

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA, LEGON**

**ASSESSMENT OF KNOWLEDGE AND USE OF PERSONAL PROTECTIVE
EQUIPMENT ON SITE AMONG BUILDING CONSTRUCTION WORKERS**

The background of the page features a large, faint watermark of the University of Ghana crest. The crest is a shield-shaped emblem with a light blue background and yellow/gold symbols. At the top, there are three stylized leaves or branches. Below them is a horizontal line. Underneath the line is a central decorative element consisting of a cross with curved ends and two circular motifs at the bottom. The text of the dissertation is overlaid on this watermark.

BY

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE
AWARD OF MASTER OF SCIENCE OCCUPATIONAL HYGIENE DEGREE**

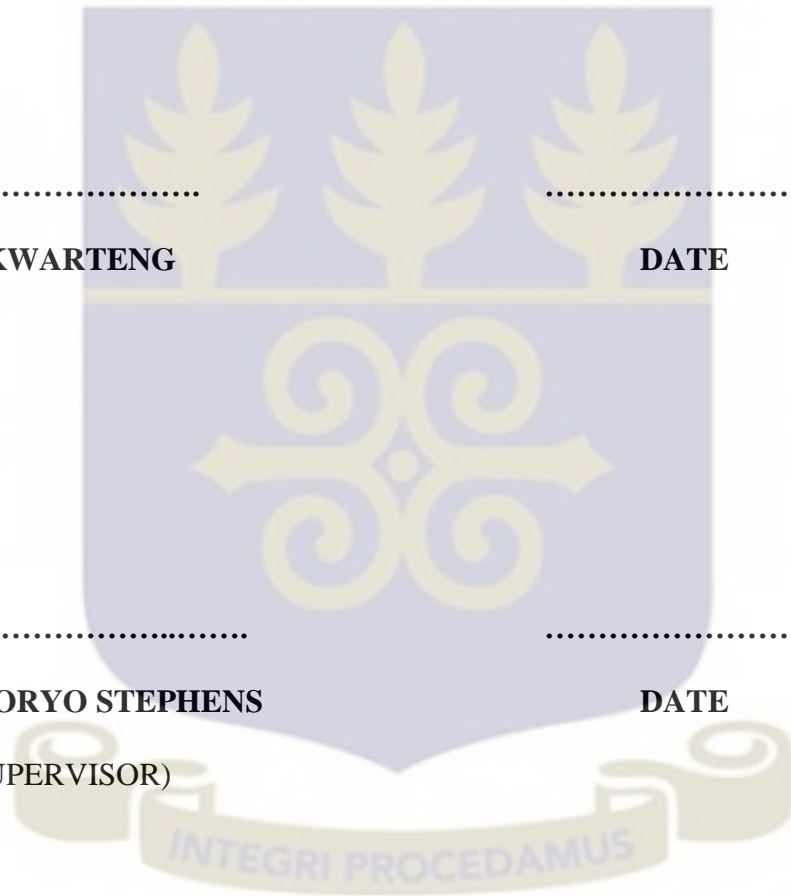
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DECLARATION

I, ALEX NSIAH KWARTENG hereby declare that apart from references to other people's works which have been duly acknowledged, this research is a result of my own independent work. I further declare that this dissertation has not been submitted for the award of any degree in this institution or other universities elsewhere.

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DEDICATION

I dedicate this work to my father, Mr. Richard Nsiah Kwarteng and the rest of the family for their love, motivation, support and encouragement they gave me throughout my education.



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I am most grateful to the God Almighty for his strength and protection to carry out this study.

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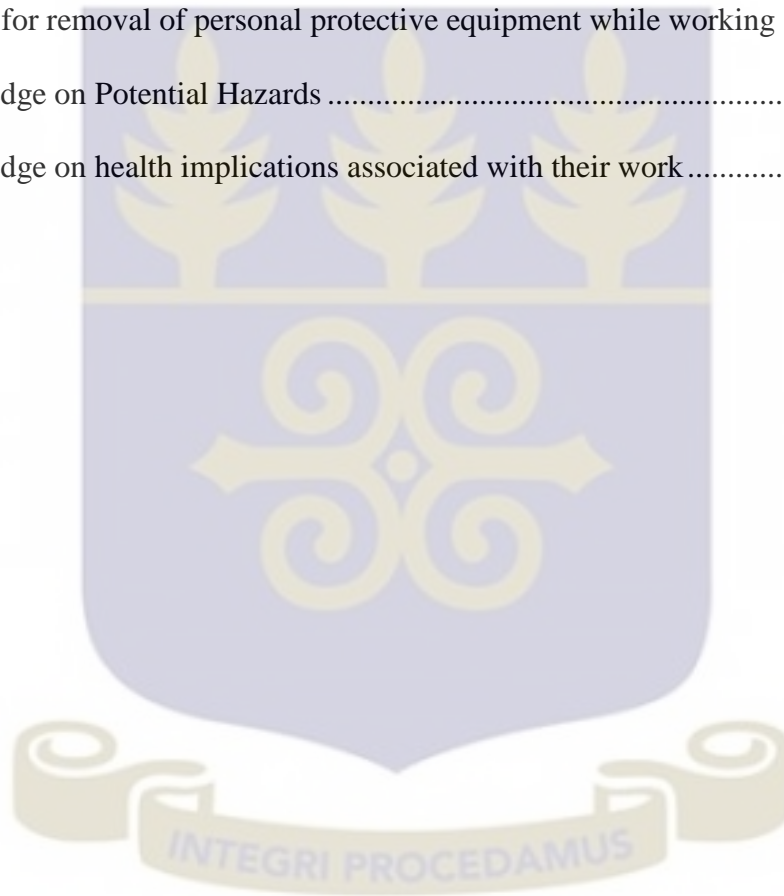
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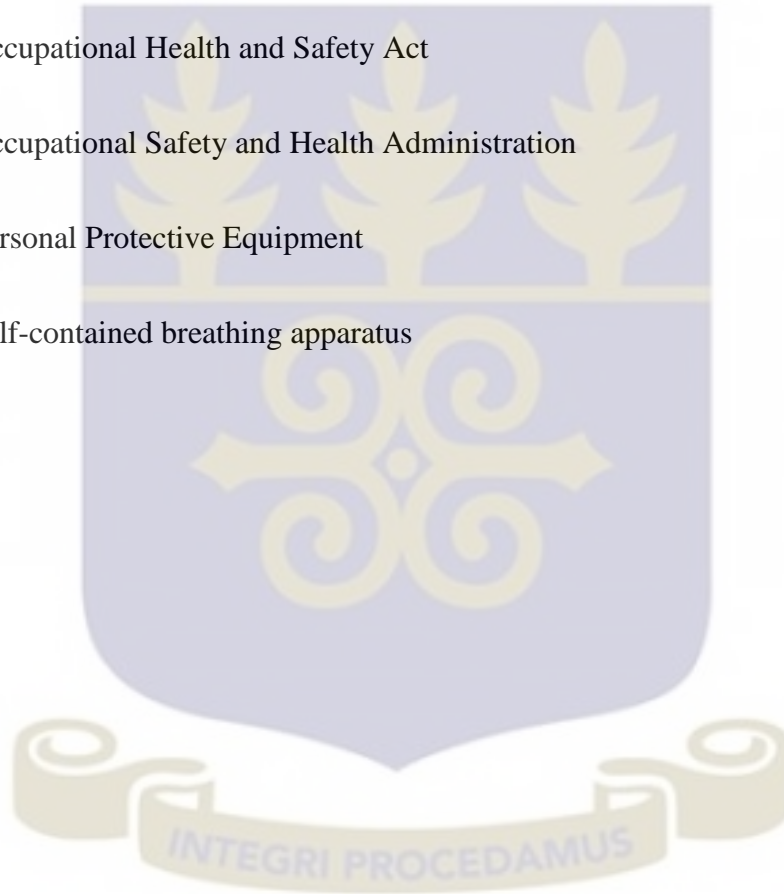
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LIST OF ABBREVIATIONS

COIDA	Compensation on Injuries and Disease Act
ILO	International Labour Organization
LEV	Local exhaust ventilation
NIOSH	National Institute for Occupational Safety and Health
OHSA	Occupational Health and Safety Act
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SCBA	Self-contained breathing apparatus



DEFINITION OF TERMS

Personal Protective Equipment

Personal Protective Equipment (PPE) is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal Protective Equipment includes face shields, safety glasses, hard hats, safety shoes, coveralls, gloves, ear protection, vests and respirators. (OSHA, 2009).

Employee

An employee is a person who has entered into or works under a contract of service, apprenticeship or learnership with an employer; whether the contract is expressed or implied, oral or in writing and whether the remuneration is calculated by time or by work done. (Compensation on Injuries and Disease Act (COIDA, 1993). For this study, an employee is a person who is working on the ongoing project at the construction site.

Employer

Employer refers to any person, including the state, who employs an employee; including any person controlling the business of an employer. (COIDA, 1993).

Compliance

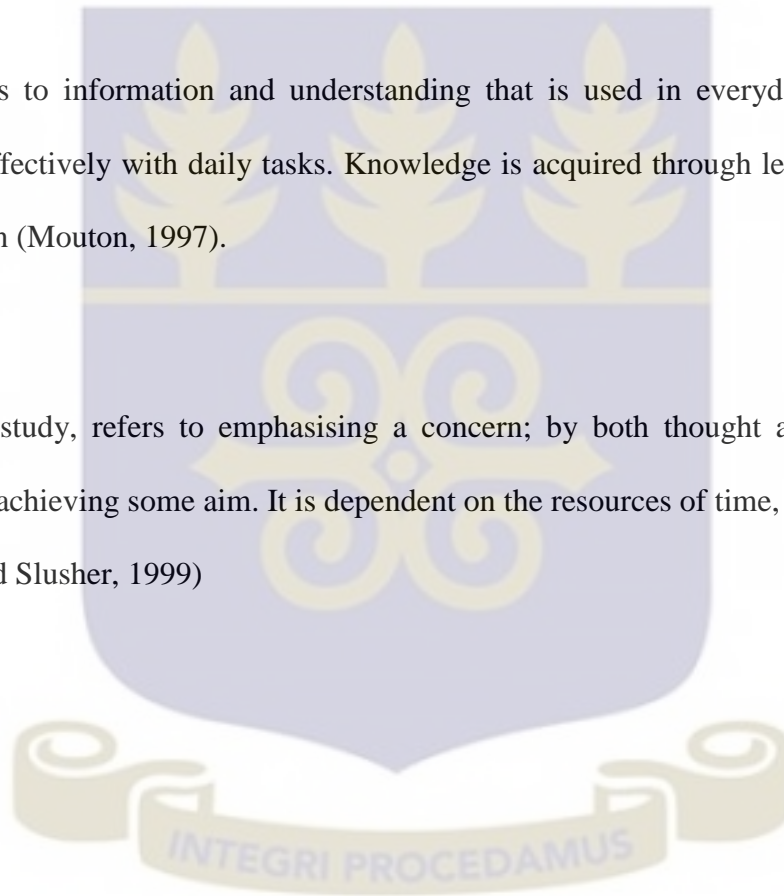
Compliance refers to the behaviour of someone who is willing to do what other people want or who is willing to accept the opinion of other people ((Farooqui, 2007). In this study, compliance refers to an employee who is willing to do what he is asked to do, like wearing and using PPE.

Knowledge

Knowledge refers to information and understanding that is used in everyday life; it enables people to cope effectively with daily tasks. Knowledge is acquired through learning, experience and self-reflection (Mouton, 1997).

Practice

Practice, in this study, refers to emphasising a concern; by both thought and action; that is directed towards achieving some aim. It is dependent on the resources of time, skills and material goods (Lesser and Slusher, 1999)



ABSTRACT

Background: Recent improvements in safety performance have taken place as a result of combination of efforts of engineers, owners, contractors, subcontractors, and designers.

Data from the (OSHA), shows that about two-thirds of workers, on average, constantly wear the correct (PPE) while the other third are at risk of injuries.

