UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

ASSESSING HEALTH AND SAFETY PRACTICES ON BUILDING CONSTRUCTION SITES IN THE CENTRAL REGION, A CASE STUDY OF BUILDING CONSTRUCTION SITES IN THE GOMOA WEST DISTRICT

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BY

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A RESEARCH WORK SUBMITTED TO THE UNIVERSITY OF EDUCATION, WINNEBA-KUMASI, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF DEGREE OF MASTER OF TECHNOLOGY (CONSTRUCTION TECHNOLOGY IN EDUCATION)

AUGUST, 2018

DECLARATION

CANDIDATE'S DECLARATION

I hereby declare that this project work is the result of my individual research, effort and all quotations from books have been duly acknowledged.

Signature: ……

Date: ……..

BENJAMIN ALWYN NII-AYITE ARYEETEY

SUPERVISOR'S DECLARATION

I hereby certify that the preparation of this project work was supervised in accordance with the guidelines on supervision of long essay laid down by the University of Education.

Signature: ……..…… Date: .....

ENGR. M.K TSORGALI

DEDICATION

I dedicate this work piece whole heartedly to my late mum, Emelia Akweley Attoh, whose eyes closed upon the light of this world some 40 years ago but her songs of inspiration keeps reminding me of discipline and hard work and to my daughter, Florence Emelia Naa Deedei Pakimony Aryeetey, for her patience and prayers for me.

ACKNOWLEDGEMENTS

To begin with, my utmost thanks and profoundest gratitude is unto his excellencies, JEHOVAH, the Universal sovereign, who has been my source of strength and provider in difficult moments throughout my existence in this world, for guiding me to this stage in life.

It would be a gross dissatisfactory and dishonesty should I neglect the commitment of my nephew, Francis Robert Nii Ayi Aryeetey (Jnr.) for his support in the data entering of respondent's questionnaires, using the statistical package for social sciences (SPSS) after the field survey.

Besides, I owe my sincere indebtedness to my supervisor, Engr. M.K. Tsorgali for his candid and objective remarks that aided me to produce this work piece. I am most grateful for his concise and constructive criticism and motivation that serves as a guiding principle and landmark in completing this project work.

This project work would have been incomplete if I do not mention these two personalities, Mr. Justice Ewusi and Samuel Ofori, the site engineer and site supervisor for their respective firms, Vamed Engineering Ltd and Plan Construction Company respectively, for their tremendous contribution during the collation of responds at their respective sites. I would also want to appreciate Mr. Adjetey Sowah, a foreman from another site who was very welcoming.

Finally, I would wish to thank my headmaster, Mr. Kobina Apo Arthur and Mr. Joseph Amofi (Asst. headmaster) as well as other colleague staff, who contributed in diverse ways to the successful compilation of the project.

ABSTRACT

The building construction industry is very important to the socio-economic development of a nation. It portrays its religions and cultural values as well as the wealth of the nation. In spite of its importance, the construction industry has been regarded as being risky with frequent and high accident rate and Ill-health problems to workers, practitioners and end users. The purpose of this project is therefore to assess the health and safety practices adopted on building construction sites in Gomoa West District and the level of compliance with health and safety regulations/measures, and to suggest strategies to be put in place to curb health and safety risks on building construction sites. The study adopted both survey and descriptive designs. The survey technique was used in gathering information from site supervisors, whereas questionnaires were used for gathering data from general workers. Interviews were conducted with project managers and casual workers on the importance of health and safety practices on site. The descriptive research was used for the study since it helped to identify the health and safety measures used on site and evaluate their enforcement mechanisms put in place. The questionnaires and the respondent's views were analyzed in percentages, frequencies, mean score and standard deviation. Among the findings of the study were

that;

Management's poor safety measures were the major causes of accidents on site, and lack of training personnel to train workers health and safety on the sites.

The study recommended that management of construction firms should employ the services of a training personnel, and provide workers with protective equipment.

Also, regulatory bodies should monitor the activities of contractor.

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INTRODUCTION

1.1 Background of the Study

Safety, as explained by Ataev (1985), is the working conditions, protective devices and methods for controlling and organizing operations, which would minimize or eliminate accident risk and the possibility of occupational diseases.

Safety management is communicated in construction context through assessment, specifications, regulation, a safety plan or program and included in the contract document. Therefore, same must be done in Ghana to ensure that its implementation is carried out to the latter, to ensure an accident-free site. It was a shock to realize that most building contracts within the Gomoa West district are being undertaken by unregistered contractors who have worked as masons for a long time and have no idea about health and safety practices and therefore, have no safety management system in place. One of such contractors admonished the foreman and other workers not to give audience to anybody wanting to conduct a research work on his site, when it was mentioned to him that his site had been chosen as a research centre for the simple reason that, workers on site work without any form of safety management system in place. Is it not obvious that most of these local building contractors do not care about the welfare of their workers but are there to make profit? Issues of safety and sanitary practices are not given prominent attention among contractors within the district.

Safety, according to the Advanced Learners Dictionary (1963), is the act of being Safe, freedom from danger or doing nothing that might endanger the life of the other people, and as the adage goes “Safety first”, meaning that, the Safety of workmen or personnel on any project or construction site must be a priority management team in order to achieve the following:

i. Maximum security of labour or workmen, ensuring an accident-free or injury-free site.

ii. Maximum performance of labour, interns of work output to enhance an increase in production

iii. Minimize or reduce the overall cost of construction, thereby increasing profit as well as alleviating poverty among workmen and finally but not the least

iv. Promote friendship among workmen and management team, in that the workmen would be conscientized about the work safety, the need to observe and practice safety at all times and be provided with safety gadgets to work with, so as to protect them from health hazards, thus keeping them active throughout the construction processes or project life cycle.

There exists lots of work hazards on the construction site starting with site preparations through material supply, erection of the structure, roofing, finishings to landscaping, health and safety practices, must be entrenched in the project management, to reduce or eliminate accidents, in relations to material and equipment handling, equipment and vehicular movement, physical environment of worksite, construction operations, properties of the construction project itself and human error or negligence on the part of workmen, in both manual construction and machine- intensive works.

The labour Act of Ghana which was revised and enacted into Law in October, 2003, by an act of parliament (Act 651), laid down safety regulations for the maintenance and safety of both the workman (employee) and the employer, as well as the general public.

For the last seven (7) years, Ghana has witnessed or experienced disasters in the construction industry (not to mention of the Melcom disaster and others) in the Greater Accra Region, within

the Accra metro which claimed the lives of prominent personnel and bread winners to families and the construction industry as well.

Kheni (2008), asserted that construction health and safety should be of paramount concern to employers, employees, governments and project participant. Hence, the safety of a successful project lies in the hands of the client, the main contractor, regulatory bodies and the employees, who must ensure that they are each other's keeper, in terms of safety.

In year 2000, the labour department (2000, 22) reported that, the construction industry in Ghana accounted for the highest rate of occupational deaths in comparism to other industrial sectors. According to the Labour Department (2000) report, 56 out of a total of 902 occupational accidents that occurred in the construction industry in year 2000, were fatal. This means a lot of deficit in the industry, individual homes and a short fall in productivity, which will adversely affect the completion date of projects and its overall cost (Annual report of the Labour Department,2000).

The number would have increased astronomically by now, hence, the need to carry out such a research activity. Hence, the purpose of this project work is to find out how knowledgeable workmen are, with the health and safety practices in the field they find themselves, and to make them aware of the essence of observing safety at the workplace and the positive impact it would bring to their socio-economic life.

Governments and for that matter, regulatory bodies and private businesses, who have been entrusted with the health and safety of the build environment must ensure that, the construction project is safe to build, safe to maintain and safe to use, providing environment safety as well.

In developing countries like Ghana, where infrastructural development like the construction of dams, gas plants for the processing and distribution of natural gas to power the energy sector, the construction of schools, health facilities, engineered roads and real estate development to meet the growing demands of the citizenry, the construction industry, if well regulated, and with health and safety well-articulated in the afore mentioned projects, even though construction sites have been known to be a risky environment where employee suffer fatalities that render them jobless, redundant or inactive and with other health associated problems, could go a long way to improving the economy of the country.

1.2 Statement of the Problem

A visit to eight building sites in the Gomoa West district of the Central region, only three (out of the eight sites visited) have some form of safety management system in place, as per my observation. For the three that have some form of safety management system in place, workers (skilled and unskilled labourers) were in their safety clothes whilst working. A steel bender working on the burglary proof window frame was seen busily joining metal pieces together, in his safety clothes. Some electrical technicians were also seen in their safety clothes going about their duty on site but for the other five sites visited, the situation was the usual Ghanaian construction attitude. Labourers were parking blocks without hand gloves, protective boots, helmets, goggles, etc. and to my surprise, they were wearing bathroom slippers known as "charle-wote" whilst the foreman looks on. On some other sites, there were dismantled forms scattered all over the site with piercing nails on them. The problem of bushy sites was one other observation made during the visit. It was observed that apart from the working area (building area), the remaining part of the building site was bushy, and no wonder a mason had a scorpion sting when wearing his boots to start his day's work.

Another problem observed was the poor disposal system on site. Waste such as material debris and food waste were kept in close proximity to the working area. Besides, some project sites do not have sanitary facilities hence, "workmen" resort to the surrounding bushes on site to ease themselves (attend to nature's call), exposing "workmen" to any form of health hazards and accidents, as well as unnecessary delay of work on site. At another site visited, the project engineer (foreigner, whose identity is withheld for the purpose of this research) was openly smoking cigarette in the midst of "workmen" who were busily working close by, inhaling the second hand smoke from the project engineer. This could be hazardous to workmen. Therefore, it can be concluded that, health and safety practices among some contractors is been relegated to the back and it is high time the health and safety regulation are revisited and its implementation enforced.

Furthermore, it was observed that there were no warning signs around open ditches or manholes to caution or ward off pedestrians who walk across the site, as most of the building sites are not hoarded, and also workers and suppliers to be cautious of danger zones within the site. All these are contractual negligence which may pose danger to human life.

Laryea, (2010), asserted that the construction industry is regarded as an accident- prone environment and project managers and contractors, clients and regulatory agencies do not priotise the health and safety of employees on site, hence, the rampant reports of accidents which are fatal on construction sites in some parts of Ghana.

A study by Kheni (2008), on health and safety practices in Ghana, revealed that, there is lack of skilled human resources, inadequate government support for regulatory institutions and

inefficiency in institutional frameworks, contributing to the poor health and safety standards, in the country.

Meanwhile, the labour Act (Act 651) of Ghana, stipulates that, it is the sole responsibility of the employer to ensure that there is a serene environment, safe and sound or healthy, to carry out work and all works must be carried out in a safe manner as possible. Which implies that, every employer of a construction project must provide workmen with safety inputs like the protective hat, overall, safety boots, gloves, goggles and high visibility vest and with warning post to protect workmen and alert the general public of possible dangers, but these remain a challenge to employers on most construction sites, especially with the small-scale construction business.

These contractors seem to have forgotten the importance and the essential role that the observation of safety practices play on project sites to the construction business, hence, the quest to delve into the safety practices on building construction sites in the Gomoa West District, specifically the category D and K contractors.

1.3 Purpose of the Study

The purpose of this study is to assess the level of awareness of health and safety practices in construction sites, and to make them aware of the essence of complying with safety norms, on their socio-economic life.

1.4 Objective of the Study

The objective of this project work is to assess the level of awareness of health and safety practices among building contractors in the Gomoa West District of the Central Region. Thus, the research objectives include:

i. Explore the health and safety practices on building construction sites.

ii. Identify the cause of non-compliance to safety and health norms on building construction sites.

iii. Devise strategies to improve the health and safety practices on building construction sites, and

iv. Make recommendations for improving the implementation of health and safety practices at construction sites in the Gomoa West District.

1.5 Research Question

These questions were carefully selected based on the research objectives in order to find lasting solutions to the numerous fatalities recorded on construction on annual basis and they include.

i. What are some of the health and safety practices adopted on building construction sites?

ii. What are the causes for the non-compliance to health and safety practices on sites?

iii. What are some of the strategies to be put in place to ensure an injury-free sites within the Gomoa west district of the Central region?

iv. What can be done to ensure the full implementation of health and safety regulations on site?

1.6 Significance of the Study

- The outcome of this research study, would help improve the health and safety needs of workmen in the construction industry, making stakeholders in the industry adopt stringent measure that could help reduce or minimize, if not eliminate, the quantum of fatalities on the site.

- Additionally, it would give insight to labourers (majority of whom are unlettered) on the importance of health and safety practices to their socio-economic life.
- Besides, the data collected will show the performance of small-scale construction businesses of their knowledge and implementation health and safety practices on the sites.
- Furthermore, it will help provide data that could aid professionals and other regulatory agencies formulate policies that will help bring sanity into building construction industry.

1.7 Scope of the Study

The research focuses on construction firms in the Central Region, precisely, within the Gomoa West District who are classified as small-scale contractors but employs a large chunk of the workforce in the country, who may be termed private businesses categorized under D and K contractors, sometimes working without any heavy-duty equipment's.

1.8 Limitations of the Study

The researcher employs the use of a descriptive survey system using questionnaires for the data collection and because the questionnaires were the close ended type, the research respondents were tight lipped to provide responses within a certain range which does not give the best of responses or intent of the respondents.

Besides, the research is targeted towards small scales construction business within the Gomoa West District of the Central Region, hence the need to be experimented or carried out at a different locality with same or different category of contractors before making a generalize assertion of the results in order to have a fair assessment of the findings.

Few challenges were encountered by the researcher in the administration of the questionnaires and are as listed below:

i. Some respondents show unwillingness to received questionnaires, though, the purpose and intension was clearly spelt out to them.

ii. Difficulty in getting back some of the questionnaires from respondents, for reasons best known to them.

iii. Some builders' refusal to grant access for interviews or access to their project sites.

1.9 Definition of key Terms

Health: It is the general condition of a person, in mind, body or spirit, usually meaning, being free from illness, injury or pain. The World Health Organization (WHO, 1946) defines health as the state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

Hazard: A situation, condition or behavior that has the potential to cause an injury or loss Health Hazard: A physical, chemical, biological or psychological hazard which may cause acute or chronic health effects in exposed employees (eg. Noise, dust, heat, ergonomics).

Safety: The act of being safe, freedom from danger or accident

Incident: A preventable, undesirable and unexpected event that results, or has the potential to result, in physical harm to person or damage to property.

Inspection: A planned, systematic evaluation or examination of an activity or worksite, checking or testing artifact against established standards

Risk: The chance of injury, damage or loss

Work site: A location where a worker is, or is likely to be, engaged in any occupation and includes and vehicle or mobile equipment used by a worker in a occupation

Manager: A person who administers and/ or supervises the affairs of a business, office or organization.

Worker: An employee supervised by a manager or supervisor or foreman.

Practice: The customary, habitual or expected procedure or way of doing something

Accident: it can be explained as the event which causes physical harm or damage to the body resulting from an exchange, usually acute, of mechanical, chemical, thermal or other environmental energy that exceeds that exceeds the body's tolerance. Anderson (1999) stated that, the terms accident and injury refer to two (2) separate phenomenon's, mutually interrelated as cause and effect.

Injury: it is the damage caused by external force. This may be caused by accidents, falls, trips, weapons, etc.

Crew: Group of workers performing discrete kinds of work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This aspect attempts to analyze tendencies in the practice of safety, health or sanitation on building construction sites. The following sources were consulted:

- Books
- Journals
- Dissertation and thesis
- Conference proceedings

The literature review forms an integral part of the study. Previous research on health and safety on construction sites is in existence and it is very relevant to this research work.

2.2 The Need for implementation of health and safety practices

Present day construction is marked by rapid execution of projects and the extensive use of machinery (from simple to complex machines) and complicated mechanized production processes. This involves a greater hazard of accidents to workers, and under these conditions, strict compliance with labour protection and industrial sanitary or health regulations is very essential. Practice has indicated that the danger of industrial traumatism is higher at those construction sites where safety regulations are not observed and work organization is poor.

It is therefore not in vain that the Labour Act of Ghana, Act 651 which was enacted in October, 2003 by parliament stipulates that the client through his/her construction agents must ensure the safety and protection and health of the workmen on site.

It is recommendations that adequate labour protection and fire prevention at construction sites should be incorporated in the design documents dealing with construction organization. No construction work must be undertaken where such documents are lacking.

The duties and degree of responsibility of administration and engineering personnel in charge of construction site for compliance with safety and health or sanitation standards must be defined in the basic norms and safety regulations relating to the execution of construction projects, including special building operations.

In accordance with the labour Act 651 (2003), the management of construction site is required to organize instruction and training of workers and engineering personnel and to check their knowledge of the safety regulations.

The results of the checks are entered into a special record book. Newly hired workers are put on the job only after an introductory instruction on safety regulations and industrial sanitation or health practices and after practical training at their respective work places.

2.3 Definitions of Safety

The Business Dictionary.Com defines safety as the freedom from danger, risk or threat of harm, injury or loss to personnel and or property, whether caused deliberately or by accident.

Alberta Labour (2015) defines health and safety management system as a process put in place by an employer to minimize the risk of injury and illness, and this is made possible by identifying, assessing and controlling risks to workers in all workplace operations. The scope and complexity of a system will vary according to the type of work place, and the type of

operations carried out. An effective health and safety management system must have the following eight (8) components in place:

1. Identification and analysis of health and safety hazard at the work site
2. Control measures to eliminate or reduce the risk to workers from hazards
3. Clearly demonstrated and management commitment, and written company policy.
4. Worker competency and training
5. Inspection programme
6. Incident report and investigation
7. Management system administration
8. Emergency response planning

Safety management is the process of determining and applying appropriate standards and methods to minimize the likelihood of accident or injuries, both during the projects and during the deliverables (PMI, Body of Knowledge, 2006: 30).

Zulch (2006) in a doctoral thesis opined that safety management systems (SMS) are implemented through policies, procedures and process of safety planning, safety assurance and safety control and continues improvement activities undertaken throughout the project (PM1, 2008: 119)

Ferry and Brandon in their book "Cost Planning of Building" quoted KirKham (2007: 34) suggesting that a health and safety Plan be designed during the design stage to establish the potential hazards and risks associated with the project. The process of safety managements:

i. Safety planning
ii. Perform safety assurance

iii. Perform safety control

Safety management is communicated in South Africa's construction context through assessments, specifications, regulations, a safety plan or programme and included in the contract document (Benett, 2003: 166, 225 – 227).

