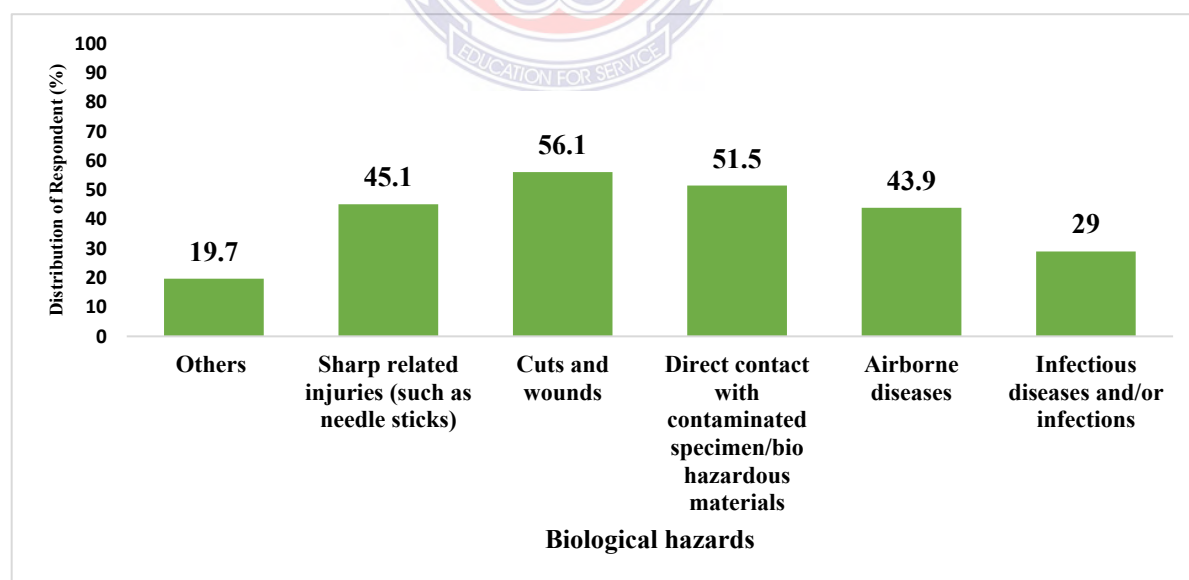
<b>Variables</b>	<b>Frequency [N=400]</b>	<b>Percentage (%)</b>
<b>Age range</b>		
20 – 29	51	12.8
30 – 39	229	57.2
40 – 49	120	30.0
<b>Sex</b>		
Female	107	26.7
Male	293	73.3
<b>Educational level</b>		
MSLC/BECE	4	1.1
Secondary/SSCE/WASSCE level	199	53.2
Diploma	74	19.9
Degree	89	23.8
Postgraduate	8	2.1
<b>Level of Practice</b>		
EMT Basic	359	89.7
EMT Advance	41	10.3
<b>Experience (Years)</b>		
3-5	82	20.5
6-8	162	40.5
9-11	83	20.8
12-14	32	8.0
≥ 15	41	10.2
<b>Marital status</b>		
Divorced	8	2.0
Cohabiting	36	9.0
Married	257	64.3
Single	99	24.7
<b>Religion</b>		
Christian	333	83.3
Muslim	59	14.7
Traditional	8	2.0
<b>Location</b>		
Rural ground	146	36.7
Urban ground	252	63.3



The socio-demographic characteristics of four hundred 400 participants are presented in Table 4.1. The age of respondents ranged from 20-49 years with a mean age of  $31.2 \pm 9.25$ . The majority 57.3% of respondents were aged between 30-39 years, 73.3% were males, 53.2% had secondary education whilst 1.1% had MSLC/BECE. Most 89.7% practice at EMT Basic level, 40.5% had worked for 6 to 8 years whilst 8.0% had worked for 12 to 14 years. The majority 64.3% were married, 83.3% were Christians and 63.3% of them live in urban areas.

#### 4.2 Occupational Hazards among EMTs in NAS of Ghana

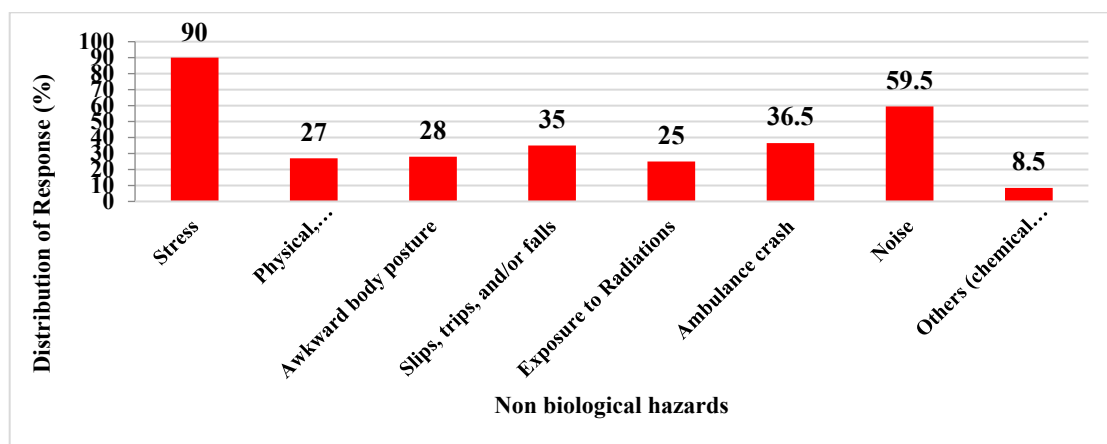
Figure 4.1 shows that cuts and wounds 56.1%, was the dominant biohazards experienced by EMTs, direct contact with contaminated specimen/bio-hazardous materials 51.5%, Sharp related injuries (such as needle sticks) 45.1%, airborne disease 43.9%, infectious diseases and/or infections 29% and others (bloodborne pathogens, vector-borne diseases, and bioterrorism) 19.7%.



**Figure 4:1 Biological hazards among EMTs**

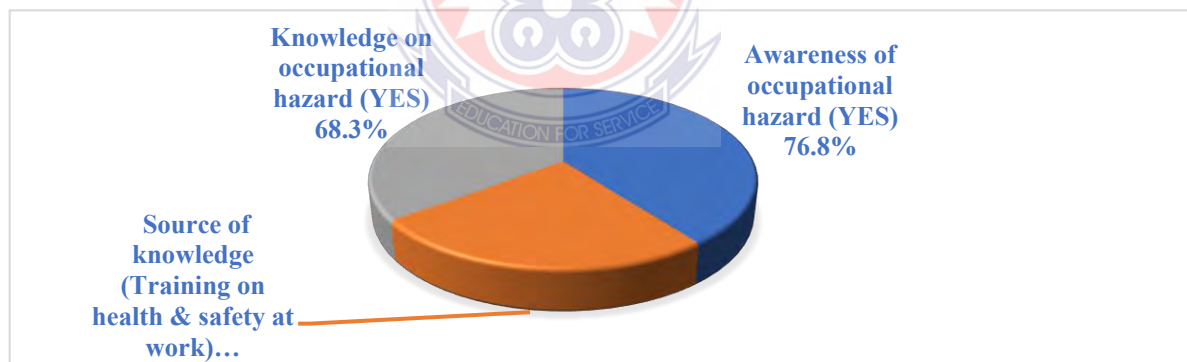
Figure 4.2 shows that non-biohazards most experienced by EMTs was stress 90% followed by noise 59.5%, ambulance crash 36.5%, slips, trips, and/or falls 35%, Awkward body

posture 28%, physical, psychological, sexual, and/or verbal abuse 27%, exposure to radiations 25% and others which included chemical spills, burns, etc. 8.5% respectively.



**Figure 4:2 Non-biohazards among EMTs**

In Figure 4.3, out of the 400 respondents, 76.8% were aware of occupational health hazards at the workplace of which 68.3% knew occupational hazards. Nearly fifty percent 48.5% had their main source of knowledge during health and safety training at work.



**Figure 4:3 Occupational Hazards among EMTs**

### 4.3 Knowledge, Attitude, and Perception of occupational health risks of EMTs of NAS

This section present result on Knowledge, Attitude, and Perception of occupational health risks of respondents of the study.

#### 4.3.1 Knowledge of occupational health risks of respondents

In Table 4.2, the majority, 71.2% of the respondents stated that they knew of occupational health risks in the workplace while 16.6% do not know of any occupational health risk in the

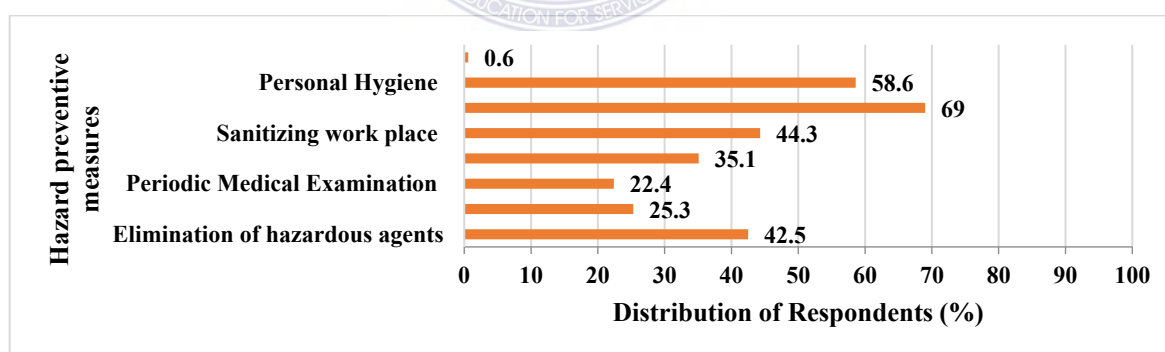
workplace and 12.2% indicated no occupational health risk at work. Majority, 52.1%, stated that, occupational health risk was very high at their workplace, followed by high 36.4%, medium 8.5%, low 2% and very low 1%.