Objective: The main aim of this study was to assess workers' knowledge level and use of on-site preventive equipment usage.

Methods: A questionnaire was used to gather information on the ongoing Civil Aviation Academy, Shopping Mall and Hotel projects. Knowledge was assessed by the use of a simple questionnaire and scored. An assessment of the use of PPE's on the site was also conducted. This included availability and appropriateness of types of PPE, condition of use and acceptability by the workers. 150 respondents were sampled.

Results: Majority (67.1%) of those interviewed had full knowledge on PPE and usage while (24.3%) had minimal knowledge. All the respondents use the available PPE on site. Although majority (78.6%) kept their PPE throughout work process, few (21.4%) removed their PPE while working. The major reasons why workers removed their PPE were uncomfortable (8.6%), poor fit of PPE (5.7%), inadequate training on appropriate use (5%) and reduction in productivity (2.1%). The most recognized potential hazard identified was falls (45.5%), others mentioned manual material handling (29.9%) and dust inhalation (6.7%). Majority (77.9%) claimed that injuries were the most common health implications associated with their work if workers do not use the appropriate PPE while (12.1%) and (10%) mentioned noise induced hearing loss and skin dermatitis respectively.

Conclusion: Majority (67.1%) of the respondents understood the need for PPE use and want to be protected against accidents, injuries and illnesses even though about one fourth of the workers had inadequate knowledge on PPE usage on site.

Most of the respondents had inadequate knowledge on exposure to potential hazards as well as the health implications of non-use of the appropriate PPE on site.



CHAPTER ONE

INTRODUCTION

1.1 Background

Recent improvements in safety performance have taken place as a result of combination of efforts of engineers, safety officers, contractors, subcontractors, and designers. The owners' involvement has been shown to favorably influence project safety performance by setting safety objectives, and participating in safety management during construction (Huang and Hinze, 2006).

Despite the improvements in safety that have taken place in recent decades, the safety record in the construction industry continues to be one of the poorest (Huang and Hinze, 2006). According to Center to Protect Workers' Rights (CPWR), the industry is consistently ranked among the most dangerous occupations accounting for a large percentage of all work-related illnesses, injuries, and deaths in the United States.

Occupational Safety and Health Administration (OSHA), the organization responsible for outlining safety policies and procedures, requires the use of PPE to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels.

Personal Protective Equipment can be a significant determining factor between an accident and safety on construction sites. Anecdotal evidence suggests that wearing the appropriate personal protection at all times is extremely important in reducing accidents and should be given high priority (Joel, 2007).

1.2 Problem Statement

There were 1,225 fatal occupational injuries in the construction sector in 2001 with an incidence rate of 13.3 per 100,000 employed workers. For the same year the construction industry experienced 481,400 non-fatal injuries and illnesses at a rate of 7.9 per 100 full-time workers in the industry (Taylor, 2011).

In 2000, the labour department reported that, the construction industry in Ghana accounted for the highest rate of occupational deaths as compared to other industrial sectors. According to the Labour Department (2000) report, 56 out of a total of 902 occupational accidents that occurred in construction were fatal and 846 were non-fatal (Laryea *et al.*, 2010). The number of accidents is likely to increase because of the number of on-going construction projects.

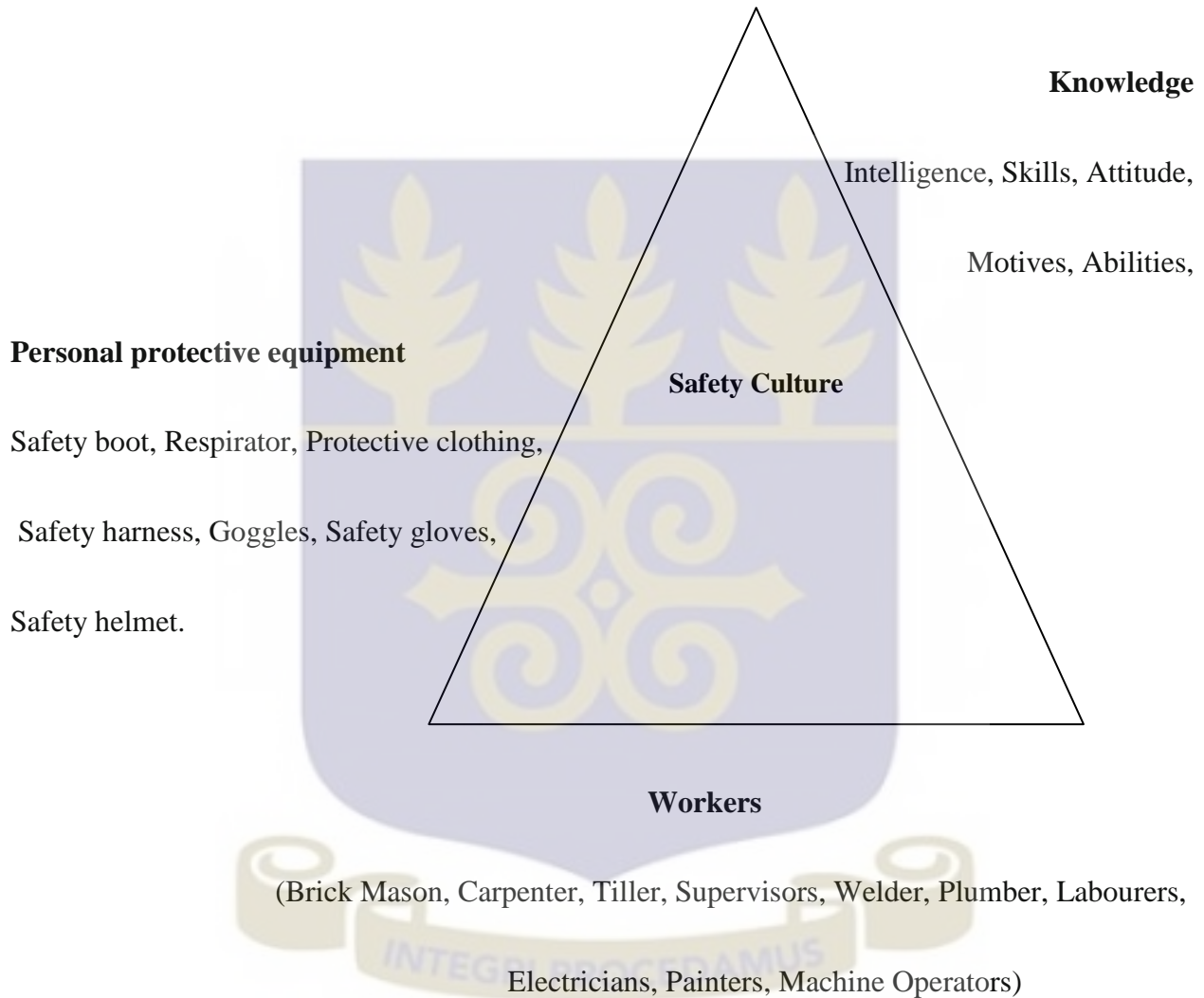
According to the Occupational Safety and Health Administration (OSHA, 2010), one in ten construction site workers are injured every year.

Recent statistics by the (OSHA), shows that about two-thirds of workers, on average, constantly wear the correct personal protective equipment and the other third are at risk of injuries.

According to the safety officers of Berock Ventures Limited and Parakuo Limited, Construction Companies, (personal communication) minor injuries occur at the ongoing projects. These injuries have increased in the past two years.

1.3 Conceptual Framework

Figure 1: The relationship between workers, knowledge and personal protective equipment on safety culture.



A guideline to create awareness of the (PPE) usage among workers on site. Develop a Project Culture that supports worker safety. It was thoroughly on the values of good working relationships and clear communication to each of them. (PPE), hazard assessment and training. The assessment should apply to set a standard operating procedure for personnel, and then train employees on the protective limitations of the (PPE), its proper use and the maintenance. All

parties involved must be totally committed to safety. When planning to carry out all parties will be involved, employee awareness would be created because they feel that employers are very concerned about occupational safety. An employee needs to express their concerns and ideas to management, the program implementer, besides that, they must have a sense of responsibility to comply with all rules and regulations.



1.4 Objectives

1.4.1 General Objective

To assess the knowledge and use of personal protective equipment among building construction workers on site.

1.4.2 Specific Objective

- To assess the worker's knowledge level on on-site preventive equipment usage.
- To describe the practices of the workers on the use of personal protective equipment.
- To assess the knowledge of the workers on the occupational hazards they are exposed to.
- To describe the associated health implications of not using personal protective equipment on site.

1.5 Research Questions

- What are the workers knowledge levels on on-site preventive equipment usage?
- What are the practices of the workers on the use of personal protective equipment?
- What are the knowledge of the workers on the occupational hazards they are exposed to?
- What are the associated health implications of not using personal protective equipment?

1.6 Justification

Recent statistics by the (OSHA), shows that about two-thirds of workers, on average, constantly wear the correct personal protective equipment and the other third are at risk of injuries.

There is currently no information on the use of the correct protective equipment among construction workers in Ghana. Thus this study seeks to find an assessment of knowledge and use of personal protective equipment on site among building construction workers.



CHAPTER TWO

LITERATURE REVIEW

The rate of industrialization in Ghana is increasing and this has led to a larger percentage of the Ghanaian workforce being exposed to workplace physical, chemical, biological and psychological stressors, but has the nation got a system of anticipating, monitoring, evaluating, controlling and preventing such exposures to the workforce? Employers in Ghana are required by the Ghana Labour Act 2003, Act 651 to ensure their employees are not exposed to conditions that would lead them to work related injuries or illnesses. Employees are also required to exhibit their duty of care in ensuring that they work as per the employers' standard operating procedures which must incorporate Safety and Health requirements.

The International Labour Organization (ILO) classifies the construction industry as government and private-sector firms erecting buildings for habitation or for commercial purposes and public works such as roads, bridges, tunnels, dams or airports.

Construction as a proportion of gross domestic product (GDP) varies widely in industrialized countries. It is about 4% in the United States, 6.5% in Germany and 17% in Japan. In most countries, employers have relatively few full-time employees. They might work an average of 1,500 hours in a year while workers in manufacturing, for example, are more likely to work regular 40 hours per week and 2,000 hours per year (Mc Vitte, 1995).

A large portion of construction workers are unskilled labourers, others are classified in any of several skilled trades. Construction workers include about 5 to 10% of the workforce in industrialized countries. Throughout the world, over 90% of construction workers are male. In some developing countries, the proportion of women is higher and they tend to be concentrated in unskilled occupations.

According to the Commission of the European Communities (CEC), construction industry forms 5 to 15% of the national economy of most countries and is usually one of the three industries having the highest rate of work-related injury risks (CEC, 1993).

Construction workers are hired from project to project and may spend a few weeks or months at any project. There are consequences for both workers and work projects. Workers must make and remake productive and safe working relationships with other workers whom they may not know, and this may affect safety at the work site. Since construction involves a large proportion of the workforce, construction fatalities also affect a large population. In the United States, construction represents 5 to 6% of the workforce but accounts for 15% of work-related fatalities more than any other sector. The construction sector in Japan is 10% of the workforce but has 42% of the work-related deaths.

The proportion of fatalities by event differs for each trade. For supervisors, falls and transportation accidents accounted for about 60% of all fatalities. For carpenters, painters, roofers and structural steel workers, falls were most common, accounting for 50, 55, 70 and 69% of all fatalities for those trades, respectively. For operating engineers and excavating machine operators, transportation accidents are the most common, accounting for 48 and 65% of fatalities respectively (Engholm *et al.*, 1995).

Research shows that the major causes of construction accidents are related to human behaviour, difficult work site conditions, inadequate use of protective equipment, and poor safety management, which result in unsafe work methods, equipment and procedures (Abdelhamid and Everett, 2000). In a recent survey by the Laborers Health and Safety Fund of North America (2006), 40 percent of construction workers said “working while hurt” is a major problem. Many of the injuries that occur in the construction industry are due to the manual material handling that

is required in the construction industry (The Eastman Kodak Company, 2004). As pointed by the U.S. National Institute for Occupational Safety and Health (NIOSH), material handling incidents account for 32% of workers' compensation claims in construction, and 25% of the cost of all claims (NIOSH, 2007). Use of appropriate PPE in a timely manner should help improve the safety scenario.

