UNIVERSITY OF EDUCATION, WINNEBA

ASSESSING THE INFLUENCE OF SITE OPERATIVES' ATTITUDES ON HEALTH AND SAFETY PERFORMANCE OF CONSTRUCTION PROJECT SITES IN GHANA: A STUDY OF SELECTED PROJECTS SITES IN THE NORTHERN REGION

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NOVEMBER, 2022

DECLARATION

STUDENT'S DECLARATION

I, **ADAMS ABUDI,** declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: .....

DATE: 15th NOV, 2022

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: DR. NONGIBA ALKANAM KHENI

SIGNATURE: .....

DATE: November 15, 2022

DEDICATION

This dissertation is sorely and humbly dedicated to my lovely wife Hajia Habiba affectionately called sister Habi and my lovely daughter Shamsiyah affectionately called hajia Shamsiyah. May Almighty Allah guide, protect and shower his abundant blessings' upon you throughout your lives.

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ABSTRACT

Construction site accidents constitute a major source of hindrance to productivity on construction sites globally. Many construction site accidents happen as a result of unsafe behaviors of construction site operatives. Arguably, controlling or managing the attitudes of construction site operatives could enhance the health and safety performance of construction sites. The aim of the study was to to explore the relationship between site operatives' attitudes on health and safety performance of project sites in Northern Region of Ghana. The specific objectives of the study include; to assess the health and safety attitudes of construction site operatives on construction site in Northern Region of Ghana, to identify the critical determinants of health and safety performance of construction project sites in Northern Region of Ghana in relation to attitudes of operatives, to assess the influence, if any, of health and safety attitudes of site operatives on health and safety performance of construction project sites in Northern Region of Ghana, and to make recommendations based on the findings of the study for improving health and safety performance of construction project sites in Northern Region of Ghana. The study employed a cross sectional survey design and a quantitative strategy. The target population comprised site managers and construction site operatives. Purposive sampling technique was employed to select experienced site managers and literate tradesmen who could read, understand, and respond to survey questions. The response rate achieved was 83%. The findings of the study revealed that the key health and safety attitudes of site operatives on project sites in the Northern Region include; willingness to identify hazards that could lead to accidents, reluctance to work during holidays and week-ends, developing hatred for management when they are either sick or hungry and willingness to participate in health and safety training. The study revealed that the critical determinants of health and safety performance in relations to attitudes of construction site operatives in Northern region included; effective communication, provision of adequate protective clothing, regular and periodic training, education and awareness creation and good cordial working relationship between management and workers. The findings of the study suggest that the health and safety attitude of construction site operatives significantly correlates with health and safety performance of construction sites. Based on the findings, the study has made recommendations for improving health and safety performance of project sites.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The construction industry plays an important role in any economy. The industry activities are also vital to the achievement of the socio-economic development goals by providing shelter, infrastructure and employment to the citizens and generating employment to people of different levels of knowledge and skills (Dadzie, 2013: 35; Anaman & Osei-Amponsah, 2007: 4). Ghana's construction industry is one of the major and most significant contributors to her economic growth, contributing at least 14.34 percent to Gross Domestic Product (GDP) (Ghana Statistical Service, 2018).

However, despite all these significant contribution of the construction industry, it is often vulnerable to many accidents and injuries (Danso *et al*., 2015: 73; Kheni & Braimah, 2014: 24; Olutuase, 2014: 2; Dadzie, 2013: 36). This is as a result of the complex nature of construction activities, in relation to its unique nature, unpredictable site conditions, diversified human behaviour, and unsafe procedures (Idoro, 2011). Due to this, the industry has recorded higher numbers of fatalities and higher injury rate, making it one of the industries that is susceptible to many accidents globally (Williams et al., 2017).

Hossain & Ahmed (2018), are of the view that the construction industry (CI) employing the largest labour force in the world has also accounted for about 11% of all occupational injuries and 20% of all deaths. This therefore have a rippling effect on construction projects as well as death tolls of many nations. The International Labour

Organization ILO (2018), estimated that at least sixty thousand (60,000) health and safety issues are recorded each year on construction sites around the world. Also, from the Health and Safety Strategy, 2004-2010, most of these accidents and injuries occur as a result of the large number of unskilled and unqualified workers who are employed in the construction sector (Orji et al., 2016).

Oza (2017) reported that the International Labour Organization (ILO) indicated that there will be more than 2.3 million fatalities every year because of occupational hazards, and 317 million accidents occur on construction sites the world over. As stated in their annual report, the Health and Safety Executives (2013) indicated that even though there have been significant reductions in the number and rate of injury over the years, the construction industry is regarded as a high risk area responsible for about 22% of fatal injuries. Aniekwu (2007) reported that, construction is generally risky because of outdoor operations, work at heights, complicated on-site plants and equipment operations and workers' careless attitudes and behaviours towards safety. In Tanzania, construction sites have been regarded as the second most dangerous places to work after mines (Mbuya & Lema, 2002; ILO, 2005). Sadly, construction site accidents account for the many unfortunate incidence, some of which incudes, de-motivating of workers, disruption of construction site activities, delay in project progress and completion and finally affects the overall cost of production.

Furthermore, the construction industry is often characterised as a dangerous or highly hazardous industry because of the disproportionately high incidence of accidents and fatalities that occur on construction sites around the world (Okoye & Okolie, 2014). Even though, the maintenance of health and safety has been the major priority set by

many construction companies around the world in collaboration with government commitment, this objective cannot be achieved through the implementation of laws alone (Idoro, 2018).

For instance, the Safety and Health Act (OSHA, 2020) which is identified as an approach to providing legislative framework to enforce human behaviour towards safety compliance by practicing high standards of safety and health at work to eliminate workplace accidents. However, ignorant behaviour and attitude from both employers and employees contribute to rise of issues on behavioural safety noncompliance (Jamal Khan 2006). So, the employer needs to adapt more holistic tactics and approaches which focus not on only improving physical working environment, but also on shaping employee's behaviours, attitudes and beliefs which lead to safety behaviour and ultimately safety compliance (Fernando, 2008).

What is needed is a paradigm shift from legislation to the inclusion of the attitudes and behaviors of workers who are always at the central point of all construction activities. In order to ensure that accident-free is achieved, all efforts must be put in place to mitigate the high risk associated with construction activities (Ghani et al., 2010). Again, all parties including individuals and companies must come together to make sure that all health and safety issues which have direct impact on the reductions in workplace deaths and injuries are followed strictly (Health and Safety Strategy, 2004-2010). The International Labour Organization (ILO, 2000) highlighted in their constitution that the protection of the worker against sickness, disease and injury arising out of employment is the fundamental element of social justice. Therefore, Occupational health and safety (OHS) is human rights and decent work is eventually safe work (WHO, 2010). In

Ghana, the construction industry is rated as one of the most accident pruned industry when it comes to the safety of workers (Berglund et al. 2019). This could be due to the lack of stronger legislative instruments to control and manage accidents and injuries of site operatives, especially people's attitudes and behaviours towards safety and its corresponding effects on construction projects (Che Hassan, 2007). The situation could be worse in the Northern Region of Ghana where majority of construction workers are unskilled and do not have any better training as far as health and safety issues are concerned (Oza 2017).