**Table 4:2 Knowledge of occupational health risks of respondents**

Variable	Frequency	Percentage
<b>Knowledge of occupational health risks at work</b>		
No	47	12.2
Yes	274	71.2
I don't know	64	16.6
<b>Frequency occupational health risk at work</b>		
Very Low	4	1.0
Low	8	2.0
Medium	34	8.5
High	145	36.4
Very high	207	52.1

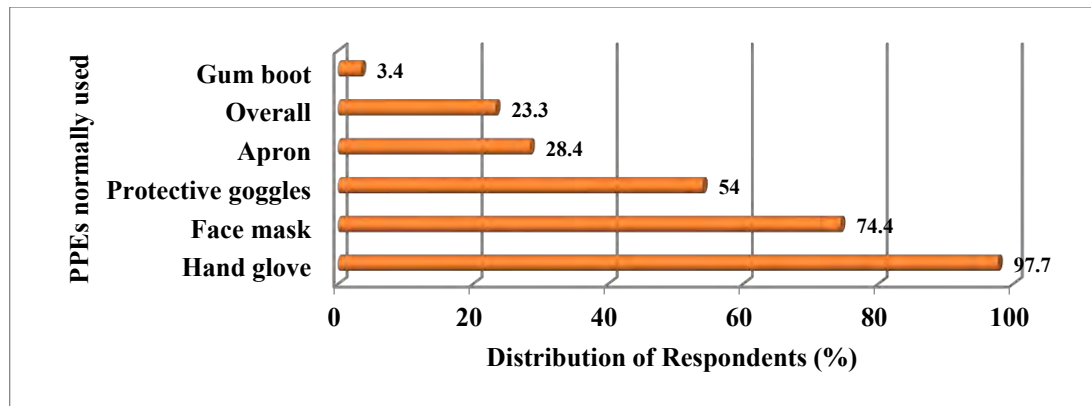
#### 4.3.1.1 Types of hazard preventive measures to avert occupational health risks

In Figure 4.4, the type of hazard preventive measure suggested by EMTs included the use of PPEs 69%, personal hygiene 58.6%, sanitizing workplace 44.3%, elimination 42%, adequate ventilation 35.1%, isolation of hazardous agents or process 25.3% and other 0.6%.



**Figure 4:4 Types of hazard preventive measures**

Figure 4.5 shows 97.7% of the respondents normally used hand gloves in their workplace, face mask 74.4%, protective goggle 54%, apron 28.4%, overall coat 23.3%, and gumboot 3.4%.



**Figure 4:5 PPEs normally used by respondents**

#### ***4.3.1.2 Training and drills on occupational health risks and safety among EMTs***

In Table 4.3, more than half of EMTs 55.6% indicated they had not received any form of training on occupational health risk, 44.4% attested receiving training on occupational health risk. Meanwhile, 98% of EMTs proposed that prevention measures would help reduce hazards to the minimum. A majority 55.7% of the respondents never had training and drills, 40.3% indicated having received such training drills. Almost all the respondents 91.5% indicated the need for occupational health and safety training drills.

**Table 4:3 Occupational health and safety training and drills**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Received training on occupational health risk</b>		
No	222	55.6
Yes	177	44.4
<b>Prevention measures to reduce occupational hazards</b>		
No	4	1.0
Yes	386	98.0
I don't know	4	1.0
<b>Organized training and drills on occupational health and safety</b>		
No	223	55.7
Yes	161	40.3
I don't know	16	4.0
<b>Importance of occupational health and safety training drills</b>		
No	10	2.5
Yes	366	91.5
I don't know	24	6.0

#### **4.3.2 Attitude of EMTs of the NAS, Ghana towards occupational health risks**

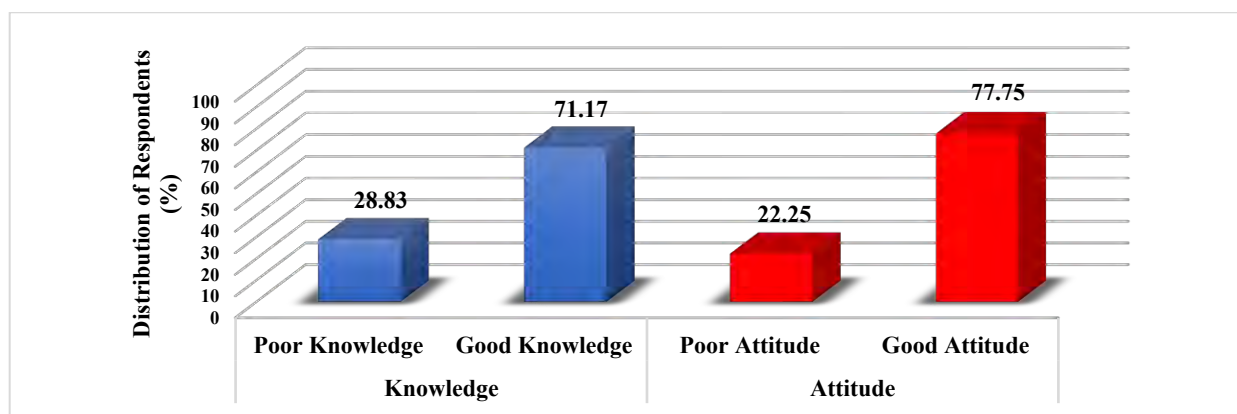
**Table 4:4 Attitude of EMTs towards occupational health risks**

Variables	Frequency [N=400]	Percentage (%)
<b>Occupational health risk, should be taken seriously and given quick attention at workplace</b>		
Agree	89	22.3
Strongly Agree	311	77.7
<b>Prevention of occupational hazards, responsibility of NAS management and EMTs</b>		
Strongly disagree	2	0.5
Uncertain	2	0.5
Agree	119	29.5
Strongly agree	277	69.2
<b>Occupational Health risk, a needless burden on EMTs</b>		
Strongly disagree	114	28.5
Disagree	62	15.5
Uncertain	18	4.5
Agree	123	30.8
Strongly agree	83	20.7
<b>Training of staff, provision of PPEs to reduce occupational hazards exposure</b>		
Agree		
Strongly agree	118	29.5
<b>Aprons, goggles, and face masks, should be worn in splash/blood spill procedures</b>	282	70.5
Agree	125	31.3
Strongly agree	275	68.7
<b>Gloves should always be worn when caring for a patient</b>		
Disagree	2	0.5
Uncertain	2	0.5
Agree	126	32.6
Strongly agree	256	66.4
<b>Hand washing should be carried out properly before and after patient contact</b>		
Agree	103	25.8
Strongly agree	297	74.2

Table 4.4 shows that 77.7% of the respondents stated occupational health risks should be taken seriously and given quick attention at their work, 69.2% strongly agreed that prevention of occupational health is a joint responsibility of NAS management and EMTs. Meanwhile, 30.8% agreed that paying additional attention to occupational health risk is a needless burden on them while 28.5% strongly disagree. Seven out of ten EMTs were of the strong view that training of staff and provision of personal protective equipment is necessary to reduce the risk of exposure to occupational hazards. The majority of respondents (68.7%) were of the view that aprons, goggles, and face masks should be worn in splash/blood spill procedures and 66.4% of EMTs proposed the use of gloves while attending to a patient. Many respondents, 74.2%, were of the view that hand washing should be carried out properly before and after each contact with a patient.

#### 4.3.2.1 Knowledge and Attitude of occupational health risks among EMTs

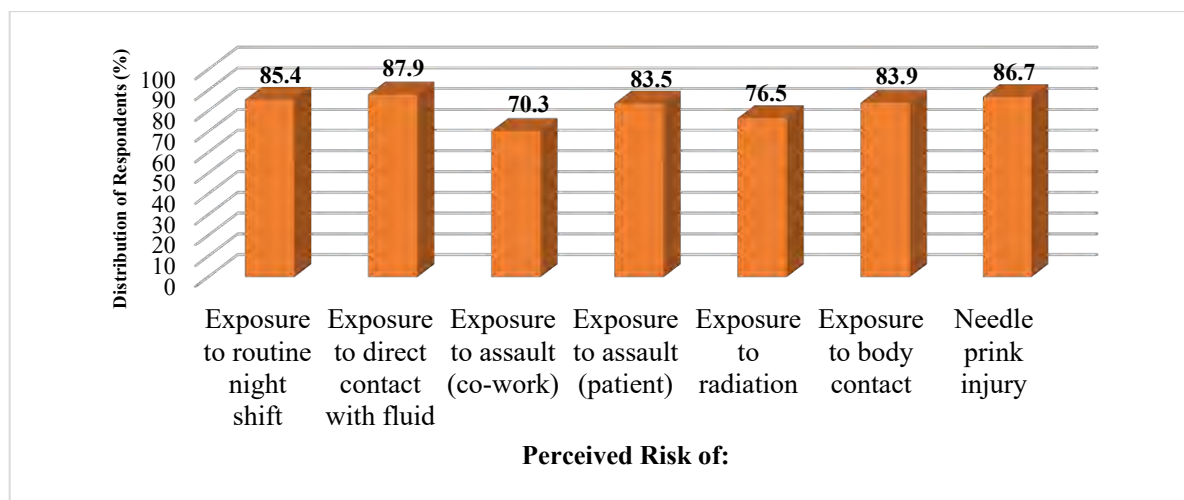
In Figure 4.6. out of 400 EMTs, 71.2% had good knowledge and 77.75% had a good attitude towards occupational health risks.



**Figure 4:6 Knowledge and Attitude of occupational health risks among EMTs**

#### 4.3.3 Perception of occupational health risks among EMTs of NAS, Ghana

In Figure 4.7, out of 400 EMTs, 85.43% perceived routine night shifts as risk, 87.94% perceived exposure to direct contact with patient's body fluid as risky, 70.30% perceived exposure to assault from a co-worker, 83.5% perceived exposure to assault from a patient, 76.52% perceived exposure to radiation, 83.92% perceived exposure to body contact with a patient with HBV, HVC, TB, and 86.68% perceived exposure to needle sticks as risky.



**Figure 4:7 Perception of occupational health risk among EMTs**

#### 4.4 Occupational hazards exposure impact, compensation, and coping strategy among EMTs

##### 4.4.1 Impact of occupational hazards exposure on EMTs of the NAS, Ghana

Table 4.5 shows that 51.0% of EMTs ever suffered an injury during work while 49.0% did not. Most EMTs 83.2% have their health or body affected because of injury or exposure. Meanwhile, 56.9% have ever been hospitalized due to injury or infectious disease acquired during work and 66.3% of EMTs hospitalized were on admission less than a week, 12.9% for 1-2 weeks, 11.9% for 5-6 weeks, and 8.9% for 3 to 4 weeks.

