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COMPLIANCE WITH HEALTH AND SAFETY PROTOCOLS AMONG BUILDING CONSTRUCTION WORKERS IN THE LA DADE KOTOPON MUNICIPAL DISTRICT, ACCRA, GHANA.

BY

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DECLARATION

I, **MARK HAMMOND**, hereby declare that with the exception of references and quotations from other sources which have all been duly cited, this study on "COMPLIANCE WITH HEALTH AND SAFETY PROTOCOLS AMONG BUILDING CONSTRUCTION WORKERS IN THE LA DADE KOTOPON MUNICIPAL DISTRICT, ACCRA, GHANA." is my independent work as a student of the School of Public Health, University of Ghana, under the supervision of **DR. MAWULI DZODZOMENYO** and has not been presented or accepted in any previous application for the award of degree in any institution.

Signed ……. Date ……

MARK HAMMOND

(Student/Principal Investigator)

Signed ……. Date ……

DR. MAWULI DZODZOMENYO

(Supervisor)

DEDICATION

I dedicate this work to my father, Mr John Hammond.

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I am grateful to the Lord for the gift of life and strength to carry out this academic work.

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ABSTRACT

BACKGROUND: Though construction advances the economic fortunes of a country, it still remains a high risk industry. Compliance with safety and health guidelines has been a major challenge to employees. It is important to identify gaps in the practice of occupational safety and health standards to inform impending policy.

OBJECTIVE: The aim of the study was to determine compliance with health and safety protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana.

METHODS: This was a descriptive cross sectional study with a quantitative approach to data collection. Multistage sampling technique was used to recruit 123 respondents selected using simple random sampling procedure for this study. Two (2) building construction sites were selected by simple random sampling. Proportionate sampling was employed to determine the number of respondents who were then administered with semi-structured questionnaires by simple random sampling. An observational checklist was used to assess PPE use and compliance with safety protocols. Data was entered into Epi Info Version 7.2.2 and exported to STATA/IC 15. Simple descriptive statistics and chi square were used to analyze categorical variables and determine associations respectively. All p-values <0.05 were considered statistically significant.

RESULTS: All the respondents in this study were males. Majority (52.0%) of the participants were aged between 20-29 years with mean age of 31.85±8.37 years. The commonest reported occupational exposures were noise, dust and falling materials. Awareness of occupational safety and health (OSH) protocol guidelines among the workers was high (87.8%). Majority of the participants (62.6%) only used PPEs when necessary. A high compliance (72.4%) with OSH protocols was observed among the workers. There was a significant association between religion and compliance with OSH protocol ($\chi 2$ =7.521, p<0.001), awareness of OSH protocols and compliance with OSH protocols ($\chi 2$ =13.811, p<0.001) and PPE use and level of compliance ($\chi 2$ =9.137, p=0.028).

CONCLUSION: Physical hazards were the most common hazards identified. There was high awareness of OSH protocol guidelines. Though PPEs were generally available most workers used them only when necessary. There was a high level of compliance with OSH protocol guidelines. Further studies should focus on qualitative approaches and adequate training for workers is required.

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LIST OF ABBREVIATIONS

GDP……. Gross Domestic Product

GHS……..... Ghana Health Service

HSE……. Health and Safety Executive

ILO……. International Labour Organization

OSH……. Occupational Safety and Health

OSHA……. Occupational Safety and Health Administration

PPE……. Personal Protective Equipment

DEFINITION OF TERMS

According to the ILO Convention on Safety and Health in Construction (ILO, 1992);

(a) **Compliance** - the practice of abiding with applicable rules and standard with the intent to improve outcome and increase productivity whilst reducing the incidence of accidents.

(b) **Construction -** covers building, including excavation and the construction, structural alteration, renovation, repair, maintenance and demolition of all types of buildings or structures and the erection and dismantling of buildings and structures.

(c) **Construction site** - any site at which any of the processes or operations described in subparagraph (b) above are carried on.

(d) **Employer** - any physical or legal person who employs one or more workers on a construction site.

(e) **Hazard** - anything that has the potential of causing harm or accident

(f) **Health and Safety Protocol** - the guidelines ensuring adequate health and safety based on national and international standards.

(g) **Personal protection equipment** - anything which provides safety from hazards and accidents taking into account the work and its risks.

(h) **Worker** - any person engaged in construction.

(i) **Workplace -** all places where workers need to be or to go by reason of their work and which are under the control of an employer.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Evidently, construction remains a vital sector which is known to support economic growth hugely with an average Gross Domestic Product (GDP) of 11% in some developing nations (Giang & Sui Pheng, 2011; Isa et al., 2013). In 2014, the industry in Nigeria reported that, construction's share of total GDP stood at 3.82% hence the country was enjoying relatively strong growth (Okoye et al., 2016).

In spite of the growth being reported due to the activities from the construction industry, there are various potential hazards and high risks of accidents associated with working in construction sites (Gürcanli & Müngen, 2013; Lette et al., 2018). These hazards which could be chemical, biological, physical, ergonomic and psychosocial, present an unsafe working environment (Vitharana et al., 2015; Abunemeh et al., 2017).

The Health and Safety Executive (HSE), in its annual report advocated for safer construction sites as an intervention for the increase in construction site accidents that occured between 2017 and 2018 (HSE, 2018). Similarly, the 2016 Statistical Report by the Ministry of Employment & Labour Relations stated that construction was part of the top three industries, which recorded increased work-related disasters in Ghana. More so, many accidents go undocumented due to under reporting and fear of job loss (Ghana Statistical Service, 2016).

The International Labour Organization (ILO) approved the worldwide strategy to enhance safety practices at various workplaces (Atombo et al., 2017; Niu, 2010). This was to ensure that employers provide safer working environments for all employees. In

addition, employees were expected to comply with all safety guidelines to prevent hazards and reduce the risk of accidents.

Ghana, like many other low middle income countries, is a ratified member of the ILO hence is expected to comply with ILO guidelines to offer maximum safety at work (Annan et al., 2015). However, Ghana has failed to develop and implement a comprehensive national policy on OSH and by extension her national occupational safety and health programs (Asumeng et al., 2015). It has been reported that effective implementation and practice of OSH have been observed to account for lower accidents in construction sites owing to their effect on the employees and managers (Okoro et al., 2016). According to Laryea & Mensah (2010), aside the absence of a comprehensive legislation, ignorance about OSH protocols and standards has to a large extent complicated the issues. Moreover, Okoye et al., (2016) posited that the widespread non-compliance to OSH standards in some developing countries is attributable to the absence of a comprehensive policy. This is reflected in the report by the Ministry of Employment & Labour Relations which revealed that although several places were registered, inspection of such workplaces to ascertain working site conditions had declined drastically (Ghana Statistical Service, 2016).

Though some construction firm managers have adopted their OSH protocol, consistent with that of the ILO to regulate safety practices among workers, non-compliance still remains high hence the many accidents observed in construction sites (Windapo, 2011). Personal Protection Equipment (PPE) is another important aspect addressed by the global strategy to improve OSH which emphasizes the various strategies and practices by workers to ensure good health and safety (Izudi et al., 2017).

According to (Bahn, 2012), managers and employees need sufficient knowledge to be able to identify hazards so as to avoid accidents or work-related injuries. The deliberate disregard for safety rules by workers and employers and presence of unsafe workplaces have contributed to the many accidents experienced in construction sites (Kemei, 2016; Rahim et al., 2008). Also, inadequate PPE, scaffolding and inappropriate record keeping have been identified as potential causes of accidents in the workplace (Rahim et al., 2008; Lette et al., 2018).

This study therefore sought to assess the exposures to hazards in the construction sites and the degree of awareness of protection guidelines. The extent of availability of PPEs as provided by employers and the measure of compliance to safety standards among building construction workers were also explored.

1.2 Problem Statement

Construction, a risky industry, immensely contributes to occupational accidents and injuries as evidenced by many studies in the sector (Muema et al., 2015; Othman, 2012; Zhao et al., 2018). More importantly, it has been estimated that globally, about a third of all work-related deaths occur in construction sites (Gürcanli & Müngen, 2013).

The Occupational Safety and Health Administration (OSHA) and HSE reported an increase in construction site hazards thus advocated for safer sites and enforcement of existing policy framework on safety and health (HSE, 2018; OSHA, 2016). A study on construction projects identified high rates of accidents, fatalities and long term injuries. In that study, 48% of the study participants agreed that the increased accidents were as a consequence of non-wearing of equipment designed for personal protection whilst 30% attributed it to the lack of knowledge and awareness of rules at the workplace (Saeed, 2017).

Over the past two decades, there has been significant increase in construction in Ghana. This includes construction of roads, bridges, oil rigs and buildings. The inspectorate department in the Labour Ministry is tasked with oversight responsibility on the issues of safety and health in Ghana. Also, the Metropolitan Municipal and District Assemblies (MMDAs) and the Environmental Protection Agency have the mandate to enforce health and safety practices in their various catchment areas.

Interestingly, a comprehensive national policy to regulate activities of safety and health does not exist in Ghana. Currently, there is a bill in parliament on occupational safety and health which is yet to be passed. In spite of the absence of a national policy, some Acts and provisions in the law of Ghana borders on safety and health at workplaces. This helps to regulate activities to ensure workplace and employee safety. Similarly, some organizations and agencies such as the Ghana Health Service have developed health and safety policy for her employees.

The enforcement of these guidelines is lacking especially in the construction industry where administrative lapses remain one of the most important challenges in compliance with OSH standards (Kheni et al., 2008). Some construction sites do not use any safety and health guidelines. Even in situations where OSH standards exist, the lack of awareness by workers and proper implementation has been described as contributing factors to the high rates of accident and injuries in developing countries (Alkilani et al., 2013). Therefore, although there may be some regulatory standards, policies and sanctions regarding safety, they are hardly complied with and also, causes of accidents resulting from construction work are unclear (Asumeng et al., 2015). The 2016 Statistical Report presented by the Labour Ministry in Ghana, indicated that the building construction industry recorded 16.88% of all reported work-related accidents in 2016 (Ghana Statistical Service, 2016). In view of this, Othman (2012) stated the need for

construction firms to be proactive towards OSH guidelines implementation at work sites if lower accidents and better safety and health records are to be expected.

It is therefore essential that workplace hazards, level of awareness of OSH guidelines, PPE availability and use the extent of adherence to OSH protocols among building construction workers are identified. This could help provide new knowledge and aid in policy formulation in a quest to minimize the risk of disasters in workplaces.

1.3 Conceptual Framework

1.3.1 Narrative of Conceptual Framework

The framework of this study was adapted and developed from the fish bone concept on factors affecting the occurrence of accidents. This is because in spite of the many theories that exist, no single theory explains personal protection, hazards and compliance to OSH entirely unless a combination of all such theories relating to OSH with respect to accident occurrence. This combination of theories contains the relevant tenets pertinent to this study and therefore addresses the purpose of the study; hazards at construction sites, awareness on OSH protocol guidelines, PPE availability and use and compliance with OSH protocol guidelines.

Awareness from the framework will focus primarily on whether the building construction has knowledge on the existence of the various OSH protocols that regulate operations on the construction site. Similarly, the aspect on personal protection will gather information on all personal protection equipment and its usage, which includes protective clothing, safety boots, helmets, gloves and ear protection. The factors that influence compliance to OSH protocols were considered under socio demographic, regulating agencies, job site condition, project management, unique nature of industry and sociologic factors (Figure 1).

In conclusion, studies from other researchers have shown results on hazards, awareness, PPE use and compliance with OSH protocols. The study seeks to identify workplace hazards and factors influencing compliance to safety protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana.