Again, KirKham (2007,374) stated that safety may relate either to safety of the structure or to the safety of the operations. Clearly, safety and cost are in conflict, safety must be paramount, therefore, it is vital that safety issues are identified at an early stage if estimates are to be relied on. However, safety is not discretionary, so there are no real choices to be made as regards the levels of safety, only the means of ensuring it.

2.4 Personnel Safety

Personnel safety can be said to be protection provided for ensuring that the workmen and any other person affected by the construction works is free from injury or accident in any form. Management must therefore ensure that workmen and other personnel are given the appropriate working tools as well as warning signs to conscientize the public and or ward them off danger zones.

Laryea, (2010) states that the state of health and safety on construction sites investigated between 2009 and 2010, using first hand observation of fourteen (14) construction projects was fairly poor. He went on to explain that, at each site, the construction project, workers and the physical environment of the sites were inspected and evaluated against health and safety indicators taken from the literature, and the results reveal a poor state of health and safety on Ghanaian construction sites. The reasons accounting to this situation were given as; lack of

strong institutional framework governing construction activities and poor enforcement of health and safety policies and procedures.

Besides, Ghanaian societies do not place high premium on health and safety of construction workers on site, and in an interview with the workers on site, it was again revealed that injuries and accidents are common on site. However, compensation for injury is often at the discretion of the contractor, although collective bargaining agreements between labour unions and employers prescribed obligations for the contractor in the event of injury to a worker.

It is even worse on construction sites where the contractor does not belong to any employers' association nor workmen belonging to any labour union. The contractor chooses to foot the medical bill to some extent, neglecting other responsibilities to the victim.

According to Fields, (2013), health and safety of the workers is the main concern on construction sites. Many sites fail to pass the safety standards when it is being inspected by local authorities. Well, it does not mean that they will lose their work. What authorities aim to do is to change the workers' way of (thinking) or working. They must be aware how dangerous their job is, so they should protect themselves from any possible risk.

Also, the Graphic Online (2016) quoted Manuli Zogbenu as stating emphatically that, Accra and some other parts of the country are witnessing the construction of interchanges, highways and high rising building.

Notable among these are the Kwame Nkrumah and the Kasoa interchanges. He expressed his shock and fear when he observed the lifting of heavy metal panels at height being mounted for

the overpass and calls for a comprehensive insurance for all motorists who ply the road and pedestrians and other road users.

Maloney, (2010), commenting on the ten most common construction site accidents, asserted that, there were 774 deaths due to construction site accidents, accounting for more than 18% of all on-the-job fatalities that year. Additionally, statistics show that four (4) in every 100 construction workers is non-fatally injured on the job annually. These staggering numbers reflect a very high-risk work environment. Surrounded by materials, tools and machinery, construction workers can find themselves facing hazards at any given moment. The most common construction site accidents include:

i. Falls from height and scaffolding
ii. Slips and falls
iii. Electrocution
iv. Falling debris materials or objects
v. Getting caught in between objects or materials
vi. Fire and explosions
vii. Over exertion
viii. Machinery accidents
ix. Getting heat by a vehicle
x. Trench collapse

When these occurred to construction workers and are injured, it does not only affect their health and livelihood, it poses a challenge to their families as well. On- the – job injuries can lead to expensive medical bills, financial constraint on company's budget as well as affecting the socio-economic life of families.

2.5 Environmental Safety Management

KirKham (2007: 314) states that construction is putting a serious dent in the world's natural building materials, and this is something the industry needs to work on to sustain the environment. The government is pressing for this taxation changes and guides to sustainability.

Environmental legislation is subject to specifics, such as noise, dust, protection of flora and fauna and waste and sustainability, and must be proactively incorporated within project planning to comply with these regulations (APM Body of Knowledge, 2006: 30).

The project environment directly influences the project and how it should be managed. The construction projects are not carried out in vacuum and are influenced by a wide range of stakeholders and issues that have an impact on, or are impacted by the project (Burke, 2010: 33).

If there are any limitations, it should appear in, or be communicated by, the contract documents (Benett, 2003:231).

Zack (2004: CD) states that, environmental management includes those processes necessary to ensure that project is executed in such a way as to not violate various government permits, regulations and conditions. Again, depending on the nature and location of the project, this can be a very technical complex part of the project management. The three areas of environmental management that a skilled cost engineer can easily assist in are budgeting, alternative selection and risk analysis.

Walker (2007:73) opines that, the construction project manager should not be concerned only with the internal regulations of the system, as the system has to respond to changes in its environment. The project manager must be able to detect and analyze changes, and actions

should be oriented to an understanding of the external influences acting upon the project organization.

The external influences that the project manager has to analyze and communicate to the client are political, meaning the influences of government policy, legal, meaning legislation may affect the client's activities by acting directly on the process of construction or influencing the incentive to build; institutional, meaning influences on professional institutions upon the activity of members, through rules of conduct, education and conditions of engagement; cultural and sociological, meaning acceptability of specific activities by the general public, particularly as reflected by the local community; technological, meaning influences of technology on processes through the development of new materials, techniques and ideas; and economical and competitiveness, that are forces, including the level of general economic activity and the demands this places upon organizations.

Active communication must be maintained with all stakeholders to provide clarification of the project's environmental objectives and to the community's environmental needs, expectations and concerns, which may have a great impact on the project (Pm1, 2008, 19).

In a News Bulletin on the nation's radio broadcast on the 5th of December, 2017, the UNEP director in-charge of Africa lamented that, in 2015, 9milion persons died globally, through environmental pollution, due to irresponsible disposal of toxins into the atmosphere.

In 2016, Agbogbloshie (also called Sodom and Gomorrha) in Accra was said to be the most polluted suburb in Accra, due to the activities of scrap dealers within the area.

The management of the environmental issues are communicated and regulated by the contract documentation, environmental safety regulation, material specifications and product identification, and the planning and design of the works regarding aspects such as land forms, drainage, vegetation and wildlife (Benett 2003:228-231).

Hence, the construction project manager needs the skill to communicate effectively with the client about environmental issues that may influence the construction project, either positively or negatively.

2.6 Safety Procedures in Transportation of Construction Loads

An essential precondition of health and safety practices in load transportation by general-purpose tracks and special handling means is strict compliance with safety regulations governing the loading and movement of motor vehicles. The regulations specify requirements on overall dimensions and marking of loads, turning radii, traffic speeds as a function of road conditions and other parameters.

Strict compliance with the health and safety practices is of importance for load handling operations in tight quarters at construction sites where movement of vehicles involves complicated maneuvering. Transport vehicles must not be overloaded and the load stresses should be distributed uniformly upon the axles.

Trucks, semi – trailers or panel – carrier cradles should be loaded in a manner to minimize dynamic stresses. This is of great importance to large – size reinforced concrete structural components which are very sensitive to dynamic stresses. Therefore, the positioning of a structural component on a transport vehicle is a function of the component's design.

2.6.1 Safety Procedure in Earth Moving

When performing earthmoving operations, it is essential to conform to safety regulations specified in the construction operations plan and in special instructions. Earthmoving near service mains (water/electricity /gas) is permitted only with the written permission of the organization in charge of the service. Earthmoving in the direct proximity of the services should be performed under the supervision of a work superintendent or a foreman.

Should unanticipated electric, water or gas mains, explosive materials or noxious gases be encounter, work must be immediately discontinued until the installations, objects or gases are identified and neutralized and permission is obtained to proceed with the work.

In natural moist soils, excavation and trenches may be worked with vertical walls without shoring to a depth of not more than 1m for sand, 1.25m for sandy loam, 1.5m for loan, clay and dry loess and 2m for every compact soil. In all other cases, excavations and trenches should be worked with sloped walls or with temporary shoring of walls.

Soil should never be dug by sapping. Excavations at points of pedestrians or motor traffic ways should be fenced off. Access to excavations and wide trenches should be provided by means of step ladders not less than 0.75m wide, and to narrow trenches, by ladders.

The spoil from excavations should be damped not nearer than 0.5m from the excavation's edge. No machines or mechanisms should be stationed or travel within areas where soil is liable to collapse or cave in. Before operations are started, all machines and mechanisms should be checked for defects and work stations prepared for them. When an excavator is in operation, no one is permitted to stand underneath its bucket or boom or perform any work on the side facing

the soil being dug. All persons not directly involved in the operations should be kept at 5m from the radius of action of the excavator.

Excavators should load the spoil into track via the end gate or side. The bucket should never be carried above the driver's cabin. Slopes and excavations should be inspected at regular intervals. Should cracks or other signs of imminent cave- in appear, work must be stopped, workers evacuated to a safe location, and proper measures should be taken to prevent the earth from collapsing.

When excavating in moist soils, shoring walls of excavation and trenches, lowering groundwater, thawing soils, digging soils by special methods and in other special circumstances, it is imperative to adhere strictly to specifications of the construction operations plan and to requirement of special safety regulations (Ateav, 1985).

2.6.2 Labour Protection in Drilling

Ataev (1985) in the book Construction Technology, opines that before starting boring operations, drillers should see that perforators (hammers) and hoses are in good condition. When faults are detected in tools, in electric mains or in compressed air supply piping, drillers should report them immediately to the foreman.

Before activating a drilling rig, make sure the rig is properly mounted on the working site, that mechanisms are in order and electric motors and starting equipment are reliably earthed. Drilling should generally be conducted by the wet method, as cleaning of the hole bottom by compressed air creates a large amount of dust at the working site. Drilling should be adequately illuminated during dark hours. No one, except for service personnel, should be allowed within the restricted Zone (15m from the well).

2.6.3 Labour Protection in Blasting

Strict observation of safety regulations is imperative in blasting. Blasting may be carried out only after it has been authorized by a relevant technical inspection. Blasting may be performed only by properly trained personnel having passed an appropriate examination.

A must in blasting is the determination of safe boundaries beyond which no trauma to personnel or damage to mechanisms and installations due to seismic action, impact wave or scattering of fragments of blasted materials is liable to occur. Radii of the danger zone are determined by appropriate calculations. Thus, the minimum radius of the safe Zone (Rsz) may be computed by the formulae. $Rsz = 5\sqrt{m}$, where m is the mass of the external explosive charge, kg.

If protective covers or shields are provided, Rsz may be diminished by a factor of 1.5. The danger zone should be cordoned off. Prior to blast, blasters and personnel are evacuated beyond the safety boundaries into artificial or natural shelters, where power supply breaker, a stand-by power generator or a blasting machine are also located.

Shooting of charges should be preceded by an audible warning or with the aid of colour flags. At night, signals are made with a red light. After the first warning signal, the danger zone is cordoned off, the hole or chambers are charged with explosives and all personnel evacuated except for the blasters.

The second signal authorizes preparatory operations related to firing. After the third signal, the fuse is ignited or current is switched on. Before the blast, the blaster –in-charge explodes a warning cartridge. This is a warning for all blasters to take shelter. The “all clear” is given by the fourth signal.

An important component of blasting operations is proper storage of explosives. Explosive stores are to be located outside the danger zone and at a distance from the buildings and installations. The distance from a fence to the store should not be more than 40m. A no trespassing zone not less than 50m wide is mandatory around the fence. Explosive should be stored in a decentralized manner. An explosive magazine should not contain more than 3 tons of blasting supplies. Transportation of explosives, especially of the nitroglycerine kind is hazardous. Therefore, observance of blasting safety regulation is imperative (Ataev, 1985).

2.6.4 Safety Procedure in Masonry Work

The most frequent causes of accident in masonry are departure from safety regulations in transportation of materials to working stations, use of non-standard or inadequate scaffolding and trestle work, absence of protective zones and visors, and incorrect working procedures resulting in the fall of materials and tools.

In laying foundations, checks are carried out to verify the strength and reliable consolidation of banks (slopes), safe arrangement of mechanism and machines, reliable drainage of water.

Construction materials should be delivered in excavations and trenches by mechanized means or with the aid of chutes and troughs fitted with sides. Cavities should be backfilled only after the mix has hardened, as the pressure of the soil may cause the failure of a fresh brickwork. When laying walls up to 7m high, a fence should be provided around the perimeter of the building at a distance of 1.5m from the walls. For walls higher than 7m, it is necessary to provide protective visors in the form of bracket supported planking. The visors should be at least 1.5m wide and slope from the wall upwards at 20^0 to the horizon.

Grabs, castings, containers and other clamping devices for handling construction materials should be reliable and prevent the fall of materials. The height of trestle work of an underlying storey should make it possible to lay 2-3 courses above the intermediate floor level, which ensures a safe erection of the first tier of the above-lying storey. Laying of cornices is very dangerous work.

Brick cornices projecting more than 30cm are laid from outside scaffolding only, and are temporarily fastened until the masonry mortar hardens. A cornice is inherently unstable as it is being erected, and therefore, on no account should beams supporting sliding scaffolding be rested upon it, and work on the wall or below, is strictly forbidden.

Loads upon planking of scaffolding and trestle work should not exceed admissible values. When a cage with bricks is placed upon the planking, a coefficient of dynamic impact of 1.2 should be allowed for. Planking of scaffolding should be guarded by handrails 1m high and capable of withstanding a side stress of not less than 250N, and provision of toe boards at 0.15m. From the first storey upwards, mason is required to work with safety belts attached to stable constructions (Ataev, 1985).

2.6.5 Safety in Concreting

In spite of the high level of mechanization of concreting, some operations are still performed manual, and a great many operations have to service numerous mechanisms. In order to ensure safe working conditions for workers during concreting, it is essential to observe the following:

When erecting forms, placing reinforcement and delivering concrete mix to where it is laid, particular care should be taken to provide reliable supporting scaffolding, planking, stairs, guardrails, barriers and slinging devices for lifting frame constructions, forms and

reinforcement units. For erecting forms at heights up to 8m, it is good practices to employ scaffolding with handrails 1m high and a toe board 15cm, high. For formwork at heights in excess of 8m, special suspended scaffolding not less than 70cm wide with safety guards should be provided.

Appropriate measures should be taken to ensure the rigidity of forms. When forms are built at upper storeys of buildings by plywood sheathing of posts, winds may give rise (particularly, during the cold season) to considerable horizontal loads (because of the sail effect) not allowed for by the design calculations. Additional bracing is then necessary to ensure adequate stability of forms. When dismantling forms, care should be exercised and form elements should be lowered by using winches and cranes.

In concreting, attention should be focused on adequate precautions against accidental electrocution. To this end, prior to starting electric welding, structures to be welded and metallic parts of welding plants (housing of welding transformers, generators, etc.) should be property grounded. Housing of vibrators should be earthed as well. It should be remembered that, despite a relatively low voltage (36v), operation of vibrators without due regard to safe practices may involve a risk of electrocution.

When electric equipment is employed, in addition to restricting access to heating devices by fencing off the area and posting warning signs, it is a wise practice to provide a red warning light. Concreting and operations involving switching of electrodes, temperature measurements, wiring repairs, etc. should be performed only after power supply is cut off, and breakers are open on both low and high voltage sides (Ataev 1985).

2.6.6 Ensuring Safety in Erection Work

One of the essentials of safe erection work is a correct operation of erecting cranes, especially provision of their stability and use of reliable slinging means. To ensure adequate stability, it is essential to place an erecting crane upon a reliable and thoroughly true base. Rail-mounted cranes must have rail anchors or anticreepers. In addition, each crane should be equipped with an automatic load-limiter, and the crane's cables should be checked at regular intervals. It is also necessary to fulfill all precautionary measures specified by regulations and in operation manuals.

In accordance with standing standards, slings, holding devices and other load handling accessories should be tested at regular intervals and condemned, if found unsafe. Before starting work and during erection, load handling accessories are tested by double load.

When lifting loads, the latter should be slightly guyed by means of taglines to prevent them from swinging and/or twisting the steel cables, however, the loads should be lifted and lowered only in a strictly vertical position. To avoid overloading erecting cranes, it is essential to read the markings indicating the masses of prefabricated reinforced concrete elements. Before lifting a load, make sure that slinging eyes are in good condition. No load should be left suspended during an interruption in operation.

Particularly strict precautions should be taken during windy. No erection work involving the use of erecting cranes should be performed in winds in excess of 6 points on the Beanfort scale. Erection of large panels having a large sail effect (solid wall panels, sheet metal structures and others) should be discontinued in winds above 5 points.

During erection, much attention should be given to welding, as it is inherently electric shock and fire hazardous. It is then imperative to take appropriate preventive measures when performing welding work. Safety in erection work greatly depends on the stability of previous mounted structures, butt joints and temporary and permanent bracing being major factors (Ataev, 1985).

2.6.7. Labour Protection in Damp proofing Work

The following precaution are essential in damp proofing work. Candors for boiling and heating dampproof mastics should be in good repair and have tightly volume. Under no circumstance should bitumen compounds be heated inside premises by means of open fire. Hot bitumen mastics should be delivered to work stations in conical barrels with tightly closed lids. Workers engaged in the preparation and the application of bitumen mastics and varnishes should perform their tasks only if provided with protective clothing, goggles, and breathing masks.

When preparing cold bitumen paints, a hot bitumen is poured into gasoline (and not the other round) and stirred with wooden agitators only to avoid striking a spark. The temperature should be kept within 70^0C. No cold mastics shall be prepared with ethyl gasoline and benzene. When handling mastics from cold products, it is necessary to employ closed type goggles and breathing masks. Expanding cement and sodium aluminate should be handled using rubber gloves and protective goggles.

Adequate training is imperative for workers preparing varnishes and paints by combining harmful and fire hazardous substances. Workers should wear breathing masks with special cat ridges or filters for collecting vapors and gases.

When damp proofing is made of perchlorvinyl paints and varnishes, workers should carry breathing masks with a forced supply of air. Synthetic varnishes and paints should be stored in specially equipped fire-resistant buildings located not nearer than 50m from dwelling and industrial buildings. Neither smoking nor use of open fire is allowed near areas where synthetic paints are handled, and no work shall be performed where sparks are a hazard. Workers handling damp proofing materials containing harmful or toxic substance should be examined for fitness at regular intervals, by a physician (Ataev, 1985).

2.6.8 Safety Procedures During Anti-Corrosion Treatment

During flushing operations and preparation of polyisobutylene, glues, mastics, filling colours and paints, work station should be isolated and provided with convective ventilation and explosion-proof electric lighting.