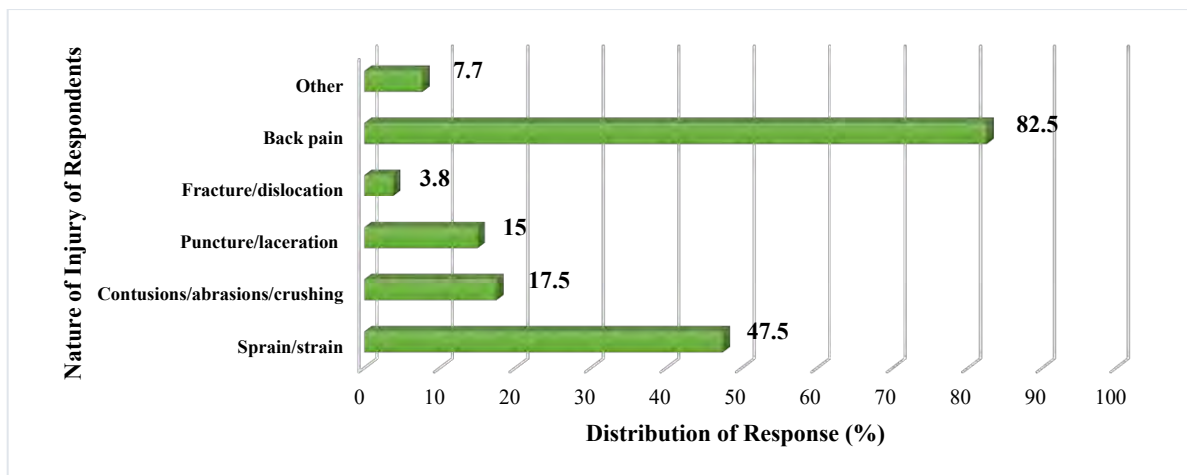
**Table 4:5 Impact of occupational hazards exposure**

Variables	Frequency [N=400]	Percentage (%)
<b>Ever had any injury during work</b>		
Yes	204	51
No	196	49
<b>Health or body affected due to injury at work</b>		
Yes	170	83.2
No	34	16.8
<b>Hospitalized due to injury or infections</b>		
Don't remember	15	7.5
Yes	72	35.6
No	117	56.9
<b>Admission duration at hospital</b>		
Less than one week	67	66.3
1 to 2 weeks	13	12.9
3 to 4 weeks	9	8.9
5 to 6 weeks	12	11.9

##### 4.4.1.1 Nature of injury sustained among EMTs of the NAS, Ghana

This section shows various injuries sustained by the respondents while attending to various emergencies. In Figure 4.8, 82.5% of EMTs complained of back pain, 47.5% said Sprain / Strain, 17.5% complained of Crushing / Abrasions / Contusions, Puncture / Laceration, 15% Fracture / Dislocation 3.8%, and Others 7.7%.

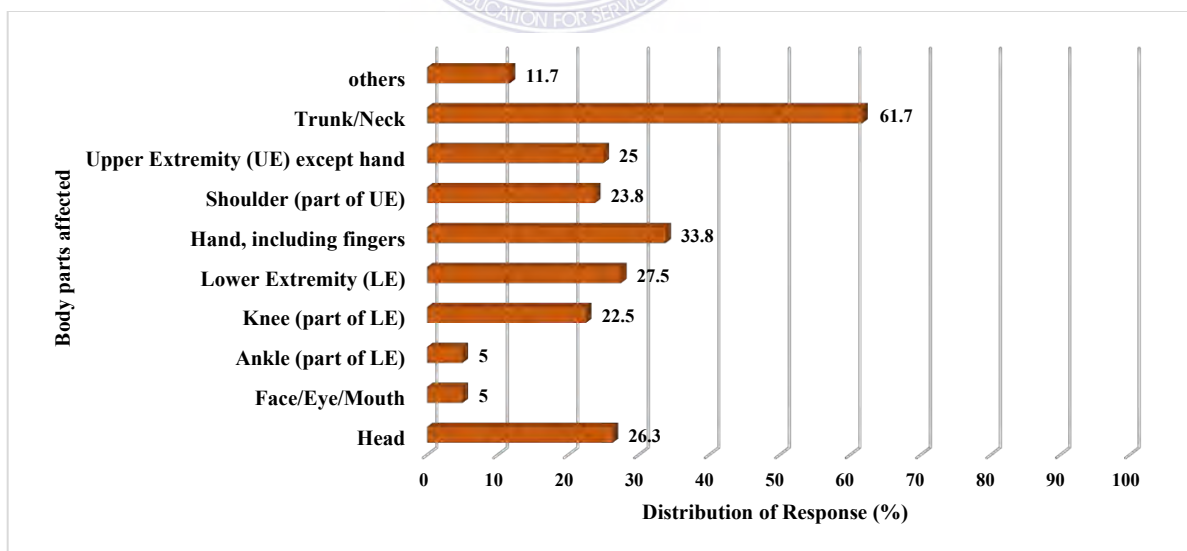




**Figure 4:8 Nature of injury of respondents**

**4.4.1.2 Parts of the body affected among EMTs of the NAS, Ghana**

In Figure 4.9, 61.7% of EMTs responded that their trunk/neck were parts of body that was affected. Nonetheless, 33.8% reported that their hand/fingers, lower extremity (27.5%), head (26.3%), upper extremity (25%), shoulder (part of UE) (23.8%), knee (part of LE) (22.5%), others (11.7%), ankle (part of LE) and face/eye/mouth (5%) were affected among EMTs.

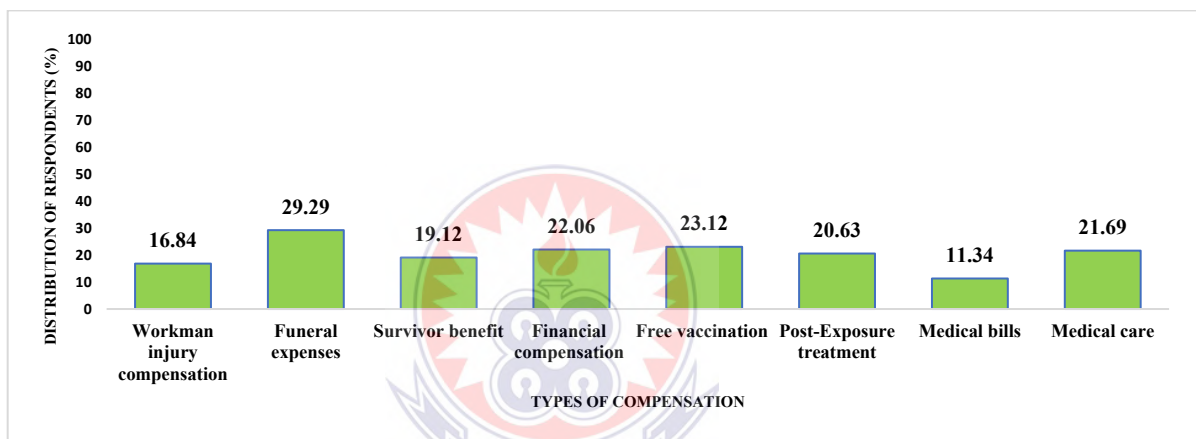


**Figure 4:9 Respondents body parts affected**



#### 4.4.2 Compensation for EMTs injured during work

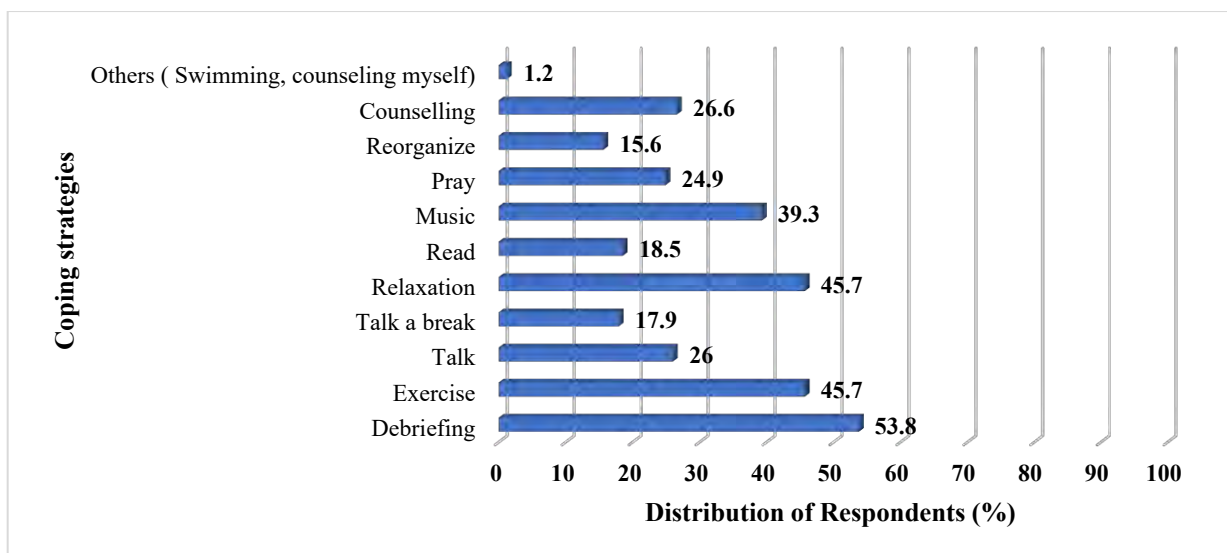
In Figure 4.10, out of 240 respondents, 21.7% attested that they have ever benefited from medical care whereas 78.3% had not. Meanwhile, 11.3% recounted their medical bills paid for by the employer. In addition, 23.1% had benefited from free vaccination at the workplace. Only a hand full 22.1% stated they had received financial compensation before whilst 77.9% did not. Other benefits EMTs indicated having received were; survivor (19.1%), funeral (29.2%), workman compensation insurance (16.8%), and post-exposure treatment (20.6%).