2.1 Health Hazards on the Construction Site

Construction workers are exposed to a wide variety of health hazards on the job. Exposure differs from trade to trade, from job to job, by the day, even by the hour. Exposure to any hazard is typically intermittent and of short duration, but is likely to reoccur. A worker may not only encounter the primary hazards of his or her own job, but may also be exposed as a bystander to hazards produced by those who work nearby or upwind. The severity of each hazard depends on the concentration and duration of exposure for that particular job (Fales, 1990).

Workers are exposed to the following health hazards: Vapours, welding fumes, dust (cement, wood, silica or sand), repetitive motion, asbestos, stress, whole-body vibration, heat, noise, heavy loads, awkward postures and paint additives.

2.2 Types of Hazards Associated with Building Construction

2.2.1 Chemical Hazards

Chemical hazards are often airborne and can appear as dusts, fumes, mists, vapours or gases. Exposure usually occurs by inhalation, although some airborne hazards may settle on and be absorbed through the intact skin. Chemical hazards also occur in liquid or semi-liquid state such

as glues or adhesives, tar or as powders like dry cement. Chemicals might also be ingested with food or water (Haslam *et al.*, 1998).

Alcoholism and other alcohol-related diseases are more frequent than expected among construction workers. Specific occupational causes have not been identified, but it is possible that it is related to stress resulting from lack of control over employment prospects, heavy work demands or social isolation due to unstable working relationships.

2.2.2 Physical Hazards

Physical hazards are present in every construction project. These hazards include noise, heat and cold, radiation, vibration and barometric pressure. Construction work often must be done in extreme heat or cold, in windy, rainy, snowy or foggy weather or at night. Ionizing and non-ionizing radiation is encountered (Haslam *et al.*, 1998).

The sources of noise are engines of all kinds (on vehicles and cranes), power saws, planers, explosives and many more. Noise is present on demolition projects. It affects not only the person operating a noise-making machine, but all those close-by and not only causes noise-induced hearing loss, but also masks other sounds that are important for communication and for safety.

Heat and cold hazards arise primarily because a large portion of construction work is conducted while exposed to the weather. Roofers or carpenters are exposed to the sun, often with no protection, thus receiving both heavy radiant and convective heat loads in addition to metabolic heat from physical labour. Heavy equipment operators may sit beside a hot engine and work in an enclosed cab with windows and without ventilation. Those that work in an open cab with no roof have no protection from the sun. A shortage of potable water or shade contributes to heat

stress as well. Construction workers also work in especially cold conditions during the winter, with danger of frostbite and hypothermia and risk of slipping.

The principal sources of non-ionizing ultraviolet (UV) radiation are the sun and electric welding. Exposure to ionizing radiation is less common, but can occur with x-ray inspection of welds.

Strains and sprains are among the most common injuries among construction workers. Many chronically disabling musculoskeletal disorders (such as tendinitis, carpal tunnel syndrome and low-back pain) occur as a result of traumatic injury, repetitive forceful movements, awkward postures or overexertion. Falls due to unstable footing, unguarded holes and slips off scaffolding and ladders are very common (Kathmandu and Nepal, 1974).

2.2.3 Biological hazards

Biological hazards are presented by exposure to infectious micro-organisms, toxic substances of biological origin or animal attacks. Excavation workers can develop histoplasmosis, an infection of the lung caused by a common soil fungus. Since there is constant change in the composition of the labour force on any one project, individual workers come in contact with other workers and as a consequence, may become infected with contagious diseases such as influenza or tuberculosis. Workers may also be at risk of malaria and yellow fever disease if work is conducted in areas where these organisms and their insect vectors are prevalent.

Toxic substances of plant origin can cause skin irritations. Attacks by animals are rare but may occur whenever a building construction project disturbs them on their habitat. This can include wasps, fire ants, snakes and many others (Gibb *et al.*, 1998).

2.2.4 Social hazards

Social hazards arise from the social organization of the industry. Employment is intermittent and constantly changing, and control over many aspects of employment is limited because construction activity is dependent on many factors over which the workers have no control, such as the state of an economy or the weather. For this reason, there can be intense pressure to become more productive. Since the hours, location of work, workforce are constantly changing and many projects require living in work camps away from home and family, employees may lack stable and dependable networks of social support. Features of construction work such as heavy workload, limited control and limited social support are the very factors associated with increased stress in other industries (Haslam *et al.*, 1998).

2.3 Controlling Occupational Hazards

Measuring and evaluating exposure to occupational hazards requires consideration of the manner in which building construction workers are exposed. Conventional industrial hygiene measurements and exposure limits are based on 8-hour time-weighted averages. Since exposures in building construction are usually brief, intermittent, varied but likely to be repeated, such measures and exposure limits are not as useful as in other jobs. Exposure measurement can be based on tasks rather than shifts. With this approach, separate tasks can be identified and hazards characterized for each. As knowledge of task-based exposure increases, one may develop task-based controls.

Exposure varies with the concentration of the hazard and the frequency and duration of the task. As a general approach to hazard control, it is possible to reduce exposure by reducing the concentration or the duration or frequency of the task. Since exposure in construction is already intermittent, administrative controls that rely on reducing the frequency or duration of exposure

are less practical than in other industries. Consequently, the most effective way to reduce exposure is to reduce the concentration of hazards.

2.3.1 Decreasing Exposure Concentration

For reducing exposure concentration, it is useful to consider the source, the environment in which a hazard occurs and the workers who are exposed. As a general rule, the closer controls are to a source, the more efficient and effective they are. Three general types of controls can be used to reduce the concentration of occupational hazards. These are, from most to least effective: Engineering controls at the source, environmental controls that remove the hazard from the environment and Personal protection equipment provided to the worker (Aksorn *et al.*, 2009).

2.3.2 Engineering Controls

The most efficient way to protect workers from hazards is to change the primary source with some sort of engineering change. A less hazardous substance can be substituted for one that is more hazardous. Non-respirable synthetic vitreous fibres can be substituted for asbestos, and water can be substituted for organic solvents in paints. Similarly, non-silica abrasives can replace sand in abrasive or sand blasting or a process can be fundamentally changed, such as by replacing pneumatic hammers with impact hammers that generate less noise and vibration. If sawing or drilling generates harmful dusts, particulate matter or noise, these processes could be done by shear cutting or punching.

2.3.3 Environmental Controls

Environmental controls are used to remove a hazardous substance from the environment, if the substance is airborne, or to shield the source, if it is a physical hazard. Local exhaust ventilation (LEV) can be used at a particular job with a ventilation duct and a hood to capture the fumes, vapours or dust. However, since the location of tasks that emits toxic materials changes, and because the structure itself changes, any (LEV) would have to be mobile and flexible in order to accommodate these changes. Mobile truck-mounted dust collectors with fans and filters, independent power sources, flexible ducts and mobile water supplies have been used on many job sites to provide (LEV) for a variety of hazard-producing processes (Aksorn *et al.*, 2009).

The simple and effective method of controlling exposure to radiant physical hazards (noise, ultraviolet (UV) radiation from welding, infrared radiant (IR) heat from hot objects) is to shield them with some appropriate material. Plywood sheets shield (IR) and UV radiation, and material that absorbs and reflects sound will provide some protection from noise sources.

Major sources of heat stress are weather and hard physical labour. Adverse effects from heat stress can be avoided through reductions in the workload, provision of water and adequate breaks in the shade and possibly, night work.

2.3.4 Personal Protective Equipment

This refers to protective clothing, Safety helmets, Safety goggles, Safety gloves, safety boots and safety harnesses, respirators and other garments or equipment designed to protect the wearer's body from injury. The hazards addressed by protective equipment include physical, electrical, heat, chemicals and biological hazards (UK Regulations, 1999).

The purpose of personal protective equipment is to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels. PPE is needed when there are hazards present. In order for such equipment to be effective, workers must be trained in its use, and the equipment must fit properly and be inspected and maintained. Employers have duties concerning the provision and use of PPE at work (UK Regulations, 1999).

To choose equipment that suits the user, consider the size, fit and weight of the PPE. If the users help choose it, they will be more likely to use it. Never allow exemptions from wearing PPE for those jobs that ‘only take a few minutes. PPE must be properly looked after and stored when not in use especially in a dry, clean cupboard. If it is reusable it must be cleaned and kept in good condition (Personal Protective Equipment Regulations, 2002).

However, PPE has the serious limitation that it does not eliminate the hazard at source and may result in employees being exposed to the hazard if the equipment fails.

Any item of PPE imposes a barrier between the user and the working environment. This can create additional strains on the wearer; impair their ability to carry out their work and create significant levels of discomfort. Any of these can discourage wearers from using PPE correctly, therefore placing them at risk of injury and illness. Good ergonomic design can help to minimize these barriers and can therefore help to ensure safe and healthy working conditions through the correct use of PPE.

Practices of occupational safety and health can use hazard controls and interventions to mitigate workplace hazards, which pose a threat to the safety and quality of life of workers. The hierarchy of hazard control provides a policy framework which ranks the types of hazard controls in terms

of absolute risk reduction. At the top of the hierarchy are elimination and substitution, which remove the hazard entirely or replace the hazard with a safer alternative. If elimination or substitution measures cannot apply, engineering controls and administrative controls, which seek to design safer mechanisms and coach safer human behavior, are implemented. Personal protective equipment ranks last on the hierarchy of controls, as the workers are regularly exposed to the hazard, with a barrier of protection. The hierarchy of controls is important in acknowledging that, while personal protective equipment has tremendous utility, it is not the desired mechanism of control in terms of worker safety.

2.4 Types of Personal Protective Equipment

Personal protective equipment can be categorized by the area of the body protected, by the types of hazard, and by the type of garment or accessory. A single item, for example boots, may provide multiple forms of protection. The protective attributes of each piece of equipment must be compared with the hazards expected to be found in the workplace.

2.4.1 Respirators

Respirators are worn because of the Oxygen-deficient atmospheres, dusts, gases and vapours at the construction site and help to protect the user from breathing in contaminants in the air, thus preserving the health of one's respiratory tract.

There are two main types of respirators. One type of respirator functions by filtering out chemicals and gases or airborne particles from the air breathed by the user (Air-purifying respirator). Gas masks and particulate respirators protect users by providing clean, respirable air from another source. This type includes airline respirators and self-contained breathing apparatus

(SCBA). In work environments, respirators are relied upon when adequate ventilation is not available or other engineering control systems are not feasible or inadequate.

Breathing apparatus may be used in a confined space or if there is a chance of an oxygen deficiency in the work area (NIOSH).

2.4.2 Protective Clothing

This form of PPE is all-encompassing and refers to the various suits and uniforms worn to protect the user from harm. Occupational skin hazards such as extreme temperatures and ultraviolet radiation can be damaging to the skin over prolonged exposure. Mechanical trauma occurs in the form of friction, pressure, abrasions, lacerations and contusions. Biological agents such as parasites, microorganisms, plants and animals can have varied effects when exposed to the skin. Chemical, metal splash, spray from pressure leaks or spray guns, contaminated dust, impact or penetration, and other skin injuries predispose construction workers to occupational diseases such as contact dermatitis, skin cancers and other infections. Conventional or disposable overalls, boiler suits, aprons, chemical suits, Reflective jackets and other protective clothing are worn to protect against potential splashes of chemicals and gives protection to the skin. The choice of materials includes flame-retardant, anti-static, chemically impermeable and high-visibility.