It is significant however to note that several factors account for construction site accidents and injuries. Some of which often come as a result of certain fundamental errors because construction sites deal with both physical and psychological welfare of site operatives. Unfortunately, in Ghana, despite the establishment of the factories and shop Act in 1970, (Act, 328), the mining regulation, 1970 (LI, 665), and the 2003 Labour Act (Act 651) which seeks to guarantee the right of all employees to work under decent and convenient work environment many construction sites workers still suffer several health and safety related problems (Ghana Statistical Service, 2018). Various studies have shown that a lot of injuries pertaining to workers occurring at the construction site is through slips and falls. The Labour Department (2000) annual report reported a total of 8,692 work related health and safety injuries to the Department for compensation.

Moreover, literature available on this subject indicates that the construction industry all over the world is among the leading causes of accidents. Like many construction economies, site operatives within the construction industry appear to be increasing

because, construction firms rely enormously on cheap labour site operatives and Ghana is no exception (Ghana Statistical Service, 2020). In attempt to deal with this canker, many developed countries have instituted various safety, health and environmental management systems to minimize these fatalities (Chan et al. 2008). Various safety schemes have also been introduced which resulted into a consistent decrease in the accident rate during the last 20 years (Choudhry et al., 2008). Countries such as the United States and the United Kingdom are implementing safety management regulations such as the Occupational Safety and Health Administration Standards for the construction industry. A system of safety management practices to accomplish positive safety outcomes through worker engagement (Wachter & Yorio, 2014).

1.2 Problem Statement

The proliferation of site operatives in the Ghanaian construction industry has brought its own accompanying occupational health and safety issues giving a bad image to the socio-economic importance of the construction industry (Agyekum, 2018). Several studies agree that the construction industry all over the world can be termed as a high risk occupational area. For example, the ILO's global estimates for 2003 indicate that each year at least 60,000 fatal accidents occur on construction sites around the world or one fatal accident in every ten minutes (ILO, 2013).

In Ghana for instance, the construction industry accounts for the highest rate of occupational deaths in comparison to other industrial sectors such as the Agricultural and services (Labour Department, 2000; Danso, 2010). This requires a study into construction-related accidents and fatalities, and how they can be significantly reduced. Meanwhile, research work indicate that the risks of labor accidents originate from or

are related to unsafe behaviors of workers (Fugar et al., 2010, WHO, 2011 & Fang, 2008). Significantly, some of these unsafe behaviors includes lack of safety awareness, demonstrated skills, colleagues' attitudes, and other economic factors which affect workers' productivity and safety when working on the job site (Choudhry, 2012). Admittedly, some studies have been done in Ghana relating to occupational health safety issues in the construction industry (Mustapha, Aigbavboa & Thwala, 2016: 11; Mustapha, 2016: 46; Kheni & Braimah, 2014: 24; Dadzie, 2013: 35; Kheni, Gibb & Dainty, 2010: 1104). While some are aimed at determining how the clauses on appropriate health and safety standards are implemented on construction projects sites (Dadzie, 2013: 36); others looked at the institutional and legal frame work relating to health and safety management in the construction industry (Kheni & Braimah, 2014: 23).

These studies did not focus directly on health and safety issues affecting site operatives' attitudes and their impact on health and safety performance. For example, Kheni (2008) in his studies did mention how workers in their quest to meet their basic needs, such as food and shelter, have compromised their demand of health and safety rights.

Furthermore, Danso (2005) observed that about 65% of construction artisans, especially the new entrants, do not have knowledge on safety issues on construction sites. Furthermore, Opeoluwa et al. (2020) looked at the Ghanaian Construction industry and road infrastructural development. Again this deficiency of safety awareness is not clearly linked to casual workers. Thus, while these studies were making significant contribution towards understanding of occupational health and safety issues in the Ghanaian construction industry, they did not relate to the issues of occupational health and safety specifically to attitudes and behaviours of site operatives who constitute

about 80-90% of the total workforce on most of the project sites (ILO, 2013, Danso, 2010, Layea et al., 2010). It is worth noting that the real issues of occupational health and safety relating to the attitudes of site operatives within the Ghanaian Construction Sector particularly in the Northern region has not been appropriately discussed. Several research work across the world indicate that fatal occupational accidents in the course of construction is high with human factor being the major cause (Khammar, 2017). In accident causation theories, Heinrich et al. (1988) found that unsafe behavior by construction site operatives or workers contribute significantly to the numerous accidents recorded by the construction industry. Fang et al. (2016) also indicated that unsafe behavior by workers is the most frequent and direct cause of on-site accidents. Therefore, unsafe behavior is a critical factor affecting the occurrence of accidents and should be prevented.

In using the accident causation model in their contribution, (Abdel Hamid and Everett, 2000), said that through inherited or acquired undesirable traits, people may commit unsafe acts or cause the existence of mechanical or physical hazards that result injury. It is important to note from this theory that people's behaviors and attitudes are the fundamental causes of accidents. Most of the accident that occur on construction sites are caused by wrong doer of the worker. It is important that management should be responsible for the accident prevention (Jacobson, 2001, p 33). In order to address these shortfalls, the research takes the stand that the attitudes of site operatives and their corresponding effects on health and safety performance should be directly considered especially in the Northern region of Ghana in order to minimise the occurrences of construction related accidents.

1.3 Justification of the Study

Various studies shown above have affirmed that the construction industry is characterised with high incidence of occupational accidents and deaths. For instance, International Labour Organization (ILO) (2014a) estimated that 160 million people suffer from work-related diseases, and there are an estimated 270 million fatal and non-fatal work-related accidents per year and Ghana is not an exception. Again, the ILO's global estimates for 2003 indicated that each year at least 60,000 fatal accidents occur on construction sites around the world or one fatal accident in every ten minutes (ILO, 2013). ILO (2014b) further indicates that, increasingly, the construction industry has a disproportionately high rate of recorded accidents. In Ghana, construction industry accounts for the highest rate of occupational deaths in comparison to other industrial sectors (Labour Department, 2000; Danso, 2010). Table 1.1 below shows the statistics of construction sites accidents that occurred at various industrial sectors from 2015-2019 (Labour Department, (2020) (you have extracted the construction so limit your statement to construction)

Table 1.1: Statistics of Accident Construction Sites in Northern, Brong Ahafo and Ashanti Region from 2015-2019.