Workers preparing and using aramsite putty and suphate-acid-resistant cement should be provided with individual protection means such as goggles, aprons, respirators and over sleeves of rubberized cloth. When performing work in closed premises, reservoirs, or ducts, that is places where vapours of inflammable solvents may attain hazardous concentrations, it is prohibited to smoke, wear shoes with metallic nails, or circlets, carry matches or metallic objects in pockets, employ metallic ladders and trestles, and employ open fires within a radius of 25m.

Molten sulphur cement should be cast by workers in gas masks supplied with fresh air from the outside via hoses. Workers should coat their hands with protective ointment before work is started and after lunch and take a shower after a shift is completed.

Bitumen mastics and materials should be prepared and employed in strict conformance to labour protection regulations outlined in Building and Road Regulation Institute's document. When

sandblasting apparatus is used, conformance to regulations covering design and safe operation of vessels under pressure is imperative (Ataev, 1985).

2.6.9 Safety Procedures During Installation of Roof Covering of Piece Materials

Workers may be admitted to the roof only after a thorough inspection of rafters, battens, parapets and other roof elements. Workers should be provided with suitable clothing, non-slip shoe wear and safety belt. Walking on roofs with nailed–on planks.

Materials may be stored on roofs only in special cases which are hooked to battens. Areas where is a risk of materials falling should be fenced off. At the end of a shift, all materials and tools should be removed or reliably secured. It is positively prohibited to throw materials and tools from the roof. Such operations as covering of eaves, installation of flashing, parapet and drain pipes should be performed from cradles and ordinary or extensible scaffolding.

When working on roods, sloped 20^0 and more and on edges of roofs any slope, workers should attach themselves to solid structures by means of safety belts. Never perform roof covering work during sleet, dense fog, heavy snowfall, storms or winds of 6 points or over (Ataev, 1985).

2.6.10 Safety Procedures in Glazing

Glazing should be performed by workers who have been trained and instructed in safe procedures. All work should be performed only with mechanism and tools in good repair, and workers should be properly trained in the operation. Glass should be cut on special tables and workers should wear protective goggles. Glaziers should have their fingers protected with rubber caps or leather caps. Pliers for breaking off edges of glass should have rubber tips. All glass waste should be placed in special boxes and removed from work stations as required. Glass should be stored and handled in special boxes only. Non- protected glass should not be

carried on step ladders or delivered to scaffolding in this form. Mittens should be worn when opening cases with glass or when carrying glass. At the end of a shift, all glass should be removed from works stations. Scaffolding, trestle and ladders for glazing work should be adequately strong and stable. They may be used only after being fully secured and checked for reliability. Ladders should never be placed or leaned against sashes. When working at a height, glaziers are required to use safety belts. Work should never be performed on two (2) different levels of a scaffolding if continues planking is not provided between them.

Skylights should never be glazed when covered with ice crust, in winds of more than 6 points, or during dark hours. Work should not be performed on scaffolding during storms, in winds stronger than 6 points, or after darkness fall. Areas where glazing work is under way should be fenced off or guarded (Ataev, 1985).

2.6.11 Safety Procedures in Plaster Work

Internal plaster work should be performed from scaffolding or mobile tables, ladders may be uses in small- scale work only. External plaster work (application of stucco) should be done from reusable tubular or swinging scaffolding or from mobile tower-scaffolding. When scaffolding is not available, external slopes should be plastered from cradles or guarded flooring placed on beams projecting from openings.

Mechanisms and powered tools may be operated only by specially trained workers in strict conformance to safety engineering regulations. Workstations of nozzle-men should be provided with signaling facilities for contacting mortar pump operators. Nozzle – men and manual plasters should wear protective goggles. Powered devices should operate on 36v or less.

Premises should never be dried or heated with braziers, touches, or other fuel consuming devices.

Workers should not remain in premises being dried for more than 3 hours. Decorative mortar should be prepared from pigments not harmful to health and red lead, chromium lead and other toxic components should never be employed.

2.6.12 Safety Procedure in Painting

Painting jobs should be performed with due regard to the operation instructions concerning powered and hand tools. Compressed air apparatus and rubber hoses should be tested before use, at pressures exceeding service value by 1.5 times.

Regulations governing the use of scaffoldings, trestles, and ladders should be strictly observed. Ladders should be provided with pointed metallic or rubber shoes. No lead white or lead paints should be employed in interior painting. The use of plain and ethyl gasoline as solvents should be avoided.

Inflammable painting composition should be stored in fire-proof premises only, and never in basements of residential buildings. Painting compositions with harmful or inflammable components should be prepared by specially trained workers who should be provided with respirators, protective goggles, harmless detergents, protective pastes and other means.

When painting internal premises with compressed air apparatus and compositions with intensive evolution of harmful solvents, workers should be given respirators and protective goggles, and the premises should be adequately ventilated. Portable fans should be used when painting work is performed inside closed vessels. When painting closed premises with perchlorvinyl varnishes

and paints, works should be provided with gas masks with supply of air. In areas where volatiles inflammable compounds are handled, smoking and operations involving the use of open fire or apparatus liable to produce spark should be positively prohibited. Electric motors and wiring should be in versions free from the spark hazard. Workers handling harmful and toxic substances should be subject to regular medical checks. Workers performing painting jobs on roofs, skylights and other structures should employ safety belts.

2.6.13 Labour Protection in Floor Construction

It is important to observe the operating instructions when working with powered and hand tools. Work with hot mastics, acids, and miscellaneous corrosive agents, should be performed in adequate working clothes. The preparation of mortars from dry mixes should be carried out in the open air or ventilated premises. In the latter case, care should be taken to protect respiratory organs and eyes against the harmful effect of dust.

Work involving the use of rapid-setting varnishes and other compositions noted for the intensive evolution of solvent vapours should be conducted in respirators. No smoking is allowed in premises where inflammable substances are handled. Inflammable compounds may be heated in hot water only.

Temporary lighting lamps supplied from 127v and 220v mains should be suspended at a height of not less than 2.5m. The voltage rating of potable lighting fittings should not exceed 36v. Hot gas welding devices employed for jointing linoleum should also be operated from 36v power supplies.

2.6.14 Training of Health and Safety Personnel for Building Construction Works

The training of health and safety personnel is carried out in accordance with "Programmes for Training Workers in Safety Procedures and Checking the Knowledge of Safety Regulations in Construction by Engineering Personnel". The programmes may be adjusted to suit particular requirement of a construction site. Moreover, the administrative staff of the contractor should coordinate and submit for trade union's approval, a list of measures for ensuring labour protection and healthy conditions on site.

In addition to improvements in safety procedures and healthy practices on the site, "fail safe" meaning, working condition, protective devices and methods for controlling and organizing operations, which would minimize or eliminate accident risk and the possibility of occupational disease must be developed. Compliance to fire prevention regulations consists in strict observance of all fire prevention measures prescribed by the Fire Department and corresponding regulations which govern the organization of a construction project, location of firefighting equipment and instructions for its operation, storage and use of inflammable and explosive materials, and other relevant aspects of fire prevention.

Kheni et al (2006) in the book "The management of construction Site Health and Safety by Small and Medium sized construction Businesses in Developing Countries" a Ghana case study, states that, statistics on construction accidents in Ghana is very scanty, providing little evidence of the health and safety performance of the sector. Available statistics on accidents reported for working compensation indicated that the sector had a poorer health and safety performance than most other industries (Workmen`s Compensation Law,1987). A comparison of employment within the various sectors, with the number of accidents occurring in the sector. They further explained that, the construction sector employs 1.4% compared with Agriculture 55%,

Manufacturing 11.7% and Transport 2.2%. Thus, in terms of number of accidents per worker, construction led in the year 1975 and it was second to transport, storage and communications sector in the year 2000. This interpretation is however based on the assumption that, employment within the sectors remain constant over the years. The sector had a very low rate of reporting accidents on construction sites who rarely registered with the Factory Inspectorate. The Chief Factory Inspector indicated the difficulty of monitoring the health and safety on construction sites and the attitude of contractors as follows:

"Unfortunately, construction as we know is one of the hazardous areas you can get workers in, but before you even get to a construction site, they have already started the work either out of ignorance of the law or their refusal to comply with the law. It is not like a factory where you can know the location and it is there for several years. If they closed down, they will come and tell you where as contractors will not register their sites and by the time one realizes, they are finished and gone or have abandoned the project due to unforeseen circumstances.

2.6.15 Sources of Health Hazards on Building Construction Sites

The factors causing construction site accidents have been addressed by several researchers. Toole (2002) listed the main causes of construction site accidents as lack of proper training, deficient enforcement of safety, lack of provided safety equipment, poor attitude toward safety and isolated sudden deviation from prescribed behavior. Thus, in order to understand the sources of accidents and subsequent injuries, researchers have attempted to develop theories of why accidents occur. Accidents are viewed as originating from a technical or human error (Chi et al., 2005; Murie, 2007).

The multiple accidents causation theory postulates that there are many contributory causes leading to an accident. The causes are categorized into behavioural and human factors. Behavioural factors include attitudes, skills and knowledge. Environmental factors include worksite hazards and procedures that contribute to injuries (Taylor et al., 2004).

A similar view is held by Lubega et al. (2001), who found that the causes of construction accidents in Uganda include a lack of knowledge about safety rules, engaging an inexperienced workforce, and lack of respect for safety. Tam et al. (2004), agreed with this view and suggest that the main factors affecting safety in China were managers` poor safety awareness, lack of training, reluctance to commit resources to safety, and reckless operations.

Besides, Dejus (2007), conducted a study in the Lithuanian Republic and identified that the major reasons for serious and mortal accident are in experienced employees, lack of qualifications and understanding risk on construction site. Rahim et al (2008), carried out a survey in Malaysia to identify the causes of accidents on construction sites, they found that unsafe methods are the most frequent reasons for accidents on construction sites.

Similarly, Holt (2001) argued that, secondary causes of accidents centered on management pressures, such as financial restrictions, lack of commitment, inadequate policy and standards, deficient knowledge and information, restricted training and task selection and poor-quality control systems. He again stressed that incomplete structural connections, temporary facilities, tight work areas, varying work surface conditions, continually changing work sites, multiple operations and crews working in close proximity are common causes of construction-related deaths and injuries.

According to Sarah (2011), the sources include site conditions such as the nature and physical layout of the work, location and weather, equipment and materials specification such as paint and asbestos that has the potential to cause ill-health problems. The human factor includes human behavior, competence, attitude and management such as leadership and safety culture of the organization. The job factors include the nature of the task, design, detail, duration and the size of the structure itself.

2.6.16 Types of Health Hazards on Building Construction Sites

A lot of researchers have categorized health and safety hazards into two (2) namely, physical injury hazards and ill-health hazards (Davies & Tomasin, 1996, HSE, 1998; Murie, 2007).

Hazard of physical injury include death consequences. Hazard of ill- health can only be notified after a long period and shall cause sickness of death after a certain period of time (Murie, 2007). The following are common hazards on construction sites irrespective of the physical injury or ill-health category:

a. Height

The main hazards associated with working at height are people and object falling on people below. Falls from height have been viewed as one of the most frequent killers of workers on construction sites. Statistics show that nearly 1000 construction workers are killed yearly at their places of work. Of these, one-third or over 300 deaths are as result of site falls (ILO, 2005). The study from different countries for example, New Zealand, indicates that, falls from heights are the leading causes of occupational injuries on construction sites (Bentley et al., 2006). In China's construction industry, falls account for approximately 51% of injuries (Yung, 2009). In Hong Kong, work – related falls from heights represented more than 47% of all fatal incidents

(Chan et al., (2008). Chi and Wu (1997) also reported that, more than 30% of fatalities in Taiwan can be attributed to falls. As a result, falls are the most frequent occupational hazard in many countries. Common construction site falls include roof-related falls, crane falls, scaffolding falls, elevator shaft falls, falls resulting from holes in flooring and falling objects. These may occur as a result of inadequate edge protection, or from objects in storage being poorly secured.

Workers at risk of falling from height include painters, masons, decorators and window cleaners and those who undertake one of such jobs without proper training, planning or equipment (Murie, 2007).

b. Slips and Trips

Slips and Trips are seen as the most common workplace hazards and contribute to over a third of all major injuries (Hughes and Ferret, 2011). Over 10,000 workers suffered serious injuries because of a slip or trip in 2010. They occur in almost all workplaces and 95% of major slips result in broken bones (HSE, 2004). According to statistics from the Health and Safety Executive (HSE), slips and trips are the single most common cause of injury at work, and account for over a third of all major work injuries (HSE, 2003). They cost employers over £512m a year in lost production and other costs and account for over half of all reported injuries to members of the public.

The study done by Lipscambe et al. (2008) on the USA revealed that slips account for 18% of all injuries and 25% of workers' compensation payments. Slips contributed to 85% of falls on the same level and over 30% of falls from heights as well as a signification number of musculoskeletal injuries sustained after slipping. They can also be the initial cause of a range of other types of accidents, such as falls from heights. Slips and trips are caused when materials

are scattered everywhere haphazardly, the floor is wet or greasy, inappropriate footwear is worn, mainly by casual employees and visitors, something large or heavy is being carried, reducing one's balance, and when lighting is poor.

c. Equipment, Machinery, Tools and Transport

Vehicles are necessary for transporting goods and people. However, many people die and are injured due to being struck or crushed by equipment and machinery at construction sites, especially by reversing machinery, site machinery falling in the excavation area, machines overturning due to travelling down a steep slope, and material falling from construction equipment, especially haulage trucks, hitting people behind it or nearby (HSE, 2004). Crush injuries can have a wide range of serious effects, including fractures, internal injuries, head and brain injuries and back injuries. In some cases, a crush injury may result in amputation and permanent disability of the affected worker. Meanwhile, many people are injured due to being chopped and cuts by equipment and hand-held working tools such as chisels, screw drivers, knives, saws, hammers, nails and drilling machines. The greatest hazards posed by hand tools results from misuse and improper maintenance.

d. Electricity

Electricity if widely used on construction sites but has the potential to be very hazardous with possible fatal results. Someone coming into contact with a live electrical conductor will get a shock that may lead to injuries or even death. In the UK, for example,2% of all fatalities at work are caused by electric shocks (Hughes and Ferret, 2011). Most injuries and deaths from electricity are due to, using poorly maintained electrical equipment, working near overhead high-tension lines or domestic electricity supplies, contact with underground power cables during excavation work and working without appropriate safety gear.

e. Fire

Fire is one of the many hazards that construction workers could face on site. Although, fire hazards are not seen as such as a high risk compared with falling from a height, slipping, tripping and falling, fire hazards need to be considered at all stages of the building process (HSE, 2003). Every year on many construction sites, workers are killed or injured as a result of fire. There are about 400 construction fires annually in the United Kingdom and about a 100 of them cause over £50,000 worth of damage and can result in the in complete dislocation of the project schedule (Hughes & Ferret, 2011).

Fires on site are caused by braising work carried by plumbers, gas lines, for underground work, power lines, power leads and tools, machinery requiring petrol and diesel, and hazardous chemicals.

f. Manual Handling

Manual handling is defined as movement of load by human effort alone (Hughes and Ferret, 2011). It includes any activity requiring the use of force exerted by a person to lift, push, carry or otherwise move or restrain any moving or stationary object (HSE, 2003). It has been argued that, lifting bricks, cement blocks, and cement bags weighing 50kilograms has been regarded as risky activities on construction sites (Hughes & Ferret, 2011). Back injuries and emasculatory disorders, sciatica, hernias, and slipped discs are often the most serious of construction site injuries. In a study by Small wood (2008), it was revealed that, in construction, 25% of injuries are back injuries. Almost 30% of all construction workers complain of back pain that requires over 30 days off. The average number of days of work missed by a construction worker is higher than those in other fields of employment.

g. Noise

Noise can be explained as an unwanted sound that is nuisance to the brain or to an individual. Exposure to noise has many adverse effects on workers ranging from physical stresses and to physiological imbalances. Noise can contribute to accidents by making it difficult to hear warming. Excessive noise can also destroy one's hearing ability. The amount of damage noise produces depends on how loud the noise is and how long the duration, one is exposed to. The frequency or pitch also has some effects, in that, high pitches are more damaging than low pitch (Shariff, 2005).

Occupational noise-induced hearing loss is defined as hearing impairment arising from exposure to excessive noise at work which is also commonly known as industrial deafness, the NOHSC National Code of Practice (2004). Exposure to hazardous noise level is so widespread as to the routine, and occupational deafness is very common among building workers. Some activities on constructions sites are notoriously noisy, for example, rock breaking during demolishing work or the operation of a jack hammer. The use of vibrating wacker plates, electric tool, explosive powered nail guns and vibrators during concrete pours, all cause specific noise problems to the operators and workers in the vicinity in relation to maintaining their hearing ability. Noise comes from the operation of plant, machinery and power tools, the movement of vehicle and delivery of materials (HSE, 2003).

h. Chemical Substance

Construction activities involve using chemicals which pose health and safety risks to workers. For example, solvent of many different kinds is used in paints, varnishes, pesticides used to treat timber, binding agents, lacquers and adhesives (HSE, 2003). At the construction site,

workers might be exposed to chemicals by breathing them in, ingestion and absorption through the eyes or skin (Murie, 2007). Chemicals at work sites can cause headaches, eye irritation, dizziness, faintness, sleepiness and affect judgment, and coordination. They can cause damage to the central nervous system and harm the skin, liver, kidneys and cardiovascular system. Some solvents increase the likelihood of cancer (Hughes and Ferret, 2011). Solvents can also cause reproductive problems. They can reduce fertility and cause birth defects and miscarriages (Murie, 2007). Some paints and varnishes, binding agents and resins, can cause asthma and dermatitis. Welding fumes – which may include a cocktail of metal fumes can cause serious health problems in the long term. The respirator system is affected and, as chemicals are absorbed, they can slowly affect the brain and internal organs (Hughes and Ferret, 2011).

i. Dust

Dust is a common hazard on roads and building works at many sites. The health risks associated with a dusty job depends on the type of dust (physical, chemical and mineralogical), which will determine its toxicological properties, and hence the resulting effect; and the exposure, which determines the dose. If dust is released into the atmosphere, there is good chance that someone will be exposed to it and inhale it. If the dust is harmful, there is a chance that, someone will suffer an adverse health effect, which may range from some minor impairment to irreversible diseases and even life-threatening conditions (Hughes and Ferret, 2011). There is higher death rate from respiratory disease and from lung and stomach cancers in dusty trades. At the construction sites, cement, silica and wood dust and dust from medium-density fiberboard poses particular risks.

j. Aggression, Violence and Bullying

Aggression and violence occur when people are verbally abused, threatened or assaulted in circumstance relating to their work. At construction sites, aggression and violence are manifested through the use of foul language and physical attacks (HSE, 2003). Where there is aggression and violence, human dignity is debased. Violence and aggression may come from superiors or workmates. Bullying occurs when workers feel that they are being singled out for unfair treatment by a boss or colleague. For example, if a worker is constantly criticized, instead of being corrected, or been demoted, and bullying can contribute to other risks such as stress (Hughes and Ferret, 2011).