2.4.3 Eye Protection

Most eye injuries occur when solid particles such as metal slivers, wood chips, sand or cement chips get into the eye, smaller particles in smokes and larger particles, (broken glass) also account for particulate matter causing eye injuries, blunt force trauma can occur to the eye when

excessive force comes into contact with the eye. Chemical burns, biological agents, and thermal agents, from sources such as welding torches and (UV) light also contribute to occupational eye injury. The recommended usage of eye protection varies by occupation. Safety glasses provide minimum protection from external debris, and are recommended to provide side protection via a wrap-around design or via side shields. Goggles provide better protection than safety glasses, and are effective in preventing eye injury from chemical splashes, impact, dusty environments and welding. It is recommended that goggles with high air flow be used, in order to prevent fogging. Eye protection used for welding operation is shaded to different degrees, depending on the specific operation (ISEA, 2007).

However, the eye protection chosen must have the right combination of impact, dust, splash, molten metal eye protection for the task and fits the user properly and must be selected based on anticipated hazards.

Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing, electrical hazards, when working with concrete, harmful chemicals, or when exposed to flying particles but may be less effective against potential impact hazards to the eye.

2.4.4 Nose/Lungs protection

Construction workers are exposed to oxygen-deficient atmospheres, dusts, gases and vapours, contaminated air. Respirators, half and full masks), compressed airline and self-contained breathing apparatus, dust mask, air filtering mask, Gas masks and particulate respirators should be worn to prevent breathing in contaminated air, asbestosis and silicosis (ISEA, 2007).

2.4.5 Ear Protection

Industrial noise is often overlooked as an occupational hazard, as it is not visible to the eye. Very high-level sounds are a hazard even with short duration. (NIOSH) recommends that worker exposures to noise be reduced to a level equivalent to 85dBA for eight hours to reduce occupational noise-induced hearing loss.

Earplugs, earmuffs and semi-insert or canal caps can be used as protectors that reduce noise to an acceptable level, while allowing for safety and communication. The right hearing protectors must be provided for the type of work, and make sure workers know how to fit them (ISEA, 2007).

2.4.6 Hands Protection

Construction workers are exposed to abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, radiation, vibration, biological agents and prolonged immersion in water which predispose them to many occupational injuries. Workers should wear the right gloves for the job. (Heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards) to reduce on-site fatal and non-fatal injuries (ISEA, 2007).

2.4.7 Feet and Legs

Wet, hot and cold conditions, slipping, cuts and punctures, falling objects, heavy loads, metal and chemical splash, vehicles are hazards that construction workers are exposed to. Safety boots and shoes with slip-resistant, puncture-resistant soles, protective toecaps and penetration-resistant, mid-sole wellington boots and specific footwear, (foundry boots and chainsaw boots) should be worn to reduce on-site occupational injuries (ISEA, 2007).

2.4.8 Head Protection

Workers should wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.

Hard hats are routinely inspected for dents, cracks or deterioration. Hard hats are replaced after a heavy blow or electrical shock and are maintained in good condition (ISEA, 2008).

2.4.9 Fall Protection

Each year, falls consistently account for the greatest number of fatalities in the construction industry. A number of factors are often involved in falls, including unstable working surfaces, misuse or failure to use fall protection equipment and human error. Studies have shown that using guardrails, Safety harness, fall arrest systems, safety nets, covers and restraint systems can prevent many deaths and injuries from falls (Pollack *et al.*, 1996).

2.5 Health Implications Associated with Construction Workers

Construction workers are exposed to a wide variety of health implications with their work. Exposure differs from trade to trade, from job to job, by the day, even by the hour. The severity of each health implications depends on the concentration and duration of exposure for that particular job.

The most recognized health implications encountered in the construction industry include: Injuries, Cement or sand dermatitis, silicosis, Musculoskeletal disorders, Skin allergies, lung cancer and other respiratory infections, fall from height, asbestosis and other diseases caused by

asbestos, Electrocution, Histoplasmosis, Noise-induced hearing loss, and Lead poisoning (Pollack *et al.*, 1996).

2.6 related studies

2.6.1 Use of personal protective equipment

A study conducted by (Tanko and Anigbogu, 2011), Department of Building, University of Jos to find out the use of personal protective equipment PPE on construction sites in Nigeria.

The study revealed that the majority (90%) of workers understood the need for PPE and want to be protected against accident, injury and illness. However there was a need to address the issues of comfort with respect to PPE to ensure that it does not interfere with workers' productivity and takes into account the work environment. Supervision, proper maintenance and replacement of PPE would also help to improve the practices of PPE use in construction sites. They also raised a concern that Policies and regulations with respect to PPE need to be developed and implemented.

2.6.2 Compliance with Personal Protective Equipment on Construction sites

(Rizwan *et al.*, 2010) Florida International University Miami, Florida, conducted a study to addressing the Issue of Compliance with Personal Protective Equipment on Construction sites.

It was reviewed that although (100%) contractors provide some kind of PPE facilities on sites, workers were not committed towards PPE usage.

The following major reasons were identified for not using PPE on sites. Uncomfortable or Poor Fit, Temperature discomfort, reduced productivity, not enough PPE, lack of enforcement by employer and Lack of training on appropriate use.

2.6.3 Knowledge about different PPE product specifications

Research carried out in UK (Taylor, 2011) found that some health and safety managers interviewed during the study admitted to a lack of knowledge about different PPE product specifications and which clothing would be most suitable for their workplace, while they also had concerns about how to deal with unknown hazards. With such a lack of clarity, it should therefore come as no surprise to discover that only just over half (56%) of workers received any PPE training at all, with nearly a third simply selecting the PPE they thought was most suitable for the appropriate task. workers also acknowledged their biggest issues with PPE were to do with comfort and performance.

2.6.4 Workers' Awareness on Using Safety Equipment

A study by (Salim *et al.*, 2014) School of Housing, Building and Planning, University Saints Malaysia to find out Construction Site Workers' Awareness on Using Safety Equipment.

It concluded that 84% of the respondents had knowledge about PPE on site while 16% of the respondents indicated that they do not have knowledge on PPE.

2.6.5 Compliance with Personal Protective Equipment on Construction Worksites

A survey by (Salman, 2010), to determine Compliance with Personal Protective Equipment on Construction Worksites.

It reviewed that organizational commitment towards PPE compliance needs to be improved. (40%) of the contractors do not consider maintaining PPE on worksites as their top most priority and there may be times in their projects where the required PPE is not available to the workers, (3.12%) contractors do not extend any efforts to ensuring the sufficiency and appropriateness of the equipment, a one-fourth proportion of contracting organizations do not provide PPE related training.



CHAPTER THREE

METHODS

3.1 Study Type/Design

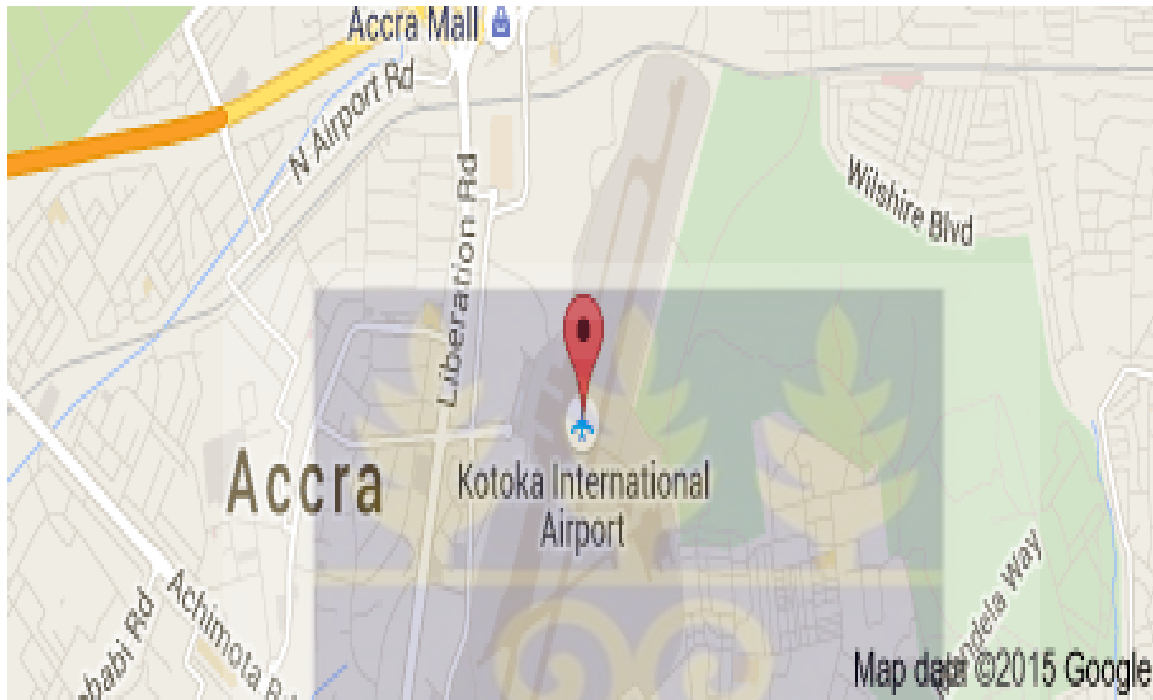
Cross-sectional design was used for this study. Structured questionnaire was administered to participants to assess their level of knowledge with regards to PPE use, provide information about the occupational hazards they are exposed to, safety practices on site and the associated health implications of not using personal protective equipment on site and those who cannot read nor write were interviewed to collect data from them. Knowledge was assessed by scoring up to 20 points. Those who scored from 15-20 were scored fully understand, 10-15 were scored average understand and less than 10 were scored minimal understand.

3.2 Study Location/Area

The study was conducted at the (Civil Aviation Academy Project, Shopping Mall and Hotel project) at Kotoka International Airport located in Accra Metropolis District, Ayawaso-West Sub-Metro. The area is made up of heterogeneous inhabitants.



Map showing direction to the study area.



3.3 Variables

Dependent variable was knowledge of Personal protective equipment.

Independent variables were Intelligence, Skills, Attitude, Training on PPE use, Acceptability.

All construction workers of Berock Ventures Limited and Parakuo Limited who were working on the ongoing projects (Civil Aviation Academy, Shopping Mall and Hotel) were used for the study.

3.5 Determination of Sample Size

The proportion of construction workers with knowledge on PPE use 90% in Nigeria, (Tanko and Anigbogu, 2011), Also, a confidence level of 95% and a desired level of precision set at 5% was used for the sample size determination.

The sample size was then calculated using the formula developed by Cochran (1963:75) to yield a representative sample for proportions.

$$n_o = \frac{z^2 pq}{e^2}$$

Where,

n_o =the sample size

Z=standard normal deviate which is 1.96 at 95% confidence interval

P=the proportion of the population estimated to be at risk (0.9)

q=the proportion of the population not at risk (1-0.9 = 0.1)

e=desired level of precision set at 5% (0.05)

This implies that,

$$n_o = \frac{1.96^2 * 0.9 * 0.1}{0.05^2}$$

$$n_o = \frac{0.345744}{0.0025}$$

$$n_o = 138$$

After calculating for the sample size, since the total population was 150 I decided to consider all the respondents. Therefore a sample size of 150 was obtained for the study.

3.6 Sampling Method

I purposively gave the questionnaire to all workers identified to be in the two construction companies to represent the population. The entire population was used as the sample size for the study.

Therefore, ninety (90) questionnaires were administered to 90 respondents from Berock Ventures Limited and sixty (60) questionnaires were administered to 60 respondents from Parakuo Limited Company construction workers for this study.

3.7 Data Collection Techniques/Method & Tools

A developed questionnaire was distributed to the workers on the ongoing Civil Aviation Academy, Shopping Mall and Hotel projects. Knowledge was assessed by the use of a simple questionnaire and scored. Knowledge was assessed by scoring up to 20 points. Those who scored from 15-20 were scored fully understand, 10-15 were scored average understand and less than 10 were scored minimal understand. An assessment of the use of PPE's on the site was conducted. This included availability and appropriateness of types of PPE, condition of use and acceptability by the workers.

3.8 Quality Control

The data collected was kept highly confidential and handle well. All data collected was kept under lock and key. Pictures of various personal protective equipment taken were protected by a password which was accessible to the researcher only.