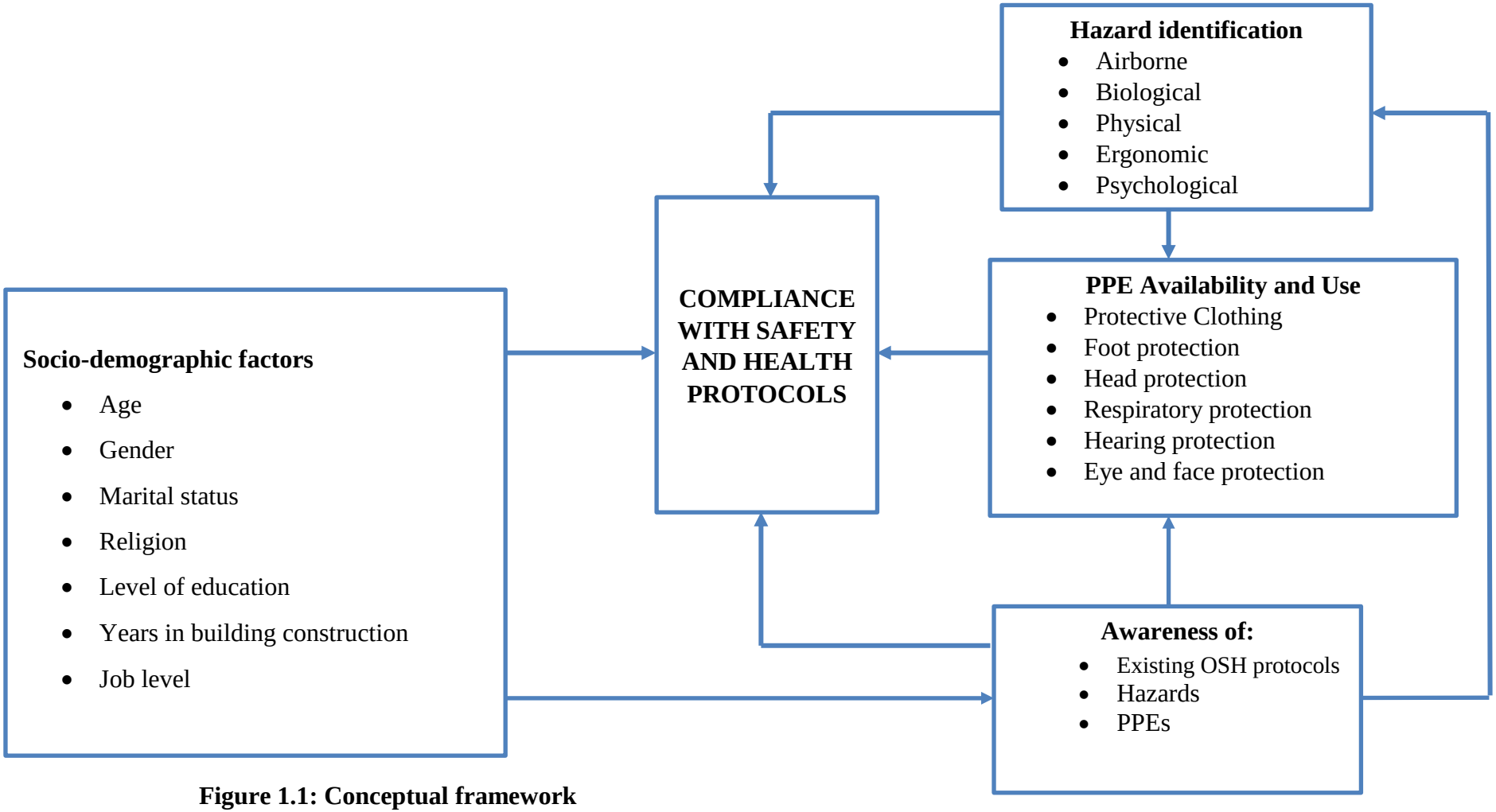

Figure 1.1: Conceptual framework

Source: Adapted from Application of Domino Theory to Justify and Prevent Accident Occurrence in Construction Sites (Sabet, Jamshidi, Aadal & Rad, 2013)

1.4 Research Questions

The research questions are:

1. What are the hazards associated with building construction sites?
2. What is the level of awareness of building construction workers on OSH protocol guidelines?
3. What is the level of availability and use of personal protection equipment among building construction workers?
4. What are the compliance levels of the building construction companies with OSH protocols?

1.5 Objectives

1.5.1 General objective

To determine the compliance to safety and health protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana.

1.5.2 Specific objectives

1. To identify hazards associated with building construction sites in the La Dade Kotopon Municipal District, Accra, Ghana.
2. To assess the level of awareness of OSH protocol guidelines among building construction workers.
3. To assess the availability and use of personal protection equipment among building construction workers.
4. To measure compliance levels of the building construction workers with OSH protocols.

1.6 Significance of the study

This study contributes to the existing studies about construction industry hazards and the extent of knowledge on guidelines among building construction workers. Personal protection equipment (PPE) availability and use among building construction workers as well as compliance to safety guidelines have also been explored.

This study ensures that policy makers get adequate and relevant information, which will be sufficient for an action to be taken in passing a comprehensive nationwide strategy on OSH. Such policy must be complete in addressing all safety issues in the sector. This can be done by providing adequate strategies for monitoring companies to conform to preventive measures. This will eventually make the workplace safe and free of potential hazards and thereby reducing accidents.

1.7 Organization of study

This work is organized in sections to enhance clarity and understanding. The introduction gives the background of this research and state the purpose for which this study was conducted. The literature review provides results on existing studies with emphasis on the building industry, hazards exposures at building construction sites, awareness of workers about OSH protocols, the availability and PPE use and compliance to OSH protocols among the workers and management. The methods that were adopted to carry out this study is recorded in the chapter 3 (methodology) whereas the results obtained after the study is presented and subsequently discussed in the next section. The conclusion and recommendation form the final parts of the study and contains the general outcome and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Previous scientific research findings that borders on occupational safety and health in various workplaces particularly building construction workplaces, have been discussed. Emphasis of discussions includes hazards in the construction industry, awareness of guidelines regulating operations in the industry, personal protection equipment in construction and compliance with OSH standards in the industry.

2.1.1 Construction industry

Construction involves building of structures, alteration, renovation, repair, maintenance and demolition of all types of buildings (ILO, 1992). By analyzing expert witness reports, Gurcancli & Mungen (2013) identified construction as one of the biggest industries due to the diverse nature of jobs in the sector.

The essence of construction with respect to its contribution to the developmental fortunes of a country cannot be underestimated. Aside structural benefits, the economic significance of the construction industry is huge. Generally, construction sector has supported the economy with about 11% of GDP in more developing countries (Giang & Sui Pheng, 2011). An overview of the industry's growth in Nigeria showed a contribution to GDP of about 3% in 2012 after a crumbling 1% the previous decade (Isa et al., 2013).

2.1.2 Characteristics of construction workers

Construction is regarded a male dominated industry with very few women. The number of women in the industry continues to be a bother to many advocates. In the quest to assess the strides made about the 11% female workforce in construction in the UK, Wright (2014) advocated the need for renewed efforts particularly collaborative partnership in addressing the issue of women minority in the industry. A cross sectional study to examine industry development for Australian women identified stress, pairing work life with family issues and the bias about the ability of women as the main challenges which prevent women from taking up construction jobs. To encourage more females, it was recommended that personal development programs and possibly flexible working schedules should be considered by construction employers for their employees who are females (Rosa et al., 2017). Similarly, in a systematic review of literature on barriers women face in construction, Amaratunga & Haigh (2006) posited that training courses and recruitment practices have been designed in a manner that supports males readily compared to females and thus provide some barriers to women in construction.

Construction work is a physically demanding industry, which tend to blend experience with physical fitness. Old age, among others, was identified by Tadesse & Israel (2016) as a vital issue that elevate the odds of occupational harms among employees. A study that explored age disparities in work fulfillment among construction workers, reported higher scores on "indifference" and poor recognition abilities among the younger workers (age<40 years) compared to the older workers who were aged more than 40 years (Chileshe & Haupt, 2010).

Good knowledge of building construction was observed in about 44% of construction workers who had an experience of ten years or more in the industry compared to about a fifth that had over six years of experience working in the industry (Ogundipe et al., 2018).

In a builders' forum in South Africa, Smallwood (2012) indicated that all religions explicitly and imply respect and preservation of human life and the environment. He further stressed the belief that work is a deed of spiritual value, which champions justice, equity, doing no harm to colleagues and sustainability of the environment. More so, Christian participants in a study indicated that they refer to the holy book though they are equally committed to human wellbeing thus the directive to show affection to all people. Strong conservation and harmony principles were observed to have stemmed from Islamic religious teachings (Hope & Jones, 2014).

2.2 Occupational hazards in the construction industry

Hazard refers to all activities of people or technology that have the tendency of causing harm to those exposed. Hazards contribute to workplace risk and comprise contaminants from the air, chemical or biological sources. Similarly, physical, ergonomic and psychosocial hazards have been identified. Exposure to threats increase risks that lower the occupational safety of workers. The presence of hazards therefore produces some likelihood to accident occurrences. For these reasons, Zhao et al. (2018) described construction as a hazardous industry with significant contribution to increased incidence of work-related injuries because of increased hazard exposures. In situations where hazards result in increased risks and harm to workers, there have been reports of adverse effects to the construction processes. Similarly, project completion time may be delayed and the quality of work may be compromised due to the impact of such hazard exposures on the construction workers (Abunemeh et al., 2017; Vitharana et al., 2015). In an investigation, which investigated the several characteristic aspects that promote occupational accident in construction, it was identified that occupational accidents occurred mostly during workers' first day at site and when construction project has

relatively low health and safety policies and implementation. Similarly, other instances that have shown to expose workers to hazards and subsequently accidents include failure by the employer to provide PPEs to workers, incorrect use of personal protection equipment, failure by workers to adopt safety practices and deliberate disregard to hazard warning signs (Cheng et al., 2010).

Vitharana et al., (2015) conducted a systematic review, which sought to identify the poor practices in different construction sites as well as the threats and risks. They argued that the likelihood of suffering a harmful effect due to hazard exposures could be minimized even if the hazard persists. One of the important factors to minimizing risks of accidents or injuries at construction sites is ability to identify the hazards and manage them appropriately.

Though many factors may lead to accidents in the industry, they may be grouped into unsafe acts by workers and unsafe environment, which increases risks. In order to prevent accidents and ensure safety among construction workers as well as the workplace, Cheng et al., (2010) advocated the need to identify the source of construction accidents whilst recommending adequate plans that reduce risk. Identification of hazards and potential sources of these hazards form the basis for risk assessment and measures to prevent accidents.

Salim et al., (2017) in a study on safety threats in construction, proposed some three stages that should be adopted to enhance worker and environment safety: identifying hazard exposures, examining the potential threat and managing the threat. Recognition of health hazards involves evaluation and techniques focusing on process inventory, walk-through occupational hygiene survey and air-sampling programs (Bahn, 2012). Keng & Razak (2014a) reiterated that inspection is the best source of directly relevant

data about health hazards hence a construction worker must be able to recognize obvious hazards, distinguish the types and initiate measures to avoid it.

According to OSHA (2016), to identify and assess hazard exposures, employees and their managers are expected to:

1. Gather and examine information on hazards at the construction site.
2. Carry out frequent reviews at construction site to recognize new threats.
3. Scrutinize incidents and shortcomings in safety practices.
4. Assemble all trends in hazards, accidents or injuries.
5. Consider the hazards that are related to uncertain situations.
6. Determine the extent and likelihood of incidents and prioritize corrective strategies based on available information.

In a cross sectional study to assess PPE use among construction workers, it was observed that one of the obvious mistakes made by employers is to assume workers to have the ability and insight to successfully identify hazards hence leaving workers prone to accidents (Izudi et al., 2017).

2.2.1 Types of hazards in construction industry

Airborne Hazards

Employees on site are on regular basis exposed to substances in the workplace with the potentially harmful ones exerting toxic effects when inhaled, absorbed through the skin or ingested. According to Safe Work Australia (2015) hazard exposures reported most by workers at construction sites were hazards in the air (69%). Among these threats in the air, dust was 66% followed by gases, vapour and fumes. Other airborne hazards include mist, aerosols, and fibres.

Biological Hazards

Such hazards occur in places where poor sanitary conditions or personal hygiene expose workers to biological agents such as fungi, viruses and bacteria. These organisms may result in serious and sudden or long-lasting conditions either through direct or indirect entry into the body (Salim et al., 2017).