**Figure 4:10 Compensation for EMTs**

#### 4.4.3 Coping Strategies at work among EMTs

In Figure 4.11, 53.8% indicated debriefing sessions, relaxation, and exercise 45.7%, music 39.3%, counseling 26.6%, talk 26%, pray 24.9%, reading 18.5%, take a break 17.9% reorganize 15.6% and other including swimming and counseling oneself 1.2%.

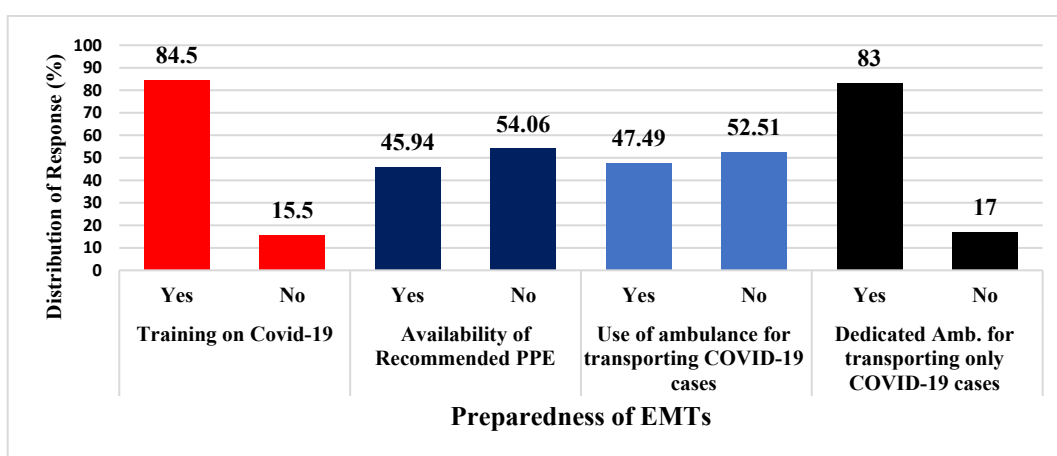


**Figure 4:11 Coping strategies among EMTs at work**

#### 4.5 Preparedness, knowledge, attitude, and perceived health risk among EMTs in transporting COVID-19 cases.

##### 4.5.1 Preparedness of EMTs in transporting COVID-19 cases

Figure 4.12 showed that 84.5% of EMTs had received training on transporting Covid-19 cases and 77.0% had good knowledge of transporting Covid-19 cases. Less than half of the respondents (45.9%) had the recommended the PPEs for transporting Covid-19 cases whilst 44.5% of the EMTs used their ambulance for transporting Covid-19 cases before whereas 83% had dedicated ambulance for transporting Covid-19 cases.

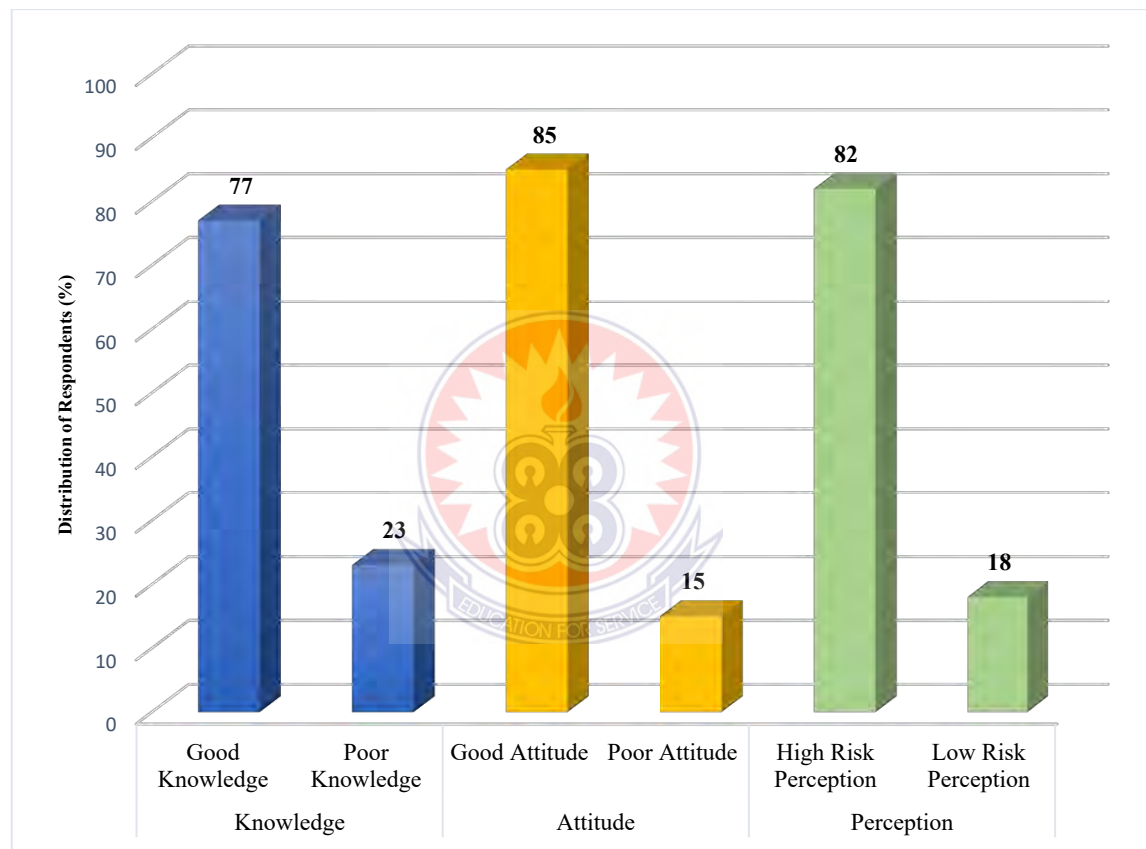


**Figure 4:12 Preparedness of EMTs in transporting Covid-19 cases**

#### 4.5.2 Knowledge, Attitude and Health risk perception of EMTs in transporting

##### COVID-19 cases

The study also showed that most of the respondents 77%, had Knowledge in transporting COVID-19. Most 85.0% of the respondents had good attitude in transporting COVID-19 cases. However, eight out of ten of respondents perceived high risk in transporting COVID-19 cases.



**Figure 4:13 Knowledge, Attitude and Health risk perception of EMTs in transporting COVID-19 cases**

#### 4.6.1 Association between socio-demographic characteristics of EMTs on their knowledge of occupational health risks

**Table 4:6 Association between socio-demographic characteristics of EMTs on their knowledge of occupational health risks**

Variables	Knowledge on Health Risk		$(\chi^2)$ (p-value)	COR (95%CI) p-value	AOR (95%CI) p-value
	Poor[N=111]	Good [ N=274]			
<b>Sex</b>					
Female	46(42.9)	61(57.1)	<b>14.47(&lt;0.001)</b>	Ref.	<b>3.30(1.76-6.15)0.000</b>
Male	65(23.4)	213(71.6)		2.47(1.54-3.96)0.000	
<b>Age</b>					
20-29	24(47.1)	27(52.9)	10.80(0.005)	Ref.	1.47(0.67-3.20)0.325
30-39	64(27.9)	165(72.1)		2.29(1.23-4.26)0.009	
40-49	23(21.9)	82(78.1)		3.16(1.54-6.50)0.002	
<b>Marital Status</b>					
Divorced	4(50.0)	4(50.0)	<b>33.86(&lt;0.001)</b>	Ref.	<b>2.75(1.43-5.28)0.002</b>
Cohabiting	8(22.2)	28(77.8)		3.3(0.71-17.21)0.123	
Married	49(20.3)	193(79.7)		3.93(0.95-16.31)0.059	
Single	50(50.5)	49(49.5)		0.98(0.23-4.13)0.978	
<b>Religion</b>					
Traditionalist	4(50.0)	4(50.0)	<b>18.40(&lt;0.001)</b>	Ref.	4.88(1.34-17.65)0.016
Muslim	4(10.3)	35(89.7)		3.75(1.29-10.83)0.015	
Christian	99(30.0)	231(70.0)		1(Empty)	
<b>Level of Practice</b>					
EMT Advance	2(4.9)	39(95.1)	<b>12.83(&lt;0.001)</b>	Ref.	0.33(0.07-1.59)0.171
EMT Basic	109(31.7)	235(68.3)		0.11(0.02-0.46)0.003	
<b>Educational level</b>					
MSLC/BECE	0(0.00)	4(100.0)	<b>41.65(&lt;0.001)</b>	Ref.	<b>0.08(0.02-0.26)0.000</b>
Secondary	73(36.7)	126(63.3)		0.08(0.02-0.23)0.000	
Diploma	30(40.5)	44(59.5)		0.06(0.02-0.20)0.000	
Degree	4(4.5)	85(95.5)		1(Empty)	
Postgraduate	0(0.00)	8(100.0)		1(Empty)	
<b>Location</b>					
Rural Ground	30(20.5)	116(79.5)	7.25(0.007)	Ref.	<b>0.22(0.12,0.42)0.000</b>
Urban Ground	79(33.3)	158(66.7)		0.51(0.31,0.83)0.008	

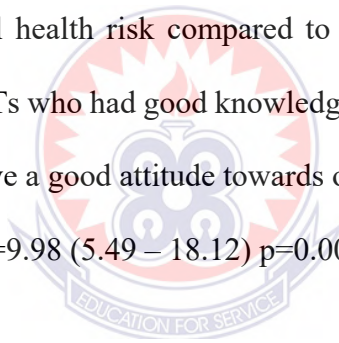
Table 4.6 shows a significant association between sex, marital status, religion, level of practice and educational level on knowledge of occupational risk ( $\chi^2=14.47$ ,  $p<0.001$ ), ( $\chi^2=33.86$ ,  $p<0.001$ ), ( $\chi^2=18.40$ ,  $p<0.001$ ), ( $\chi^2=12.83$ ,  $p<0.001$ ) and ( $\chi^2=41.65$ ,  $p<0.001$ ) respectively. Males EMTs were 3.30 times more likely to have good knowledge on occupational health risk than females [AOR=3.30 (1.76 – 6.15)  $p=0.000$ ]. EMTs who were married and those cohabitating were 2.75 and 3.56 times more likely to have good knowledge on occupational health risk than those who were divorced or single [AOR=2.75 (1.43 – 5.28)  $p=0.002$ ; AOR=3.56(0.98 - 12.86)  $p=0.052$ ]. EMTs with secondary and diploma level of education were 0.08 and 0.05 times likely to have good knowledge on

occupational health risk compared with MSLC/BECE [AOR=0.08(0.02 - 0.26) p=0.000; AOR=0.05 (0.01 – 0.19) p=0.000].