3.9 Data Processing and Analysis

Data was collected and responses were scored. The variables were analyzed using Statistical Package for Social Sciences (SPSS), Microsoft Word and Microsoft Excel from Microsoft Windows and data was presented in simple frequencies tables and graphics in the form of bar chart.

3.10 Ethical Consideration/Issues

Ethical clearance was sought from the Ghana Health Service Ethics Review Board. Permission was sought from the management of Berock Ventures Limited and Parakuo Limited Company. There are no risks associated with participating in this study. The procedures involved in this study are non-invasive and will not cause any discomfort to the participants. A questionnaire was administered to study participants by previously trained research assistants in English and a local language.

The information given will guide government on any future interventions on health and safety issues at the building construction sites. Respondents' were informed that they would not be paid for participating in this study.

All data collected was kept under lock and key. Pictures of various personal protective equipment taken were protected by a password which was accessible to the researcher only.

The study materials (questionnaire, pictures and consent forms) were not labelled with names of study subjects but rather unique identification numbers. Participation in the study was entirely voluntary and that declining to enter the study had no negative consequences.

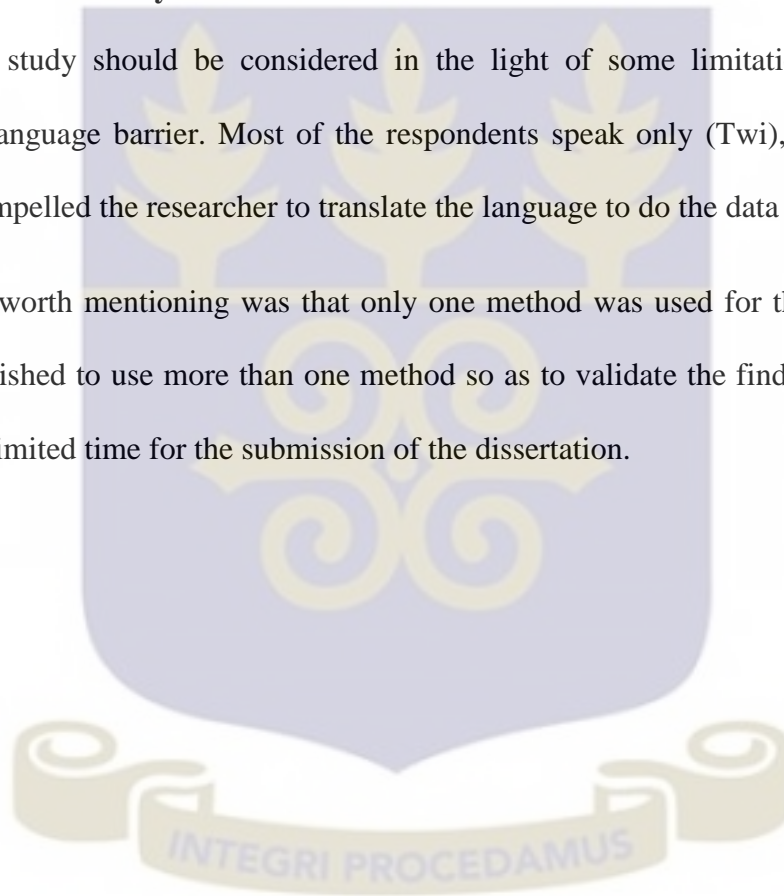
3.11 Pretest or Pilot Study

To determine the appropriateness of the data collection tools, the tools were pre-tested at High brains Construction Company limited, Kumasi, which had similar characteristics as Berock Ventures Limited and Parakuo Limited Company

3.12 Limitations of the Study

Findings of this study should be considered in the light of some limitations. One of such limitations was language barrier. Most of the respondents speak only (Twi), a local language. This situation compelled the researcher to translate the language to do the data collection.

Another setback worth mentioning was that only one method was used for the data collection. The researcher wished to use more than one method so as to validate the findings but could not do so due to the limited time for the submission of the dissertation.



CHAPTER FOUR

RESULTS

4.1 Survey Results on Respondents' Characteristics

A total of one hundred and fifty (150) copies of the questionnaire were distributed to the respondents on the two sites with response rate of 140(93.3%). A summary of the characteristics is presented as Table 1. Berock Ventures Limited and Parakuo Limited Company contributed 90(64.3%) and 50(35.7%) respectively. The respondents were aged between 20 and 44 years with a mean age of 29.4 years.

All respondents had received some formal education. The highest educational level attained by the respondents was Tertiary education 21(15%). Followed by Secondary education 59(42.1%). The rest were Junior high school and primary 54(38.7%) and 6(4.3%) respectively.

Majority 74(52.9%) were single, 51(36.4%) were married while only 1(0.71%) was widowed. The highest number of hours worked by the respondents was eight hours and sometimes overtime 75(53.6%) followed by eight hours 44(31.4%) and the rest work for over eight hours 21(15%) work for eight hours. Majority of the respondents 76(54.3%) had less than five-year working experience in construction, 47(33.6%) of the have worked between 5-9 years while 17(12.1%) of respondents have worked for 10 years and above. Majority 70(50%) have been in the company for 1-2 years, 30(21.4%) have been in the company less than a year with few 24(17.1%) of the respondents being with the company for over five years. The occupation ranged from helpers 79(56.4%), site supervisors (engineers, contractors, safety managers) 18(12.9%), mason 15(10.7%), steel benders 5(3.6%).

Table 1: Characteristics of study Participants (N=140)

Variable	Characteristic	Frequency (N)	Percent (%)
Name of organization	Parakuo Limited Company	50	35.71
	Berock Ventures Limited	90	64.29
Age range of the respondents (Years)	20-24	15	10.71
	25-29	70	50.00
	30-34	35	25.00
	35 and above	20	14.29
Educational level of background	Primary	6	4.29
	Junior High School	54	38.57
	Senior High School	59	42.14
	Tertiary	21	15.00
Marital Status of Respondent	Single	54	52.86
	Married	31	36.43
	Widowed	1	0.71
	Divorced	14	10.00
Number of Hours Respondent Work per Day (Hours)	Less than 8 Hours	0	0.00
	8 Hours	44	31.43
	Over 8 Hours	21	15.00
	8 Hours and Sometimes overtime	75	53.57
Working experience of respondent on construction site (Years)	Less than 5 Years	76	54.29
	5-9 Years	47	33.58
	10 years and above	17	12.14
Number of years in company (Years)	Less than 1 Year	30	21.43
	1-2 Years	70	50.00
	3-4 Years	16	11.43
	5 Years and above	24	17.14
Respondent Occupation	Helper	79	56.3
	Steel Bender	5	3.57
	Machine Operator	8	5.71
	Painter	7	5.00
	Mason	15	10.71
	Carpenter	8	5.71
	Site Supervisor	18	12.86

The results in figure 4 reflects that workers are rarely provided with respirators or nose mask, hand gloves, overall and goggles. The majority 130(92.9%) agreed that using PPE on site reduces the risk of occupational injuries or diseases. Majority 137(97.9%) indicated that training is organized for them while 3(2.1%) claimed that they do not receive training on how to use the available PPE on site. The majority 89(65%) claimed that the training was organized during induction and every two weeks while 48(35%) indicated training was organized during induction and every morning. All of the respondents 140(100%), use the available PPE on site.

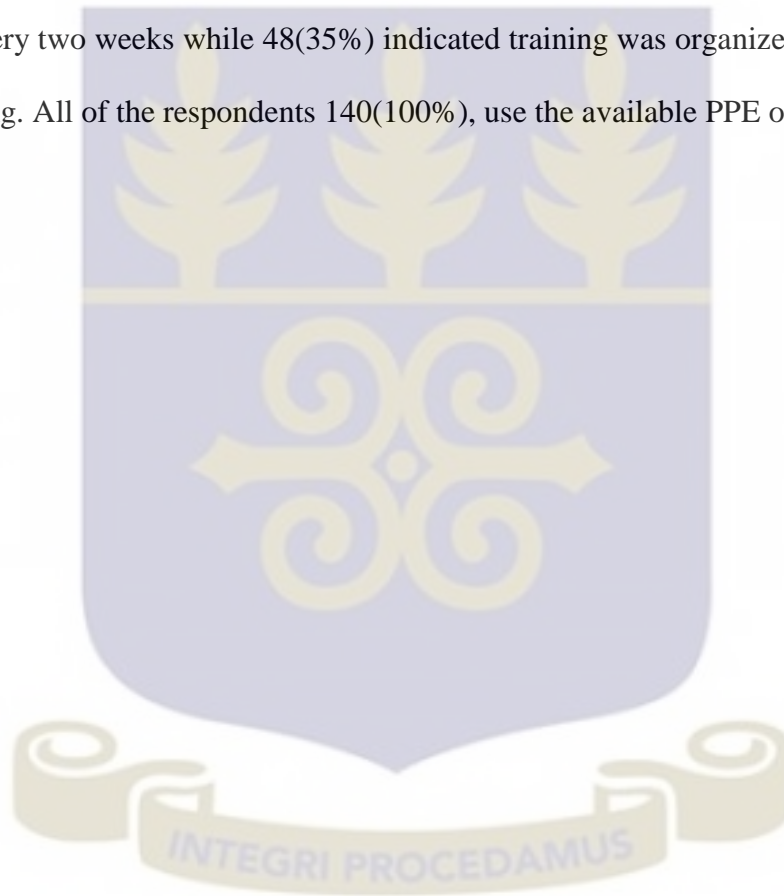
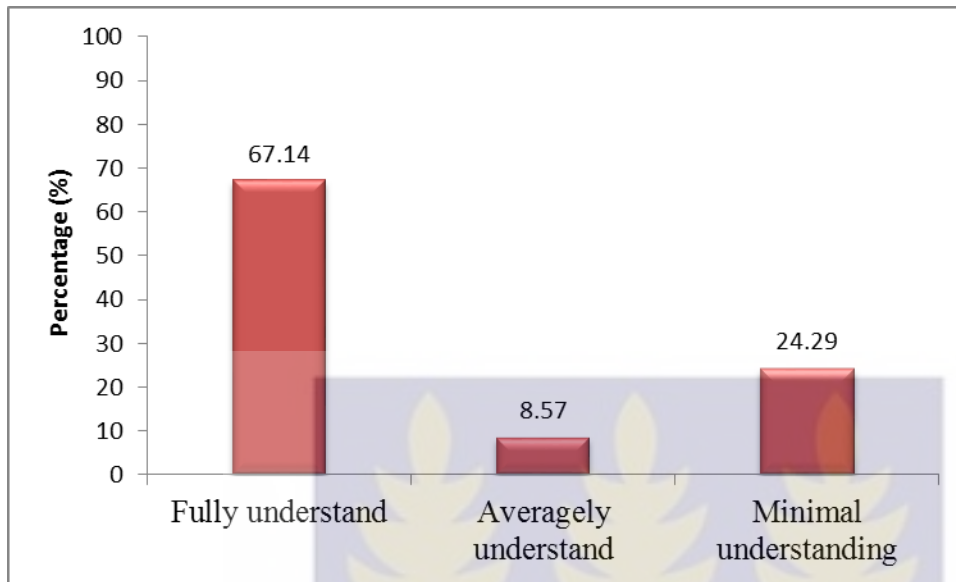


Table 2: Knowledge and use of Personal Protective Equipment among construction workers in Accra (N=140)

Variable	Characteristic	Frequency (N)	Percent (%)
Awareness of personal protective equipment	Yes	137	97.86
	No	3	2.14
Whether usage of personal protective equipment reduces the risk of occupational injuries or diseases	Agree	130	92.86
	Disagree	10	7.14
Received Training on personal protective equipment	Yes	137	97.86
	No	3	2.14
Frequency of Training	During induction and every morning	48	35.05
	During induction and every two weeks	89	64.96
Usage of available personal protective equipment on site	Yes	140	100
Awareness of Potential Hazards on Construction Site	Agree	134	95.71
	Disagree	6	4.29
Awareness of Health implications of not using personal protective equipment	Agree	138	98.57
	Disagree	2	1.43