Physical Hazards

Potential physical hazards in the construction industry include noise, vibrations, lightening system, extremely high temperatures and radiations. Falling objects have also been identified (Asumeng et al., 2015). About 55% respondents reported vibrations as the second most common hazard among construction workers. Of those who had vibration contacts, 58% reported hand-arm vibration whilst 19% reported whole body vibration. Similarly, 53% of the workers reported noise as the third ranked hazard in construction (Safe Work Australia, 2015).

Ergonomic Hazards

In a review of ILO's policies and activities on ergonomics with respect to occupational safety and health, carrying, pulling, pushing, lifting and poorly designed tools or work stations were identified as sources of ergonomic hazards (Niu, 2010). Work-related musculoskeletal diseases have been identified as some of the effects of ergonomic hazards on workers (Kim, 2017).

Psychological Hazards

In a study which assessed approaches to improve workplace safety, Asumeng et al. (2015) identified sources of psychological hazards to include stress related to work-life violence and conflict, anxiety, depression and sleep disorders. More so, others sources include boredom, production pressure, low pay and lack of recognition

2.2.2 Accidents in the construction industry

Various unfortunate occurrences happen at building sites. Gürcanli & Müngen (2013) following analyses of expert witness reports realized that these construction site accidents include;

Scaffold Accidents

In a study to explore the major safety provisions in construction, falls due to scaffold and scaffolds collapse were shown to have contributed to accidents in building construction sites (Benny & Jaishree, 2017).

Accident due to Slips, Trips and Falls (STFs)

A systematic review identified STFs as potential reasons that lead to accidents at site (Vitharana et al., 2015). Similarly, growing increase in occupational slips, trips and falls (STF) have been realized in the construction industry.

Ladder accident

Accidents from ladder falls were observed to have increased greatly (Benny & Jaishree, 2017). Similarly, a fall from height, beyond a metre, was most identified injury. Notwithstanding the awareness of falls, the ladder accidents persist.

Electrical accidents

Electrical works pose some danger to people in the industry, mostly influenced by electrical injuries. Some workers have suffered electrical injuries or deaths due to electrocution from direct or indirect contact with power lines (Chi et al., 2015).

2.3 Awareness on safety guidelines in the construction sector

Knowledge remains a very important tool which goes beyond giving information but also creating awareness based on gained through experience, observation or learning. It is expected of all employers to give adequate training to their workers on OSH to be able

to properly execute duties with adequate knowledge. Bahn (2012), following two hazard identification and hazard management training workshops conducted among underground mining employees in Western Australia posited that, experience does not necessarily equate to adequate and comprehensive knowledge of hazard management. In view of this, managers and employees must have sufficient knowledge to identify common hazards in the work place to carry out the required acts to successfully control the dangers involved (Bahn, 2012). More so, Albert (2013) opined that one of the reasons that injury rates remain high is due to workers' inability to properly identify and manage threats at work environments.

The development and implementation of OSH awareness programs with focus on active safety management among workers has been advocated as a sure way of helping workers to understand and identify risks and the appropriate strategies to prevent accidents (Asrafali & Gunasekaran, 2018; Kemei, 2016).

All persons are to be involved in OSH development programs. This is because when all workers adopt good working behaviours, comply with regulations and continuously improve their personal activities, health and safety management will significantly improve (Asrafali & Gunasekaran, 2018). This means that OSH protocols must be implemented and enforced as enshrined in our laws though Asumeng et al. (2015) indicated that a national guideline bordering on safety is yet to be enacted and the existing provisions have not been enforced as expected. In addition, some laws on safety are no more relevant and do not serve much purpose in the ever changing working environment hence a call to enact laws that are able to address the challenges of the 21st century have been advocated (Okoye et al., 2016). Kumar & Bansal (2016) claimed that awareness of accidents could reduce the burden due to accidents. In instances where such rules exist, regulating agencies are not effective in implementation strategies.

The employment of skilled and unskilled workers and subsequent assumption that without adequate training such employees could work devoid of any OSH education and training is another issue of concern in the construction industry (Kanchana et al., 2015). Dzeng et al., (2016) posited that promoting OSH practices among workers and advocating the use of awareness measures has the tendency to upgrade construction site safety. The application of knowledge, a worthy tool in safety management, ensures development of relevant information required to make informed choices to avoid accidents (Teizer & Cheng, 2015). Employers are therefore encouraged to acquire skills as this serves as a motivating factor for workers to emulate. Some avenues of safety knowledge acquisition include incident and accident survey and evaluation teams that ensure continuous review of strategies.

Knowledge on what constitutes unsafe acts, ability to identify hazards and take proper measures is key in ensuring that any potential work-related accidents are avoided.

In an institutional-based cross sectional study licensed construction sites, Tadesse & Israel (2016) argued that about 53.1% of the workers had no awareness about the existence of hazards.

2.4 Personal Protection Equipment in the construction industry

Ogundipe et al., (2018) assessed the aspects of effective use of personal protection equipment on site. Personal safety equipment has been identified as important tools, the use of which ensure the good wellbeing of the workers whilst ensuring a safe working environment. Similarly, greater influence towards improving safety behaviour has been identified as a result of modifying the behavior of workers (Fang et al., 2015). It has been realized that several unsafe acts occur on sites due to failure to use protective wears,

inappropriate lifting, holding or wrongful disposal of sharp materials (Ogundipe et al., 2018; OSHA, 2016).

Workers have over the years exhibited high degrees of unawareness, over-confidence, sloppiness, negligence and total disregard for protective wears which are major factors influencing OSH practices (Keng & Razak, 2014a). Similarly, other studies have unsafe conditions and improper use of PPEs (Solaja, 2014; Vitharana et al., 2015). In addition, some workers have also been identified as having shown disregard for the existence and compliance to safety measures to the extent of accepting risky jobs as a means of survival due to the high rates of unemployment (Umeokafor et al., 2014).

The use of PPE has been largely absent during training of workers hence it becomes relatively difficult for same persons to implement or comply with safety measures in mainstream work, increasing the risks to accidents (Keng & Razak, 2014b). Also, failure by employers to provide adequate personal protective equipment and in some cases failure to implement or enforce safety measures have been identified as another negligence which puts the lives of workers at risk of potential accidents (Izudi et al., 2017). Lette et al., (2018) however observed that the providing the PPE and strictly promoting its utilization could lessen work-related injuries at building sites. For this reason, Laryea & Mensah (2010) argued that a usual construction site expects workers to put on equipment meant for personal protection and such items must be provided by the employer.

A study sought to assess the reasons that control the availability and PPE use on construction sites identified that about 90% of employees comprehend the importance of PPE use and wish to be safe from any form of harm. However, about 81.1% of workers failed to use PPEs because the safety wears provided by the employer were either

oversized or undersized (Tanko & Anigbogu, 2012). Similarly, a cross sectional study by Tadesse & Israel (2016) showed that about 90% of the workers do not have periodical medical checkup and none of the study participants were found to be in PPE at work.

A cross sectional study conducted at a building construction site showed that the most common hazard exposures to workers around the study area were associated with some important factors which includes protective clothing (Salim et al., 2017).

2.5 Compliance with safety guidelines in the construction sector

Compliance with safety guidelines describe the various practices that enable an individual to adhere to the applicable rules and standards with the intent to improve outcome and increase productivity whilst reducing the incidence of accidents. It is therefore important that laws, rules and standards for operations are properly made and communicated. The people to whom such rules and standards are made must be taught and trained to understand the details and purpose of same since knowledge on such rules and standards enhance abiding by them (Asumeng et al., 2015).

Compliance to OSH rules and regulations (protocols) amongst building construction workers have been identified to be relatively low with low OSH performance as Okoye et al., (2016) opines that knowledge and compliance to OSH protocols is not sufficient to cause behavior change for improved performance. This low compliance to OSH protocols could be attributed to failure on the part of stakeholders to ensure the passage and enforcement of measures on OSH irrespective of an obvious increase in work-related accidents in construction sites which has proved costly (Asumeng et al., 2015).

Laryea & Mensah (2010) opined that some regulations in Ghana had provided procedures to enhance safety at workplaces. However, these guidelines and procedures were not

strictly forced and unfortunately some managers are unaware of their OSH responsibilities under these regulations. Similarly, monitoring agencies such as the municipal assemblies who are responsible for ensuring adherence to these OSH regulations are not adequately resourced to carry out their mandate (Laryea & Mensah, 2010). In addition, Raheem & Issa (2016) identified that weak implementation of regulations hence worker safety has not been given the necessary attention which is quite worrying considering the advocacy by the ILO on importance of providing a safer environment for the worker. High value homes and attitude of building site managers have been identified to be crucial in the compliance of workers to OSH at construction sites (Windapo, 2011).

To improve adherence to OSH at construction sites with subsequent reduction in accidents, Windapo (2011) advocated evaluation of the attitude of construction site and suggested that only managers who have relevant capabilities must be employed. A study explored non-adherence among contractors with the safety and health strategies. Forty-eight percent of the respondents attributed non-adherence with OSH procedures to negligence and carelessness of labourers whilst 24% of the labourers were not wearing their PPE. Similarly, 15% of the respondents attributed non-compliance to unskilled labour with little or no knowledge on safety procedures and 13% due to lack of supervision (Othman, 2012).

A survey research conducted in Nigeria on safety knowledge and compliance workers in the building industry revealed moderate knowledge and low adherence to OSH practices among the workers. Subsequently, workers' compliance to OSH was attributed to management's ability to implement OSH standards whilst ensuring adequate supervision (Okoye et al., 2016).

2.6 Safety management in the construction sector

The OSH practices in a working environment is not limited to only the workers but also, the managers who are expected to implement policies bothering on ensuring a safer work environment as well as the safety of all workers (Saeed, 2017). Safety management is an important procedure used to recognize OSH risks and implement actions to decrease the potential risk and consequences of work-related accidents due to hazards (Chi et al., 2015). In the quest to ensure that OSH, Niu (2010) posited management's mandate to take notice of all risks and develop appropriate strategies based on the regulations of the ILO and ensure its implementation. The deplorable nature of safety systems on construction sites in Ghana have been primarily attributed to the absence of robust regulatory body that oversees all operations as well as implementation of strategies to enhance safety of workers (Laryea & Mensah, 2010). Management must ensure good safety practices throughout the working hours till the last worker leaves the site (Keng & Razak, 2014b). Amponsah-Tawiah et al., (2016) therefore concluded that leadership with emphasis on safety is crucial in the management of OSH guidelines.

2.7 Safety regulations in the construction sector

The "The Plan of Action" of the ILO was to support member states to build on the previous policy frameworks geared towards spelling out the basic principles required by employers to generate OSH guidelines (Niu, 2010).

Also, periodical review of a national policy on OSH with full participation of all stakeholders has also been advocated as this drives the agenda towards effective implementation of strategies (Okoye et al., 2017). In a quantitative study on safety , Ahamed et al., (2008) posited that government's responsibility in safeguarding the life of workers highly depended on OSH guidelines. van Heerden et al., (2018) observed that managing hazards and adherence to safety legislation were identified as vital reasons

which motivated implementation of OSH guidelines in construction. van Heerden et al., (2018) provided indications for which organizations could reduce accidents and its associated complications by adopting strategies that identify and manage threats on site.

Though Ghana, a ratified member of the ILO, does not have a national policy on H&S and has been described by many as regrettable (Asumeng et al., 2015), there are some provisions which address some issues bordering on safety.

Labour Law, Act 651: 2003

This deals with labour and employers issues, trade unions and industrial relations as well H&S issues for industry role players and employees (GOG, 2003). Part of this Act is particularly dedicated to work health, environment and protection at workplaces.

Health and Safety Provisions In Act 651: 2003

The employer is expected to provide all the necessary equipment needed for a healthy and safe work (GOG, 2003). The employer should provide personal protection equipment such as helmet, safety spectacles, safety boots, reflective vest required for any work. The law enjoins employers to make available all the necessary information and manuals required for any work to the employee. It was however estimated that about 50% of employers fail to give adequate training on safety to their workers (Safe Work Australia, 2015). The employer has the duty to provide free training and reasonable supervision for its operations to the employee. To eliminate hazards at work to prevent accidents and injuries, employers are to put in place appropriate measures.