	Sectors	2015	2016	2017	2018	2019	Total
Ashanti Region	Construction	45	51	45	42	52	235
Brong Ahafo	Construction	29	15	24	44	25	137
Northern Region	Construction	12	16	9	10	21	68

Source: Labour Department, Ghana (2020)

From the table above, it could be seen that in 2015and 2016, there were increases in the number accidents cases in both the Ashanti and the Northern regions. For instance, in the Ashanti, the accident rate increased from 45 in 2015 to 51 in 2016. Also, in the Northern region, accidents cases increased from 12 in 2015 to 16 in 2016. Even though

there were decreases in the figures in both Ashanti and Northern regions in the 2017, there was a sharp increase of accidents in the Brong Ahafo region from 15 in 2016 to 24 in 2017.

However, in 2018 while the Ashanti recorded a decrease of 42 cases from the previous year cases of 45, the Northern and Brong Ahafo experienced increases. For example, the number of recorded accidents in the northern region increased marginally from 9 in 2017 to 10 in 2018, while the Brong Ahafo recorded a tremendous increase of 24 cases in 2017 to 44 in 2018. Lastly, while there was a drop in the 2019 figures from 44 in 2018 to 25 in the Brong Ahafo regions, there were rather increases in the figures in both the Ashanti and Northern regions. For example, there was a 50% increase in the Northern region from 10 in 2018 to 21 in 2019. Again in the Ashanti region, the figures moved from 42 in 2018 to 54 in 2019.

It is significant to state that the low numbers recorded in the Northern region are not surprising because, there are lessor number of construction firms or contractors as compared to Brong Ahafo and Ashanti regions (Ghana Statistical Service, 2021). As such lessor construction activities are carried out in those regions, hence the low numbers of recorded construction accidents. Despite the low numbers of construction accidents recorded in the Northern Region, it is important to look at alternative measures by which the number of construction accidents could either be eradicated or reduced. It is in view of the above that the study seeks to look into the human element (attitudes) of site operatives which has been deemed to be one of the many causes of construction-related accidents and fatalities, especially in the Northern Region of Ghana (WHO, 2011). Similarly, there seems to be several reasons why there are

increasing numbers of construction accidents in the Northern region as can be seen in the Table 1 above, especially from 2018 to 2019. Some of these reasons include the high employment rate amongst the youth who in their quest to earn a living go beyond all odds to engage in construction works (Kheni, 2008).

Secondly, the high illiteracy rate amongst the populace who are inexperienced in the areas of health and safety, therefore find it very difficult adhering to rules and regulations on construction sites in the Northern Region. Also, available records from the Northern Regional Metropolitan Assembly, reveal that many of the construction firms or companies are in the D3K3 and D4K4 categories and therefore have low capacity in terms of their capital based ~~factor~~. These factors amongst others prevent construction companies in the region from employing competent construction managers, safety officers as well as procuring the required basic safety equipment for employees on their various construction sites. At the end of the day, the only option available to these companies is to employ people who are mostly unskilled in the areas of construction related works.

However, due to these increasing number of accidents in the Northern region, the government through the Metropolitan, Municipal and District Assemblies pay huge sums of monies as compensation to accident victims resulting in the increased in Government expenditure. Monies that can be spent on other sectors of the economy are mostly used to pay compensation to accident victims who sustain various forms of injuries in the course of construction work. Sometimes these accident victims who can work and pay taxes to support the economy becomes incapacitated (Ghana Statistical Service, 2021).

Furthermore, many lives are lost and accident victims become poorer and vulnerable. Therefore, this study seeks to build on the works of Danso (2010), Kheni et al., (2008), Laryea et al., (2010) and Adow (2013) by exploring the attitudinal and behavioural tendencies of construction site operatives towards improving health and safety performance on construction projects sites in the Northern Region of Ghana.

1.4 Aim and Objectives of the Study

The aim of the study is to explore the relationship between site operatives' attitudes on health and safety performance of construction project sites in Northern Region of Ghana. The specific objectives of the study are as follows:

1. to assess the health and safety attitudes of construction site operatives on construction projects site in Northern Region of Ghana;
2. to identify the critical determinants of health and safety performance of construction project sites in Northern Region of Ghana.
3. to assess the influence, if any, of health and safety attitudes of site operatives on health and safety performance of construction project sites in Northern Region of Ghana.

1.5 Research Questions

The following key research questions will guide the conduct of the study:

1. What are the health and safety attitudes of construction site operatives on construction project sites in Ghana?
2. What are the critical determinants of health and safety performance of construction project sites in Ghana?
3. What is the influence, if any, of health and safety attitudes of site operatives on health and safety performance of construction project sites in Ghana?

1.6 Significance of the Study

Although several works have been carried out in the area of occupational health and safety, there is still a gap which this study seeks to fill especially the attitudes of site operatives and their influence on health and safety performance. That is to say, most of the studies conducted on occupational health and safety in Ghana does not focus much on the attitudes of site operatives especially in respect of health and safety performance which the study seeks to accomplish in the first place.

Secondly, the outcome this research will further provide reinforcement to the implementation of some suggested ways of minimizing occupational injuries by Ghanaian researchers in the same areas of study. This will go a long way to reduce and minimise the numerous accidents and injuries in the Ghanaian construction industry which is regarded as one of the major contributors to occupational injuries. The findings of the study would also add to the already existing literature in the field of occupational health and safety especially in the Ghanaian construction sector. Therefore, future researchers can make use of the findings of the study as a foundation for their research works.

Furthermore, the study will enhance the relationship and commitment between both employers and employees to see health and safety as a shared responsibility. This collaborative effort will help improve on the reduction of the numerous accidents that occur on construction sites in the Northern Region of Ghana.

1.7 Limitations and Delimitation of the Study

1.7.1 Limitations

Every research work is burdened with some limitations and this one is of no exception. Among the limitations of the study are the following: First and fore-most, the high illiteracy rate amongst site operatives affected the responses to the questionnaire. A good number of site operatives were made of respondents with low academic qualification, hence did not have adequate knowledge on certain portions of the questionnaire even though this was explained to them before the questionnaire was administered. In addition, respondents' knowledge in ICT coupled with poor internet services, lead to late submission of online questionnaires after the dead line or due date. Hence, this affected the quantum of data gathered.