#### ***4.6.2 Association between socio-demographic characteristics of EMTs on their***

##### ***Attitude towards occupational health risk.***

Table 4.7 shows association between sex, age, marital status, religion, educational level, and good knowledge of EMTs attitude on occupational health risk ( $\chi^2=10.96$ , p=0.001), ( $\chi^2=17.67$ , p<0.001), ( $\chi^2=42.41$ , p<0.001), ( $\chi^2=15.73$ , p=0.001), ( $\chi^2=44.76$ , p<0.001) and ( $\chi^2=94.05$ , p<0.001). EMTs who were Muslim were 13.87 times more likely to have a good attitude toward occupational health risk than traditionalists [AOR=13.87 (2.72 – 70.51) p=0.002], EMTs with diploma qualification were 0.04 times likely to have a good attitude toward occupational health risk compared to MSLC/BECE [AOR=0.04 (0.01- 0.14) p=0.000] whereas EMTs who had good knowledge on occupational health risk were 9.98 times more likely to have a good attitude towards occupational health risk than those with poor knowledge [AOR=9.98 (5.49 – 18.12) p=0.000].



**Table 4:7 Association between socio-demographic characteristics of EMTs on their Attitude towards occupational health risk**

Variables	Attitude on Health Risk		$(\chi^2)$ (p-value)	COR (95%CI) p-value	AOR (95%CI) p-value
	Poor [N=89]	Good [N=311]			
<b>Sex</b>					
Female	36(33.6)	71(66.4)		Ref.	
Male	53(18.1)	240(81.9)	<b>10.96(0.001)</b>	2.29(1.39-3.78)0.001	2.34(1.22-4.49)0.010
<b>Age</b>					
20-29	23(45.1)	28(54.9)		Ref.	
30-39	44(19.2)	185(80.8)		3.45(1.81-6.56)0.000	2.90(1.32-6.36)0.008
40-49	22(18.3)	98(81.7)	<b>17.67(&lt;0.001)</b>	3.65(0.70-7.51)0.000	1.51(0.57-3.98)0.401
<b>Marital Status</b>					
Divorced	6(75.0)	2(25.0)		Ref.	
Cohabiting	10(27.8)	26(72.2)		7.8(1.34-45.27)0.022	
Married	34(13.2)	223(86.8)		19.67(3.81-101.48)0.000	
Single	39(39.4)	60(60.6)	<b>42.41(&lt;0.001)</b>	4.61(0.88-24.03)0.069	
<b>Religion</b>					
Traditionalist	2(25.0)	6(85.0)		Ref.	Ref.
Muslim	2(3.70)	52(96.3)		9.02(2.15-37.83)0.003	<b>13.87(2.72-70.51)0.002</b>
Christian	85(25.8)	245(74.2)	<b>15.73(0.001)</b>	1(omitted)	
<b>Level of Practice</b>					
EMT Advance	4(9.8)	37(90.2)		Ref.	<b>Ref.</b>
EMT Basic	85(23.7)	274(76.3)	4.12(0.042)	0.34(0.12-1.00)0.051	1.04(0.29-3.65)0.949
<b>Educational level</b>					
MSLC/BECE	0(0.0)	4(100.0)		Ref	Ref.
Secondary	50(25.1)	149(74.9)		0.14(0.04-0.40)0.000	0.15(0.04-0.52)0.003
Diploma	35(47.3)	39(52.7)		0.05(0.01-0.15)0.000	<b>0.04(0.01-0.14)0.000</b>
Degree	4(4.5)	85(95.5)			
Postgraduate	0(0.00)	8(100.0)	<b>44.76(&lt;0.001)</b>		
<b>Location</b>					
Rural Ground	29(19.9)	117(80.1)		Ref.	Ref.
Urban Ground	60(23.8)	192(76.2)	0.82(0.362)	0.79(0.48-1.30)0.363	0.35(0.18-0.68)0.002
<b>Knowledge</b>					
Poor	62(55.9)	49(44.1)		Ref	
Good	27(10.0)	247(90.0)	<b>94.05(&lt;0.001)</b>	11.57(6.70-19.98)0.000	<b>9.98(5.49-18.12)0.000</b>

#### 4.6.3 Association between sociodemographic characteristics of respondents on the knowledge of transporting COVID-19 cases.

Table 4.8 shows an association between sex, age, educational level, and knowledge in occupational health risk on knowledge among EMTs in transporting COVID-19 cases ( $\chi^2=32.96$ ,  $p<0.001$ ), ( $\chi^2=16.02$ ,  $p<0.001$ ), ( $\chi^2=15.27$ ,  $p=0.004$ ) and ( $\chi^2=23.75$ ,  $p<0.001$ ) respectively. EMTs with secondary level education were 0.27 times likely to have good knowledge in transporting COVID-19 cases compared with those with MSLC/BECE qualification [AOR=0.27 (0.12 – 0.60)  $p=0.002$ ]. EMTs who had good knowledge in occupational health risk were 4.20 times more likely to have good knowledge in transporting COVID-19 cases than those with poor knowledge [AOR=4.20 (2.41 – 7.29)  $p<0.001$ ].

**Table 4:8 Association between socio-demographic characteristics and knowledge in transporting COVID-19 cases among EMTs**

Variables	Knowledge in transporting COVID cases		$\chi^2$ (p-value)	COR (95%CI) p-value	AOR (95%CI) p-value
	Poor [N=92]	Good [N=308]			
<b>Sex</b>					
Female	46(42.9)	61(57.1)		Ref.	Ref.
Male	46(15.7)	247(84.3)	<b>32.96(&lt;0.001)</b>	4.04(2.46-6.64) <0.001	3.30(1.88-5.78)0.000
<b>Age</b>					
20-29	22(43.1)	29(56.9)		Ref.	Ref.
30-39	52(22.7)	177(77.3)		2.58(1.36-4.87)0.003	1.77(0.83-3.78)0.138
40-49	18(15.0)	102(85.0)	<b>16.02(&lt;0.001)</b>	4.29(2.03-9.07) <0.001	1.73(0.69-4.29)0.210
<b>Marital Status</b>					
Divorced	0(0.0)	8(100.0)		Ref.	Ref.
Cohabiting	6(16.7)	30(83.3)		2.17(0.81-5.76)0.119	0.77(0.24-2.40)0.654
Married	56(21.8)	201(78.2)		1.56(0.92-2.62)0.094	0.66(0.34-1.26)0.210
Single	30(30.3)	69(69.7)	6.39(0.094)	1(Omitted)	
<b>Religion</b>					
Traditionalist	0(0.0)	8(100.0)		Ref.	Ref.
Muslim	4(7.4)	50(92.6)		4.26(1.49-12.17)0.007	3.09(0.96-9.94)0.058
Christian	84(25.5)	246(74.5)	11.04(0.011)	1(Omitted)	
<b>Level of Practice</b>					
EMT Advance	4(9.8)	37(90.2)		Ref.	Ref.
EMT Basic	88(24.5)	271(75.5)	4.52(0.033)	0.33(0.11-0.96)0.042	0.58(0.18-1.84)0.358
<b>Educational level</b>					
MSLC/BECE	0(0.0)	4(100.0)		Ref.	
Secondary	61(30.7)	138(69.4)		0.31(0.15-0.64)0.001	<b>0.27(0.12-0.60)0.002</b>
Diploma	20(27.0)	54(72.9)		0.38(0.16-0.85)0.020	0.31(0.12-0.79)0.014
Degree	11(12.4)	78(87.6)			
Postgraduate	0(0.0)	8(100.0)	<b>15.27(0.004)</b>		
<b>Location</b>					
Rural Ground	30(20.6)	116(79.6)		Ref.	Ref.
Urban Ground	62(24.6)	190(75.4)	0.85(0.355)	0.79(0.48-1.29)0.356	0.60(0.34-1.06)0.083
<b>Knowledge on occupational health risk</b>					
Poor	45(40.5)	66(59.5)		Ref.	Ref.
Good	47(17.1)	227(82.9)	<b>23.75(&lt;0.001)</b>	3.29(2.01-5.38) <0.001	<b>4.20(2.41-7.29)0.000</b>
<b>Attitude towards occupational health risk</b>					
Poor	30(33.7)	59(66.3)		Ref.	Ref.
Good	62(19.9)	308(77.0)	7.41(0.006)	2.04(1.21-3.43)0.007	1.90(1.06-3.42)0.031



## CHAPTER FIVE

### 5.0 DISCUSSION

#### 5.1 Introduction

This chapter presents the discussion of the findings regarding relevant literature on the subject. The current study assessed the occupational hazards among emergency medical technicians of the national ambulance service in Ghana. Key findings of the specific objectives are discussed in these thematic areas: occupational hazards and coping strategies among emergency medical technicians (EMTs); knowledge, attitude, and perceptions of occupational health risk among EMTs; the impact of occupational health hazards exposure and compensations for EMTs; preparedness, knowledge, attitude, and health risk perceptions among EMTs in response to transporting COVID-19 cases and an association between the socio-demographic characteristics of EMTs with occupational hazards variables.

##### *5.1.1 Occupational Hazards among EMTs of the NAS, Ghana (Specific Objective 1)*

The current study assessed the occupational health hazards among Emergency Medical Technicians of the National Ambulance Service of Ghana. In this current study, most EMTs were aware of occupational health hazards issues in their work environment, and more than half had suffered from a form of occupational health hazard, mostly cuts and wounds, and stress. These findings are largely comparable to previous studies conducted by other researchers. A study among healthcare workers in Tanta University Hospitals, Egypt, reported that 63.7% of them were much aware of physical hazard safety comparable with findings of this current study (El-Sallamy *et al.*, 2018). However, the results of this study are not in agreement with a similar study in Iran among Iranian Emergency Medical Technicians, which revealed that 76% of EMTs had a low level of awareness on



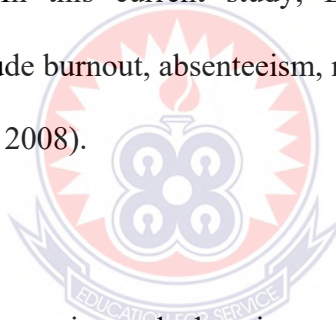
occupational hazards (Soheili *et al.*, 2016). Meanwhile, Yoon *et al.* (2016) reported workplace injuries among Korean Fire Fighters such as cuts and wounds 42.3% fairly similar to findings in this current study. The results in this study corroborate with a study conducted in Kampala that reported that 50% of emergency medical technicians experienced occupational health hazards, 39.5% biological hazards, and 31.5% non-biological hazards comparable to the results of the current study (Ndejjo, *et al.*, 2015).