2.7 Strategies to Prevent Hazards at Building Construction Sites

In the developed as well as developing part of the world, the construction industry is considered to be one of the most significant industries in terms of its impact on health and safety of the working population. The construction industry is both economically and socially important. Therefore, the subsequent subsections suggest some measures to be adopted to improve on health and safety within the construction industry.

Farooqui (2008) points that the prevention of construction accident usually entails predicting future accidents and their nature under given circumstance. Thus, the making of such predictions is based on knowledge about past accidents. The major causes of accidents in the construction industry are related to the unique nature of the industry, human behavior, difficult work-site conditions, and poor safety management which result in unsafe work methods and procedures.

2.8 Importance of Safety and Sanitation *in* Building Construction Industry

Occupational accidents cause important social and economic problems by loss of life and physical injuries to the employees. The cost of workday loss caused by minor occupational accidents are almost 35% of major workday losses. These costs present the importance of preventive measures for workers' health and safety in construction. Some of the basic importance of safety on construction sites to be considered are accident prevention, reduction of construction cost, increase in production, promotion of friendship, clean working environment and avoidance of construction delay.

i. Accident or Injury Prevention

When employers educate or train employees on safety and health practices on site, the employees would likely observe the practices, knowing that failure would result in fatalities which would mean that, the employees would be hospitalized, if fortunate and would drain on economic prosperity of the company. Management should therefore make it a responsibility to train and educate workers before put on a job or trade of specialization in order to protect their purse by ensuring an accident or injury free site.

ii. Reduction of Construction Cost

The cost of construction is huge in terms of material and operation costs and if cost of compensations and treatment are to be added, then most companies would "fold up" in no time. It is therefore incumbent on the employer to ensure the provision of mechanisms and machinery and monitoring of workers, that they use and practice safe working methods on the site. These would ensure construction cost is maintained or reduced which in turn increase profit and over

heads. It would also eliminate the cost of investigations, into accident, suspension of work and medical bills which could create huge financial loss to the company.

iii. Increase in Production

If workers on construction sites are safe and healthy, production on the site could be maintained and increased, through the implementation of incentive schemes and overtime work and wages paid promptly, to enable employees work their "hearts out" namely, working beyond limits to help achieve set targets, which would be impossible if site conditions are unsafe and unfavorable, and workers are injured or ill.

iv. Promotion of Friendship

When employees are given adequate training on safety and healthy practices and know the consequences of neglecting them, they become happy with management when they hear of, or see the negative effects on other workers on other construction site who lack training on their occupation hazards and are injured or dead, realizing the significance of their existence or fitness. It also enhances the socio-economic status of workers, maintaining family success and happiness, building a strong and responsible society. The opposite of these, would result in a catastrophe, should management fail in their capacity to train workers on the "dos and don'ts", and the accompanying consequences that would confront them, if denied health and safety procedures on the work site.

v. Avoidance of Delay in Construction

Construction time delay comes with a very huge cost if due the contractor or any member of the construction management team, or as a result of injury or accident to an employee, in the course of duty. The delay could affect the completion date, prices of materials, goods and services and

may have a negative tone on contractors' retention and further, the profit margin, as well as creating "shocks" on the contractor's ability to undertake other contracts.

Hence, the need for the contractor to have an in- depth knowledge on health and safety procedures on tools, materials and environment, to enhance efficient training of employees and to ensure its implementation at the workplace, to reduce or eliminate accidents on site.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methods used for the study. It described and justifies the methods and processes used to collect data that helped in achieving the research objectives. The chapter is presented under the following sections namely, research design, population, sampling technique and sampling size, data collection and instrumentation, design of questionnaire, data source, reliability and validity, research constraints and challenges.

3.2 Research Design

The study adopted both descriptive and quantitative framework. However, a case study approach was adopted for this research to assess the impact of the poor implementation of safety and health practices on building construction sites in the Gomoa West district of the central region.

Bryman (2004) asserted that, among the various research designs, surveys are frequently regarded as using both quantitative and qualitative research and a combination of both approaches.

Burns and Grove (2005), describes research as the blue print for conducting the study that maximizes control over factors that could interfere with the validity of findings. They went further to explain that, designing a study helps the researcher plan and implement the study in a way that will help the researcher obtain intended results, thus, increasing the chance of obtaining information that could be associate with the real situation.

3.3 Population

The population is the aggregate or totality of all the object, subject or members that conform to a set of specification (Pilot and Hungler, 1999). Again, Parahoo (2006:258) defines population as the total number of units from which data can potentially be collected. The research targeted project managers, site engineers, clerks-of-work, foremen, skilled and unskilled labourers, in small and medium scale construction business classified under category D and K, within the Gomoa West district.

3.4 Sampling Technique and Sampling Size

The study adopted the purposive sampling strategy to select a sample size of 75 respondents for the research work. The intension was to get a well-informed data or response into the effects of health and safety practices on building construction sites in the Gomoa West district, hence, the need for the selection of project managers, site engineers, clerks of work, foremen, skilled and unskilled labourers who have worked in the building construction industry for a long time and have acquired some level of experience in the health and safety practices on site.

3.5 Data collection and instrumentation.

The researcher personally administered the questionnaires to respondents at their places of work, and were allowed sufficient time to respond at their own pace, for a period of four (4) weeks. The questionnaires consist of close-ended options with respondents selecting the best option that suits their thought or reflected their understanding. The constructs were written in simple and unambiguous language, hence, poses no problem or influence in responding to the questionnaire. The study identifies a number of health and safety strategies considered during material transportation, through to finishing. Due to the vast size of the Ghanaian construction

industry, the survey was delimited to the Gomoa West District of the Central region. Data collected was conducted using Cluster sampling techniques from construction site within the Gomoa West District. The technique was adopted in order to obtain precise data with generalizable conclusion from building construction companies within the Gomoa west district. The questionnaire design adopted the five (5) points Likert scale and was administer by hand to two (2) principal target groups. The groups were selected due to the significant function in the building construction supply chain and because, their perceptions would be highly valuable to this research. The two (2) groups were private businesses who undertake contract and those registered with the assembly and thus, are awarded government contracts. The cronbach's alpha reliability test was conducted on the research question to ensure the reliability of the questionnaire.

A total of (75) questionnaires were administered to the afore mentioned groups to ascertain the views of respondents on the health and safety practices on building construction sites but only 56 answered questionnaires were retrieved. The responds were scrutinized using the descriptive statistically analysis in the statistical package for the social sciences (SPSS), 2008 version 20. Interviews were conducted with professional in the construction and property development industry to gain insight from their knowledge and experience.

3.5.1 Design of Questionnaire

Wahab (1996) explained that, the quality of responses and the response rate is traditionally affected by the level of questions and the way in which the questions were expressed and presented. To this premise, it is important to ensure that, the right questions are asked, well understood and asked in the right way. The questionnaire survey was designed based on the objective of the study, which includes:

i. Exploring the safety activities on construction site in the Gomoa West District.
ii. Identify the causes of non-compliance to safety and health practices on sites
iii. Devising strategies to improve health and safety practices on construction sites as well as
iv. Ensure the implementation of health and safety measures on site.

3.5.2 Data Source

To devise a rational framework or tool for evaluating the health and safety practices on building construction sites, it was important to gather information from primary and the secondary sources.

3.5.3 Primary Data

The primary data for this study was gathered through questionnaires and personal observations. Primary data was collected through the use of questionnaires and personal interaction in the form of interview, alongside observation. The questionnaire survey was chosen as an appropriate tool for collecting views from the respondent within the specified duration. Besides, observations were made on some construction sites to ascertain the level of conformance with health and safety practices on the site.

3.5.4 Secondary Data

The study also researched into existing literature sources like textbooks, news reports, conference proceedings, electronic journals, with the internet, being the most helpful source in this regard. The questionnaire survey was developed to get the opinion and understanding from experience participants and respondents who have worked in the building construction industry for some number of years and have had face-to-face acquaintance with the effects of safety and

sanitation practices on site. A five (5) point Likert scale of ordinal measurement from 1 to 5, based on the level of awareness of safety and sanitation practices on site, in order of magnitude. Such that 5- indicates, To a great extent, 4- To a moderate extent, 3- To some extent, 2- To a small extent and 1- Not at all.

The questionnaire is divided into four (4) sections:

Section A: Respondent/participant background.

Section B: Causes for non-compliance of health and safety practices on building construction sites.

Section C: Types of Health Hazards on building construction sites.

Section D: Importance of safety and sanitation practices on building construction sites.

Furthermore, Oppenheim (1996) stated that, before questionnaires are developed, it is important to first establish the information to be gathered so that relevant questions are asked. Attempt was therefore made to ensure that, the questions are of simple language, devoid of technical terms to mitigate errors from respondents. Again, the number of questions in each set is kept low as much as possible, in order to encourage respondents, partake in the research work. The format of the questionnaire is a guided genuine appeal to respondents and with of ease of reading.

3.5.5 Reliability and Validity

Bryman and Bell (2007) defines reliability as fundamentally concerned with issues of consistency of measures. The three (3) prominent factors related to considering whether a measure is reliable includes stability, internal reliability and inter observer constituency. In this study, internal reliability will be considered. Bryman and Bell suggested that a multiple item

measure in which each answer to each question is aggregated to form an overall score. Hence, it would be reasonable to ensure that all the indicators are related to each other.

Validity is defined as how much any measuring instrument measures what is intended to measure. Bryman and Bell (2007) again suggested that the important issue of measuring validity related to whether measures of concepts really measure the concept. Validity refers to the issue of whether an indicator (or set of indicators) that is devised to measure a concept really measures that concept. Construct validity would be employed for this project work.

3.6 Data Analysis

The responses to the questionnaire items will be analyzed using frequencies and percentages, with the use of the statistical package for the social sciences (SPSS) version 20. The data collected from the respondents through the questionnaires were coded whilst using the SPSS. The open-ended questions were categorized based on commonalities of responds. The data collected was then analyzed using tables and simple percentages, mean scores and standard deviations.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results and discussion of questionnaires, interviews and observations.

4.2 Result of questionnaires from

4.2.1 Result of questionnaires from Management Team

Demographic Profile of the Management team Staff

This aspect of the research work describes the demographic characteristics of the selected respondents on their gender, age, level of education and occupation within the building construction industry.

Table 4.1 to 4.5 discussed the results of the demographic data of respondents selected for the study.

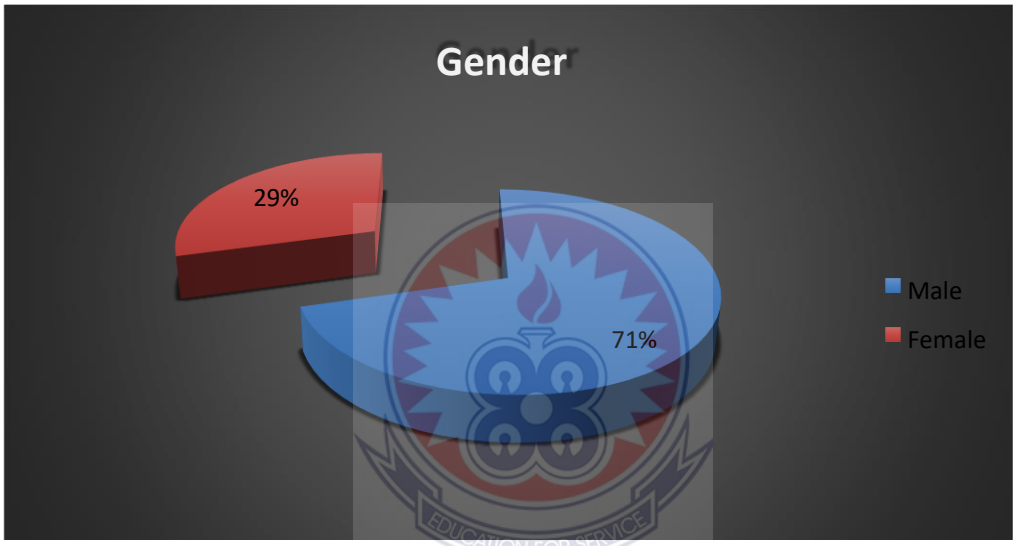
Distribution of Respondents by Gender

Table 4.1 Shows the distribution by gender among the building construction management team, selected for the research work.

Table 1: Distribution by Gender for Management Team

GENDER	FREQUENCY	PERCENTAGE (%)
Male	12	70.6
Female	5	29.4
Total	**17**	**100**

Source: Researcher's Field Survey Data, 2018



Source: Researcher's Field Survey Data, 2018

Figure 2.1: A Pie Chart showing Distribution by Gender for Management Team

The results presented in figure 4.1 were based on data sample from the questionnaires distributed to 17 management team staff during the study. The results indicated that, out of the 17 respondents who responded from the 25 management team staff chosen from the building construction sites in the Gomoa West District, representing 68% respondents out of which 29.4% represents Females, the remaining 70.6% are Males. The results show that more males are employed in the building construction sector than their female counterparts.

Among the general workers who are sometimes referred to as casual staff, 39 out of the 50 general workers who responded to the study were all males, and this indicates that it is a male-dominated field of work.

Distribution of Respondent by Age.

Table 4.2 shows the distribution of the respondents by age. The results presented were based on data collection from the questionnaires issued to 17 building construction firm management team staff during the period of the study.

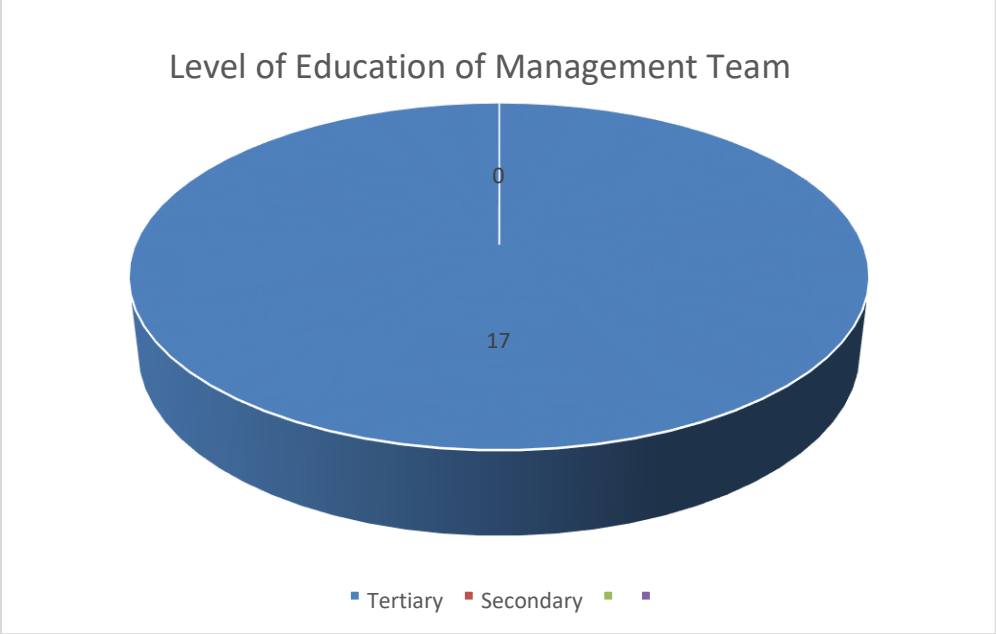
Table 2: Distribution of respondents by age for the Management Team

AGE (YEARS)	FREQUENCY	PERCENTAGE (%)
Below 20	-	-
20-29	4	23.5
30-39	10	58.8
40-49	1	5.9
50-59	2	11.8
Total	**17**	**100**

Source: Researcher's Field Survey Data, 2018

Level of Education of Management Team

Figure 4.2 shows the level of education of research respondents selected for the study. The results presented in the Pie-Chart was based on data collected from 17 management team staff from five building construction firms during the period of study.



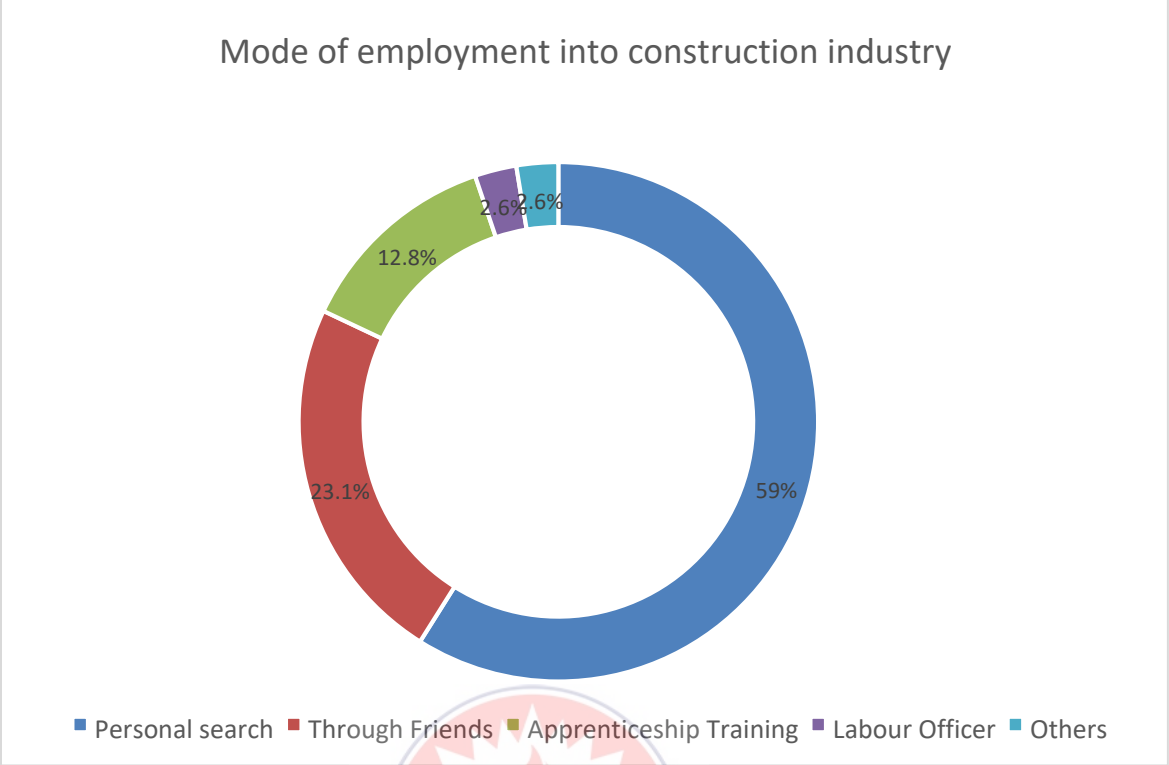
Source: Researcher's Field Survey Data, 2018

Figure 2.2: A Pie-Chart

The results presented in the Pie-Chart was based on the data sample from questionnaires distributed to 17 Management team staff from five building construction firms. In all the data sampled, 100% of the respondents have had tertiary education, 0% representing a total of 0 out of the Management team staff neither have secondary technical education.