Factories, Offices and Shops 1970, Act 328

This addresses issues bordering on construction OSH requirement, accident, industrial diseases notifications and cleanliness (GOG, 1970). Other sections deal with personal

protection equipment (PPE), noise, weights lifting and hoisting, first aids, fire alarms, safe access to work place, machine guards and workers welfare (Tadesse & Israel, 2016). Regulations also exist for how employers must deal with confined space works and the removal of dangerous fumes from work places. All explosive substances are to be labelled as such and specially regulated to prevent accidents at the work place.

Workmen's Compensation Law 1987 (PNDCL 187)

The employer is under duty to pay all medical expenses for treating any injury suffered by a worker sustained whilst carrying out duties for which he or she was engaged or employed (GOG, 1987). Also, whilst undergoing treatment, the employer is expected to pay same amount of salary or remuneration the employee is entitled to (GOG, 1987). All written company policies must take into account the laws of the land, as these policies must be consistent with it.

In conclusion, various studies have shown results on hazards, awareness of safety guidelines, PPE use and compliance with safety guidelines. This study however sought to recognize hazards in building locations, assess the awareness of building construction workers about the existence of OSH protocols, and assess the level of availability PPEs and their use among workers. In addition, the compliance levels of the building construction workers with OSH protocols was measured.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This contains various procedures used in conducting the research are explained in this section. This includes detailed description of study design and location, study population, sampling procedure and techniques. It further includes instruments for collecting data, issues on research ethics, data processing and analysis.

3.2 Study location

Selected locations where buildings were being put up in the La Dade Kotopon Municipal District were used for the research. The Municipal District spans an area of 36.033 square kilometers (Ghana Statistical Service, 2014). It is bounded on both North and West by the Accra Metropolis, on the East by the Ledzokuku-Krowor Municipality and on the South by the Gulf of Guinea. The population of La Dade Kotopon Municipal District stood at 183,528, with males representing 47.3% whilst females represented 52.7% (Ghana Statistical Service, 2014).

The Municipality is urban (100%) with a youthful population (44.3% of population are children under 15 years). Of the total population in the Municipality, 1.5% are into skilled occupations such as forestry and fishing, 34.8% into sales and service provision, 18.8% into trade, and the rest are professionals (Ghana Statistical Service, 2014).

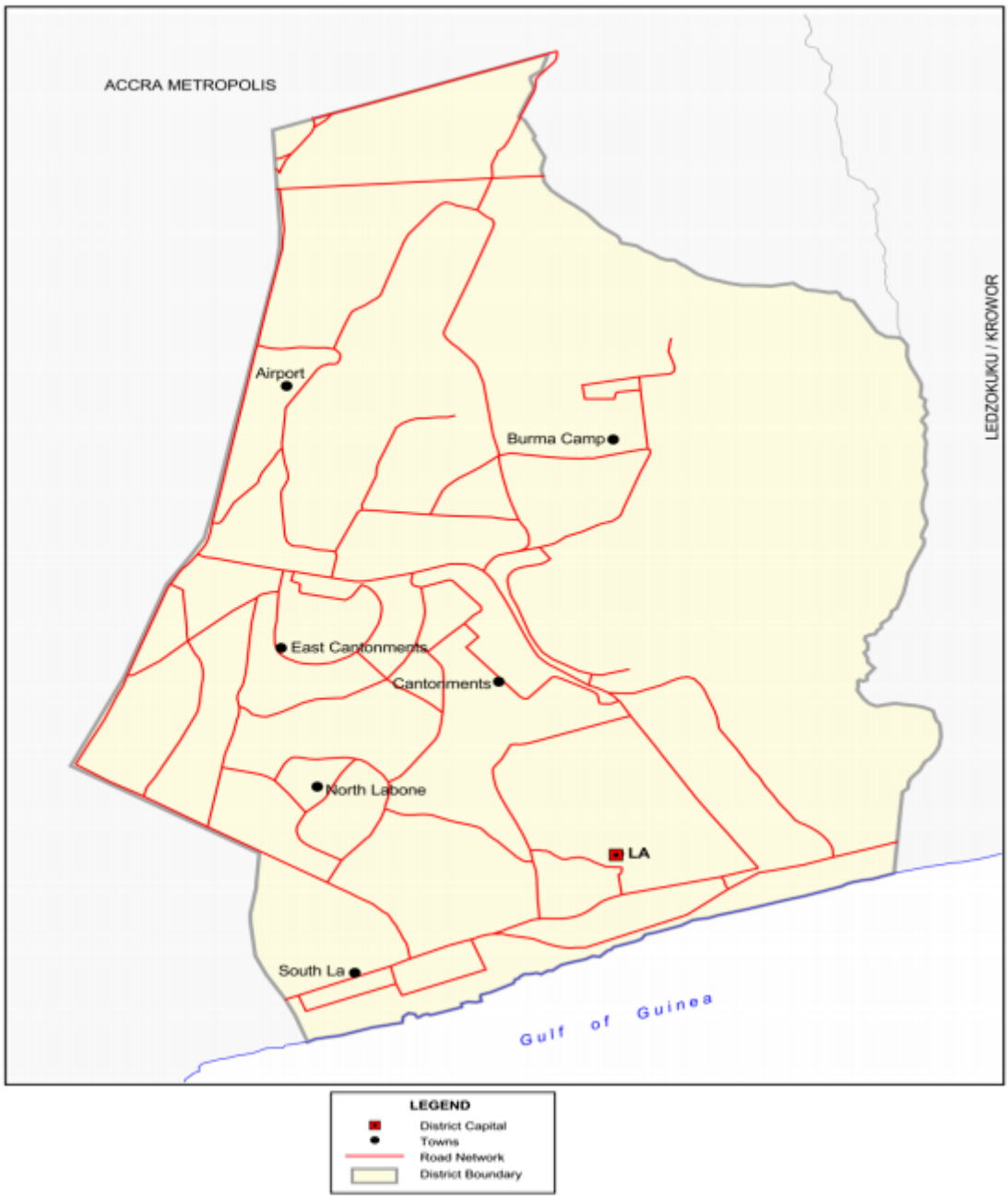

Figure 3.1: Map of La-Dade Kotopon Municipal
Source: (Ghana Statistical Service, 2014)

3.3 Study population

The study population was made up of employees and employers in selected building construction sites in La Dade Kotopon Municipal District in Accra.

3.4 Inclusion criteria and Exclusion criteria

3.4.1 Inclusion criteria

1. Employees and managers with not less than a year's experience in building construction.
2. Construction companies with occupational safety and health protocols.

3.4.2 Exclusion criteria

1. Employees and managers with less than a year working experience in selected construction sites.
2. Construction workers who were not permanent employees.

3.5 Study design

The design was a cross sectional study which used quantitative approach of gathering data. A simple descriptive survey and observation checklist was used for the quantitative measurement of variables. This method was most suitable because it allowed the exploration of employees' awareness regarding hazards, OSH guideline and PPE use.

3.6 Dependent and independent variables

3.6.1 Dependent variable

The dependent variable in this study was compliance to safety and health protocols.

3.6.2 Independent variables

These included socio-demographic characteristics, hazards, awareness on health and safety protocols, years of working experience, gender, level of education and job level or category.

3.7 Sample size calculation

A study conducted on adherence to safety in construction found that the prevalence of compliance to safety guidelines on construction sites among building construction workers was 92.3% (Windapo, 2011). In this study, one of the indicators, which was measured was the compliance with OSH protocol guidelines among building construction workers. Hence, the sample size was calculated at 95% confidence level, margin of error of 0.05, proportion of 92.3% using a formula by Cochran (1963).

Using $n = \frac{z^2pq}{e^2}$ where

- n= required sample size,
- e= margin of error = 0.05
- z = standard normal deviate for two tailed-test based on 95% confidence interval = 1.96
- p = proportion of building construction workers compliant to OSH = 0.923
- q= proportion of building construction workers non-compliant to OSH = 1- 0.923 = 0.077
- Therefore, the sample size will be calculated as follows

$$N = \frac{1.96^2 \times 0.923(1-0.923)}{0.05^2}$$

$$N = \frac{3.8416 \times 0.923 \times 0.077}{0.0025} = \frac{0.2730}{0.0025} = 109.2$$

Using a non-response rate of 10%, final estimated sample size is = 121 participants

3.8 Sampling method

This study employed the multistage sampling technique. First, a list of all building construction sites with safety and health protocols in the La Dade Kotopon were identified with help from the Municipal Assembly's files. All the identified companies with OSH protocol served as the sampling frame. Subsequently, two (2) building construction sites were selected from the sampling frame by simple balloting without replacement. Proportionate sampling was then employed to estimate the number of participants to be selected to make up 123 participants. Simple random sampling was subsequently used to choose participants who were administered with semi-structured questionnaires.

3.9 Data collection techniques and tool

The survey was done using a developed semi-structured questionnaire, which was given out to all respondents. An observational checklist was employed to assess employees' compliance to health and safety protocols following a thorough walk through in each of the two construction sites.

3.10 Data collection

Three research assistants under the supervision of the principal investigator did data collection. The two main data collection techniques used for data collection were a semi-structured questionnaire and an observational checklist.

3.10.1 Quantitative approach

For the quantitative approach, a developed semi-structured questionnaire was used to collect information on hazards; awareness on OSH among building construction workers, availability and use of PPEs.

The questionnaire was made up of five areas. The first section had the socio-demographic characteristics of the respondents, the second part has questions on hazards associated with building construction sites and the third section was made up of awareness of building construction workers about the existence of OSH protocol guidelines. The fourth and fifth sections has questions on availability and use of PPEs and compliance with OSH protocols respectively. To assess awareness of OSH protocols, the ILO safety guidelines on construction was used with some modifications. Key sections were extracted and modified to obtain appropriate questions. The fourth section contained questions on the availability and use of PPEs among building construction workers. A separate section was made up of compliance and from the perspective of the building construction workers. In situations where a participant did not understand English, the research assistants translated the questions into the appropriate local dialect of the participant. (See appendix III for the questionnaire).

An observational checklist was used to gather information on compliance to OSH protocols. Hazards at workplace, availability of PPEs and its usage as well as compliance with OSH protocol guidelines among the building construction workers were identified using an observational checklist. (See appendix IV for the observational checklist).

3.11 Data quality control

To ensure data quality, data collection tools used were validated via pre-testing. This pre-testing was done at a building construction site, which had not been selected for the actual data collection. The pre-testing helped to review the questions to ensure that the variables under study were properly measured. Similarly, prior to data collection, research assistants were given adequate training. This was to ensure that, research assistants familiarize themselves with data collection tools and procedures. It was also done to

avoid misinterpretation and allow for modification and/or clarification of ambiguous questions.

3.12 Data analysis

3.12.1 Quantitative Analysis

Data was entered into Epi Info Version 7.2.2 and exported to STATA/IC 15 for analysis. Prior to data analysis, the data was cleaned and validated to ensure data quality and consistency. Simple descriptive statistics were done for categorical variables such as religion, marital status, educational level, job title and job level as well as continuous variable such as age and years of experience in building construction. This was also done for both the dependent and independent variables. All questions relating to awareness of OSH protocols by the workers were given scores. A twelve item based questions relating to knowledge base of the workers were combined to generate a minimum and maximum scores of 0 and 12 respectively. A score less than 6 was classified as low awareness, 6-10 was classified as moderate awareness whiles a score of 11 and above was classified as high awareness.

Similarly, the 10 questions rating participants' level of compliance with safety and health protocols had a 1-5 likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. All the likert questions were combined and the mean scores obtained. The 10 questions were combined to generate a total minimum and maximum score of 0 and 50 respectively. The mean 30 was used as a cut off for low and high compliance. The scores were then categorized into low and high levels of compliance with OSH protocols.

The list of PPEs and other protective equipment were represented in a table and duly described. All p-values <0.05 were considered statistically significant.

3.13 Ethical considerations

Permission to carry out the research was obtained from the Ghana Health Service Ethics Review Committee (GHS-ERC). In addition, written consent was sought from all respondents after explaining the benefits and risks involved in participation. Permission was also sought from the Municipal Assembly where the research was conducted. The study, following approval from GHS-ERC, provided a participant information sheet (PIS) to each eligible respondent and Informed Consent Form (ICF) for all data collection tools.