1.7.2 Delimitations

Although there are several researchable areas within the construction sector, the study seeks to focus only on the occupational health and safety issues within the Ghanaian construction industry. This is because the Ghanaian construction sector is becoming one of the industries that records a lot of fatalities. As such it is important to continue to educate and sensitise workers within the sector on their own health and safety. Furthermore, the attitudes of site operatives were chosen because they are directly involved in the day to day activities in all the construction activities. The attitudes of site operatives which involve the mind set and feelings of people have a greater influence on their health and safety on site for that matter could help reduce accidents drastically. The study was also limited to the Northern region due to the high rate of construction site accidents recorded by the Northern Regional Labour department from 2015-2018. As a result, the recommendations and suggestions from the study would be

a policy document for construction practitioners in the Northern Region on the control of construction accidents.

1.8 Organisation of the Study

The rest of the study is sectioned as follows:

Chapter Two: this chapter focuses on the related literature on the topic, as well as the conceptual frame work which guides the study. Furthermore, the chapter looks at the definition of some key terms in relation to the topic.

Chapter Three: the chapter covers the research methodology which comprises research philosophy, research design, research approach, description of study area, study population, sampling Techniques and sample size, as well as the data collection instruments and data analysis procedures.

Chapter Four: this chapter presents the analysis of responses in relation to the specific objectives and research questions.

Chapter Five: this chapter looks at the discussion of the results in relation to the specific objectives of the study.

Chapter Six: this chapter presents the summary of the findings of the study, conclusion and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter presents the review of relevant literature related to the research topic. It is organized into ten sections comprising an introduction, concepts of Health, Safety and related terms, Health and Safety in the Construction Industry, Construction Project Sites in Ghana, Perception of risk on Health and Safety Management on Construction projects in Ghana, Attitudes and Behaviors of site operatives, influence of Attitudes on site operatives on Health and Safety performance, Health and Safety Management in Construction and summary of the reviewed Literature.

2.1.1 Conceptual Definition of Terms

2.1.2 Site Operatives

This comprises all craft based construction workers who carry out their respective/assigned duties or responsibilities under the strict supervision of their superiors (site managers, fore-men, safety officers or their representatives etc.). Some of these skilled operatives include carpenters, masons, welders, scaffolders, plumbers etc. (Kulatunga et al., 2014).

2.1.3 Health

The World Health Organization WHO (2020) explained Health "as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Similarly, the International Labor Organization ILO (2014), defined health as "The promotion and maintenance of the highest degree of physical, mental and social

well-being of workers in all occupations". In another way, the Merriam - Webster online dictionary (2016), explained health as "the condition of being well or free from disease". That is the condition of being sound in body, mind or spirit, especially freedom from physical disease or pain. Hughes and Ferrett (2010:3), in defining health, states "that health is the protection of the bodies and minds of people from illness resulting from the materials, processes or procedures used in the workplace, and Safety is the protection of people from physical injury ".

2.1.4 Safety

Safety as explained by Occupational Health and safety Administration OHSA (2020) stated that, safety is the state of being "safe", the condition of being protected from harm or other danger. Safety can also refer to the control of recognized hazards in order to achieve an acceptable level of risk.

In another development, Safeopedia (2015), refers to safety as "any safety procedure which aim at ensuring that a construction site or the industry as a whole is not the cause of immediate danger to the public around a construction site or the workers as well as making sure that the finished product meet required standard". However, this thesis will explain safety as the prevention of illness, injury, and hazards in the workplace for all employees. Workplace safety involves the creation of a safe and healthy environment for all workers to evade hazards, injuries, and illnesses.

2.1.5 Safety performance

This refers to the quality of safety related work. This includes, using personal protective clothing, engaging in work place practice to reduce accidents, communicating hazards and accidents and exercising employee rights.

2.1.6 Attitudes

Attitudes as explained by (Kulatunga et al., 2014) indicated that attitudes are the evaluation of various objects that are stored in memory. This explanation was further collaborated by Mcshane & Von Glinow (2013), who stressed on the significance of attitudes to individuals who hold them, as they help people to group and priorities the world around them. They further stated that attitudes are important to construction managers as they determine people's behaviour and provide an insight into their motivating values and beliefs. According the same authors, an attitude includes affect (feeling), cognition (thought) and behaviour (Teo and Loosemore 2003). According to Ajen (1993), Attitudes represent people's evaluations of objects or situations that predispose them to behave in a certain way. Attitudes refer to the ability of an individual to react either positively or negatively towards an object or person. An attitude expresses the way a person evaluates the degree of positive or negative feelings he or she has towards an object in question.

2.2 Overview of the Construction Industry in Ghana

The construction industry in Ghana comprises building project consultants, engineers, architects, quantity surveyors, building contractors, and artisans. There is currently no national authority that governs and regulates the activities of the industry. In the absence of this authority, the various sectors within the industry have individual governing institutions (Donkoh& Aboagye-Nimo, 2016). The Ministry of Works and Housing (MWH 2018), supervises all building and civil works in the country while the Ministry of Roads and Highways oversees the activities of players in the construction and maintenance of roads, highways, railways, airports, and other structures. These two ministries are therefore jointly responsible for the registration and classification of

contractors within the industry (MWH 2018). Meanwhile, there is no national database of industry players with information on the respective sizes and capabilities of the members. Classification of contractors in both the housing and roads and civil works subsectors is primarily based on the financial resources, human resource capacities, and level of technology (i.e. type and efficiency of equipment employed) of firms. There are different classifications for contractors in the housing and roads subsectors (Vulink, 2014).

The Chartered Institute of Building in Ghana estimates that there are over 1,600 building contractors working in Ghana since October 2012 (Oxford Business Group 2014). These are described below. Contractors in the housing subsector are grouped into four classifications, 1 to 4, depending on the value of the project to be implemented. As described in Table 2.1 below, class 1 contractors (D1K1) are contractors with the capacity to execute projects that are above US$500,000 in value; class 2 contractors (D2K2) have the capacity to execute projects that are up to a value of $500,000; class 3 (D3K3) contractors have the resources to implement projects with a maximum value of $200,000; while class 4 (D4K4) contractors have the means to carry out projects with a maximum value of $75,000. Table 1: Housing subsector classification Class Project value Proportion of contractors Class 1 (D1K1) > $500,000 10% Class 2 (D2K2) ≤ $500,000 20% Class 3 (D3K3) ≤ $200,000 60% Class 4 (D4K4) ≤ $75,000 10% (Ministry of Works and Housing, 2018).

Table 2.1: Housing Sub- Sector Classification

Class	Category	Capacity to execute project
Class 1	D1K1	Projects that are above US$500,000 in value
Class 2	D2K2	Projects that are up to a value of $ 500,000.
Class 3	D3K3	Projects with a maximum value of $ 200,000.
Class 4	D4K4	Projects with maximum value of $75000.