### ***5.1.2 Knowledge, Attitude, and Perception of occupational health risk among EMTs of NAS (Specific Objective 2)***

This current study reported that 71.2% of EMTs had adequate knowledge on occupational health risk in agreement with an in Nigeria which reported 89% among health at health care facilities (Olufemi, *et al.*, 2016). The plausible similarities could be due to pre-placement and routine training of staff on safety practices and adequate reinforcement of staff capacity (Amosu *et al.*, 2011). This current study reported that male EMTs were 3.30 times more likely to have good knowledge on occupational risk than their female counterparts [AOR=3.30(95%CI: 1.76- 6.15);  $p<0.000$ ]. This could be attributed to the fact the male EMTs were more educated had worked in the field for many years and had gathered experiences. Meanwhile, other studies reported that more than 90% of workplace fatalities were mostly men (Bilsker, Goldenberg, & Davison, 2020), in the United States, and Australia (US Bureau of Labour Statistics, 2013). Although men were 3 times more likely to have good knowledge of occupational health risks and safety, men, in general, had the propensity to engage in more risky activities than a woman (Dola, 2011). Conversely, men are less likely than women to engage in health-seeking and health promotion behaviors (Ashley *et al.*, 2016).

The finding of this study showed that more than 77% of EMTs had a positive attitude towards occupational health risks. This could be due to the high knowledge of respondents

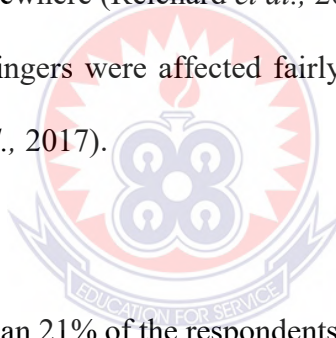
on occupational health risks and fear of contracting infections and illnesses. The finding of this study is similar to a study at the Accra Regional Hospital that reported high positive attitudes towards occupational health and safety practices among health workers (Nyame-Annan, 2017). The similarities in these studies may be due to similar socio-demographic characteristics of study participants. A study among Nigerian healthcare workers reported having 80% positive attitudes towards occupational hazards possibly motivated by fear of infections and illness and high knowledge of occupational hazards among the respondents Olufemi *et al.*, 2016. In this study, most EMTs perceived exposure to occupational health as a high risk similar to nurses in Taiwanese hospitals (Chiou *et al.*, 2013) who indicated most occupational exposures as direct contact with fluid, needle prick injury, routine night shifts, and body contact. In this current study, EMTs reported consequences of occupational hazards to include burnout, absenteeism, reduced patient satisfaction agreed with a previous study (CDC, 2008).



The WHO model of health promotion and education proposed that high knowledge would transfer to a positive attitude despite several factors that may be involved (WHO, 2012). This current study showed that EMTs' educational level and good knowledge were significantly associated with a positive attitude. These findings agree with a study that showed that the level of education influences the level of knowledge in occupational health (Tziaferi *et al.*, 2011) (Tziaferi *et al.*, 2011). This could be attributed to the fact that respondents with high knowledge had better education in agreement with (WHO, 2012). Conversely, respondents' attitude was not influenced by geographical location and level of practice.

### ***5.2.3 Impact of occupational hazards exposure, compensation, and coping strategies for Emergency Medical Technicians (Specific Objective 3)***

The risks for occupational health injuries to EMTs continue to increase. The finding of this current study indicated that 51% of the respondents ever suffered from occupational injuries, mostly affecting their health or body. This finding is similar to studies that showed that more than 75% of health workers in Ondo experienced occupational injuries (Osungbemiro *et al.*, 2016) and little over 81% in Turkey (Gülen *et al.*, 2016). In this current study, a little above half of the respondents were hospitalized due to injuries or infections of which 66.3% were admitted for at most a week comparable with a study by (Reichard *et al.*, 2017). This present study reported that most EMTs had back pain much higher than 41% reported elsewhere (Reichard *et al.*, 2017). Also in this study, more than 30% of EMTs' hands and fingers were affected fairly consistent with 23% reported in another study (Reichard *et al.*, 2017).



In this present study, more than 21% of the respondents ever benefited from medical care, and 29.2%, funeral expenses. The proportion of beneficiaries was much lower than 81.4% (Baidwan *et al.*, 2020) claims paid for medical bills while the rests were disability and death. More than 53% of EMTs used debriefing sessions as coping strategies which are fairly consistent with 89% among junior doctors using debriefing sessions for emotional and social support (Gunasingam *et al.*, 2015).

The coping strategy of EMTs in this present study is consistent with health care workers' psychological and coping responses toward emerging infectious disease outbreaks (Chew *et al.*, 2020). The study also showed that clear communication between healthcare workers 80.1% helped cope with strategy in the Covid-19 pandemic (Chew *et al.*, 2020). This

current study established that more than 83% of EMTs had direct contact exposure, needle prick, routine night shift, body contact, assault, and 76.5% exposure to radiation among the occupational health risks similar to a study among emergency medical service workers (Reichard *et al.*, 2017).

#### ***5.2.4 Preparedness, knowledge, attitude, and health risk perception among EMTs in transporting COVID-19 cases (Specific Objective 4)***

The present study has established that the preparation level for transporting Covid-19 cases among EMTs was good. This agreed with a study on pre-hospital care and inter-facility transport of Covid-19 emergency patients in Europe (Hilbert-Carius *et al.*, 2020), which had a 90% preparedness level. Over 77% of EMTs had adequate knowledge in transporting Covid-19 cases fairly consistent with 96% among emergency medical service workers in Turkey (Vatan *et al.*, 2020). Also, 82% of EMTs had good health risk perception in transporting Covid-19 cases comparable with 91% among Emergency medical services personnel on awareness and training on personal protective equipment and health risk perception in transporting during the Covid-19 cases in the U.S.A. (Cash *et al.*, 2020). In this current study, a significant association between health risk perception in transporting Covid-19 cases and knowledge of occupational health risks (see Table 4.5). This is in contrast with a study conducted among health care workers in Egypt, which revealed no correlation between health risk perception in transporting Covid-19 cases and knowledge of occupational health risks (Wahed *et al.*, 2020). The differences found in these studies could be because of the good knowledge level of occupational health risks among EMTs in this current study that possibly translated into their good health risk perception.

## CHAPTER SIX

### 6.0 SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

#### 6.1 Overview

This chapter presents a summary of the major findings of the study which assessed the occupational health hazards among Emergency Medical Technicians of the National Ambulance Service of Ghana. The chapter includes a summary of the research findings, conclusions from the results obtained, and recommendations for further studies.

#### 6.2 Summary of the Key Findings

More than half of the EMTs had experienced occupational health hazard with cuts and wounds as main biological hazard exposed to during their line of duty while stress was the main non-biological hazard experienced. However, study revealed that eight out of ten of the EMTs were aware of occupational health hazards at their workplace. Most of the respondents had adequate knowledge of occupational hazards. Nearly half of EMTs had health and safety training at work which served as their main source of knowledge. Debriefing was identified as the most adopted coping strategy among EMTs of the National Ambulance Service. This study also reveals that seven out of 10 of the EMTs who participated in the study had good knowledge and eight out of ten had a good attitude towards occupational health risks. Most respondents of the study perceived high risk of exposures to needle prick injury, body contact with infectious agents such as HBV, HVC, TB, COVID-19 and retroviral patients, radiation, assault from patients, assault from co-workers, direct contact with patient's body fluids and, routine night shift. The study also shows an association between sex, age, marital status, religion, educational level, and good knowledge on occupational health risks.

Then again, the study reveals that five out of ten of the respondents have ever suffered an injury during work as they go through their day-to-day duties. The majority of the EMTs

indicated that injuries they suffer at the workplace affect their health/body. Few of the respondents have benefited from medical care, medical bills paid for by the employer (NAS), post-exposure treatment, free vaccine at the workplace, financial compensation. Then again, few enjoyed survivor benefits, funeral expenses, and workmen compensation insurance. This study establishes that eight out of ten EMTs had received training on transporting Covid-19 cases, eight out of ten had good knowledge in transporting Covid-19 cases. Nearly half of EMT stations had recommended PPEs for transporting Covid-19 cases. Moreover, nearly half of respondents ever transported Covid-19 cases whereas most regions had dedicated ambulance for transporting Covid-19 cases. Most respondents had good knowledge in transporting Covid-19 cases. However, sex, age, educational level, and knowledge in occupational health risk of EMTs were associated with knowledge in transporting Covid-19 cases.

### **6.3 Study Limitations**

Perhaps, the most important limitation of this study was the self-reported nature of the data that was collected. This study is facility-based and only relied on a report by the participants. This may lead to reporting bias because of the possibility of socially desirable reporting behaviors. To help reduce the occurrence of this bias, participants were assured of strict confidentiality to the data collected and that their anonymity was guaranteed. Participants were also informed that the research is a purely academic exercise intended to contribute towards the improvement of the National Ambulance Service and to minimize occupational health among workers but not to indict individual shortcomings. These limitations notwithstanding did not affect the outcomes of this study and therefore the findings in this study are very relevant for National Ambulance Services and the medical emergency services.