Mode of Employment into the Building Construction Industry.

The figure 4.3 shows the distribution of the respondents by management team on the mode of employment into the building construction industry.



Source: Researcher's Field Survey Data, 2018

Figure 2.3: A Pie – Chart showing the distribution of respondents by management team on the mode of employment.

The results from Figure 4.3 shows that 8 out of the 17management team members representing 47.1% were employed into the building construction industry through personal search whilst the same number and percentage had employment through friend with only 1 person representing 5.9% of the management team, recruited through apprenticeship training.

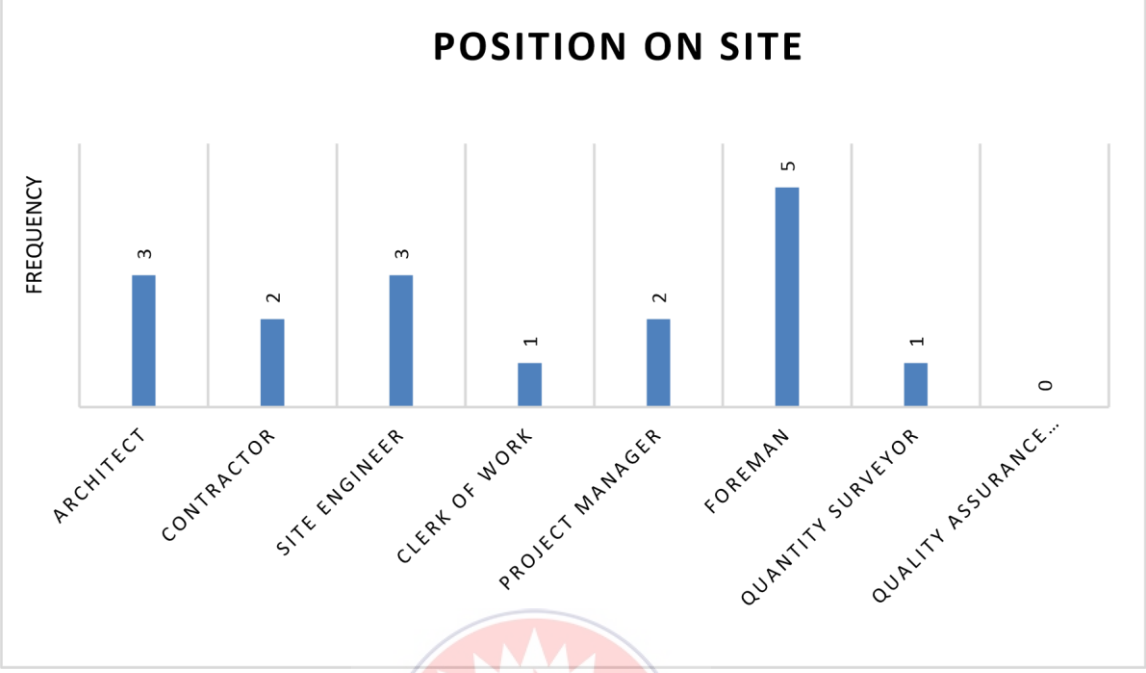
Besides, 23 personnel out of the 39 respondents among the general workers representing 59.0% were also employed in the building industry through personal search, whilst 9 persons representing 23.1% were employed by the facilitation of their friends, 5 persons representing 12.8% had employment through apprentice training with the remnant of the general workers getting employed through the labour office and other means respectively.

Table 3: Working Experience of Management Team

Working Experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5 years	3	17.6	17.6	17.6
	5-10 years	6	35.3	35.3	52.9
	11-20 years	7	41.2	41.2	94.1
	Above 30 years	1	5.9	5.9	100.0
Total		**17**	**100.0**	**100.0**	

Furthermore, among the management team, the results from the Table 4.3 indicates that 3 out of the 17 permanent staff respondents had within 3 years of working experience, 6 personnel representing 35.3% have between 5 to 10 years of work experience, 7 out of the 17 personnel representing 41.2% have had between 11 to 20 years of work experience, with one person representing 5.9% having over 30 years of work experience. This could be part of the reasons why accident rate among building construction site "workmen" is low or zero within the Gomoa West District of the Central region, due to the caliber of management staff at hand.

Position on Project Site of Management Team



Source: Field Survey Data, 2018

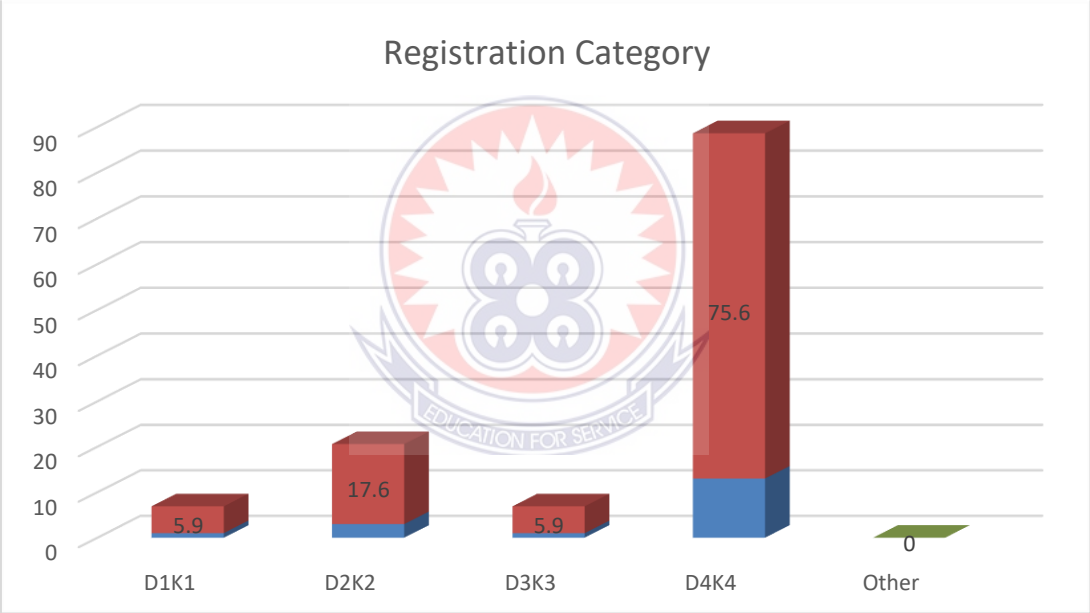
Figure 4.4: A Chart showing positions on project site.

The Figure 4.4 shows the results of distribution of respondents by the management team based on their position on project site. The results for the field survey shown above indicates that, among the management team staff, 3 personnel were architects, 2 main contractors, 3 were site engineers, 2 clerks of work, 5 works foremen and 2 project managers, selected among the five main contractors within the Gomoa West District representing 17.6%, 11.8%, 17.6%, 11.8% and 29.4% respectively in percentage terms.

Registration Category (Financial Classification)

$D_1 K_1$, 1 of the firms had $D_2 K_2$. Again, I had $D_3 K_3$, 2 said they belong to category $D_4 K_4$ with non-without any registration.

The Figure 4.5 shows the distribution of respondents by management team members on the registration category of their respective building category construction firms and the results indicate that 1 building construction firm had a registration D3K3, 11 had category D4K4, with 1 without any registration but undertaking building projects within the district and have no idea about safety norms or rules, some of such contractors wouldn't even accept audience with any research student. Unlike the unregistered contractors, the registered ones are somehow safety compliant as observed on my visit to most of the sites. Some workers were seen in their safety clothing's whilst working on site.



Source: Field Survey Data, 2018

Figure 4.5: Registration Category

Awareness of Health and Safety Practices Adopted on Building Sites.

(Within the Management Team)

The Table 4.4 below shows the distribution of respondents by the management team staff on the awareness of health and safety practices on building construction sites within the Gomoa West District of the Central Region. The results from the respondents indicate that 14 management team personnel had received some form of training before they were put on the job, with the remaining three (3) denying any training before put on the job and this could be due to negligence on the part of Senior management members to carry out their assigned duty as opined by Tam et al. (2004), that the main factors affecting safety in China Construction Industry were managers poor safety awareness and reluctance to commit resources to safety. On the issue of availability of safety management systems on site, 14 out of 17 management team staff, represent 82.4% acceded to a provision available on safety management system on site.

Table 4: Distribution of respondents by age (Management team staff) on the awareness of health and safety practices on building construction sites.

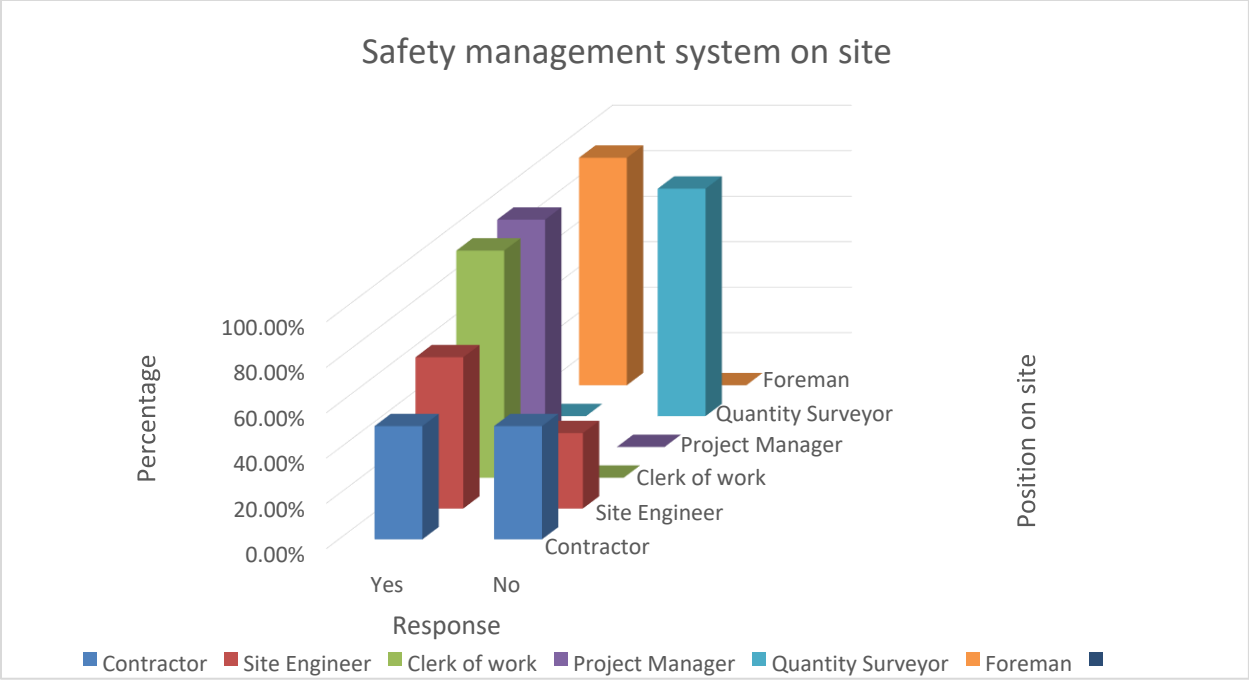
TRAINING	FREQUENCY	PERCENTAGE (%)
Received training	14	82.4
No training	3	17.6
Total	**17**	**100**

Source: Researcher's Field Survey Data, 2018

Source: Researcher's Field Survey Data, 2018

Figure 4.6: Health and safety personnel in charge of training employees before put on job

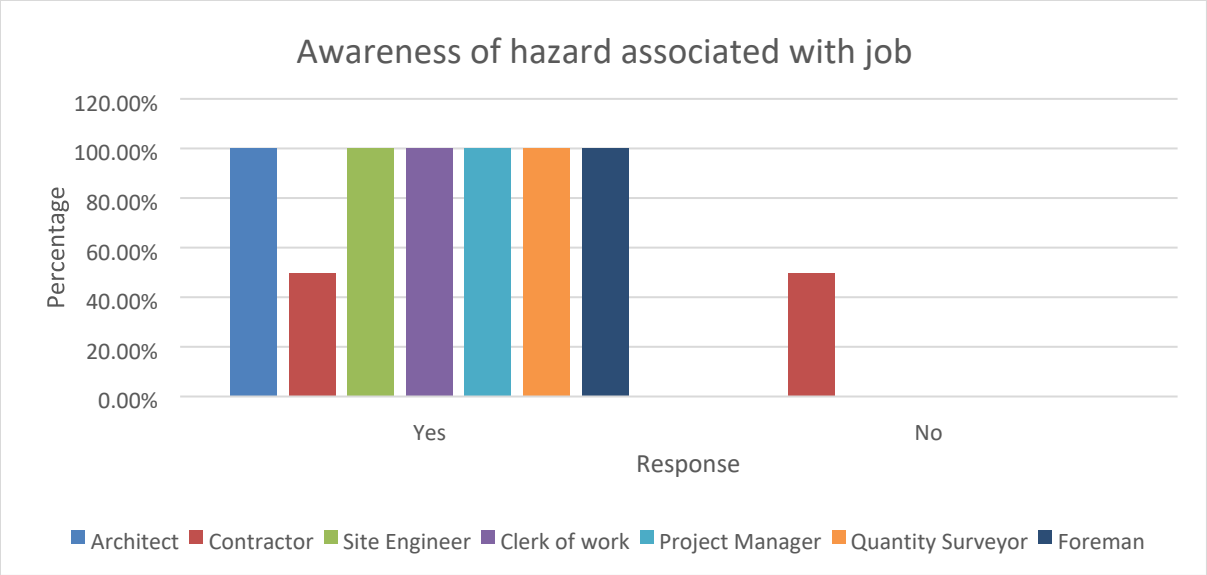
Again, when the 17 management team respondents were asked whether they have been trained on safety management systems (S.M.S) on the site, 13 respondents out of the 17 management team staff representing 76.5%, said 'Yes', whilst the remaining 4 which represents 23.5%, had not received any training on safety management systems on the site, as indicate on the table below.



Source: Researcher's Field Survey Data, 2018

Figure 4.7: Safety management system on site

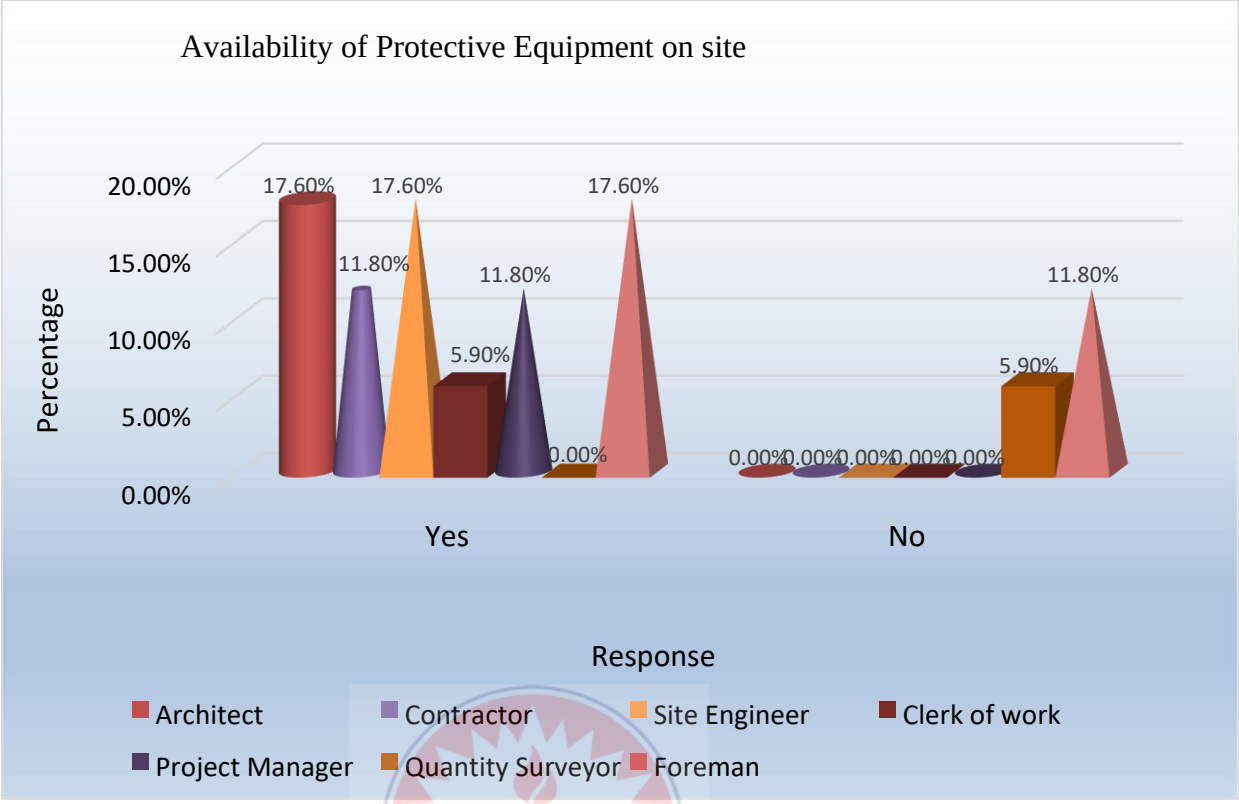
The distribution of respondents by management team staff on the awareness of hazards associated with their jobs. The results of the results of the respondents as indicated in the Table 4.8 shows that 16 out of the 17 staff, representing 94.1%, knows the consequences of the hazards associated with their job, with only 1 person, which represents 5.9%, claiming innocence of hazards associated with job.