Source: Ministry of Water Resources, Works and Housing -2018

Table 2.2: Road sub-sector classification

Classification	Category	Project net value
Class 1	D1k1	No Limit
Class 2	D2K2	< $2.5 M
Class 3	D3K3	< $ 1.3M
Class 4	D4K4	< $0.5M

Source: Ministry of Water Resources, Works and Housing, 2018

2.3 Occupational Health and Safety Administration in Ghana

Occupational Safety and Health (OSH) is generally defined "as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment" (Ghana statistical service, 2015). This ideology is worth noting due to the numerous of disciplines of workplace and environmental hazards that exist. It therefore requires that greater skills, knowledge and analytical capacities are required to coordinate and implement all the necessary policies that make up national OSH systems so that protection is extended to both workers and the environment (Ghana Statistical Service**,** 2016). According to Annan (2010), in Ghana, there are currently two major frameworks that have provided the foundation for the establishment and implementation of the provision of occupational/industrial safety and health services, practice and management. These frameworks include the Factories, Offices and Shops Act 1970, Act 328 and the Mining Regulations 1970 LI 665.

He indicated that, there is also the Workmen's Compensation Law 1987 (PNDC 187), but this was only concerned with the compensation of personal injuries caused by accidents at work place. This assertion had a corresponding impact on monitoring worker / workplace safety. Despite this, the Radiation Protection Board of the Ghana Atomic Energy Commission also participated actively in monitoring companies with radiation exposure hazards for compliance. However, due to limited resources, effectiveness of their activities is compromised (Ghana Statistical Service labour report, 2015).

Another initiative to providing a legal frame work to health and safety was by the Ghana Chamber of Mines. This was to be in collaboration with the Inspectorate Division of the Minerals Commission to form a Technical Committee with representations from each mining company. Its main function was to review and recommend corrective actions for reported or identify unsafe acts, conditions or failures in the existing Health and Safety system of the mining industry. This good initiative is however militated by the lack of adequate resources and hence enforcement of the law was highly challenging. There are other statutes which indirectly impact on Occupational Safety and Health and these include the Environmental Protection Agency Act 490 1994, the Ghana Health Service and Teaching Hospital Act 526, 1999 and the National Road Safety Commission Act 567 1999.

According to the (Ghana Statistical labour force report 2016), Ghana is among the 183 member countries of ILO, which requires, as per the ILO convention number 155 1981, that member countries formulate, implement and periodically review a coherent policy on occupational safety and health and work environment. Ghana has not yet rectified

this convention and the nation has no established authority dedicated to Occupational Safety and Health to guide and facilitate the implementation of the "Action at the National Level" as indicated in the R16 Occupational Safety and Health Recommendation, 1981. However, the Labor Act 2003. Act 651, Part XV, sections 118 to 120 apparently directs employers and employees in their roles and responsibilities in managing Occupational Health, Safety and Environment in the nation, but is not specific about whom to report accidents and occupational illnesses to. It is not clear or does not specify what to consider as Occupational Illness. It does not specify who to be responsible for ensuring the industries in Ghana implement corrective actions as per recommendations. The report further states that currently, accidents that occur in factories are expected to be reported to the Department of Factory Inspectorate but Companies hardly report such events to the inspectorate for investigation and correction. When these accidents get reported, it takes a long time before corrective or preventive actions get implemented, hence, there is little or positive effect of the action of the DFI on the factories.

Notwithstanding this, the nation has made significant thrives in positive "Safety and Health management systems among some indigenous construction companies due to the influx of some foreign companies into the country. This has further provided requirements for the contractors, subcontractors and some of whom are Ghanaian, to follow their Health and Safety standards (ILO, 2016). Currently, the Oil and Gas sector has designed and introduced their side of approach to managing health and safety. This is purely based on risks and it definitely an improvement on what already exists since this is a good attempt and helps in creating the awareness (WHO, 2010).

2.4 Health and Safety Management in the Construction Industry

Health and Safety has been explained as an organized approach to managing health and safety including all the necessary organizational structures, accountabilities, policies and procedures (ICAO, 2005). In furtherance to this, Manuel et al, (2010), indicated that effective health and safety management is both functional (involving management control, monitoring, executive and communication systems) and human (involving leadership, political and safety cultural sub- systems) Liu et al, (2015). In another development, health and safety is regarded as a planned, documented and verifiable method of managing hazards and associated risks or a plan to reduce and eliminate hazards and risks at workplace Gunduz, Birgonul & Ozdemir (2017). Significantly, good health and safety management provides construction firms and other companies or organizations with the framework to develop and implement solutions to minimize the ever increasing challenges faced by companies and organizations which range from high injury and illness, lost work days, increasing or rising worker's compensation costs, costly medical claims, worker retention and employee satisfaction (Lee, 2018).

Henz, Hallowell & Baud (2013) indicated in their work that prudent health and safety practices aids top management to improve upon safety planning in which leads to the reduction of accidents and injuries in an organization. According to Hanafi et al., (2018), Safety management is seen as the tangible practices, responsibility and performance related to safety. These Authors elaborated on some key elements which contribute to effective safety management in an organization. Notable amongst these includes management commitment to safety, safety communication, health and safety objectives, training needs, rewarding performance, and worker involvement (Liu et al., 2020).

Health and Safety management issues in the construction industry has become very important to management because, it has greater influence on the survival of an organization. This is because, poor health and safety management leads to extra costs to both individual and public sectors of the economy of a country Ahmed et al., (2016). In addition, they went on to state that the rate and frequency of accidents arising from poor implementation or the noncompliance of effective health and safety management in the Construction industry is overwhelmingly high due to the large direct relation to occupational accidents.

However, it is worth stating that noncompliance of effective H&S management is likely to result to both direct and indirect costs and incur an insured and an uninsured cost. In the end this would end up with legal actions by the national civil or criminal courts. This will create a bad image for the company and there will be a significant decrease of customer loyalty in the organization (Daily Star, 2017). With regards to this, regulating authorities need to double their efforts to curtail the effects of hazards. H&S measures taken in every industry could prevent any accident that can cause moral or economic and legal losses that can be adverse for any industry or business opportunity (Almost etal., 2019). Due to the very sensitive and important nature of health and safety in the construction industry, the International Aviation Organization (ICAO, 2005), advocated that, there should be a paradigm shift from the traditional approach to a modern and more pragmatic approach to Health safety management (Daily Star, 2017).

Notwithstanding this, there has been greater improvement in health and safety management in the construction due to the enactment and implementation of laws, codes and safety standards. This therefore means that, there are greater efforts by the construction industry towards health and safety management (Robson et al., 2007).