Detailed ethical issues in the study such as benefits, risks, confidentiality and privacy, data storage and usage, conflict of interest were included in the PIS and ICFs in the appendix section. Ethical issues were adequately explained to participants including the minimal risk in taking part in the study. Only participants who consented to participate in the study were used. The data collected was solely done for academic purposes and collected data was kept under lock and key, with only the principal investigator having access. In order to ensure anonymity, eligible employees were identified with codes and numbers instead of their actual names during and after the data collection. (See appendix I for the PIS and appendix II for the ICF).

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This chapter reports the analysis of data collected from the field. This study sought to identify hazards associated with building construction sites in Greater Accra Region. It also assessed the level of awareness of building construction workers about OSH protocols. Availability and use of PPEs among these workers and their compliance with OSH protocols was assessed.

4.2 Demographic characteristics

A total of 123 building construction workers were interviewed. The average age of the participants was 31.85±8.37 years. About half, 52% (64/123), of the participants were between age group 20-29 years. Approximately 34.2% (42/123) were between age group 30-39 and 9.8% (12/123) were between age group 40-49. Only 2.4% (3/123) were aged 60-69 years. All, 100% (123/123), the participants were males and lived in urban communities in Greater Accra Region. A little more than half, 51.2% (63/123), of the participants were single, 48% (59/123) were married and 0.8% (1/123) co-habiting. Majority of the participants, 94.3% (116/123), were Christians. Less than half of the participants, 47.2% (58/123), had no child at the time of the study whiles 17.9% (22/123) had one child. Only 10.6% (13/123) had 4 and more children. At the time of the study, less than half, 47.2% (58/123), attained Senior High level of education. Only 4.8% (6/123) had no formal education. Payment of medical bills was mainly through self-payment in about 66.7% (82/123) of the participants, 26% (33/123) paid through the institution and 6.5% (8/123) through NHIS. Less than half, 40.7% (50/123), had less than 5 years in building construction. Only 3.2% (4/123) had 20 years and above of experience

in building construction. Majority of the participants, 91.1% (112/123), interviewed were lower-level-skilled workers. Only 0.8% (1/123) was a higher level-construction officer. Almost all the participants, 98.4% (121/123), had less than 5 years working at site and about 62.6% (77/123) earn less than GHC 1000 per month whiles 1.6% (2/123) earn more than GHC 2000 as shown in Table 4.1.

Table 4.1: Background characteristics of building construction workers

Variable	Frequency N=[123]	Percentage (%)
Age (in years)		
20-29	64	52.0
30-39	42	34.2
40-49	12	9.8
50-59	2	1.6
60-69	3	2.4
Mean(SD)	31.85(±8.37)	
Sex		
Male	123	100
Female	0	0
Residence		
Urban	123	100
Rural	0	0
Marital status		
Co-habiting	1	0.8
Married	59	48.0
Single	63	51.2
Number of children		
None	58	47.2
1	22	17.9
2	19	15.5
3	11	8.9
4 and above	13	10.6
Level of education		
No education	6	4.8
Primary	1	0.8
Junior High	29	31.7
Senior High	58	47.2
Tertiary	19	15.5
Payment of Medical Bills		
The Institution	33	26.8
NHIS	8	6.5
Self-payment	82	66.7
Years in Building Construction (years)		
< 5	50	40.7
5-9	43	34.9
10-14	18	14.6
15-19	8	6.5
20 and above	4	3.2

Table 4.1 Background characteristics of building construction workers (continuation)

Variable	Frequency N=[123]	Percentage (%)
Job Level		
Lower level-skilled worker	112	91.1
Middle-level construction manager	10	8.1
Higher level-construction officer	1	0.8
Others		
Years working at site		
< 5	121	98.4
≥ 5	2	1.6
Monthly income (GHC)		
<1000	77	62.6
1000-2000	44	35.8
>2000	2	1.6
Religion		
Christian	116	94.3
Muslim	7	5.7

4.3 Hazards associated with building construction sites in Greater Accra Region

Figure 4.1 below, shows hazards associated with building construction sites. Physical hazards were the most common type of hazards in the construction sites. About 99.2% (122/123) of the participants reported that the major exposures at their construction sites were dust and noise pollution. Similarly, 89.4% (110/123) of the participants reported falling materials as amongst the major exposures to hazards whiles 84.6% (104/123) reported on stress. The least reported hazard exposures were smoke by 16.3% (20/123), heat by 15.5% (19/123) and hazardous chemicals by 10.6% (13/123) participants. Also, 8.9% (11/123) participants reported fire and wet floors as exposures whiles and 1.6% (2/123) reported on work-related violence.

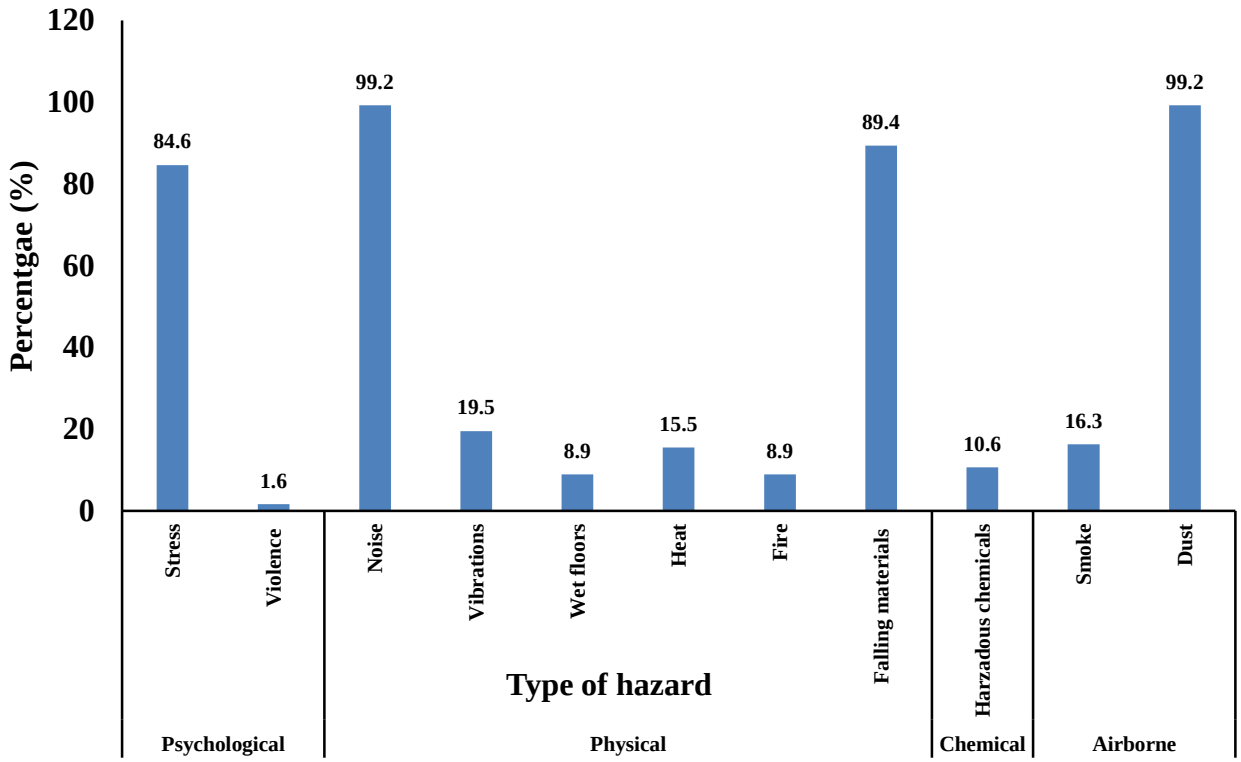

Figure 4.1: Hazards associated with building construction sites

4.4 Awareness of building construction workers on OSH protocols

Table 4.2, depicts awareness of building construction workers on OSH protocol guidelines. All the participants were aware of OSH management policies available at their workplace. Approximately 98.4% (121/123) of the participants were aware of OSH policy at their workplace whiles 99.2% (122) were aware of protocol on PPE. None of the participants was aware of sanitation and waste management protocols. Approximately 99.2% (122/123), 100% (123/123) and 61.8% (76/123) of the participants were aware of the availability of ventilation, lightening and safety monitoring protocols respectively. About 74.8% (92/123) of respondents were aware of the availability of safety guidelines, 98.4% (121/123) on awareness of first aid protocol, 99.2% (122/123) were aware of warning/emergency/evacuation protocols and all the workers were aware of safety plan before start of projects. Majority of the participants, 95.1% (117/123) were aware of availability of fire protocols and 99.2% (122/123) were aware of the availability

of signs around working environment. Only 8.1% (10/123) of participants were aware of the availability of electrical protocol.

Table 4. 2: Awareness of OSH protocol guidelines

	YES		NO	
Awareness	n	%	n	%
OSH management policy available at your workplace	123	100	0	0
Awareness of employee OSH policy	121	98.4	2	1.6
Awareness on Personnel Protective Equipment protocol	122	99.2	1	0.8
Awareness on Sanitation and Waste Management protocol	123	100	0	0
Awareness on Ventilation protocol	122	99.2	1	0.8
Awareness on Lightening (illumination) protocol	123	100	0	0
Awareness on Safety Monitoring protocol	76	61.8	47	38.2
Awareness on Safety brief guideline	92	74.8	31	25.2
Safety brief before the commencement of any day work	75	60.9	48	39.0
Awareness on Equipment and Material labelling protocol	70	56.9	53	43.1
Knowledge on Safety Training and Education protocol	122	99.2	1	0.8
Knowledge on First Aid protocol	121	98.4	2	1.6
Knowledge on Warning/Emergency/Evacuation protocol	122	99.2	1	0.8
Health and safety plan before start of construction projects	123	100	0	0
Knowledge on Fire protocol	117	95.1	6	4.9
Fire extinguisher at your area of work	123	100	0	0
Trained to use fire extinguisher	93	75.6	30	24.4
Safety labels or warning signs around the working environment	122	99.2	1	0.8
Knowledge on Electricity protocol	10	8.1	113	91.9

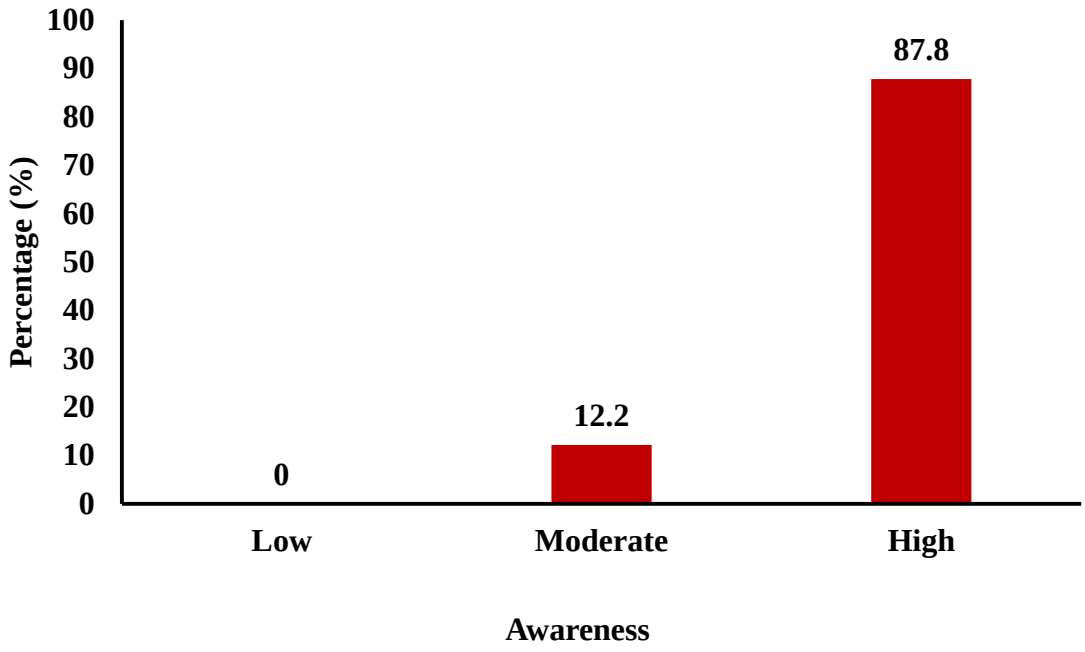

Figure 4.2: Overall awareness of OSH protocol guidelines

Figure 4.2 above, shows the overall awareness of building construction workers on the OSH protocol guidelines. Majority (87.8%) of the participants was aware of the availability of OSH protocol and 12.2% were moderately aware of the availability of OSH.