## 6.4 Conclusion

After assessing the occupational health hazards exposure and risk perception among Emergency Medical Technicians of the National Ambulance Service of Ghana in the light of this present study result, it can be concluded that:

1. EMTs were aware of occupational health hazards in their work with cuts and wounds and stress was the most experienced among EMTs.
2. There was a high level of knowledge, good attitude, and high-risk perception. Socio-demographic characteristics (sex, marital status, religion, level of practice, and educational level) were significantly associated with EMTs knowledge and attitude towards occupational health risk.
3. EMTs who ever suffered injuries during work were associated with their body and health such as back pain of which most were admitted to the hospital for days. Compensation was low with funeral expenses been the predominant package. Debriefing was identified as the most adopted coping strategy.
4. There was good preparation in transporting Covid-19 cases because of the training of EMTs coupled with dedicated ambulance for transporting Covid-19 cases. However, availability of recommended supply of PPEs was below average and EMTs perceived transporting Covid-19 cases as high occupation health risk. Socio-demographic characteristics (sex, marital status, religion, level of practice, and educational level) were significantly associated with EMTs' knowledge in transporting COVID-19 cases.



## 6.5 Recommendations

Given the above findings, it is recommended that;

### 1. Government (Ministry of Health)

- Should give provide adequate resources to empower National Ambulance Service (NAS) to ensure continuous training on occupational health and safety drills and frequently monitor EMTs work practices.
- **National Ambulance Service Stations**
- Should include debriefing as one of the coping strategies at all the stations after attending to emergencies such as Mass Casualty Incidence (MCI) and counseling support.
- Establish occupational health and safety ambassadors and Infection Prevention Control (IPC) focal persons at the stations to help enforce health and safety, IPC to reduce injuries suffered by EMTs during work.
- Should establish policy guideline on workmen injury compensation which should be beneficial to all EMTs in the service.
- Provide adequate PPEs.
- Should focus on running training programs on occupational health and safety that will improve the competence, capacity, and performance of EMTs leading to safe and health-oriented behavior which often linked directed to specific tasks.
- Should design training programs that will focus on providing EMTs with skills and knowledge to perform their work safely and healthfully.



## 2. Future Research

- Conduct a study on causes of occupational injuries and stress suffered by EMTs.
- Conduct a study on Infection Prevention Control and Practice among EMTs.



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## APPENDICES

## APPENDIX I

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
<b>SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS</b>			
Q1	Sex	Male.....1 Female.....2	
Q2.	Age	≤ 19 .....1 20-29.....2 30-39 .....3 40-49 .....4 50 ≥.....5	
Q3.	What is your current marital status?	Married (civil, traditional, religious) .....1 Living together.....2 Divorced .....3 Widowed.....4 Single.....5	
Q4.	What is your religion?	Christian.....1 Muslim.....2 Traditional/Spiritualist .....3 No religion .....4 Other .....5	
Q5.	What is your level of Practice?	EMT-Basic .....1 SEMT-Basic.....2 PEMT-Basic.....3 Advance EMT.....4 SAEMT.....5 PAEMT.....6	
Q6.	Years of experience in EMS	3-5 years .....1 6-8 years.....2 9-11 years.....3 12-14 years.....4 15 years and above.....5	
Q7.	Educational Qualification	None.....1 MSLC / BECE.....2 GCE 'O' LEVEL/ SSSCE / WASSCE.....3 Diploma.....4 Degree.....5 Others (GCE 'A', Postgraduate.....6	
Q8.	Nature of employment	Full time.....1 Contract.....2	
Q9.	The geographical location of operation	Rural ground.....1 Urban ground.....2	
<b>SECTION B: OCCUPATIONAL HAZARDS AND COPING STRATEGIES AMONG EMTs</b>			
<b>I. OCCUPATIONAL HAZARDS</b>			
Q10.	Are you aware of occupational health hazards in your workplace?	Yes.....1 No.....2	→Q12.
Q11.	Source of your knowledge	Training on Health and Safety at work.....1 From colleagues at work.....2 Books.....3 NAS Training School.....4 Television and Radio.....5 From friends.....6 Other.....7 _____	



<b>Q12.</b>	Do you have Knowledge of occupational hazards and their categories?	Yes.....1 No.....2	
<b>Q13.</b>	Which of these occupational Hazards have you experienced before in your workplace?  <b>Multiple options-Please ticks where appropriate</b>	<b>Biological hazards</b> Sharp related injuries (such as needle sticks)..1 Cuts and wounds.....2 Direct contact with contaminated specimens/biohazardous materials.....3 Airborne diseases.....4 Infectious diseases and/or infections.....5 Others (bloodborne pathogens, vector borne diseases, and bioterrorism) .....6	
<b>Q14</b>	Which of these occupational Hazards have you experienced before in your workplace?  <b>Multiple options-Please ticks where appropriate</b>	<b>Non-biological hazards</b> Stress .....1 Physical, psychological, sexual, and/or verbal abuse .....2 Awkward body posture .....3 Slips, trips, and/or falls .....4 Exposure to Radiations.....5 Ambulance crash.....6 Noise.....7 [Others (chemical spills, burns, etc.) .....8	
<b>II. COPING STRATEGIES</b>			
<b>Q15</b>	Which of the following coping strategies do you adapt when exposed to occupational hazards at your workplace?  <b>Multiple options-Please ticks where appropriate</b>	Debriefing.....1 Exercise.....2 Talk.....3 Talk a break.....4 Relaxation.....5 Read.....6 Music.....7 Pray.....8 Reorganize.....9 Counselling.....10 Other .....11 Specified : _____	
<b>SECTION C: KNOWLEDGE, ATTITUDES, AND PERCEPTIONS OF OCCUPATIONAL HEALTH RISKS AMONG EMTs</b>			
<b>I. KNOWLEDGE</b>			
<b>Q16.</b>	Do you know of any occupational health risks in your workplace?	Yes.....1 No.....2 I don't know.....99	→ Q 17 → Q 17
<b>Q17.</b>	Source of your knowledge  <b>Multiple options-Please ticks where appropriate</b>	Training on Health and Safety at work.....1 From colleagues at work .....2 Books .....3 NAS Training School .....4 Television and Radio .....5 From friends.....6 Other .....7 Specified : _____	
<b>Q18.</b>	Have you received any form of training on occupational health risk assessment?	Yes .....1 No.....2	
<b>Q19.</b>	How will rate occupational health risk at your workplace?	Very high.....1 High.....2 Medium.....3 Low.....4 Very low.....5	
<b>Q20.</b>	What type(s) of hazard(s) preventive measure(s) do you know of in your workplace?  <b>Multiple options Please Tick where appropriate</b>	Elimination of hazardous agents.....1 Isolation of Hazardous agents or process.....2 Periodic Medical Examination .....3 Adequate ventilation .....4 Sanitizing workplace .....5	

		Use of Personal Protective Equipment .....6 Personal Hygiene .....7 Other .....8 Specified : _____	
Q21.	Occupational Hazards prevention measures will result in reducing hazards to the minimum, preventing injuries, avoiding the occurrence of hazards, and preventing occupational diseases in pre-hospital care?	Yes .....1 No.....2 I don't know.....88	
Q22.	Are occupational health and safety training and drills organized for you?	Yes.....1 No.....2 I don't know.....88	
Q23.	Do you think occupational health and safety training drills are important?	Yes.....1 No.....2 I don't know.....88	
Q24.	Which of these PPE(s) do you normally use in your workplace?  <b>Multiple options -Please tick where appropriate</b>	Hand gloves.....1 Protective goggles.....2 Face mask.....3 Apron.....4 Overall coat.....5 Gumboot.....6 Other .....7 Specified : _____	
<b>II. ATTITUDES</b>			
Q25.	Occupational health risk is an issue that should be taken seriously and given quick attention in your workplace	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q26.	Prevention of occupational hazards is a joint responsibility of the NAS management and EMTs	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q27.	Paying additional attention to occupational health risks is a needless burden on me.	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q28.	Training of staff and provision of personal protective equipment is necessary to reduce the risk of exposure to occupational hazards.	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q29.	Aprons, goggles, and face masks should be worn in procedures where splash/spill of blood is likely to occur.	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q30.	Gloves should always be worn when caring for a patient.	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q31.	Hand washing should be carried out properly before and after each contact with a patient, after body fluid exposure, before the aseptic task, and patient environment.	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
Q32.	Sharps should be disposed of in sharps' boxes	Strongly Agree.....1 Agree .....2 Uncertain.....3 Disagree .....4 Strongly disagree.....5	
<b>III. PERCEPTIONS</b>			

Q33.	Do you perceive the risk of exposure to Needle prick injury?	Yes ..... 1 No..... 2	
Q34.	Do you perceive the risk of exposure to Body contact with HBV, HVC, TB, and Retroviral patients?	Yes ..... 1 No..... 2	
Q35.	Do you perceive the risk of exposure to Exposure to radiation?	Yes ..... 1 No..... 2	
Q36.	Do you perceive the risk of exposure to assault from patients?	Yes ..... 1 No..... 2	
Q37.	Do you perceive the risk of exposure to assault from co-workers?	Yes ..... 1 No..... 2	
Q38.	Do you perceive the risk of exposure to direct contact with a patient's body fluids?	Yes ..... 1 No..... 2	
Q39.	Do you perceive the risk of exposure to routine night shifts?	Yes ..... 1 No..... 2	
<b>SECTION D: IMPACT OF OCCUPATIONAL HAZARDS EXPOSURE AND COMPENSATION FOR EMTs</b>			
<b>I. IMPACT OF OCCUPATIONAL HAZARDS EXPOSURE</b>			
Q40.	Have you ever had any injury because of your work?	Yes ..... 1 No..... 2	→ Q55
Q41.	What was the nature of your injury?  <b>Multiple options-Please ticks where appropriate</b>	Sprain/strain ..... 1 Contusions/abrasions/crushing.....2 Puncture/laceration .....3 Fracture/dislocation.....4 Back pain.....5 Other .....6 Specified : _____	
Q42.	Which part(s) of your body was injured?  <b>Multiple options-Please ticks where appropriate</b>	Trunk/neck.....1 Upper extremity (UE).....2 except hand Shoulder (part of UE) .....3 Hand, including fingers .....4 Lower extremity (LE) .....5 Knee (part of LE) .....6 Ankle (part of LE) .....7 Face/eye/mouth.....8 Head.....9 Other .....10 Specified : _____	
Q43.	Time of injury (24-hour clock)	6:00–11:59.....1 12:00–17:59 .....2 18:00–23:59 .....3 24:00–5:59 .....4 Don't remember.....88	
Q44.	Has your health or body been affected because of your injury or exposure?	Yes ..... 1 No..... 2	
Q45.	Have you been hospitalised before due to injury or infectious disease(s) acquired because of care given to a patient?	Yes ..... 1 No..... 2 Don't remember.....88	
Q46.	How long were you admitted to the hospital?	Less than one week.....1 1 to 2 weeks.....2 3 to 4 weeks.....3 5 to 6 weeks.....4 7 to 8 weeks.....5 9 to 10 weeks.....6 11 weeks and above .....7	
<b>II. COMPENSATION FOR EMTs</b>			
Q47.	Do you know of Workmen's Compensation Act 1987 (PNDC 187)?	Yes ..... 1 No..... 2	
Q48.	Source of knowledge  <b>Multiple options-Please ticks where appropriate</b>	Training on Health and Safety at work.....1 From colleagues at work .....2 Books .....3	