Figure 2: Knowledge on personal protective equipment usage

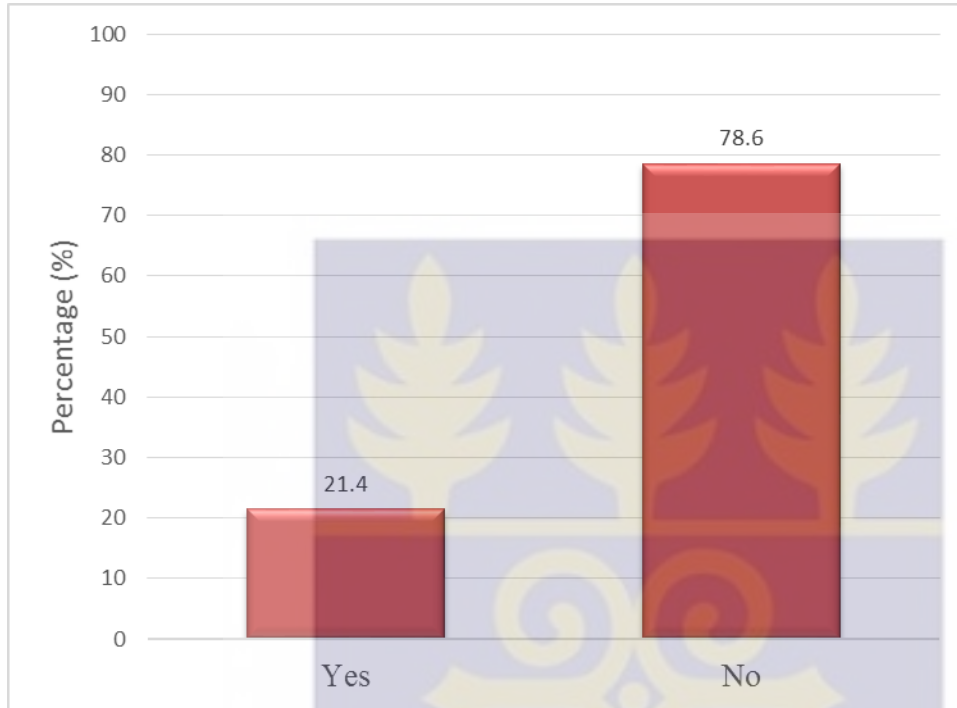


4.2 Workers Knowledge on on-Site Preventive Equipment Usage

Workers knowledge on PPE and use of PPE is summarised in Table 2 and figure 2-5. Awareness of PPE was high 137(97.9%), a few of them, about (2%) said they had no idea about PPE. From figure 2, majority 94(67.1%) had full knowledge on personal protective equipment (scored from 15-20 points) whilst 34(24.3%) had minimal knowledge on PPE (scored less than 10 points).



Figure 3: Removal of personal protective equipment while working



From figure 3, 30(21.4%) of the respondents removed their PPE while working.



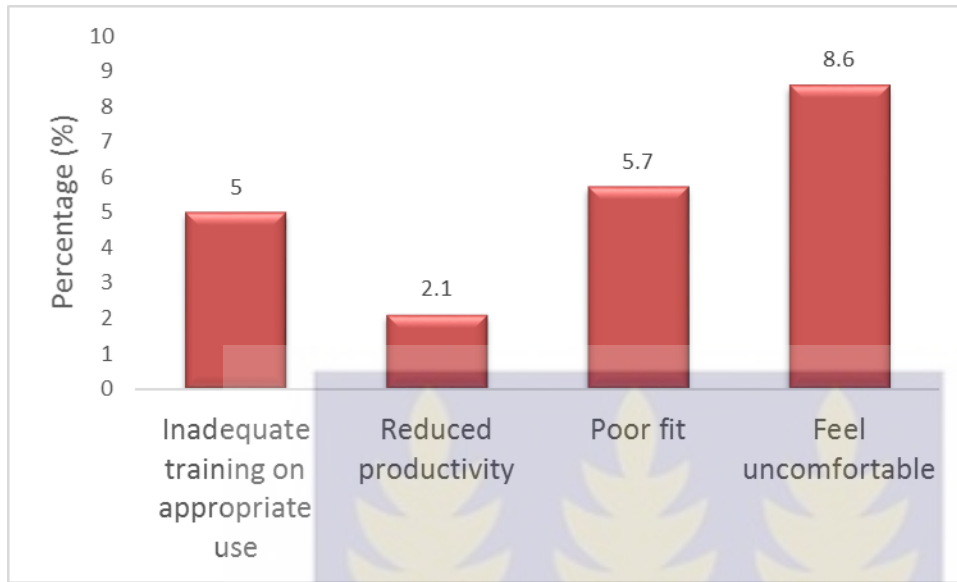
4.3 Practices with Regards to Personal Protective Equipment

Figure 4: Pictures of the types of personal protective equipment available to use on site



- a. Prevents many deaths and injuries from falls from height.
- b. Protects the head from potential for objects falling from above or any other accident that could result to trauma to the head.
- c. Used as protectors that reduce noise to an acceptable level, while allowing for safety and communication.
- d. Protects the head from potential for objects falling from above or any other accident that could result to trauma to the head.
- e. Worn to reduce on-site occupational injuries such as cuts and punctures.
- f. Worn for easily identification on the site to prevent accidents or injuries

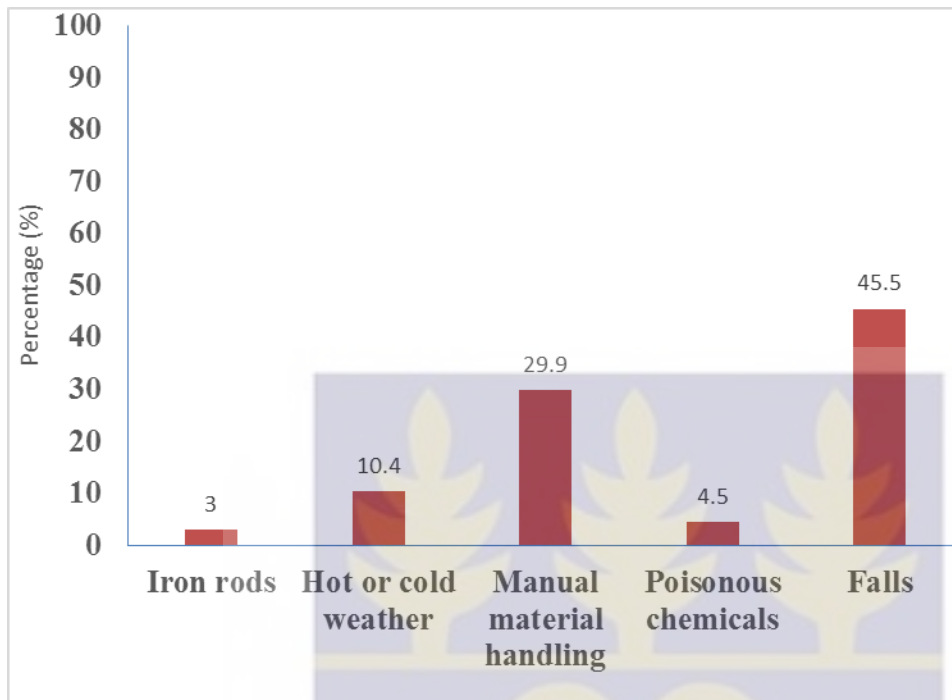
Figure 5: Reason for removal of personal protective equipment while working



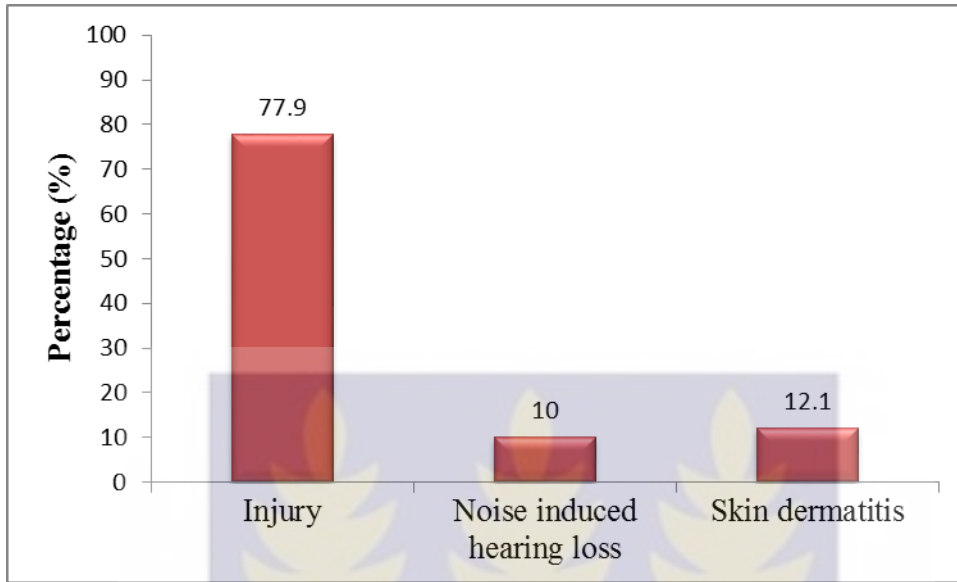
From figure 5, the major reasons why workers do not like to use PPE were 12(8.6%) claimed that they felt uncomfortable, poor fit of PPE 8(5.7%), inadequate training on appropriate use of protective equipment on site 7(5%) while few 3(2.1%) claimed that it reduces productivity



Figure 6: Knowledge on Potential Hazards



Majority 134(95.7%) agreed that there was high level of hazards on the construction site while only 6(4.3%) disagreed that there was hazard on site. From figure 6, the most recognized potential hazard on the construction site was falls 61(45.5%) followed by manual material handling 40(29.9%) while iron rods recorded the least 4((3%).

Figure 7: Knowledge on health implications associated with their work

4.4: Knowledge on associated health implications of non-use of the appropriate personal protective equipment on site

From table 2, the majority 138(98.6%) of the respondents agreed that there were associated health implications if they do not use the appropriate personal protective equipment on site with only 2(1.4%) who claimed that if they do not use the appropriate PPE they could still work safely. From figure 7, majority of the respondent 109(77.9%) claimed that injuries were the most common health implications if they do not use the appropriate PPE on site with 17(12.1%) and 14(10%) indicating for noise induced hearing loss and skin dermatitis respectively.

CHAPTER FIVE

DISCUSSIONS

5.1 Respondents' Characteristics

The respondents were aged between 20 and 44 years with a mean age of 29.4 years. This case shows that the construction work was categorized as an occupation with young people. They are still young and thus possess the needed strength to carry out their duties. However, those who are aged 35 years and above have a lot of working experience than young workers do. With regards to the respondent marital status, majority 74(52.9%) were single was not surprising because most of them were young with only 20(14.3%) above 35 years. Also only few 21(15%) respondents received tertiary education which explained why only 18(12.9%) were site supervisors. The rest of the respondents schooled at various level (primary, JHS and SHS) of the educational system. This situation was reflecting that the level of education can be classified as a middle level. Concerning the number of hours spent at work, majority of the respondents 75(53.6%) said they worked for eight hours and occasionally do some overtime. Majority 76(54.3%) of the respondents said they have less than five-year working experience with only 17(12.1%) of respondents working on site for 10 years and above. Again this finding was not surprising since majority of the respondents were young adult. Majority 79(56.3%) of the respondents were helpers or labourers, 18(12.7%) were site supervisors, 15(10.7%) were mason with only few 5(3.6%) being steel benders. This result indicates that majority of the respondents 79(56.3%) did not take vocational training for the activities they perform.

5.2 Workers Knowledge on on-Site Preventive Equipment Usage

Almost all 137(97.7%) the respondents were aware of PPE usage on site. 94(67.1%) had full knowledge on PPE, 12(8.6%) had averagely knowledge with 34(24.3%) having minimal understanding of PPE usage. This finding agrees with a study carried out by (Salim *et al.*, 2014) and another study by (Tanko and Anigbogu, 2011). However, it does not support a study conducted by (Taylor, 2011).