Source: Researcher's Field Survey Data, 2018

Figure 4.8: Awareness of hazard associated with job

The respondents were again probe on whether they appreciate the importance of health and safety practices on site and the results from the respondents from within the various experts among management team staff were that, all three Architects appreciate the importance of safety and health practice on site, represents a hundred percent endorsement, from within the Architects with no body against the appreciation of health and safety on site. Also, all the other management team members acceded to appreciating the importance of health and safety practices on site which is in line with the assertion by Ataev, (1985), that management staff must be trained on health and safety practices before put on the job.



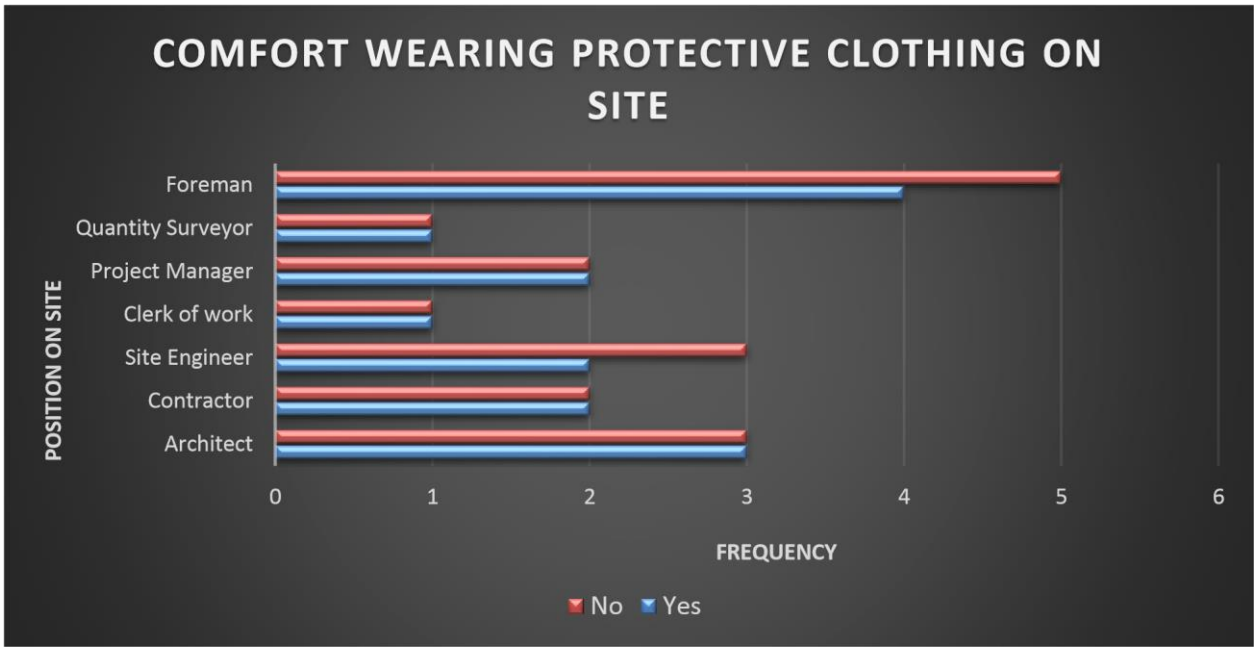
Source: Researcher's Field Survey Data, 2018

Figure 4.9: Importance of Health and Safety Compliance Appreciation

Protective Equipment on site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	94.1	94.1	94.1
	No	1	5.9	5.9	100.0
	Total	17	100.0	100.0	

Additionally, the management team staff were asked about the availability of protective equipment on site and the results from the respondents were that, all management team staff use protective equipment on site, hence may be the reason for the less incidence of accident among the management team staff.



Source: Researcher's Field Survey Data, 2018

Figure 4.10: Comfort Wearing Protective Clothing on Site

Furthermore, the results from the management team staff namely 3-architects, 2contractors, 2-site engineers, 1-clerk of works, 2-project managers, 1-quantity surveyor and 4-foremen about their comfortability in the use of protective equipment on site, the respondents gave a positive response, whereas, 1-site engineer and works foremen shows discomfort in the use of protective equipment on site, though it is a pre-requisite requirement before entering the site.

Orientation of Employees on New Jobs and Transfers

The Table 4.5 below shows the distribution of respondents by management staff on the orientation of employees on new jobs and transfers to new sites, the results of the respondents from the distribution data indicates that 12 out of the 17 management team staff, representing 70.6% had some form of orientation before put on the job, and this is against the assertion by Ataev, (1985), that, all employee's within the construction industry must be trained or given some form of orientation before put on the job.

Table 5: Distribution of respondents by management staff on the orientation of employees on new jobs and transfers to new sites

ORIENTATION	FREQUENCY	PERCENTAGE (%)
Orientated	12	70.6
Not orientated	5	29.4
Total	**17**	**100**

Source: Researcher's Field Survey Data, 2018

4.2.2 Results of Questionnaires from Workers

Distribution of Respondent by Age.

Table 4.6 shows the distribution of the respondents by age. The results presented below were based on data collection from the questionnaires issued to 39 general workers during the period of the study.

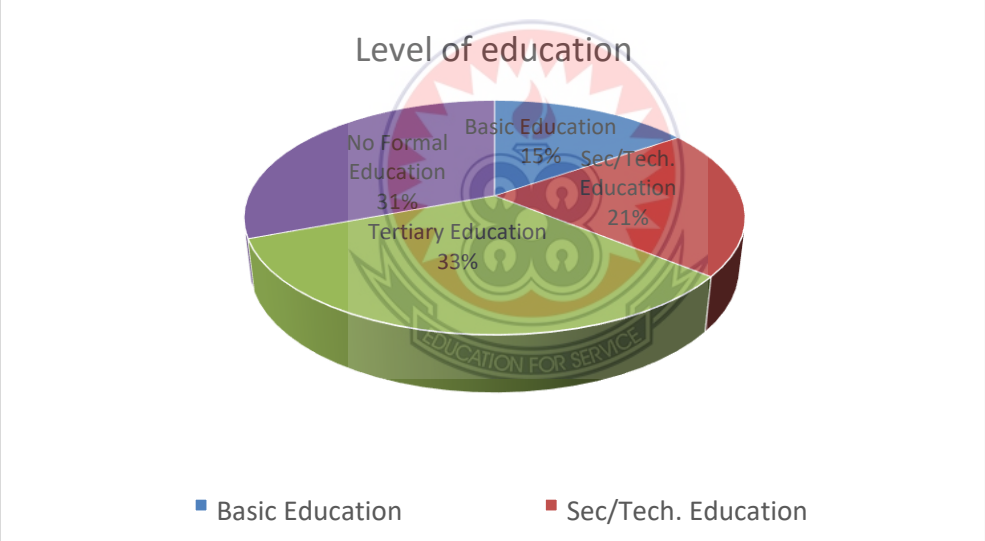
Table 6: Distribution of respondents by age (General Workers)

AGE (YEARS)	FREQUENCY	PERCENTAGE (%)
Below 20	-	-
20-29	18	46.2
30-39	14	35.9
40-49	7	17.9
50-59	-	-
Above 60	-	-
Total	**39**	**100**

Source: Researcher's Field Survey Data, 2018

Level of Education (General Workers)

The Figure 4.11 shows a Pie-Chart for the distribution of the Level of education of respondents among the general workers. The results indicate, 18 respondents representing 33% had Tertiary education, 12 out of the 56 respondents representing 21% had received Secondary or Technical education. Also, 8 out of the 56 respondents representing 15% had Basic education whilst the remaining 17 representing 31% of the entire population had no form of formal education and this is in conformity with the assertion by Dejus (2007), that inexperienced employees, lack of qualifications and understanding risk on construction sites in a study conducted in the Lithunian Republic contributes to accidents on sites.



Source: Researcher's Field Survey Data, 2018

Figure 4.11: A Pie-Chart showing the level of education of respondents among the general workers.

Working Experience

The table 4.7 shows the distribution of respondents by the general workers on the number of years worked in the building construction industry. The results obtained from the field survey

as indicated in the table below indicates that 5 personnel among the general workers representing 20.5% have less than 5 years of work experience, 10 personnel representing 25.6% had worked for between 5 to 10 years, 14 of the general workers representing 35.9% have had 11 to 20 years of working experience, 6 persons had work between 21 to 30 years which represents 15.4% of the general workers with only 1 person representing 2.6% with over 30 years of working experience, and this attest to the fact that players in the building construction as asserted by Lubega et al. (2001) that, inexperience workers are employed in the industry.

Table 7: Working Experience of General Workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5 years	8	20.5	20.5	20.5
	5-10 years	10	25.6	25.6	46.2
	11-20 years	14	35.9	35.9	82.1
	21-30 years	6	15.4	15.4	97.4
	Above 30 years	1	2.6	2.6	100.0
	Total	**39**	**100.0**	**100.0**	

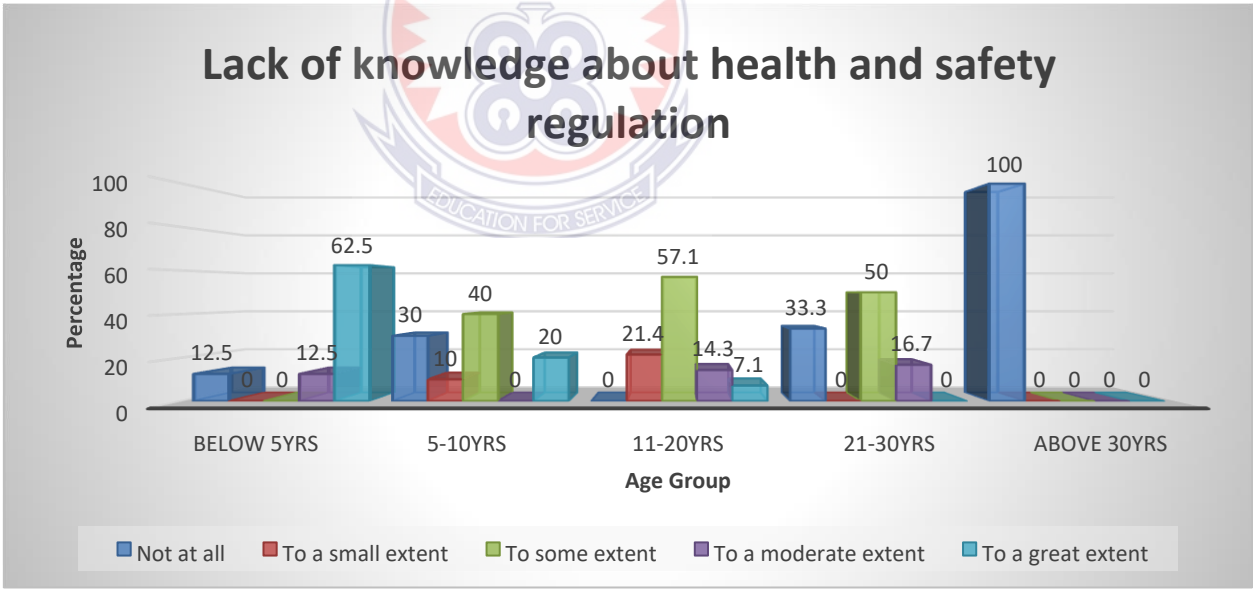
Causes for the Non-Compliance with Health and Safety Practices on Site

The building Construction industry performs a task which when safety is not adhered to, could cause damage to life and loss of valuable property, hence, education of the work men and experience are key ingredients in enhancing compliance with health and safety norms in the industry, and much as it can be said that, the management team is endowed with knowledge and

experience about the industry but so cannot be said among the general workers who are otherwise called casual staff.

The Figure 4.12 shows the distribution of respondents by the general workers who were mainly tradesmen or artisans on the causes for the non-compliance with health and safety practices on site. The respondents ranked the variables on the 5-point Likert scale 1-5, as follows:

1. Not at all
2. To a small extent
3. To some extent
4. To a moderate extent
5. To a great extent



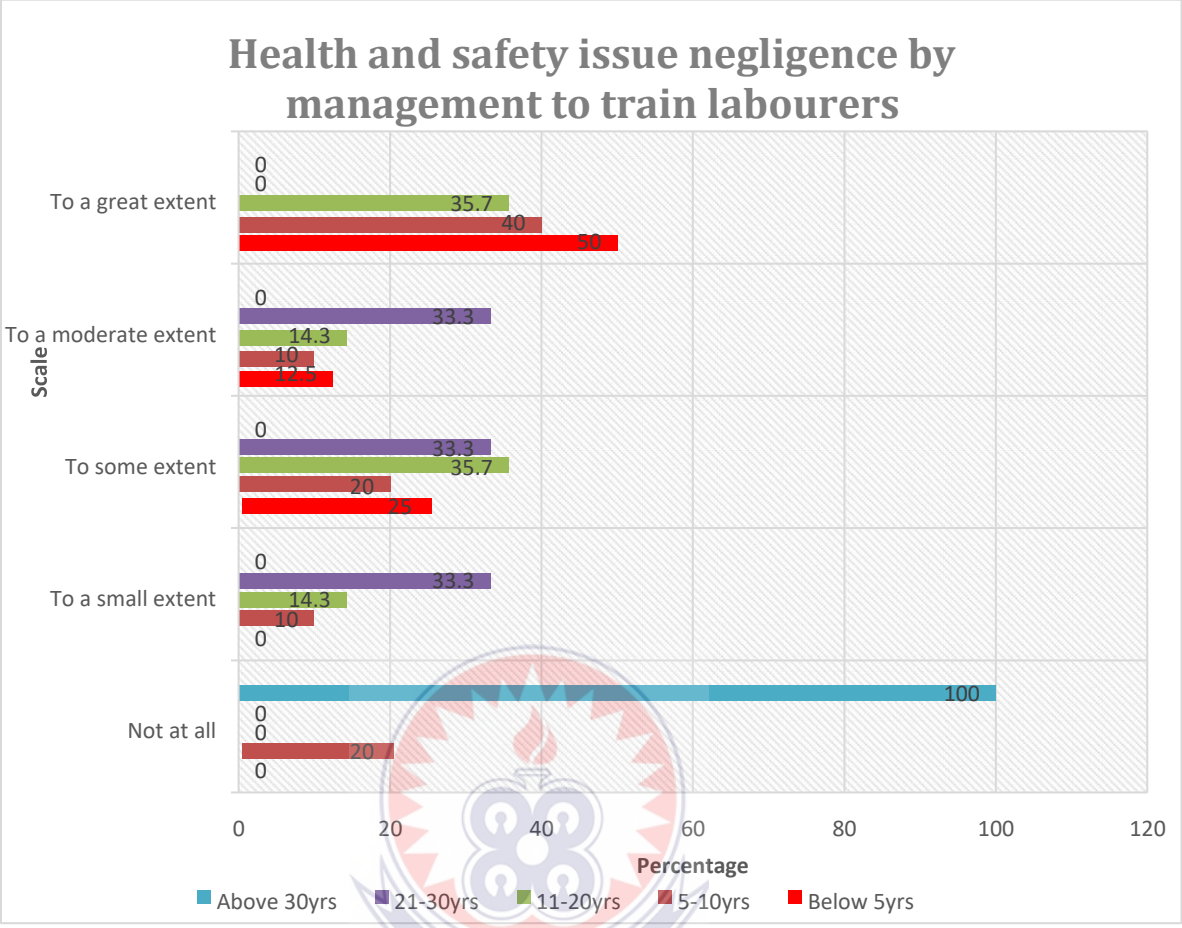
Source: Researcher's Field Survey Data, 2018

Figure 4.12: Lack of knowledge about health and safety regulation

The purpose of Figure 4.12 was to rank the factors that could influence noncompliance with safety and sanitation practice in the Gomoa West District. The results of the study shows that,

7 out of the 39 casual workers sampled from the various building sites, representing 17.9% said 'Not at all' to having knowledge about health and safety practices on site, 4-general workers representing 10.3%, said "To a small extent", whilst 16 general workers representing 41%, agreed to some extent that employing inexperience workers is a cause for the lack of knowledge about health and safety. Furthermore, 4 casual workers representing a total of 10.3%, out of the 39 casual working class agreed to a moderate extent that, number of years worked on the construction site determines one's knowledge about health and safety compliance on site, and finally but not the least, 8 out of the 39 casual workers representing 20.5% agreed "To a great extent" that the number of years worked on the site (experience) influences knowledge on health and safety and this conforms with Lubega et al. (2001) that the causes of construction accidents in Uganda include a lack of knowledge about safety rules, engaging an inexperienced workforce, and lack of knowledge about safety rules, engaging an inexperienced workforce, and lack of respect for safety.

On the issue of employing large number of employees who are not educated on site, the results of the respondents indicate that, only 1 casual worker said "Not at all", representing 2.6%, 5 out of the 39 representing 12.8%, agreed "To a small extent", 7 persons representing 17.9%, agreed to some extent that general workers are not educated, 2 of the workers representing 5.1% agreed to a moderate extent whilst 24 out of the 39 representing 61.5% agreed to a great extent that most of the casual workers are uneducated, which is in line with the assertion by Dejus (2007) in a study conducted in the Lithuanian Republic that, the major reasons for serious and mortal accidents are as a result of recruiting inexperienced employees, lack of qualifications and understanding the risk on construction sites.