4.5 Availability and Use of PPE among building construction workers

From Figure 4.3, boots, helmet and reflector vest were the most available PPE at the building construction sites according to the respondents. The least available PPE were protective clothing (15.5%), nose mask (11.4%), safety belt (0.8%), hand gloves (16.3%), goggles (22.8%) and ear plugs (0.8%).

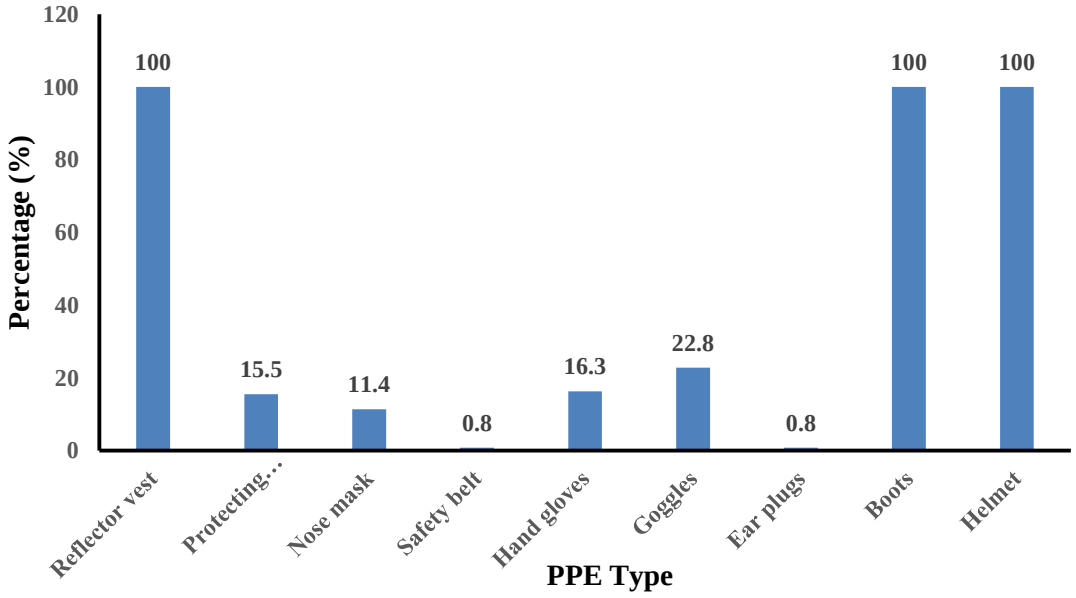

Figure 4.3: PPE availability among building construction workers

Table 4.3: Availability of protective equipment

	Construction site A	Construction site B
Fire Prevention		
Number of Fire extinguisher available	7	4
Number of fully charged fire extinguishers	5	3
Scaffold		
Availability of scaffolding	Yes	Yes
Availability of Smoke areas	No	No
Availability of Emergency contacts	Yes	Yes
Availability of Functional exit doors	Yes	No
Availability of Fire evacuation guideline	Yes	Yes
Foot Protection		
Availability of Safety boots	Yes	Yes
Availability of Caution on safety boot signs	No	No
Hearing Protection		
Availability Ear plugs	Yes	Yes
Availability of caution on noise areas	Yes	No
Head protection		
Availability of Helmet	Yes	Yes
Face/Eye/Nose protection		
Availability of face shield	No	No
Respiratory Protection		
Availability of mask	Yes	Yes
Body Protection		
Availability of clothing	Yes	Yes
Availability of filters	Yes	Yes
PPE use by construction workers		
Helmet	Yes	Yes
Boots	Yes	Yes
Reflector vest	Yes	Yes

Table 4.3 shows results of the availability of protective equipment at the construction sites based on an observational checklist. There was a total of 11 fire extinguishers of which 72.72% (8/11) were fully charged. Scaffolding, emergency contacts and fire evacuation guidelines were available. Personal protection equipment (PPE) available included foot protection (boots), hearing protection (ear plugs) and head protection (helmet). Similarly, protective clothing and respirators were available. It was observed that all workers were in helmet, boots and reflector vests.

In Figure 4.4, most of the participants (62.6%) only use PPE when necessary, 30.9% use PPE only when reminded, 4.1% use them occasionally. Only 2.4% use PPE always (Figure 4.4)

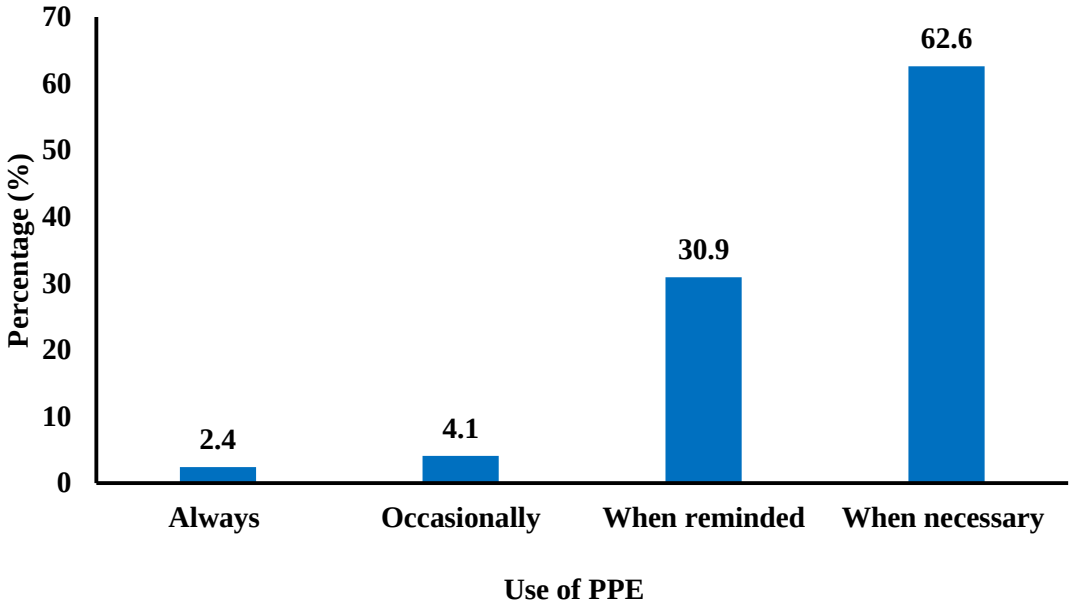

Figure 4.4: Overall PPE use among building construction workers

4.6 Compliance with OSH protocols among building construction workers

Table 4.3 shows the mean score of compliance to OSH elements among building construction workers. The highest mean score was the use of PPE all the time (4.41), availability for safety and health trainings (4.04) and proper handling of tools at workplace (4.08). The mean score for reporting hazard at workplace was 3.39 always follow available SOP at workplace (3.82). The least mean scores were not aware why to follow rules (1.65), periodic medical check-up (1.68) and no need to follow rules to get the job done (1.74).

Table 4.4: Mean score of compliance with OSH protocols at building construction companies

Compliance	Mean score
I sometimes do not know why I have to follow the rules	1.65
I put on PPEs all the time	4.41
I am always available for safety and health trainings	4.04
I report hazards at the workplace	3.29
I always go medical check-ups at least once a year	1.68
I always follow available SOP at workplace	3.82
Some rules make the job less efficient for me	2.08
Some rules do not need to be followed to get the job done safely	1.74
I properly handle waste according to rules	4.12
I properly handle the tools I use at work	4.08
Mean Score	**30.97**

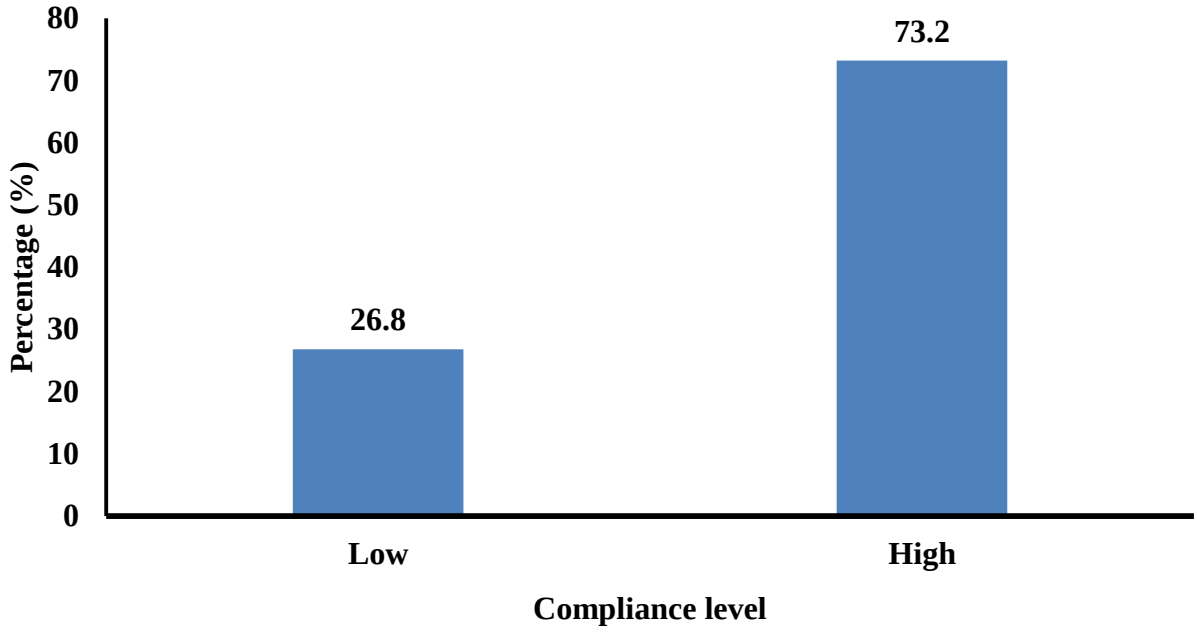

Figure 4. 5: Compliance with OSH protocols among building construction workers

The overall compliance with OSH protocol was high (73.2%) among building construction workers in this study compared to 26.8% who do not comply with OHS protocols (Figure 4.5)

4.7 Association between other variables and compliance with OSH protocols among workers

Table 4. 5: Association between some demographics and compliance to OSH protocols

Variable	Low Compliance N=[33]	High Compliance N=[90]	Chi-square	p-Value
Age (in years)				
20-29	16 (48.5)	48 (53.3)		
30-39	11 (33.3)	31 (34.4)		
40-49	4 (12.1)	8 (8.9)		
50-59	0 (0.0)	2 (2.2)		
60-69	2 (6.1)	1 (1.1)	3.53	0.473
Marital status				
Co-habiting	0 (0.0)	1 (1.1)		
Married	14 (42.4)	45 (50.0)		
Single	19 (57.6)	44 (48.9)	1.011	0.603
Number of children				
No child	18 (54.6)	40 (44.4)		
1	6 (18.2)	16 (17.8)		
2	4 (12.1)	15 (16.7)		
3	3 (9.1)	8 (8.9)		
4 and above	2 (6.1)	11 (12.2)	1.716	0.788
Level of education				
No education	2 (6.1)	4 (4.4)		
Primary	0 (0)	1 (1.1)		
Junior High	11 (33.3)	28 (31.1)		
Senior High	15 (45.5)	43 (47.8)		
Tertiary	5 (15.2)	14 (15.6)	0.564	0.967
Payment of Medical Bills				
The Institution	9 (27.3)	24 (26.7)		
NHIS	3 (9.1)	5 (5.6)		
Self	21 (63.6)	61 (67.8)	0.529	0.767
Years in Building Construction (years)				
< 5	14 (42.4)	36 (40.0)		
5-9	13 (39.4)	30 (33.3)		
10-14	3 (9.1)	15 (16.7)		
15-19	1 (3.0)	7 (7.8)		
20 and above	2 (6.1)	2 (2.2)	3.166	0.530