The majority (67.1%) had knowledge on personal protective equipment because of the constant training they receive during induction as well every morning and every two weeks before the start of the day's activity. However, those with minimal knowledge on PPE usage might probably be due to their level of education, few number of years of work in the industry, inadequate training given to them as well as their own attitude towards on-site equipment usage.

5.3. Practices with Regards to Personal Protective Equipment Use

The pictures of the types of PPE available to use on site were captured by the researcher. These included safety helmet, ear plugs, safety belt or harness, reflective jackets, safety boot and rain boot. However, it was interesting to note that overall, safety goggles, nose masks or respirators and hand gloves were not available for use on site.

Concerning the use of different colours of safety helmet, the workers wear the yellow and red colours for respondents at Parakuo Limited Company and Berock Ventures Limited respectively. While the supervisors wear white colours, blue and green colours for the visitors for respondents at Parakuo Limited Company and Berock Ventures Limited respectively. However, with

regards to the reflective jackets, the workers wear the pink colours while the supervisors and visitors wear the green colours.

Almost all 137(97.9%) of the respondents indicated that training was organized for them. It was interesting to note that 3(2.1%) claimed that they do not receive training on how to use the available PPE on site. Interestingly, this finding disagrees with the findings from a study by (Taylor, 2011) and another study by (Salman, 2010).

Majority 89(65%) claimed that training was organized during induction and every two weeks while 48(35%) said training was organized during induction and every morning. This finding does not support a study conducted by (Taylor, 2011).

All the respondents 140(100%) said they use the available PPE on site. However, it is important to ensure that workers wear the appropriate PPE while working on site. There is a possibility that they just worn the Protective equipment when instructed by the safety officers or from an authorities visited and when they realize that surveillance and monitoring is not carried out, they indiscriminately violate the regulations; not wearing PPE equipment during working. This finding disagrees with a study by (Rizwan *et al.*, 2010).

Few, 30(21.4%) of the respondents removed their PPE while working on site. This might probably be due to the fact that they were not monitored by the safety officers or authorities. They gave reasons such as they feeling uncomfortable 12(8.6%), equipment does not fit right 8(5.7%), reduction in productivity 3(2.1%) with 7(5%) indicating that they do not receive adequate training on appropriate use of protective equipment on site. This finding supports a study conducted by (Tanko and Anigbogu, 2011) and another study by (Rizwan *et al.*, 2010).

The workers also complained facing stress problem in wearing PPE particularly in hot, sunny weather, confined and poor ventilated areas. This indicates lack of management commitment towards PPE enforcement.

To validate some of the survey findings, site observations were conducted on the sites. It was observed that a group of painters were painting without wearing goggles while some group of steel benders were working with iron rods without wearing a protective hand gloves.

5.4 Knowledge on Potential Hazards

Almost all 134(95.7%) of the respondents agreed that there was high level of hazards on the site. However close to half of the respondents 61(45.5%) recognized falls as the only potential hazard on the construction site while others mentioned manual material handling 40(29.9%), dust inhalation 9(6.7%), poisonous chemicals 6(4.5%) and iron rods 4(3%) as potential hazards on the construction site. This findings agrees with the studies by (Engholm *et al.*, 1995) and a similar study by (Taylor, 2011).

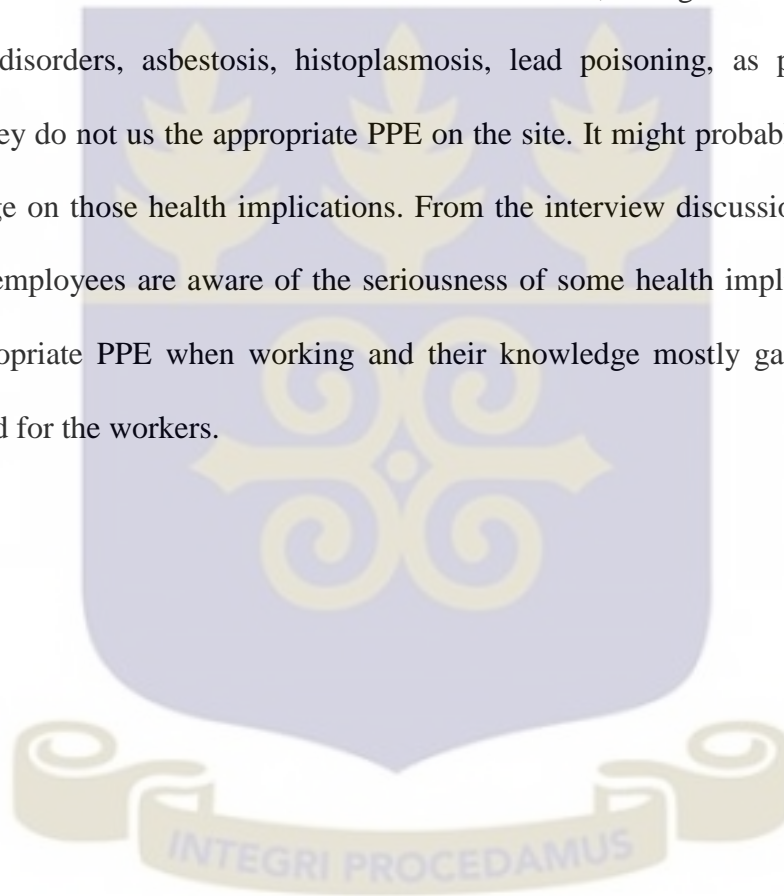
Surprisingly, none of the workers mentioned stress, heat, whole-body vibration, noise, repetitive motion, awkward postures, isolation, as part of the potential hazards on the site. It might probably be as a result of inadequate knowledge on those health hazards due to inadequate training given to them.

5.5 Knowledge on Health Implications Associated with their Work

Concerning the knowledge on associated health implications if not using the appropriate PPE on site almost all 138(98.6%) of the respondents agreed that there were associated health

implications if they do not use the appropriate personal protective equipment. However majority of the respondent 109(77.9%) claimed that injuries were the most common health implications if not using the appropriate PPE, 17(12.1%) of the respondents mentioned noise induced hearing loss with 14(10%) indicating skin dermatitis. This finding supports a study by (Kathmandu and Nepal, 1974).

Surprisingly, none of the workers mentioned silicosis, lung cancer, electrocution, musculoskeletal disorders, asbestosis, histoplasmosis, lead poisoning, as part of the health implications if they do not use the appropriate PPE on the site. It might probably be as a result of lack of knowledge on those health implications. From the interview discussions, the researcher noted that most employees are aware of the seriousness of some health implications if they do not use the appropriate PPE when working and their knowledge mostly gained from various training organized for the workers.



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The study showed that majority 94(67.1%) of the respondents understood the need for PPE and want to be protected against accidents, injuries and illnesses even though about one fourth of the workers had inadequate knowledge on personal protective equipment usage on site.

Furthermore, it showed workers were provided with Safety Boots, Rain Boots, Ear plugs, Safety Helmets, Safety Belts or Harness and Reflective Jackets. However, workers were not provided with the following required personal protective equipment needed for their work. (Goggles, hand gloves, nose masks or respirators and overalls).

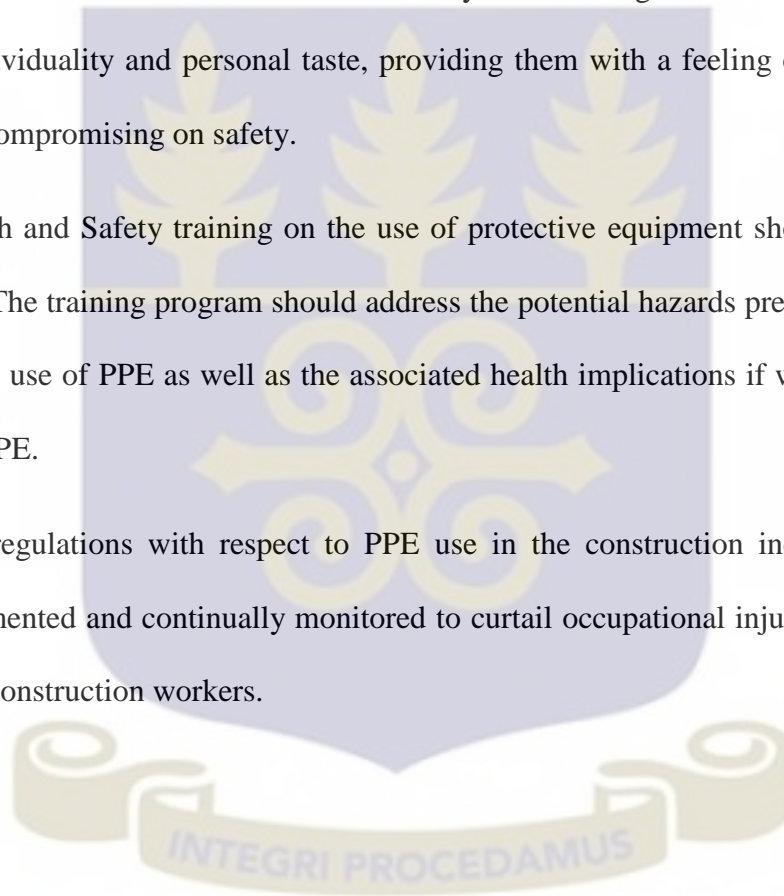
Reasons such as feeling uncomfortable, poor fit of PPE, reduction in productivity as well as inadequate training on appropriate use of PPE accounted for the avoidance of PPE use.

Most of the respondents had inadequate knowledge on exposure to potential hazards as well as the health implications of non-use of the appropriate personal protective equipment on site.

The most recognized health implications of non-use of the appropriate personal protective equipment on site was injuries 109(77.9%), skin dermatitis 17(12.1%) and noise induced hearing loss 14(10%).

6.2 Recommendations

1. The required PPE should be provided on the construction sites. However, the level of comfort with regards to PPE should be improved by providing the workers with PPE made from lighter materials, that provide both protection and a better fit to help make the use of PPE more user friendly to enhance compliance.
2. Employees should be allowed to choose their style that can give them the opportunity to express their individuality and personal taste, providing them with a feeling of appearing more stylish, without compromising on safety.
3. Periodic Health and Safety training on the use of protective equipment should be conducted for the workers. The training program should address the potential hazards present, the selection, maintenance, and use of PPE as well as the associated health implications if workers do not use the appropriate PPE.
4. Policies and regulations with respect to PPE use in the construction industry need to be reviewed, implemented and continually monitored to curtail occupational injuries, accidents and illnesses among construction workers.



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APPENDICES

Appendix 1: Questionnaire

Title: “Assessment of knowledge and use of personal protective equipment on site among building construction workers”

Principal investigator: Alex Nsiah Kwarteng

Qualification: BSc Nursing

Address: Department of Biological, Environmental and Occupational Health,
School of Public Health, University of Ghana, Legon.

General information about the research

This research is being conducted to collect data on Assessment of knowledge and use of personal protective equipment on site among building construction workers. It seeks to assess the worker’s knowledge level on on-site preventive equipment usage, to describe the practices of the workers on the use of personal protective equipment, to assess the knowledge of the workers on the occupational hazards they are exposed to and to describe the associated health implications of not using personal protective equipment on site.

The study is purely academic research which forms part of the researcher’s work for the award of a Master’s Degree in Occupational Hygiene. The study has no room for any conflict of interest.

Confidentiality

All data collected will be kept under lock and key. The field notes will be expanded and typed into computer files.

Pictures of various personal protective equipment taken will be protected by passwords which will be accessible to the researcher only.

Voluntary participation.

Participation in the study is entirely voluntary and that declining to enter the study will have no negative consequences.

Your rights as a participant

This research has been reviewed and approved by the Ghana Health Service Ethical Review Board. If you have any further questions about your rights as a research participant, you may contact the chairman of the Board.