Source: Researcher's Field Survey Data, 2018

Figure 4.13: Health and safety issue negligence by management to train general workers

Figure 4.13 shows the results of respondents from the distribution from the distribution of the general workers, whether negligence on the part of management team to train workers on health and safety issues could be a cause for the non-compliance of health and safety practice on site and response indicate that 3 out of the 39 casual workers, representing 7.7% said "not at all", 6 out of the 39, representing 15.4%, agreed to a small extent; 11 out of the 39 general workers, representing 28.2% , 6 out of the 39 representing 15.4%, agreed to a moderate extent, whilst 13 out of the 39 general workers, representing 33.3% of the total population agreeing "to a great extent" that negligence on the part of management team to train workers on health and safety

issues leads to the non-compliance nor conformity health and safety norms at the building construction sites as constructed by Tam et al (2004) study that the main factors affecting safety in China. Construction Industry were manager's poor safety awareness and reluctance to commit resources to safety.

Asked whether working in a congested and poor site layout contributed to noncompliance with health and safety practices on site, the results of the respondents from the distribution of the general workers indicate that, 6 of the workers disagrees ticking "not at all", 5 agreed "to a small extent", 15 out of the 39 agreed to some extent, 11 workers, to a moderate extent where as 2 out of the 39 agreed "to a great extent" that working in a congested and poor site layout makes it difficult to observe health and safety rules.

Table 8: Damaged working tools used by workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	10	25.6	25.6	25.6
	To a small extent	4	10.3	10.3	35.9
	To some extent	14	35.9	35.9	71.8
	To a moderate extent	8	20.5	20.5	92.3
	To a great extent	3	7.7	7.7	100.0
	Total	39	100.0	100.0	

Source: Researcher's Field Survey Data, 2018

From Table 4.8 above, 10 out of the 39 general workers which represents 25.6% disagrees with the assertion that, working with damaged tool could lead to noncompliance with health and

safety observation, 4 agreed “to a small extent”, 14 out of the 39 workers agreed “to some extent”, 8 agreed “to a moderate extent”, whilst 3 out of the 39 agreed “to a great extent” that working with damaged affect compliance with health and safety norms badly.

Table 9: Non-availability of protective equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	3	7.7	7.7	7.7
	To a small extent	6	15.4	15.4	23.1
	To some extent	13	33.3	33.3	56.4
	To a moderate extent	3	7.7	7.7	64.1
	To a great extent	14	35.9	35.9	100.0
	Total	39	100.0	100.0	

Source: Researcher’s Field Survey Data, 2018

Table 4.9 shows the distribution of respondents by the general workers on whether the non-availability of protective equipment at the work site could be a cause for the non-compliance with health and safety norms at the sites, the results of the respondents indicate that only 3 out of the 39 general workers said “not at all”, 6 agreed “to a small extent”, representing 15.4%, 13 out of the 39 general workers which represent 33.3% agreed “to some extent”, 3 agreed “to a moderate extent”, whilst 14 general workers representing 35.9% agreed “to a great extent” that non-availability of protective equipment leads to the non-compliance with health and safety practices at the site. Working under the hot weather condition without protection was also identified as an issue that could cause non-compliance with health and safety practices on site

and the results of the respondents indicate that only one (1) person disagrees representing 2.6% out of the total , 1 agreeing “to a small extent”, 6 and 4 workers agreeing “to some extent” and “to a moderate extent” respectively, with 27 workers representing 69.2% agreeing “to a great extent”, which was evident in most of the sites visited.

Table 10: Poor scaffolding system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	6	15.4	15.4	15.4
	To a small extent	3	7.7	7.7	23.1
	To some extent	11	28.2	28.2	51.3
	To a moderate extent	10	25.6	25.6	76.9
	To a great extent	9	23.1	23.1	100.0
	Total	39	100.0	100.0	

Source: Researcher’s Field Survey Data, 2018

Besides, the general workers were probed into the condition of scaffolding system on site and 6 out of the 39 workers which represents 15.4% disagreed that the scaffolding system is poor, 3 workers agreed to a small extent, 11 general workers representing 28.2% agreed to some extent whilst 10 and 9 of the general workers agreed to a moderate and great extent respectively that poor scaffolding system without supporting rails, is a cause for non-compliance with health and safety on site.

Table 11: Lack of training on Tools use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	2	5.1	5.1	5.1
	To a small extent	6	15.4	15.4	20.5
	To some extent	16	41.0	41.0	61.5
	To a moderate extent	10	25.6	25.6	87.2
	To a great extent	5	12.8	12.8	100.0
	Total	39	100.0	100.0	

Source: Researcher's Field Survey Data, 2018

Also, 37 out of the 39 general workers agreed, from "a small extent to a great extent" that they lack training on the appropriate use of tools on site.

On the issues of sanitation on site, only 2 out of the 39 general workers disagrees that lack of sanitary facilities on site influence non-compliance with health and safety practices on site where as 19 out of the 39, agreed to a great extent, 10 out of the 39, agreeing to a moderate extent that the lack of sanitary facilities causes the non-compliance with health and safety on site. This is in line with the assertion by Ataev (1985), in the book "Construction Technology", states that most construction sites do not have the desired sanitary facilities, hence workers resort to any isolated area on or around the site to ease themselves which exposes them to diseases which keep them off work, delaying construction work and increase in construction bill on medication.

Strategies put in place to Ensure an Accident-Free Site.

The views of the general workers were sought on the strategies put in place to ensure an accident-free site and the mean (m), Standard deviation (SD) and Skewness were computed from the scores obtained from the respondents using the Likert Scale Score as follows;

1. Not at all
2. To a small extent
3. To some extent
4. To a moderate extent
5. To a great extent.

Table 12: Strategies put in place to Ensure an Accident-Free Site

Response	1	2	3	4	5	Standard deviation	skewness	Mean
Implementation of hazard controls. (Engineering)	5	3	9	16	6	1.227	-0.709	3.38
Implementation of hazard controls. (Administration)	5	0	7	22	5	1.142	-1.282	3.56
Implementation of hazard controls. (Protective equipment)	8	3	24	4	0	0.935	-0.761	2.62
Involvement of workers in establishing control of health hazards	19	8	5	5	2	1.276	0.940	2.05
Employees using control development for identified Health and Safety hazards	3	5	14	12	5	1.023	0.068	2.82
Process for maintaining equipment and preventing the use of defective equipment	5	4	20	8	2	1.025	-0.357	2.95
Management enforcing the use of engineering control	3	5	14	12	5	1.099	-0.349	3.28
Management enforcing the use of safe work procedures, rules, and work practices	4	2	9	17	7	1.166	-0.884	3.54
Availability of required personal protective equipment	9	9	16	3	2	1.095	0.286	2.49
Employees training in the use of PPE	7	9	16	4	3	1.132	0.251	2.67
Enforcement in the use of PPEs	8	9	13	8	1	1.115	0.006	2.62
Employees compliance with the use of personal protective equipment	12	8	14	5	0	1.055	0.043	2.31

Source: Researcher's Field Survey Data, 2018

The Table 4.12 shows the frequencies obtained from the general workers on the strategies put in place to ensure an accident free site and the responds from respondents to each research statement, selected from the five (5) building construction sites within the district. The Table 4.10 further shows the variables under study with reference to " Implementation of Hazard Controls (Engineering)" and "implementation of Hazard controls (Administration)", and 5 out of the 39 respondents disagreed, 3 agreed to a small extent with 31 respondents (agreeing from some extent to a great extent) with the statement resulting in a mean (m) value of 3.38, a stand deviation (SD) of 1.227 with a skewness value of .0.709. the results show that implementation of Hazard controls was ranked second (2nd) among the strategies put in place to ensure an accident-free site. The results agreed with the view held by Alberta Labour (2015) that hazard controls be identified and implemented by Engineers, and Administration.

The degree of agreement to the statement regarding the "Implementation of Hazard controls (protective equipment) shows that, 8 out of the 39 respondents totally disagreed with the statement by ticking "Not at all", 3 respondents agreed to some extent with 28 respondents agreeing from some extent to a moderate extent, with the statement. Namely, majority of the general workers were of the view that management's provision of protective equipment could help ensure an accident free site, as asserted by Alberta (2015), showing a mean of 2.62, a standard deviation of 0.935 and a skewness of -0.761. The level of agreement with the statement "Involvement of workers in establishing control of health hazards" shows that, 19 respondents out of the 39, disagreed with the statement whilst 20 respondents agreed (from a small extent to a great extent). The results from the respondents indicates a mean value of 2.05 with a standard deviation (SD) of 1.276 and a skewness of 0.940 which shows that when 'general staff' is

involved in the establishment of health hazards control norms at the work site, it enables the workers to understand and comply with what it entails.

The degree of agreement to the statement regarding the next variable "Employees using Control Development for Identified Health And Safety Hazards" shows that only 3 respondents out of the 39 general workers selected from the five (5) building construction sites, disagreed with the statement, but 36 agreed (from a small extent to a great extent), with the statement resulting in a mean (m) value of 2.82, a standard deviation value of 1.023 with a positive skewness of 0.068, which was ranked (6^{th}) sixth among the strategies put in place to ensure an accident-free site. The results is in conformity with the view held by Ataev, (1985), that employees must be trained on health and safety hazards before put on the job.

Next, general workers were asked about provision made for the "Process for maintaining equipment and Preventing the use of Defective Equipment" and the level of agreement with reference to the variable indicates that, 5 respondents denied the existence of such provision on site whilst the remnant agreed (from a small extent to a great extent). The statement results in a mean (m) value of 2.95, a standard deviation of 1.025 and a negative value of skewness of -0.357. this result show that the process for maintaining equipment and preventing the use of defective equipment was ranked fifth (5^{th}) among the strategies put in place to ensure an accident-free site. Again, the degree of agreement with the statement with reference to the contract "Management Enforcing the use of Engineering Control" indicates that 3 out of the 39 respondents said "Not at all", 5 respondents acceded to a small extent with 31 respondents agreeing (from some extent to a great extent). The statement results skewness of -0.349. this indicates that the variable is ranked fourth (4^{th}) among the strategies put in place to ensure an incident-free workplace.

Additionally, the level of agreement to the next statement relating to the variable "Management Enforcing The Use Of Safe Work Procedures, Rules And Work Practices" as part of the strategies to curb accidents on site and the outcome of the study indicates that, 4 respondents disagreed with the statement whilst 35 respondents agreed to some extent and to a great extent, resulting in a mean (m) value of 3.54, a standard deviation of 1.166 and a negative skewness of -0.884, with the variable ranking second (2^{nd}) among the strategies put in place to ensure an accident-free site. This therefore implies that casual workers would like to see management enforcing the use of safe work practice to prevent accidents and its repercussion.

Again, the level of agreement to the statement regarding the variable "Availability of Required Personal Protective Equipment" shows that 9 out of the 39 general workers (Casual workers) disagreed with the statement, whereas 30 agreed, out of which 2 respondents agreed to a great extent with the statement. Thus, the results show a mean (m) value of 2.49, a standard deviation of 1.095 with a positive skewness of 0.286.

The result shows that 9 respondents do not have any form of personal protective equipment and it confirms the observation made during the visit to some of the building construction sites in the Gomoa west district which is in line with the assertion by Tool (2002) who listed the main causes of construction site accidents as lack of proper training, deficient enforcement of safety, Lack of provided safety equipment, poor attitude towards safety and isolated sudden deviation from prescribed behaviour.

Next, the degree of agreement to the statement "Employees Training in The Use of Personal Protective Equipment (P.P.E)" indicates that 7 respondents disagreed outright that, there is no such equipment's (P.P.E) in place with the remaining 32 respondents agreeing (from a small

extent to a great extent), showing a positive skewness of 0.251, a standard deviation of 1.132 with a mean value of 2.67. the variable was ranked Seventh (7^{th}) among the strategies put in place to ensure an accident-free site. This is in line with the assertion by Ataev (1985) that protective equipment's are not just provided but employees must be trained on the use of the equipment's.

Also, the level of agreement to the statement "Enforcement in The Personal Protective Equipment's (P.P. Es) shows that 8 out of the 39 respondents disagreed to that effect whilst 31 respondents agreed to some form of enforcement to a great extent, showing a mean (m) value of 2.62, with a standard deviation of 1.115 and positive skewness of 0.006. Finally, but not the least, the degree of agreement to the statement "Employees Compliance with The Use of Personal Protective Equipment" indicates that 12 out of the 39 respondents were not in agreement with the statement, 26 agreeing to a moderate extent with no one agreeing to a great extent. The results show a mean value of 2.31, a standard deviation value 1.055 and a skewness of 0.043 being positive. This is frightening because almost 1/3 (one third) of the Population, numbering 12, said not at all to employee's compliance with the use of P.P. Es on site due to its non-existence. This conforms with the view held by Holt (2001), that secondary causes of accidents centered management pressures, such as financial restrictions, lack of commitment, inadequate and standards, deficient knowledge and information, restricted training and task selection, as well as poor quality control systems. Dejus (2007), also conducted a study in the Lithuanian Republic and Identified that the major reasons for serious and mortal accidents are due to inexperienced employees, lack of qualifications and understanding risk on construction sites. These few studies show the health and safety on site is a global canker that must be given credence by governments

and its agencies and “crack the weep” on any construction firm that does not train, implement nor provide the Personal Protective Equipment’s needed for the work.

The Table 4.13 displays the views of general workers on the types of health and safety hazards in the building construction industry within the Gomoa West district of the Central Region. The respondents showed their degree of agreement on the 5-point Likert scale as follows:

i) Strongly Disagree

ii) Disagree

iii) Neutral

iv) Agree

v) Strongly Agree

Table 13: Types of Health Hazards in Building Construction Step

	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1.	Working on height	7	4	2	11	15	39
2.	Hit by falling object	4	3	7	29	4	39
3.	Trips and falls	3	2	2	18	14	39
4.	Manual handling of materials	1	3	2	6	27	39
5.	Electrocution/ Electric shocks	31	5	2	1	-	39
6.	Noise pollution	15	4	7	12	1	39
7.	Dust pollution	6	1	4	24	4	39
8.	Chemical substance	30	6	-	2	1	39
9.	Poor attitude towards proper usage of plant/equipment	5	`13	11	8	2	39
10.	Trench collapse due to lack of side support (timbering)	27	6	3	3	-	39
11.	Poor access into excavations	10	14	5	9	1	39
12.	Poor fire-fighting equipment/techniques	4	5	4	20	6	39
13.	Poor drainage systems on site	4	5	1	13	16	39
14.	Poor sanitary facilities	-	5	3	6	25	39
15.	Hit by falling materials from overloaded truck	33	3	-	2	1	39

Source: Researcher's Field Survey Data, 2018

The results of the respondents on the variable "Working on height" showed that 11 respondents disagreed with the statement whilst 26 respondents agreed that working on height is one of causes

of accidents on sites with 2 remaining neutral. One site engineer confided in the researcher that he quit his former work because a carpenter fell from a roof top and was paralyzed, and the company did not provide him with any "appropriate" compensation. This corresponds with the view held by Tam et al. (2004), that contractors negligently refuse to provide the necessary personal protective equipment's (P.P. Es) for workmen to carry out their duties. "Hit by falling objects" was the next variable the general workers were asked to indicate their level of agreement, as a type of hazard on site, and only 5 respondents out of the 39 disagreed with the statement, I chose to be neutral but 33 agreed to that effect. Again, respondents were asked to show their level of agreement to the variable "Trips and falls and the results indicate that, 5 out of the 39 respondents disagreed with the statement, 1 remained neutral whereas 33 respondents agreed to statement that trips and falls are a type of hazard on building constructing sites as asserted Ataev, (1985), due to congestion on sites.

Again, respondents asked to indicate the degree of agreement to the statement "Manual Handling of Materials" as a type of health hazard on site and the results from the field survey shows that, only 4 respondents disagreed, 2 wanted to be neutral but 33 agreed (agree to strongly agree) that manual handling is a major cause and type of hazard on site, as observed during the site visits, when causal workers were off-loading and packing blocks and cement with their hands, and worse of all, wearing bathroom slippers (Charlie wote) on site which in conformity with the view held by Sarah (2011), that handling loads manually is one of the sources of health hazards on site. Furthermore, Hughes and Ferret (2011) define manual handling as the movement of a load by human effort alone.

They argued that lifting bricks, cement blocks, and cement bags weighing 50kg, has been regarded as risky activity (s) on site, which is notable practice on most construction sites in the district.

The next variable respondents were asked to show their degree of agreement on the 5point Likert scale was "Electrocution/Electric shock" and results from the Table 4.13 indicates that 31 out of the 39 casual workers selected across building construction sites within the Gomoa West district of central region, shows that only 1 respondent agreed that electrocution or electric shock was a type of casualty or hazard on site but 36 respondents disagreed, with 2, remaining neutral. "Noise Pollution" was also identified as another type of health hazard on site and the result from respondents indicate that, 19 out of 39 general workers disagreed (strongly disagree to disagree), 4 remained neutral, where as 16 respondents agreed to the effect that, "noise" from operating machines is nuisance on site, making its operatives shout, even when chatting or talking in close proximity, during recess. This could also cause hearing impairment to operatives, the workers closer by and pedestrians walking around the site. The general workers (casuals) were again asked to show their level of agreement on the next variable which was "Dust Pollution" and the results show that, 7 respondents strongly disagreed, 4 were neutral whilst 28 respondents agreed that dust pollution is a worry to their health on site, as most of them (casual works) work without personal protective equipment's. When asked to indicate the degree of agreement on the next construct, "Chemical Substance Pollution", 36 respondents out of the 39 casual workers totally disagreed with the notion that, chemical substance is a type of health hazard on site with only 3 respondents agreeing with the statement and this shows the "degree of ignorance" among construction workers, since most of them are not educated on the hazards associated with their job, because the paints, cement dust, blocks and other building materials inhibits some chemicals

which are hazardous to human life, which workers must be protected against, and this in conformity with the view held by the UNEPA representative for Africa, that 9 million people died globally in 2015, through environmental chemical pollution. Source: GNA, 5th. December, 2017, Uniq FM News Report.

Besides, the general workers were asked to indicate the degree of agreement with the statement "Poor Attitude Towards Proper Usage of Plant or Equipment" and the result of the respondents show that 18 respondents disagreed, 11 of the workers remained neutral, whilst 10 out of the 39 respondents agreed, which is in line with Alberta (2015) that workers' poor towards proper usage of plant or equipment could affect or damage the plant or equipment which may be a life threatening tool to its operatives. The next variable that general workers were asked to indicate their level of agreement on the five (5) point Likert scale was "Trench Collapse Due to Lack of Side Support" and the result from respondents show that, 27 respondents strongly disagreed, while, yet another 6, disagreed. 3 respondents were neutral with the remnant agreeing to the statement. This shows that trench collapse is not common in our part of the country since most of the foundations are not deep.