Table 4.5 Association between some demographics and compliance to OSH protocols (continuation)

Variable	Low Compliance N=[33]	High Compliance N=[90]	Chi-square	p-Value
Job Level				
Lower level-skilled worker	32 (97.0)	80 (88.9)		
Middle-level construction manager	1 (3.0)	9 (10.0)		
Higher level-construction officer	0 (0.0)	1 (1.1)	1.982	0.371
Others				
Years working at site				
< 5	33 (100.0)	88 (97.8)		
≥ 5	0 (0)	2 (2.2)	0.745	0.388
Monthly income (GHC)				
<1000	21 (63.6)	56 (62.2)		
1000-2000	12 (36.4)	32 (35.6)		
>2000	0 (0.0)	2 (2.2)	0.745	0.689
Religion				
Christian	28 (84.8)	88 (97.8)		
Muslim	5 (15.2)	2 (2.2)	7.521	0.006
Awareness of OSH protocol guidelines				
Moderate	10 (30.3)	5 (5.6)		
High	23 (69.7)	85 (94.4)	13.811	<0.001
Availability of PPE				
Yes	22 (66,7)	58 (64.4)		
No	11 (33.3)	32 (35.6)	0.122	0.342
PPE use				
Always	1 (3.0)	2 (2.2)		
Occasionally	4 (12.1)	1 (1.1)		
When reminded	12 (36.4)	26 (28.9)		
When necessary	16 (48.5)	61 (67.8)	9.137	0.028

Table 4.5 presents association between background characteristics and compliance to OSH protocols. There was a significant association between religion and compliance to OSH protocol ($\chi 2$ =7.521, p<0.001, α=0.05) and awareness of OSH protocols and compliance to OSH protocols ($\chi 2$ =13.811, p<0.001, α=0.05). There was also an association between PPE use and level of compliance ($\chi 2$ =9.137, p=0.028, α=0.05). There was however no significant association between age, marital status, number of

children, level of education, payment of medical bills, years in building construction, job level, years of working at site, monthly income and compliance to OSH protocols.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

The purpose of the current study was to measure the compliance levels of the building construction workers with OSH protocols. In addition, the study sought to identify the hazards associated with building construction sites, assess the level of awareness of building construction workers about the existence of OSH protocols and assess the level of availability and use of personal protection equipment among building construction workers.

5.2 Characteristics of construction workers

The study found the mean age of participants to be 31.85±8.37 years with about half of the participants between age group 20-29 years. Only a few respondents were aged 60-69 years, which indicates that due to the physically demanding nature of construction, a more youthful, and energetic age group is required. However, a blend of experience with physical fitness is preferred as indicated by (Tadesse & Israel, 2016). This was done to reduce the risk of occupational injuries among construction workers. Furthermore, a blend of the young and old helps the younger workers to take work more serious and develop appropriate skills on the job. This is because, in a study on the effect of age on the job satisfaction of construction workers, the younger workers were found to be indifferent and lacked recognition abilities compared to the older workers who were above 40 years (Chileshe & Haupt, 2010).

All 123 the participants from the study were males and lives in urban communities in Greater Accra Region. This corresponds with a study by Rosa et al., (2017) which reiterated the male dominance in the construction industry. A systematic review

identified some barriers women face in construction hence their underrepresentation in the industry (Amaratunga & Haigh, 2006). A study by Rosa and her colleagues (2017) identified some of these barriers to include but not limited to stress, balancing family-work life and bad perceptions. Similarly, Wright (2014) advocated the need for renewed efforts to address these challenges of women in construction.

At the time of the study, less than half attained Senior High level of education. This corresponds to a study by Teizer & Cheng (2015).which indicated that application of knowledge is a worthy tool in safety management and required to make informed choices to avoid accidents. Almost all the participants had less than 5 years working at site. Contrary to these findings, Ogundipe et al. (2018) indicated that good knowledge of building construction was observed in construction workers who had had more than ten years of working experience in the construction industry compared to less years of working experience. This is because spending more years at the site and undergoing training regularly enhances the hazard identification and risk management ability of workers. The more experienced therefore tend to have less injuries compared to the less experienced for same reasons.

There was a significant association between religion and compliance to OSH protocol guidelines. This is supported by Smallwood (2012) at a builders' forum in South Africa where he indicated the link between religion and OSH guidelines. He reiterated the explicit and implied nature of religions in promoting respect and preservation of human life and the environment. A study by Hope & Jones (2014) corresponds with this finding after observing strong conservation and harmony principles stemming from Islamic religious teachings.

5.3 Hazards associated with building construction sites

This study identified that construction workers encounter many hazard exposures at building construction sites. Major hazards identified were falling materials, dust and noise pollution. Least available hazards were smoke, fire, heat, violence and wet floors. These findings are consistent with other studies which indicated that hazard exposures reported most by workers at construction sites are physical hazards (Safe Work Australia, 2015). Findings from our current study also showed high reports of work-related stress (psychological hazard). Stress has not been widely reported as hazard in construction sites probably due to admission that the jobs in the construction industry are relatively demanding. However, the increased occupational exposures to major hazards such as dust, noise and falling objects could have contributed to the stress experienced by workers (Safe Work Australia, 2015). In order to ensure safety of workers in such hazardous industry, Cheng et al. (2010) advocated the need to identify the root causes of construction accidents whilst proposing adequate risk mitigation strategies. Similarly, Vitharana et al., (2015) advocated the importance of developing the capacity to readily identify the hazards and manage them appropriately.

5.4 Awareness of OSH protocol guidelines

From this study, there was a high overall awareness on the availability of OSH protocols. An institutional-based cross sectional study argued that about half of the workers had no awareness about the existence of occupational safety and health hazards and practices at the sites (Tadesse & Israel, 2016). This level of awareness in literature was low compared to that from the current study. All the participants were aware of OSH management policies available at their workplace. Majority were aware of employee OSH policy at their workplace whiles almost all were aware of protocol on PPE. The high awareness

level on OSH protocols was due to the well-coordinated orientation programs conducted for all workers prior to the start of any project. These findings also coincide with a study by Dzeng et al., (2016) who posited that promoting OSH practices among workers and advocating awareness has the tendency to upgrade construction site safety.

Approximately 99.2%, 100% and 61.8% were aware of the availability of ventilation, lightening and safety monitoring protocols respectively. About 99.2% of the respondents were aware of warning/emergency/evacuation protocols and all the workers were aware of health and safety plan before start of construction projects. These findings coincide with previous works which advocated creating awareness by providing adequate training (Kanchana et al., 2015; Kemei, 2016).

Findings from this study indicated that there was a significant association between awareness of OSH protocol guidelines and compliance to OSH protocols. This corroborates findings from Dzeng et al., (2016) who posited that promoting OSH practices among workers and implementing awareness strategies have the tendency to upgrade construction site safety due to increased compliance among workers.

Therefore, findings from this study indicate that awareness translates into compliance with OSH protocol guidelines among building construction workers.

5.5 Availability and Use of personal protection equipment

Though many personal protection equipment (PPE) were available, the most common PPE at building construction sites were boots, helmet and reflector vest as evidenced in Table 4.3. Similarly, the least available PPE were safety belt and earplugs. Findings from this study is corroborated by a study conducted by Izudi et al. (2017) which indicated the failure by employers to provide adequate personal protective equipment. In some cases,

failure to implement or enforce safety measures have been identified as factors which increase the risk of potential accidents on construction site.

From this current study, most of the participants only used PPEs when necessary, whilst few participants used PPEs them occasionally. Very few used PPEs always. These findings endorse findings from a study by Tanko & Anigbogu (2012), where 90% of workers understood the importance of PPE use but about 81.1% of workers failed to use PPEs because the safety wears provided by the employer were either oversized or undersized. Keng & Razak (2014a) also identified that ignorance, negligence, carelessness; over-confidence and disregard for proper use of safety wears are major factors influencing OSH practices in the construction industry.

There was also an association between PPE use and level of compliance, which indicated that PPE use was a vital factor in ensuring compliance at workplaces. This finding is reinforced by Lette et al. (2018) who observed that the provision PPE and strictly promoting its utilization could lessen work-related injuries at building sites through compliance.

5.6 Compliance with OSH protocols

Overall compliance to OSH protocol was high among building construction workers in this study compared to those who did not comply with OSH protocols. In spite of the high overall compliance with OSH protocols, some non-compliance was observed. This non-compliance could be attributed to negligence, carelessness of labourers, unskilled labour, little or no knowledge on safety procedures and lack of supervision as evidenced by the findings from the cross sectional study in South Africa (Othman, 2012).

To this end, the study has found physical hazards as the most common type of exposures at building construction sites. Awareness on OSH protocol guidelines among building construction workers was high and workers used PPEs only when they felt it was necessary. A significant association exists between religion, awareness on OSH guidelines, PPE use and compliance.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study identified the hazards associated with building construction sites, level of awareness of workers on OSH protocol guidelines and the availability and use of personal protective equipment among building construction workers and further assessed the level of compliance with OSH protocols among the workers. A total of 123 participants were involved the study

The most reported occupational exposures at building construction sites were dust, noise and falling objects whereas the least reported was violence-related hazard. Physical hazards contributed to most exposures on site.

The overall awareness of OSH protocol guidelines was high though some exhibited moderate awareness. Also, there was a significant association between awareness of OSH protocols and compliance with OSH protocols.

All types of PPE were available and the most common were helmet, reflector vest and safety boots. Majority used PPEs only when necessary. A statistical significance existed between awareness and PPE use and compliance with OSH protocol guidelines

The building construction workers exhibited a high overall compliance with OSH protocol guidelines.

6.2 Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. The training programs of employees must focus on hazard identification and accident risks, particularly physical hazards.
2. Employers must enhance the promotion of OSH practices among workers and advocate for its awareness since this has the tendency to upgrade construction site safety
3. Employers should intensify training and supervision of PPEs usage among employees. Employers must however supply PPEs in their right sizes to encourage its usage.
4. Respiratory filters and masks, ear plugs and helmets must be made readily available always to offer adequate protection from dust, noise and falling objects respectively at construction sites.
5. In order to maintain high compliance with OSH guidelines, only managers who have relevant capabilities must be employed because such managers ensure adequate implementation and compliance with standard guidelines.
6. Further studies should focus on the qualitative approaches to assess factors influencing compliance with safety protocols among construction workers.

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APPENDICES

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

APPENDIX I: PARTICIPANTS INFORMATION SHEET FOR BUILDING CONSTRUCTION WORKERS

Study title: Compliance to health and safety protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana

Introduction

I, Mark Hammond, MPH student of the University of Ghana (School of Public Health) conducting a study on afore-mentioned study title. I can be contacted on postal box 3103, Mamprobi, Accra. My phone number is **0240477318** and my email is **mhammond006@st.ug.edu.gh**

Background of study

Construction remains a very important industry that contributes greatly to the economic development of a country but has high risks of accidents. In order to prevent these accidents, the International Labour Organization provides occupational safety and health (OSH) standards regulate operations on construction sites. This study wishes to investigate the compliance to health and safety protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana

Purpose of study

The study will assess hazards in building construction, level of awareness of the existence of health and safety protocols, of availability and use of personal protection equipment among building construction workers and compliance with OSH protocols.

Nature of research

This will be a descriptive cross sectional study with a mixed method approach to data collection. Information from two (2) building construction sites will be collected using a semi-structured questionnaire and observational checklist. The study wishes to identify hazards associated with building construction sites, awareness of building construction workers on OSH protocol existence and the level of availability and use of personal protection equipment among building construction workers. The level of compliance

with OSH protocols will also be measured. A list of all building construction sites using OSH protocols will be identified and two (2) selected by simple random sampling. Respondents will be selected using proportionate sampling and simple random sampling. An observational checklist will be used to identify workplace hazards and personal protection equipment (PPE) use among the employees. A total of **121 building construction workers** at the la Dade Kotopon Municipal Assembly in Accra, Ghana, will be involved in this study.