In conclusion, effective and prudent health and safety management systems can be implemented by using the 'plan, do, act review' principles. This system is widely used in environmental management. This system is a part of Environmental Management System Standard which is a family of standards supposed to comply with applicable laws, regulations and other environmentally oriented requirements. These phases are intended to develop systematic management approach to health and safety management in all construction and other organizations (Fruhen et al., 2019).

2.5 Health and Safety Management Practices in the Construction Industry

2.5.1 Management Commitment

Management commitment is agreed as the main significant factor by many researchers in occupational literature to be actively responsible for the management of occupational health and safety in an organization. Therefore, top management should actively lead the organization and employees towards achieving this goal. In furtherance to this, (Hsu et al., 2007), added that the extent of top Management commitment attitudes towards safety has a corresponding effect on employee's attitudes towards safety. According to Li et al., (2015), Health and safety can also be effectively managed where construction managers or employers are seen as front line workers. Indicating the important role of employers in the implementation of health and safety precautions, the Ilo. org (2018) defined employers as "any physical or legal person who employs one or more workers on a construction site" and, depending on the context, comprises "the principal contractors, the contractor or the sub-contractor" (Hale & Borys, 2013).

Owing to the above, the construction manager or employer is to develop all the health and safety guidelines related to hazards control in the project schedule and contract general conditions. This according to the ILO includes the responsibility of maintaining workplaces and equipment and actively improving any working situations through to guarding against physically stressful positions that could prove dangerous (ILO, 2018). Moving forward, it was again stressed by ILO, 2018) that, the sole duty of the employer is to provide protective clothing and work-gear in order to protect employees against dangerous conditions and poisonous agents. This assertion from the ILO was further supported by (Yule, Flin & Murdy, 2007), who stated that supervisors also play an important role in ensuring safety in the workplace and employees conform to safety rules and procedures when they perceived that the action of their supervisor was fair.

However, they noted from available literature with the concern that supervisors who demanded more work from their workers demonstrated less commitment to assisting their workers with safety equipment providing safety equipment than supervisors who delegated job task motivated employees to acknowledge their safety accountability (Ros and Gustafson, 2015).

In addition, in the general provisions of the ILO, section 2.2.5 of Section 2, it is indicated categorically that it is the employer's duty to make provision for safety officers or experts to pay "regular site safety inspections". In conclusion, the ILO expect all employers to ensure that health and safety practices are implemented, including the provision of safety tools such as first-aid facilities, protective gear and safety training (ILO 2018). Therefore, construction managers or employers are also required to supervise and monitor the actions of their employees with the aim to ensuring that they are working safely (Ilo.org, 2018).

The International Labour Organisation (ILO, 2018) cautions all construction managers not to task any employee beyond his or her physical ability in terms of delegated task. The ILO holds that employers are also responsible for ensuring that the equipment provided is both safe and operational. For example, in Hong Kong, the employer is ultimately obliged for implementing safety guidelines and for ensuring compliance with company-developed policies and plans (Lestari et al., 2019).

It is the employer's responsibility to develop a safety policy, with guidelines, and then effectively enforce the organization's own rules. Mirroring the responsibilities of the employer as presented by the ILO the Hong Kong guidelines go further and recommended that the employer undertake a "Risk Assessment Program" that identifies specific individual dangers that each worker may encounter (Jamal, 2015). The employer must also ensure the provision of proper protective safety equipment for all workers. Cheyne et al. (2002) conducted a study on employee attitudes towards safety in the manufacturing sector in UK. The study identified safety standards and goals, and safety management, which include personal involvement, communication, workplace hazards and physical work environment as factors that enhance safety activities in organization. The study found that a good physical working environment and employee involvement were key factors that contributed to safety activities in organizations (Dong et al., 2011).

Again, one of the fundamental contributory factors to effective health and safety is the effective implementation of Safety training and safety policies on construction projects sites. In relation to this, safety training is explained as knowledge of safety given to

employees in order for them to work safely and with no danger to their wellbeing (Law, Chan & Pun, 2006).

In another way, Zohar (2010) also indicated that clear policy statements and safety training is one of the vital factors in reducing accident rates. Effective and continuous training of workers lead to a sense of belonging and thus, is more accountable for safety in their workplace. Thus, a company's ability to continuously communicate the aims and objectives of safety to all workers is the crucial aspect of effective health and safety management as lack of communication may hinder employee involvement (Roy et al., 2019). Similarly, Mohammadi et al.'s (2018) in their work, longitudinal survey of OHS attitudes, practices and policies among Canadian worker and management representatives in the manufacturing sector revealed that management commitment, effective communication, worker involvement, attitudes, competence, and supportive and supervisory environments are critical factors with regard to establishing positive safety climates (Haslinda et al., 2016).

2.5.2 Organizational Commitment

Organizational commitment can be seen as the ability of an individual employee to be actively involved in the management and implementation of safety policies (Vinodkumar & Bhasi, 2010). Organizational commitment is one of the main fundamental determining factors that explain how employees behave and relate with safety issues within the work environment (Bakshi et al., 2009).

2.5.3. Effective Communication

Islam et al., (2015) indicated in their study that organizational support can be greatly achieved when there is quality communication of safety issues and good human relations amongst employees and top management thereby improving the quality of health safety relationship within an organization (Robson et al., 2007).

Apart from the above, promoting effective communication across the organization can help promote health and safety on the construction site. According to (Ismail, 2012), free flow of information between management and subordinates is an essential consideration to safe and efficient workplace. This idea was further supported by Zohar (2010), who argued that when leaders convey vision and values through interaction and communication, it will lead to improved communication channel resulting in decreased in micro accidents and increased in using Personal Protective Equipment (PPE). (Chowdhury et al., 2007).

These authors further stated that effective communication can be achieved in three ways. These includes, through visible behavior, employer can communicate the importance of safety and health. Employees soon recognize what employer regard as important and will adopt their own behavior accordingly. Thus, through negative behavior employer can undermines the safety and health culture of the organization (Robson et al., 2007).

2.5.4 Employee Safety Motivation and Incentives

In order to promote good working relations between management and employees, management should put in place incentives and motivational packages to employees

with good injury and accident free records in relations to good safety behavior. Even though these packages could be indifferent forms, they should be geared towards encouraging workers to continuously maintain good safety habits during their working life (Michael *et al* 2007). Furthermore, there must be adequate measures to put in place in order to prevent or control the identified health risks in conformity with the national laws and regulations.