Additionally, the general workers were asked to indicate the degree of agreement with the statement "Poor Access into Excavations" and the result from the 39 respondents indicate that 24 disagreed with the statement, 5 remained neutral whilst 10 respondents agreed that they lack proper accessibility into manholes and excavations like septic tanks. The next construct workers were asked to indicate their level of agreements was "Poor Firefighting Equipment/Techniques" and the respondents indicate that, 9 respondents disagreed with the statement, 4 were neutral with 26 agreeing to the effect that they lack fire-fighting equipment on site and the technique to fight fire or escape, in-case of fire outbreak. Also, the general workers showed their level of agreement

on the next variable "Poor Drainage System Onsite" and the result from the respondents indicated that, 9 were not in agreement with the statement since their sites(s) were well laid out, with good drainage system. 29 respondents agreed with the statement whilst 1 respondent remained neutral. The next item general workers were to indicate the degree of agreement was "Poor Sanitary Facilities" on site and surprisingly, nobody strongly disagreed with the variable, though 5 respondents disagreed ordinarily, 3 labourers remained neutral with 31 respondents agreeing to the effect that, they have to resort to the surrounding bushes which expose them to dangers during the dry season and health hazard during the raining season. Finally but not the least, the general workers were asked on their tick on the variable "Hit By Falling Materials From Overloaded Truck" and the result from respondents indicate that, 36 totally disagreed with the remaining agreeing to that effect which is in conformity with the view held by Ataev, (1985) that loaded trucks conveying materials to and from the site should be loaded with axial load and other traffic regulations in mind in order not to cause any damage to loaded material (plant or equipment) and workers on site.

Table 14: Importance of Safety and Sanitation Practices on Building Construction Site.

No. Of People Who Have Responded	**Saves Cost**	**Increases Production**	**Prevents Accidents**	**Smooth Running of Construction Project**	**Promotes Friendship**	**Reduces Poverty**
Yes	15	14	16	8	5	5
No	2	3	1	9	12	12
TOTAL	17	17	17	17	17	17

Source: Researcher's Field Survey Data, 2018

The Table 4.14 displays the views of respondents from among the management team staff, on the "Importance of Safety and Sanitation Practices Onsite. The respondents were required to state their individual opinions on the issue at hand and 15 out of the 17 respondents stated that, the importance of safety and sanitation practice on site, saves construction cast, 4 respondents indicated that, it increases production on site, 16 out of the 17 respondents stated that safety and sanitation practice on site prevents accidents, 8 of the management team staff indicated that, it enhance the smooth running of the construction project, 5 respondents indicated that, it promotes friendship among the management team and general workers, whilst another 5 respondents also stated that safety and sanitation practice on site helps reduce poverty among workers, as they remain "strong and fit" to carry out their duty always. In an oral interview with some of the labourers about the "Importance of safety practice on site", the responds were so contributing that, the researcher will wish to share; some indicated that, it provides a healthy site, clean and serene environment to work, protect workers from the outbreak of communicable diseases, as well as bites from snakes and scorpions. Namely, training workers (casuals) on health and safety issues and enforcing its implementation site would go a long way to minimize, if not eliminate accidents or injuries among and enhance their maximum output on the project to help achieve the completion dates of projects.

4.3 Results and Discussion of Interviews

4.3.1 Results and Discussions of Interviews with Site Engineer

The researcher concluded an interview with a site engineer in one of the construction sites during the visit, and it was revealed that most of the contractors know it's their responsibility to ensure and provide welfare and safety equipment's but negligence and lack of monitoring by regulatory

agencies have made them shun those tasks, to the employee's. The site engineer went on to narrate his ordeal why he left the former company, saying, a carpenter fell from a roof top, sustained serious injuries and deformities, and payment of compensation became a tag-of-war between the contractor and the family of the injured. This conforms with the assertion by Smallwood et al. (2008), and the ILO (2005) that construction sites have been regarded as the most hazardous place to work, with a high level of health and safety risks. Hence, the ILO estimates that at least 60,000 fatal accidents happen in a year on construction sites around the world which is one in six (1–in–6) of all fatal work-related accidents.

Furthermore, it has been acknowledged that 25% to 40% of fatalities in the world's occupational settings are contributed to by construction (ILO, 2005). Based on fatality statistics, different countries show that the construction industry produces 30% of fatal industrial accidents across the European Union (E.U), yet it employs only 10% of the working population. In the United States of America (U.S.A), the sector accounts for 20% of fatal accidents and only 5% of employment. Again, in Japan, construction fatalities account for 30% to 40% of industrial fatal accidents (ILO, 2005). In the developing world, the risks associated with construction works are much greater. Available data suggests they are 3-6 greater (Jason, 2008). This implies that, comparatively, it is ten times more dangerous to work in construction sites in the developing world than the developed world.

4.3.2 Results and Discussions of Interview with Site Supervisor

In an interview with a foreman at another site visited, the site supervisor mentioned why their employers do not spend or refuse to employ the services of a health and safety expert to train the casual workers, saying the casuals can stop working for their company at any time and take up

appointment with another company that promises to provide better incentives. Besides, they do not require any recommendations from their former employers to be employed by another firm, not considering the cost of training workmen to the firm.

4.3.3 Results of Interview with labourers

The researcher conducted another interview with the labourers on site about the importance of health and safety practices on site and surprisingly, the respondents mentioned that it provides a healthy site, clean and serene work environment, protect workers from the outbreak of communicable diseases as well as bites from snakes and scorpions. Some of them claim bought their own safety equipment's like protective boots and gloves, knowing the risks associated with their jobs, in effect, the reaction of cement on their skin and the effect of dust on their health and well-being. The labourers also mentioned that, their continuous prospects on the job depends on their health and safety, and that would mean better life for their dependents.

4.4 Results and Discussions of Observations

4.4.1 Results and Discussions of Observation at Gomoa Dawurampong

It was observed during the site visits that, safety is a social canker that needs to be given exigent attention by the regulatory agencies and crack the whip or sanction contractors who negligently fail to provide, implement and enforce the usage of safety equipment's at their work sites. On most of the site visited within the Gomoa West District, the general workers work without health and safety equipment's. Some casual workers and skilled labourers (carpenters) wore "Charlie wote" and barefoot on site, whilst working in trenches and on the roof. Labourers were seen mixing concrete with bare feet with the exception of the mason placing the concrete, wearing protective boots. Some of the sites visited were very bushy whilst workers were working on the

site. Scattered forms with nails on them all over the site. Honestly, health and safety practices are alienated to most of the project sites visited.

4.4.2 Results observation of workers mixing concrete at Gomoa Senior High Technical School (Dawurampong)

The researcher observed labourers mixing concrete on site and the best form of protective equipment was the warrington boot, as shown in Figure 4.1

Figure 4.1 Mixing Concrete at the Site at Gomoa Senior High Technical School (Dawurampong)

4.4.3 Results of observation at a site at Dawurampong

It was also observed at the project site at Gomoa Senior High Technical School that an electrician was fixing electrical fittings wearing slippers instead safety or protective equipment which is the norm, for the three (3) days the researcher visited the site, as shown in Figure 4.2 below.

Figure 4.2: Fixing Fluorescent Lamp at Gomoa Senior High Technical School (DAWURAMPONG)

Figure 4.3: Plumbers Laying Soil Vent Pipes at a Poly Clinic at Gomoa (Dawurampong)

The researcher observed with strangeness, the degree of neglect of safety practices on site where plumbers were seen laying soil vent pipes for the drainage system (at a project site where the contractor claimed to have safety management system in place), with bare feet, as shown in the Figure 4.3 above.

4.4.4 Results of observation at a site at Apam

It was observed at this site, as shown in Figure 4.4 below that, the external area was unkept and left bushy because workers were working on the internal finishing's. It is a dangerous practice and poses a threat to workers in cases of accidents, and when it occurs, it is the worker who

suffers because the best the contractor could do is to pay for medical bills but compensation for days off is not catered for.

Figure 4.4: Shows a bushy site whilst workers work on internal finishing's.

Figure 4.5: Carpenters Positioning roofing members at the top at Gomoa - Abrekum

The researcher observed that health and safety practices are farfetched from the minds of contractors so much that worker safety is not a bother to the contractors. Such that both labourers and carpenters work on site either bare footed or in slippers, with nails scattered all over the floor. Carpenters placing roofing members were without any protective equipment. The project site was cleared of bushes but the stumps of young trees were all over the site and could cause injury to the workers. It could also be a harbor of reptiles like snakes or scorpions which could pose danger to the workers, as shown in the Figure 4.5.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings, conclusions derived from the finding as well as the recommendations and suggestions for further research. The study was intended to assess the level of awareness of health and safety practices at building construction sites.

5.2 Summary of Findings

The study showed that;

- The management team staff have had some form of training and education on health and safety practices associated with their work. A total of 14 out of the 17 management team respondents accede to the fact that, they have received training on health and safety practices associated with work and this can be found among the category D_1K_1 to D_3K_3 contractors, where as the remaining 3, belonging to the category D_4K_4 registration group claimed they have never received any education nor training associated to their work.
- The study revealed that due to the graduate unemployment which is on the rise and unreliable income for labour, the graduates accept any wage for any work just for survival. The contractors have taken advantage of the situation and do not consider the health and safety of the workers.
- It was found out that, most of the casual workers were employed on the job without any education on health and safety associated with their work. Some of

  the building construction firms have some form of safety management system policy they follow.

- Furthermore, the study showed that, some firms have health and safety regulations in the place but its implementation and enforcement was their biggest challenge, simply because the casual workers claimed they do not feel comfortable wearing them, on the grounds that, it retards their pace at work.
- The study revealed that even though accidents do occur at the building sites resulting into injuries, there were not records of them.
- The study also showed that most building construction firms do not engage the services of personnel with technical expertise in health and safety so as to ensure a healthy and safety site.
- Due to lack of supervision by regulatory agencies in the implementation and enforcement of occupational health and safety laws at building construction sites, most employees are exposed to hazards and accidents, sometimes resulting in death.

5.3 Conclusion

The study concluded that, the principal objective of systematic health and safety is the replacement casual or unsafe practices which allow accidents or injuries or faecal matter to be exposed to contact with flies and vermin, which may contaminate food and drinking water sources. Most accidents and diseases are caused in these ways, and prevention is not only economical and hygienically preferable but is also cheaper than medical treatment. For these reasons, this project work has been produced to meet the needs of all who are concerned with the development programmes involving what are related to the building construction industry.

It was revealed that contractors give preference to training management staff who are permanent workers of the organization, and even that, it is only the highly ranked contractors who have some form of health and safety training system in place. Those of the management team staff working with the category D_4K_4 group of contractors claimed they have never received any form of training on hazards related to the work.

Additionally, it can be emphatically stated that most building contractors in the Gomoa West District do not educate nor train casual workers on occupational health and safety before assigned on the job. The contractors claimed that, the casuals could leave their firm and work for another firm without any recommendation from their previous employers. Hence, the resolution not to spend resources in their training.

Some of the building contractors also claimed to have safety management systems in place but were not able to implement nor enforce it on the workers, whilst some casual workers refused the usage of the personal protective equipment because they don't feel comfortable wearing them.

Again, building contractors in the district do not have records to show on injuries (be in minor or major), incident reporting unit, let alone first and kits. Casual workers come to work with pain killers in their pockets.

Communication barrier was another factor that hinders education on health and safety on site, since most of the contractors working on major government projects in the district were foreigners from Eastern Europe and Asia who are not well versed in the English Language, and most of casual workers were also foreigners from neighbouring Francophone countries.

Finally, but not the least, lack of monitoring by regulatory agencies is another contributing factor to the non-adoption nor compliance of health and safety practices on site, through their laws that stipulates that health and safety facilitates be provided for "workmen" in their places of work. This situation could be attributed to insufficient funding by government or misplaced priority by agencies in charge of supervision of projects in the district.

5.4 Recommendations

The following recommendations were made to address the findings;

- Contractors, especially those within the registration category D4K4 should ensure the training of all their personnel on health and safety issues related to their work before put on the job, in order to curtail any casualties.
- Contractors should always ensure that workers are educated and trained on hazards associated with their jobs, so as to minimize or eliminate accidents on site.
- Management team should be trained to enforce the rules on health and safety management on site and ensure that, the workers comply with the rules.
- Management staff in charge of health and safety should have records on the history of health and safety issues on the sites, to indicate whether there have been casualties (major or minor) and the action taken to prevent would-be or future occurrences.
- Contractors should be made to employ the services of a health and safety experts to train their workers on occupational health and safety in order to curb any uncertainty at the site, as was evident on one of the building sites where the site engineer was in-charge of health and safety training.

- Government and its regulation agencies should intensify their supervisory role to ensure the implementation and enforcement of safety regulations on site in order to reduce or prevent casualties and the lives of innocent employees, and should not wait for disaster to struck before visiting the sites.
- Foreign contractors from non-English speaking countries should be made to learn the English Language and employ the services of a Ghanaian interpreter to ensure effective communication between the contractors and employees on health and safety at the site.

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QUESTIONNAIRE

THIS QUESTIONNAIRE SEEKS TO COLLECT VIEWS FROM CLIENTS, ARCHITECTS, CONTRACTORS, QUANTITY SURVEYORS, PROJECTS MANAGERS, SITE ENGINEERS, CLERKS OF WORK, FOREMEN, SKILLED LABOURERS AND UNSKILLED LABOURERS, ON THE COMPLIANCE WITH HEALTH AND SAFETY PRACTICES ON BUILDING CONSTRUCTION SITS IN GOMOA WEST DISTRICT OF THE CENTRAL REGION.

I would humbly wish to reiterate that; this exercise is purely for academic work in partial fulfilment for the award of the Master of Technology Education (M-Tech) Degree.

I therefore crave your honour to provide responses to the following questions to enable the researcher contribute knowledge in the field of study.

All information provided shall be treated with the utmost confidentiality, besides, your anonymity is of utmost importance to the researcher, and you count on the researcher for this assurance.

Thank you for your cooperation.

Please tick (√) in the box where appropriate

a) Gender

1. Male [ ] 2. Female [ ]

b) Age Group

1. Below 20 years [ ] 4. 40-49 [ ]
2. 20-29 [ ] 5. 50-59 [ ]
3. 30-39 [ ] 6. 60 years and above [ ]

c) Level of education

1. Basic Education [ ]
2. Sec/Tech. Education [ ]
3. Tertiary Education [ ]
4. No Formal Education [ ]

d) Working experience

1. Below 5 years [ ]
2. 5-10 years [ ]
3. 21-30 years [ ]
3. 11-20 years [ ]
5. Above 30 years [ ]

e) Position on project site

1. Client [ ]
2. Architect [ ]
3. Contractor [ ]
4. Site Engineer [ ]
5. Clerk of work [ ]
6. Unskilled labour [ ]
7. Project Manager [ ]
8. Quantity Surveyor [ ]
9. Quantity Assurance Officer
10. Foreman [ ]
11. Skilled labour [ ]

f) Registration category

1. D1K1 [ ]
2. D2K2 [ ]
3. D3K3 [ ]
4. D4K4 [ ]
5. Others (Please specify) ……..

g) Mode of Employment into the Construction Industry:

1. Personal search [ ]
2. Through Friends [ ]
3. Apprenticeship Training [ ]
4. Labour Officer [ ]
5. Others (Please Specify) ……

SECTION B: AWARENESS OF HEALTH AND SAFETY PRACTICES ADOPTED ON BUILDING SITE.

Please this portion is to be filled by management team.

You are please entreated to use Yes [ ] or No [ ] to respond to these questions.

AWARENESS OF HEALTH AND SAFETY HAZARDS ON BUILDING CONSTRUCTION SITES.

		Yes	No
1.	Do you give employees training before put on the job?		
2.	Do you have safety management systems on the site?		
3.	Do you have Health and safety personnel in-charge of training employees before putting them on the job?		
4.	Have you been trained on Safety Management systems on the site?		
5.	Are you aware of the hazards associated with your job?		
6.	Do you appreciate the importance of Health and Safety Compliance		
7.	on the site?		
8.	Do you use protective equipment on site?		
	Do you feel comfortable wearing protective clothing on site?		

ORIENTATION ON EMPLOYEES ON NEW JOBS AND TRANSFERS

		YES	NO	N/A
	WORKSITE TOUR AND INTRODUCTIONS Health and Safety Manuel Reviewed and discussed			
	REVIEWED AND DISCUSSED POLICIES • Health and Safety • Drugs and alcohol • Violence • Enforcement			

	RESPONSIBILITIES Reviewed and discussed responsibilities to: • Refused unsafe work • Know about the hazards present in the workplace			
	OCCUPATIONAL HEALTH AND SAFETY LEGISLATION Reviewed and discussed? **HAZARDS** Reviewed and discussed job – specific health and safety hazards? **TRAINING** Reviewed and discussed job – specific health and training required?			
	ITEM			
1.1	Is there a written Health and Safety Policy for the organization?			
1.2				
1.3	Is the policy signed by the current senior operating staff?			
1.4	Is the policy readily available to employees?			
1.5	Are the employees aware of the policy's content? Have specific Health and Safety responsibilities been written for: • Managers? • Supervisors? • Workers? • Contractors? • Visitors?			
1.6	Are the following aware of their Specific Health and Safety responsibilities covered by legislation and department policy? • Managers? • Supervisors?			

	• Contractors? • Workers			
1.7	Are all employees evaluate on their individual Health and Safety performance? • Managers? • Supervisor? • Workers			
1.8	Does the Senior Operating Officer communicate to employees, at least annually, the organization's commitment to health and safety?			
1.9	Do the most Senior Managers on site tour the work site to reinforce Health and Safety practices and behaviours? • Every 6 months? • Yearly?			
1.10	Is relevant current Health and Safety legislation readily available at the work site?			
1.11	Is there a process in place that addresses contractor's Health and Safety while on site?			
1.12	Is there a process in place that addresses visitor's Health and Safety while on site?			
1.13	Does the employer provide the Health and Safety resources needed (workers, equipment method, material and money) to implement and improve Health and Safety on site?			