Name and contact of the GHS/ERC Administrator. (Ms Hannah Frimpong-0243235225/0507041223)

I agree to participate as a volunteer.

Date.....

Signature or thumbprint of volunteer.....

QUESTIONNAIRE

SECTION 1: BACKGROUND INFORMATION ABOUT THE RESPONDENT AND THE

ORGANIZATION: Please respond by marking or ticking in the box of your choice.

1. What is your age in years?
2. Marital status a(Single) b(Married) c(Widowed) d(Divorced)
3. What is your highest Level of Education a(Primary) b(JHS) c(secondary) c(Tertiary)
d(Other.....)
4. What is your total number of years of working experience?
a(1-2 years), b(3- 4years), c(5-6 years), d(7-9 years), e(10 years and above)
5. What is your occupation? a(Helper), b(Steel bender), c(Machine operator), d(Painter),
e(Mason), f(Carpenter) h(Site supervisor), i(Other specify.....)
6. How long have you been in this company?
a(Less than 1 year), b(1 year), c(2 years), d(3 years), e(4 years), f(5 years and above)
7. How many hours do you work per day?
a(Less than 8 Hours), b(8 Hours), c(Over 8 hours), d(8 hours and sometimes overtime)

SECTION 2: OCCUPATIONAL HEALTH AND SAFETY ISSUES

8. Have you ever sustained an injury or impairment(s) while employed?

a(Yes) b(No)

9. If yes what was the extent of the injury? a(Slight injury), b(Partial disability), c(Permanent disability), d (Other specify.....)

10. Do you agree that there is a high level of hazards on sites? a(Agree) b(Disagree)

11. If you agree what are some of the potential hazards identified on your site?

Please select as many as apply. a(Falls), b(Dust inhalation), c(Poisonous chemicals), d(Manual material handling) e(Hot or cold weather), f(Iron rods) g(More than 1) h(Other specify.....)

SECTION 3: WORKERS' KNOWLEDGE ON THE ASSOCIATED HEALTH

IMPLICATIONS OF NOT USING PERSONAL PROTECTIVE EQUIPMENT ON SITE

12. Do you agree that there are some associated health implications if you do not use the appropriate Personal protective equipment on sites? a(Yes), b(No)

13. If yes what are some of the associated health implications of not using (PPE) on site? Please thick as much as you know.

a(Injuries), b(Skin dermatitis and allergies), c(Noise-induced hearing loss), d(Lung cancer), e(Musculoskeletal disorders), f(Silicosis) g(Other specify.....)

SECTION 4: ASSESSMENT ON KNOWLEDGE ON PERSONAL PROTECTIVE EQUIPMENT

14. Have you heard about (PPE)? a(Yes) b(No)

15. If yes what is the extent of your understanding of Personal protective equipment? a(Fully understand), b(Average understand), c(Minimal understand)

SECTION 5: PRACTICES AND ATTITUDES WITH REGARDS TO PERSONAL PROTECTIVE EQUIPMENT USE ON SITE.

16. What are the types of personal protective equipment available to use on site?

a(safety Boot), b(Rain Boot), c(Overall), d(Reflective jacket), e(Nose Mask or Dust mask), f(Safety Helmet), g(Safety Belt or Harness), h(Gloves), i(Goggles), j(All the above)

17. Do you use Personal protective equipment on site for protection from injuries?

a(Yes), b(No)

18. Is there any training organized for the workers on how to use the available personal protective equipment? a(Yes) b(No)

19. If yes, how often is the training organized for you? a(During induction), b(Every morning), c(During induction and every morning), e(Other specify.....)

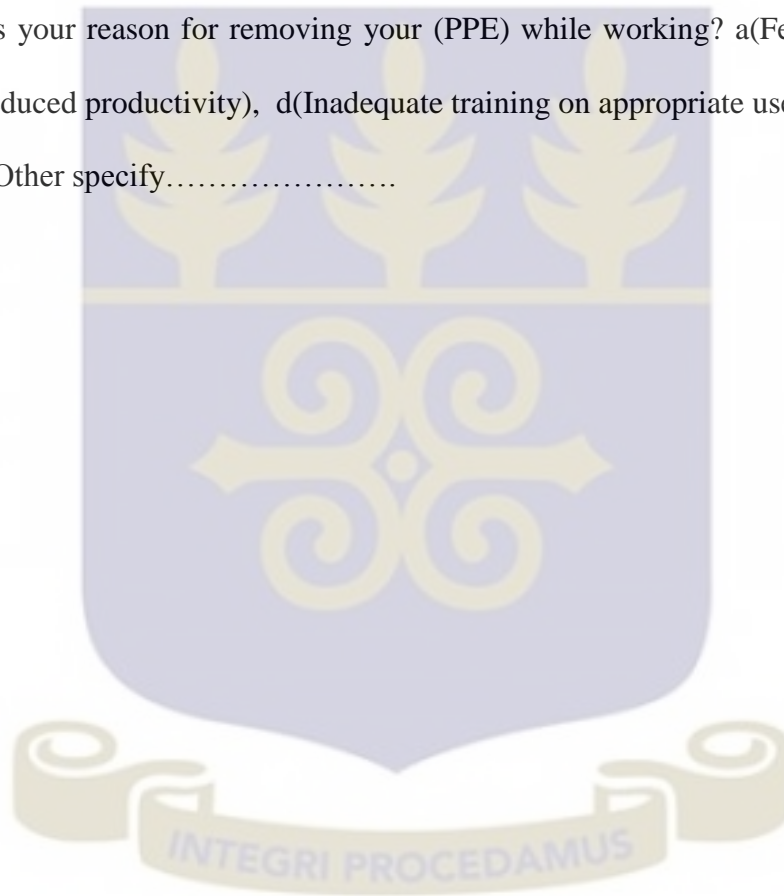
20. Do you agree that using Personal Protective Equipment reduces the risk of occupational disease or injury due to continuous working in a hazardous environment? a(agree), b(disagree)

21. Do you agreed that it is the requirement of the employer to provide Personal protective equipment for all workers at sites? a(Agree), b(Disagree)

22. Do you agree with this company to restrict entry of workers without using Personal protective equipment from entering construction sites? a(Agree), b(Disagree)

23. Do you remove your personal protective equipment while working on site? a(Yes), b(No)

24. If yes what is your reason for removing your (PPE) while working? a(Feel uncomfortable) b(Poor Fit), c(Reduced productivity), d(Inadequate training on appropriate use), e(Not enforced by employer), f(Other specify.....)



Appendix 2: Consent Form

Title: “Assessment of knowledge and use of personal protective equipment on site among building construction workers”

Principal investigator: Alex Nsiah Kwarteng

Qualification: BSc Nursing

Address: Department of Biological, Environmental and Occupational Health,
School of Public Health, University of Ghana, Legon.

General information about the research

This research is being conducted to collect data on Assessment of knowledge and use of personal protective equipment on site among building construction workers. It seeks to assess the worker’s knowledge level on on-site preventive equipment usage, to describe the practices of the workers on the use of personal protective equipment, to assess the knowledge of the workers on the occupational hazards they are exposed to and to describe the associated health implications of not using personal protective equipment on site.

The study is purely academic research which forms part of the researcher’s work for the award of a Master’s Degree in Occupational Hygiene. The study has no room for any conflict of interest.

Possible risk and discomfort

There are no risks associated with participating in this study. The procedures involved in this study are non-invasive and will not cause any discomfort to the participants.

Description of level of research burden

Study participants would be asked to fill a questionnaire which will be interpreted into a language understood by participants by a translator.

The workers knowledge level on the use of (PPE) during working on construction sites can be seen through to the habit (behaviour), mode of application, their initiative on getting the (PPE) as a personal protective. Careful observation the type of protective equipment available to them, rate of compliance with wearing (PPE) and reasons for non-compliance, types of training offered with respect to (PPE) use, how employers supply personal protective equipment and other information about occupational safety and workers will be identified.

Possible benefits

The information given will guide government on any future interventions on safety issues at the building construction sites.

Please, be informed that you are not going to be paid for participating in this study.

Confidentiality

Data security:

All data collected will be kept under lock and key. The field notes will be expanded and typed into computer files.

Pictures of various personal protective equipment taken will be protected by passwords which will be accessible to the researcher only.

Plans for record keeping:

The study materials (questionnaire, pictures and consent forms) will not be labelled with names of study subjects but rather unique identification numbers.

Person responsible and phone number

The person responsible for the data storage will be Alex Nsiah Kwarteng, a student of School of Public Health, University of Ghana, Legon. Mobile phone number:
0241138480/0203910900

Voluntary participation.

Participation in the study is entirely voluntary and that declining to enter the study will have no negative consequences.

Contacts for additional information

Please call the person responsible for this study, Alex Nsiah Kwarteng on 0241138480/0203910900 if you have questions about the study.

Your rights as a participant

This research has been reviewed and approved by the Ghana Health Service Ethical Review Board. If you have any further questions about your rights as a research participant, you may contact the chairman of the Board.

Name and contact of the GHS/ERC Administrator. (Ms Hannah Frimpong-0243235225/0507041223)

Volunteer agreement

The above document describing the benefits, risks and the procedures for the research entitled “Assessment of knowledge and use of personal protective equipment on site among building construction workers” Kotoka International Airport, Accra” has been read and explained to me. I have been given the opportunity to ask questions and all the questions that I have asked about the research have been answered to my satisfaction.

I agree to participate as a volunteer.

Date.....

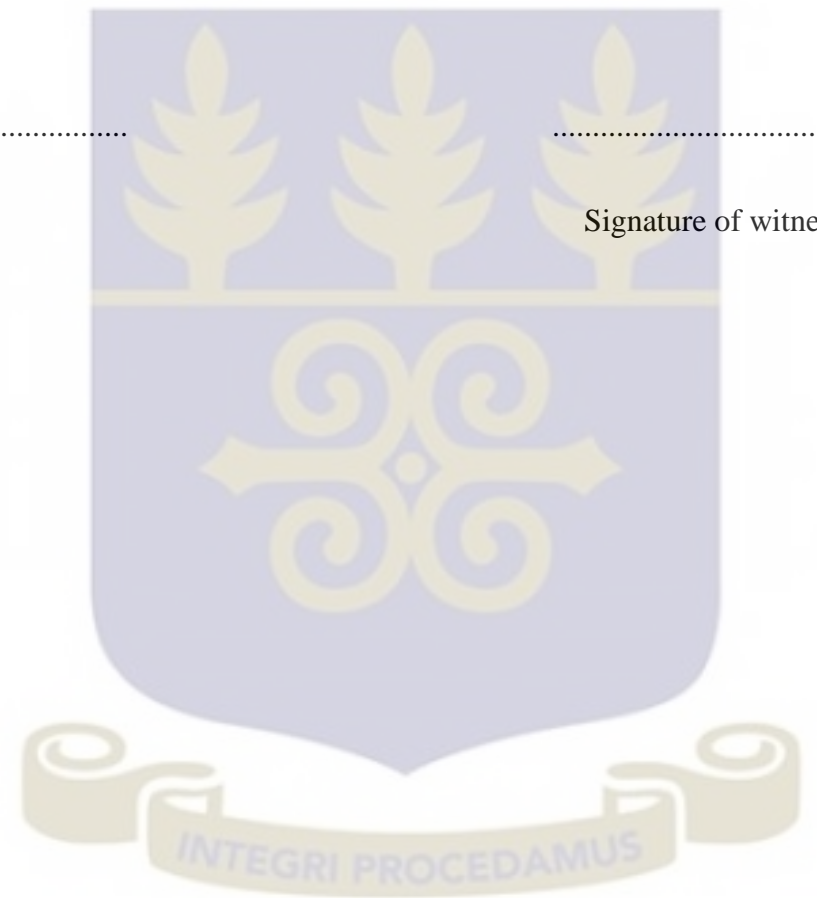
Signature or thumbprint of volunteer.....

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual. All questions were answered and the volunteer has agreed to take part in the research.

.....

Date Signature of witness



Appendix 3: Map of the study area