2.5.5 Provision of First Aid and Protective Clothing

According to Jamal (2015), employer should be responsible for ensuring that first aid, including the provision of trained personnel, is available (Yi et al., 2012). The manner in which first-aid facilities and personnel are to be provided should be prescribed by national laws or regulations, and drawn up after consulting the competent health authority and the most representative organizations of employers and workers concerned. Where the work involves risk of drowning, asphyxiation or electric shock, first-aid personnel should be proficient in the use of resuscitation and other life-saving techniques and in rescue procedures (Roy, et al., 2019).

2.5.6 Ensuring Effective Management Systems

Since, health and safety at many work places have become a general concern for construction site management, management requires an effective management system (Nottaath & Mohammed, 2018). It is in the light of this that the International Civil Aviation Organization (ICAO) (2005) stated in their guidelines that it was time for a paradigm shift of construction companies to adopt more pragmatic ways of dealing with health and safety issues.

ICAO (2005) defines safety management system as an organized approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures. Also Mohd Saidin et al. (2008) emphasized that effective safety management is both functional (involving management control, monitoring, executive and communication subsystems) and human (involving leadership, political and safety culture sub-systems paramount to safety climate (Dong et al., 2013).

Health and Safety should be an integral part of the total business activities of an enterprise and be addressed as part of the overall corporate Safety, Health and Environment policies (OECD, 2003:29). This should be reflected in the overall management instruments for the enterprise and for individual sites. The Bureau of Labour Statistics (2007) indicated that safety policy should provide standards and strategies designed to protect the health and safety of workers and the public as well as the environment. The policy should not be affected by short-term changes in the enterprise's economic conditions. Through the policy the organization can communicate its view on safety to external stakeholders (WHO 2011).

The WHO (2011) in their manual for primary health care, advocated for the establishment of safety management system (SMS) which should be based on the safety policy. The SMS provides a structured approach to manage arrangements needed for a good safety performance. The SMS should define an ambition level that the enterprise considers adequate for its business. According to Cheng et al., (2010), a safety management system will clearly state the requirements for safety management which should not only be on paper, but should be radically reviewed and overhauled. This review should address:

- Developing stronger criteria for active and effective safety management systems. These should include design and planning, day-to-day management and monitoring and auditing practices.
- These criteria should be developed in new ways of auditing safety management systems, which can routinely and reliably assess the activity and effectiveness of the system.
- The role of safety officer should be strengthened to ensure that it is less easy to marginalize what is essentially an advisory role.
- The accountability of operational management needs to be made clearer and firmer, and this accountability needs to be tied to measurable outputs of the safety management system, including the demonstration of effective action.

2.6 Behavioral and Attitudinal Causes of Accidents

An accident is defined as a short, sudden, and unexpected event or occurrence that results in an unwanted and undesirable outcome (Marin et al., 2019). An incident, also called a near-accident, is an undesired event that might cause an undesirable outcome (Hossan & Ahmed, 2018). Chan et al. (2005) argued that accidents sometimes occur as a results of a random combination of many contributing factors. Generally, they are categorized according to unsafe conditions and unsafe acts by operatives or workers. Also, the Health and Safety Executives (HSE, 2002) indicated that human behavior is one of the major contributing factors to approximately 80% of the accidents that happen on construction sites.

In addition, (Garavan & O'brien, 2001), revealed that the majority of accidents and resulting injuries are attributed to unsafe work practices of the workers rather than

unsafe working conditions. Again, (Mullen, 2004) wrote in his work that organizational and social factors are not to be overlooked because these factors influence safety behaviors. It is therefore clear that if unsafe conditions are present, it becomes the normal practice of workers to perform construction activities by accepting the risks associated with the work. In this situation, construction site accidents cannot be solely attributed to the unsafe work practices of workers, but one must pay attention to and view the injury from the worker's perspective.

Notwithstanding, (Che Hassan, et al., 2007) advocated that, many of the accidents that occur on construction sites are due to inadequate adherence of workers to work procedures or irresponsible behavior of the workers themselves or complete refusal to use the appropriate equipment or wear personal protective equipment. Hassan, et al. (2005) also posited that regardless of all the important safety regulations and policies pertaining to safety on all construction sites, some workers' poor attitudes had resulted in quiet a significant number of "near misses, incidents and accidents. It is therefore mandatory for all workers under the labour Act 2003 to take full personal responsibility towards their own safety and health on all construction projects sites.

It is therefore incumbent on all construction site workers under the Labour Act, 2003 (Act 651) "to use safety appliances, fire-fighting equipment and personal protective equipment provided by the employer in compliance with the employer's instructions" (Section 118:3). Despite the provision provided under this law, one of the best ways to ensuring safety on construction sites is to promote a safety work culture among construction site workers. Therefore, it is the sole duty of construction site managers to ensure that workers who do not possess good safety attitudes are encouraged to become safety conscious.

According to Michael et al. (2007), Falling has been identified as the leading cause of fatalities in construction operations. In order to minimize fall-related accidents and injuries, the international literature advocates that nonslip flooring, handrails, guardrails with safety lines and belts, harnesses and safety nets should increasingly be used onsite (Shourav et al.,2015). Unsafe site conditions, continuously changing worksites, multiple operations and crews working in close proximity are recognized as other common causes of construction-related deaths and injuries (Hossain et al., 2018).

Micheal et al. (2007), further indicated that some of the most prominent factors of construction accidents includes, the workers' negligence, failure of workers to obey work procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment's and poor worker's attitude about safety (Chowdhury et al., 2007).

Also, the World Health organization (WHO, 2011), indicated that workplace accidents are sometimes caused by human error. Contributing to the causes of behavioral accidents on projects sites, Shourav et al., (2015), wrote that unsafe working conditions which is one of the major contributory factors can be associated to four causes, namely management action/inaction, unsafe practices of workers, non-human related acts, and unsafe conditions that exist as natural elements of the initial construction site conditions. Liu et al., (2020), supported the above view by asserting that unsafe acts and conditions are "symptoms" of "basic underlying indirect or secondary causes." (Shourav et al., 2015).

Although Liu et al., (2020) claim that the primary cause of construction accidents is the inability of safety legislation to specify the safety requirements of materials and contracting parties. He went on to indicate that, unsafe acts and unsafe conditions contribute greatly to causes of construction accidents. In addition, to the above, defective structural connections, temporary facilities, tight work areas, varying work surface conditions, continuously changing work-sites, multiple operations and crews working in close proximity have also been identified as common causes of construction-related deaths and injuries (Lee, 2020).

Again, the author added that the most common cause of fatal injuries reported by the HSE (2003,) was "fall from heights," lack of preplanning, inadequate selection of contractors and laissez-faire attitudes and other easily overlooked causes of safety incidents. Other general causes consisted of inappropriate protection, harmful substances and environment, workers being hurt by falling objects, removal of protection measures, insufficient physical and mental capacities, distraction from carrying other tasks, unauthorized access to hazardous areas, and mechanical failures (Chi et al. 2005). Apart from these causes, Holt (2001) argues that secondary causes of accidents centers on management system pressures such as financial restrictions, lack of commitment, inadequate policy and standards, deficient knowledge and information, restricted training and task selection, as well as poor quality control systems resulting from these restrictions and deficiencies.