Participants' involvement:

- **Duration/what is involved:** If you decide to take part in the study, you will be required to answer a set of semi-structured questions concerning the study. It will take at least 20 – 30 minutes of your time and will be administered to you by a trained data collector/interviewer.
- **Potential Risks**: Apart from the time you will spend during the interview the study will cause you minimal risk or harm.
- **Benefits:** Participating in this study is an opportunity for you to contribute to identifying some health and safety practices among building construction workers. It will also provide you with the opportunity to make some workplace hazards in the workplace known.
- **Costs:** No cost will be borne by the participant and any costs incurred will be paid by the principal investigator.
- **Compensation:** You will be duly acknowledged in the final thesis for your participation, cooperation and contribution.
- **Confidentiality:** All the information collected about you during the study will be treated confidentially. Your name will not be needed or used for the final data analysis. All information collected as well as materials used to collect data will be kept under lock and key for ten years.
- **Voluntary participation/withdrawal:** You will not be forced to take part in this study or pay any amount of money to be part of the study. Participation is voluntarily and you can withdraw at any stage without any penalty.
- **Feedback to participant**: Findings from this study will be made known to participants through their managers in the form of leaflets which will contain the findings.
- **Funding information**: This study is only being carried out for academic purposes and will be funded by the researcher.
- **Sharing of participants Information/Data:** Data generated from this study is for academic purposes and will be owned solely by the principal investigator. The

data will not be shared unless with consent from the Ghana Health Service Ethical Review Committee.

- **Questions:** You are at liberty to ask any question about the study as well as seek clarifications on any issue during administration of the questionnaire.

For further information or clarification on ethical issues in this study, contact:

1. Mark Hammond (Principal Investigator): 0240477318
2. Hannah Frimpong (Administrative Secretary ERC): 0507041223

APPENDIX II: CONSENT FORM FOR BUILDING CONSTRUCTION WORKERS

Study title: Compliance to health and safety protocols among building construction workers in the La Dade Kotopon Municipal District, Accra, Ghana

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language (English □/ Ga □/ Twi □) I understand. I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

I agree for my voice to be recorded (please tick response) YES □ NO □ N/A □

Name or Initials of Participant…… ID Code ……

Participants' Signature ……..... OR Thumbprint……

Date: _____/_____/2019

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore-named participant to the best of my ability in the language (English □/Ga □/ Twi □) to his proper understanding.

All questions, appropriate clarifications sort by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter……

Signature of Interpreter…….. OR Thumbprint…….

Date: _____/_____/2019

Contact Details

STATEMENT OF WITNESS (where applicable)

I was present when the purpose and contents of the Participant Information Sheet was read and explained all questions satisfactorily to the participant in the language (English □/ Ga □/ Twi □) he/she understood

I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name……

Signature……. OR Thumb Print ……..**....**

Date: _____/_____/2019

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study.

All questions and clarifications raised by the participant have been addressed.

Researcher's name……

Signature ……

Date: _____/_____/2019

THANK YOU

UNIVERSITY OF GHANA

SCHOOL OF PUBLIC HEALTH

Title: "Compliance to health and safety protocols among building construction workers in the La Dade Kotopon municipal district, Accra, Ghana"

APPENDIX III: QUESTIONNAIRE FOR BUILDING CONSTRUCTION WORKERS

Questionnaire Code:	
Date of interview:	
Name of Construction site:	

A. DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Serial No.	Questions	Response Option
100	How old are you?	[----------]
101	Sex	[1] Male [2] Female
102	Residence	[1] Urban [2] Rural
103	Are you married?	[1] Married [2] Single [3] Divorced [4] Widowed [5] Co-habiting [6] Other ……
104	How many children do you have?	[----------]
105	What is your highest level of education?	[0] None [1] Primary [2] JHS [3] SHS [4] Tertiary [5] Others ----------
106	How do you pay your medical bills?	Self NHIS The institution

		Other
107	How many years have you been working in the building construction industry?	……
108	What is your job level in this construction site?	[1] Lower level-skilled worker [2] Middle-level manager [3] Higher level officer [4] Others ----------
109	How many years have you been working at this site?	……
110	How much do you averagely make in a month?	……
111	What is your religion?	[1] Christianity [2] Islam [3] African Traditional Religion [4] Other.....
B. HAZARDS IN BUILDING CONSTRUCTION		
112	Have you come into contact with any of these hazards?	[1] Falling materials [2] Smoke [3] Fire [4] Heat [5] Hazardous chemicals [6] Violence [7] Wet floors [8] Dust [9] Vibrations [10] Noise [11] Stress [12] Depression [13] Lifting heavy objects [14] Poorly designed tools [15] Poorly designed work station. [16] Poor sanitation [17] Poor waste disposal system [18]Others……
113	Among these hazards, which ones are the most common?	……..
114	How did you get to know of the occupational hazards associated with your work?	[1] Co-worker [2] Media [3] Relative [4] Magazines [5] Health centre [6]Others ……

C. AWARENESS ABOUT EXISTENCE OF HEALTH AND SAFETY PROTOCOLS		
115	What do you understand by occupational health and safety?	…… …… …… ……
116	Is there an Occupational Health and Safety Management policy available at your workplace?	[1] Yes [2] No
117	Do workers know about this policy?	[1] Yes [2] No
118	Do you know about the existence of Personnel Protective Equipment protocol at this workplace?	[1] Yes [2] No
119	Do you know about the existence of Sanitation and Waste Management protocol at this workplace?	[1] Yes [2] No
120	Do you know about the existence of Ventilation protocol at this workplace?	[1] Yes [2] No
121	Do you know about the existence of Lightening (illumination) protocol at this workplace?	[1] Yes [2] No
122	Do you know about the existence of Safety Monitoring protocol at this workplace?	[1] Yes [2] No
123	Do you know about the existence of Safety brief guideline at this workplace?	[1] Yes [2] No
124	Is there always a safety brief before the commencement of any day work	[1] Yes [2] No
125	Do you know about the existence of Equipment and Material labelling protocol at this workplace?	[1] Yes [2] No
126	Do you know about the existence of Safety Training and Education protocol at this workplace?	[1] Yes [2] No
127	Do you know about the existence of First Aid protocol at this workplace?	[1] Yes [2] No
128	Do you know of the existence of Warning/Emergency/Evacuation protocol at this workplace?	[1] Yes [2] No
129	Is there always health and safety plan before start of construction projects	[1] Yes [2] No
130	Do you know about the existence of Fire protocol at this workplace?	[1] Yes [2] No
131	Is there a fire extinguisher at your area of work	[1] Yes [2] No
132	Have you been trained to use it.?	[1] Yes [2] No
133	Are safety labels or warning signs found around the working environment?	[1] Yes [2] No

134	Do you know about the existence of Electricity protocol at this workplace?	[1] Yes [2] No
D. AVAILABILITY AND USE OF PERSONAL PROTECTION EQUIPMENT		
135	Do you know of hazard preventive measures in your line of duty in this construction site?	[1] Yes [2] No
136	If yes, What types of preventive measures do you know of in this factory?	[1] Elimination of hazardous agents [2] Isolation of Hazardous agents or process [3] Periodic Medical Examination [4] Adequate ventilation [5] Adequate illumination [6] Appropriate warning systems [7] Sanitizing work place [8] Use of Personal Protective Equipment [9] Personal Hygiene [10] Others ……
137	Do you comply with the safety measures of your work?	[1] Yes [2] No
138	If yes, why?	…… …… …… …… ……
139	If no, why?	…… …… …… …… …… ……
140	Do you use PPEs in your line of duty?	[1] Yes [2] No
141	If Yes, why?	…… …… …… …… …… ……

142	If No, why?	…… …… …… …… ……
143	Were you trained on PPEs?	[1] Yes [2] No
144	Are these PPEs readily available for your use?	[1] Yes [2] No
145	If yes, name the ones available?	…… …… …… …… …… ……
146	If yes, how often do you use these PPEs?	[1] Always [2] Occasionally [3] When Reminded [4] When I feel it's necessary [5] Other ……
147	Are you trained periodically on health and safety protocols?	[1] Yes [2] No
148	If no, why?	…… …… …… ……
149	Do you often report of unsafe acts and conditions to your supervisors?	[1] Yes [2] No
150	If yes, why?	…… …… …… ……
151	Have any unsafe acts been investigated?	[1] Yes [2] No
152	If yes, were sanctions/preventive measures taken?	[1] Yes [2] No
153	If no, why?	…… …… ……
154	Is your work guided by Standard Operating Procedures?	[1] Yes [2] No
155	If yes, do you follow them?	[1] Yes [2] No
156	If no, why?	[1] Not compulsory [2] Not Effective [3] Cumbersome

		[4]Other ……
157	Have you suffered any accident or injury in your workplace since you were employed?	[1] Yes [2] No
158	If yes, how many times have you sustained an injury(s)?	…… ……
159	Did you report this accident to the appropriate authorities?	[1] Yes [2] No
160	If yes, what actions were taken to prevent the occurrence of the same accident or injury in the future?	…… …… …… …… ……

E. COMPLIANCE WITH HEALTH AND SAFETY PROTOCOLS

Statement	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I sometimes do not know why I have to follow the rules					
I put on PPEs all the time					
I am always available for safety and health trainings					
I report hazards at the workplace					
I always go medical check-ups at least once a year					
I always follow available SOP at workplace?					
Some rules make the job less efficient for me					
Some rules do not need to be followed to get the job done safely					
I properly handle waste according to rules					
I properly handle the tools I use at work					
Additional Comments:					

F. FACTORS INFLUENCING COMPLIANCE					
Company safety policies					
Lack of safety initiatives					
Lack of effective communication					
Inadequate safety mangers					
Insurance policies					
Training on PPEs					
Safety auditing					
Regulatory body (OSH representative)					
Effective project supervision/inspection					
Additional Comments:					
Thank You					

UNIVERSITY OF GHANA

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COMPLIANCE TO HEALTH AND SAFETY PROTOCOLS AMONG BUILDING CONSTRUCTION WORKERS IN THE LA DADE KOTOPON MUNICIPAL DISTRICT, ACCRA, GHANA

Date: …. /……/…….

Name of construction site: …….

APPENDIX IV: OBSERVATIONAL CHECKLIST FOR BUILDING CONSTRUCTION WORKERS

	Total number of workers		**Total**		
	Male				
	Female				
PERSONAL PROTECTIVE EQUIPMENT					
	Fire Prevention		**Yes**	**No**	**Short notes**
	Availability of fire extinguishers	**Total =[ ]**			
	Fully charged fire extinguishers	**Total =[ ]**			
	Availability of precautions in explosive atmospheres				
A	Safe explosive chemical usage and storage				
	Availability of smoke areas				
	Availability of emergency contact number(s)				
	Fire exit functional doors (with sign)				
	Fire evacuation guideline				
B	**Foot protection**				
	Safety shoes				
	Availability of caution on safety shoes signs				
	Availability of Hearing protection				
C	Availability of ear pads				
	Availability of caution on noise areas				
	Availability of helmet				
D	**Face and Eye protection**				
	Availability of scaffolding				
	Availability of goggles				
E	**Availability of Respiratory protection**				
	Availability of masks				
	Availability of filters				
	Availability of proper ventilation systems				
F	**Availability of Machine Hazards**				
	Workers are trained on the use of power tools.				
	Workers have appropriate PPEs				
	Workers are trained prior to using nail guns				
G	**Availability of Electrical hazards**				

	Work on electrical circuits or energized equipment is begun only after all power sources have been identified, de-energized and locked out or tagged out.			
	Overhead and underground electrical power lines are located, identified, and avoided.			
	Ladders, scaffolds, equipment or materials more than 10 feet from any electrical power lines			
H	**General**			
	Floors: clean, dry, free from debris, clutter and trip hazards			
	Signs are posted when floors are wet (e.g., when floors are washed, spills)			
	Stairs and landings kept clear and unobstructed			
	Routes, signs and doors clearly marked; exit signs easy to see; outside entrances and parking lots are clear			
	Walkways and parking lots are free from snow, ice, water, grease			
	Washrooms are clean			
	Washing facility available			
	Hazardous substances are properly labelled, stored and disposed			
	Safety measures are in place for anyone working alone			
	Are there any notices or signs visible that state that workers should wash their hands?			

OBSERVE PPES CURRENTLY BEING USED BY WORKERS		
	Names of PPE observed being used	**Total PPEs observed**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
12		
13		
14		
15		
Comments/Remarks