		NAS Training School .....4 Television and Radio .....5 From friends.....6 Other .....7 Specified :	
Q49.	Do you benefit from any coverage of medical care and sickness?	Yes ..... 1 No..... 2	
Q50.	If you become sick or injured by accident arising out, and in the course of employment and needed to pay for medical care, who would pay for your medical expenses?  <b>Multiple options-Please ticks where appropriate</b>	Me ..... 1 ..... My spouse/partner ..... 2 ..... Other family members..... 3 ..... My employer ..... 4 ..... Use government (free) services ..... 5 Health insurance ..... 6 Other ..... 7 ..... Don't know.....99	
Q51.	Did your employer pay all your medical bills?	Yes ..... 1 No..... 2 Don't remember.....99	
Q52.	Do you benefit from post-exposure treatment at your workplace?	Yes ..... 1 No..... 2	
Q53.	Do you benefit from free vaccination at your workplace?	Yes ..... 1 No..... 2	
Q54.	Do you benefit from financial compensation at your workplace?	Yes ..... 1 No..... 2	
Q55.	Do you enjoy survivor benefits?	Yes ..... 1 No..... 2	
Q56.	Do you benefit from funeral expenses?	Yes ..... 1 No..... 2	
Q57.	Does your workplace have workmen's injury compensation insurance?	Yes ..... 1 No..... 2	
<b>SECTION E: PREPAREDNESS, KNOWLEDGE, ATTITUDE AND HEALTH RISK PERCEPTION AMONG EMTs IN TRANSPORTING COVID-19 CASES.</b>			
Q58.	Have you received any form of training on COVID-19?	Yes.....1 No.....2	
Q59.	Source of your training	Yes.....1 No.....2	
Q60.	How often do you receive regular up-date on COVID-19?	Daily.....1 Once a while.....2 Never.....3	
Q61.	Do you have the recommended PPEs for transporting COVID-19 cases?	Yes.....1 No.....2	
Q62.	Do you receive enough of the recommended PPEs?	Yes.....1 No.....2	
Q63.	How regularly do you receive these recommended PPEs?	Weekly.....1 Monthly.....2 Quarterly.....3 As and when requested for.....4	
Q64.	Do you use your ambulance for transporting COVID-19 cases?	Yes.....1 No.....2	
Q65.	Do you have another ambulance for carrying COVID-19 cases aside from your normal ambulance for emergencies?	Yes.....1 No.....2 Don't know.....99	
<b>II. KNOWLEDGE ON COVID-19</b>			
Q66.	Which microorganism causes COVID-19?	Bacteria.....1	

		Fungi.....2 Virus.....3 Algae.....4 Protozoa.....5 Don't know.....99	
Q67.	What is the most common mode of transmission of COVID-19?	Airborne droplets via breathing, sneezing, or coughing.....1 Touching contaminated objects or surfaces.....2 Kissing, hugging, sex or other sexual contacts.....3 Eating of contaminated water or food.....4	
Q68.	What are the common symptoms of COVID-19?  <b>Multiple options-Please ticks where appropriate</b>	Cough.....1 Shortness of breath.....2 Sneezing.....3 Fever.....4 Sore throat.....5 Fatigue.....6 Muscle pain.....7 I don't know.....8	
Q69.	What are the common ways of preventing COVID-19?  <b>Multiple options-Please ticks where appropriate</b>	Hand hygiene.....1 Social distancing.....2 Disinfecting contaminated surfaces.....3 Closing schools and public events.....4 Fumigation of public places.....5 The hot weather of Africa.....6 Consuming gins, herbs, and African foods.....7 Taking chloroquine and antibiotics.....8	
Q70.	Do you clean and decontaminate the ambulance after each COVID-19 case transport?	Yes.....1 No.....2	
Q71.	What is the common way of cleaning and decontaminating the Ambulance?	Use of chlorine solution.....1 Covered vomitus and blood with paper towels or absorbent material.....2 All surfaces should be wiped down and washed.....3	
Q72.	Which of the recommended PPEs do you normally use for managing and transporting COVID-19 cases?  <b>Multiple options-Please ticks where appropriate</b>	Hand gloves.....1 Protective goggles.....2 Face mask.....3 Apron.....4 Overall coat.....5 Gumboot.....6 Other .....7 Specified : _____	
<b>III. HEALTH RISK PERCEPTION</b>			
Q73.	Are you worried about the COVID-19 pandemic?	Yes.....1 No.....2 Don't know.....88	
Q74.	Do you think you are likely to be directly and personally affected by the COVID-19?	Yes ..... 1 No.....2	
Q75.	Do you agree or disagree that COVID-19 will affect your co-worker?	Treatment of Exposure Site.....1 Reporting on Incidence of Exposure.....2 Identify the source person (patient) if possible & determine status.....3 Other .....4 Specified : _____	
Q76.	Do you agree or disagree that you can get the COVID-19?	Yes ..... 1 No..... 2	
Q77.	Do you think you might be transmitting the COVID-19 to your family members?	Yes ..... 1 No..... 2	
<b>END OF INTERVIEW</b>			





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7<sup>th</sup> September, 2020

The Chairman  
Committee on Human Research, Publications and Ethics  
School of Medical Sciences  
KNUST  
Kumasi

Dear Sir,

**CONSENT FOR RESEARCH: OCCUPATIONAL HAZARDS AMONG  
EMERGENCY MEDICAL TECHNICIANS OF THE NATIONAL AMBULANCE  
SERVICE, GHANA**

Mr. Joshua Amah Doku (Index Number: 7181930007) is a student at the Department of Environmental Health and Sanitation Education, University of Education, Winneba currently pursuing MPhil. degree in Environmental and Occupational Health Education. As part of the requirements for the award of the degree, he is undertaking a study on “**Occupational Hazards among Emergency Medical Technicians of the National Ambulance Service, Ghana**”.

A descriptive cross-sectional study will be employed to assess occupational hazards associated with Emergency Medical Technicians (EMTs) of the National Ambulance Service (NAS), Ghana. This study would provide empirical data on occupational health hazards and injuries among EMTs in Ghana. Also, relevant recommendations would be made to the NAS and EMT training institutions to formulate policies that would reduce possible occupational injuries associated with the work.

Your kind approval is therefore requested for the conduct of this study to fulfil this academic obligation.

Yours faithfully,

**DR. ISAAC MONNEY  
ACTING HEAD OF DEPARTMENT**



In case of a reply, the number  
And the date of this  
Letter should be quoted

My Ref. No. NAS/HRD/07/20/259

Your Ref. No.



REPUBLIC OF GHANA

NATIONAL AMBULANCE SERVICE  
MINISTRY OF HEALTH  
P.O.BOX MB 423  
ACCRA  
Tel: 0299370202

16<sup>TH</sup> JULY, 2020

**PROF. EMMANUEL DARTEY**  
**HEAD OF DEPARTMENT**  
**DEPARTMENT OF ENVIRONMENTAL HEALTH AND SANITATION EDUCATION**  
**FACULTY OF SCIENCE AND ENVIRONMENT EDUCATION**  
**UNIVERSITY OF EDUCATION, WINNEBA**

Dear Sir,

**APPROVAL TO CONDUCT DATA COLLECTION**  
**MR. JOSHUA AMARH DOKU (INDEX NUMBER: 7181930007)**


We write to inform you that, approval has been granted for Mr. Joshua Amarh Doku, an MPhil Environmental and Occupational Health Education student at the Faculty of Science and Environment Education, University of Education, to collect data for the study on Occupational Hazard among Emergency Medical Technicians (EMTs) of the National Ambulance Service in Ghana. The data collection will be done in the following regions:

1. Ashanti Region
2. Bono Region
3. Eastern Region
4. Greater Accra Region
5. Northern Region
6. Oti Region
7. Western Region



Thank you.

Yours sincerely,

  
**PROF. AHMED N. ZAKARIAH**  
**(MD, MPM, EMBA, MPHIL, FGCS)**  
**CEO**

Cc:  
Deputy Director, Operations  
Ag. Head HR & Admin  
All affected Regional Coordinators/Administrators  
Mr. Joshua Amarh Doku

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Website: [www.nas.gov.gh](http://www.nas.gov.gh)



KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY  
COLLEGE OF HEALTH SCIENCES



SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL  
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/349/20

29<sup>th</sup> September, 2020

Mr. Doku Joshua Amah  
Faculty of Science and Environment Education  
University of Education  
WINNEBA

Dear Sir,

**LETTER OF APPROVAL**

**Protocol Title:** *Occupational Hazards among Emergency Medical Technicians (EMTs) of National Ambulance Service (NAS) of Ghana.*

**Proposed Site:** *National Ambulance Service, Ghana.*

**Sponsor:** *Principal Investigator.*

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 16<sup>th</sup> July, 2020 from the National Ambulance Service (study site) indicating approval for the conduct of the study at the Institution.
- A Completed CHRPE Application Form
- Participant Information Leaflet and Consent Form
- Research Protocol
- Questionnaire

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning ~~29<sup>th</sup> September, 2020~~ **29<sup>th</sup> September, 2020** to ~~28<sup>th</sup> September, 2021~~ **28<sup>th</sup> September, 2021** renewable thereafter. The Committee may however, suspend or ~~withdraw~~ **revoke** ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publications arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

  
Rev. Prof. John Appiah-Poku  
Honorary Secretary  
FOR: CHAIRMAN

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