Holt (2001), further suggested that construction accidents are indirectly caused by social pressures, particularly group attitudes, trade customs, industry tradition, society attitudes to risk-taking, workplace behavior norms and commercial or financial

pressures between contractors. These notions are reflected by Toole (2002), who reported that onsite construction accidents are caused by deficient safety management through a lack of proper training, deficient safety enforcement and provision of safety equipment, unsafe methods or sequencing, and unsafe site conditions (Cheng et al., 2010).

Suraji et al. (2001), who also studied the causes of construction accidents, noted that, onsite construction accidents are complex and multi-causal in nature. These authors further classified the causes of accidents into proximal and distal factors, which may be provoked by actions of clients, designers and operatives. Distal factors were observed to include constraints of the project conception, project design, project management, construction management, subcontractors and operatives who precipitate potentially unsafe responses by clients, designers, the client's project team, contractors, subcontractors and operatives (Dong et al., 2018).

According Behm, (2005), these distal factors includes, the influence of management and organizational factors, environmental factors (such as economic, legislative, political and social), and individual factors of the participants. Proximal factors causing construction accidents were identified as inappropriate processes (such as construction planning, construction control and construction operation), site conditions and operative actions. (Dong et al., 2018).

In their contribution to behavioral causes of accidents, Accident causation in trenching operations formed the focus of a study conducted by Arboleda and Abraham (2004). These researchers analyzed 296 fatality reports related to trenching operations from the

Occupational Safety and Health Administration between 1997 and 2001 and documented the causes of trenching accidents as they relate to physical processes and human behavior. Arboleda and Abraham (2004), identified the three core causes of trenching accidents, viz., being caught in cave-ins, caught in or compressed by equipment or objects, and being struck by objects. Lack of safety equipment, unsafe methods or sequencing and lack of proper training were identified as behavioral-related causes of trenching accidents (Yi et al., 2012).

Also, Abdelhmid and Everett (2000), revealed that construction safety can be enhanced through the provision of adequate and appropriate safety equipment at the right time, enforcement of specific training in equipment use, the institution of more effective planning processes before the onset of trenching operations in order to identify jobsite hazards, and incorporating clearly-defined accident prevention strategies. In spite of the above, Phong & ouyen (2017) evaluated the scaffold safety practices by examining 113 scaffolds in nine areas of the eastern US. Their research found that 31.9% of scaffolds examined were either in danger of collapse or were missing planking, guardrails or adequate access. The authors suggest that scaffolds should be inspected regularly in order to ensure that appropriate planking and railings are in place and that they are both accessible and securely tied to buildings (Choudhry & Fang, 2008).

In order to add their voice to the above, Tam et al. (2004), suggested, that scaffolding safety is enhanced when, outside scaffold erectors are employed, trained and competent scaffold individuals are onsite. Secondly, when appropriate frame scaffolds are utilized, and inspectors examine planking, railings, access and secure tying to buildings.

In addition to the numerous causes of accidents already discussed, falls have been identified as a leading cause of fatalities in construction operations Ghoni & Barzinpour (2018). In an analysis of data from 621 case reports of work-related fatal falls that occurred during 1994-1997 in the Taiwan construction industry, Chi et al. (2005) examined the factors contributing to fatal falls. These authors observed that the factors contributing to fatal falls include individual victim characteristics such as age, gender, experience and use of personal protective equipment, the fall site itself, the size of the organization, and the specific cause of the fall. Chi et al. (2005) found that contributing factors to fatal falls varied depending on the nature of the fall.

Chi et al. (2005) observed that inexperienced workers and employees of small construction companies were at greatest risk with respect to fatal falls. Likewise, Larsson and Field's study (2002) into occupational injury risks in the Victorian construction industry revealed that falls from heights represented the most severe injury problem. These authors observed that falls were also associated with the different equipment and tasks of the varying construction parties. In conclusion, Larsson and Field (2002) indicated that architectural, engineering and design solutions are required in order to manage the risk of falls in construction.

2.7 Factors Promoting Safety Performance on Construction Projects Sites

It is important to note that, the monitoring and continuous evaluation of safety performance programmes during construction projects execution cannot be overemphasized. This is because the setting and implementation of safety guidelines and rules has a greater impact not only on minimizing and overcoming problems such as poor quality work and unsafe working conditions, but also reduce costs and enhance

productivity (Health and Safety Executive, 2002). Literature on safety across the world has revealed numerous factors affecting safety performance on construction projects sites. Some of these are outlined below.

2.7.1 Contractor Selection Procedure

Studies have shown that safety performance is affected greatly during contractor selection stages. This is because at the procurement level, poor safety performance is best explained by contractor selection based on principles of cheapest price/lowest cost (Dejoy et al., 2004). This occurs when contractor selection criteria include intangible considerations such as environmental preservation and consideration, social and economic sustainability, credibility and reputation, life-cycle operation and maintenance costs. Others include maintainability aspects, demolition and replacement aspects, and other factors such as health and safety, security benefits to the local economy and flexibility with regard to alternative usage and upgradeability (Autenrieth et al 2016).

2.7.2 Clear Specification of Safety Obligations and Rules

Best practice with regard to safety also involves contracts that clearly outline the contractual responsibilities of both contractors and subcontractors. In the award of Contracts, specifications must establish specific guidelines in order to control expected hazards by naming the person responsible for overseeing the contractor's performance. Tanko et al., (2017) argued that contractors must be required to prepare and submit an acceptable project hazard prevention plan that defines supervisory and employee safety training. This will go a long way to identify specific published safety standards and hazard prevention requirements and lists qualifying requirements for eligible

contractors with a view to ensuring that bidders are restricted to those whose past performance demonstrates care, competence and safety. In addition, Haslinda et al., (2016), suggested that both contractors and subcontractors should perform all onsite inspections as outlined in the pre-approved site-specific environmental health and safety plan and ensure that the program is implemented by competent individuals.

2.7.3 Safety Policies

During the design stage of construction, safety by design appears to be critical to enhancing OHS performance. Designers must work and communicate with the principal parties of a construction project such as supervisors or clients, and ensure that the following safety considerations are reflected in site plans and designs (Misnan et al., 2008).

These factors or considerations are, Site remediation and methods, Provision of amenities/services, Site security/access, Excavation, Adequate ground conditions and type of control medium (e.g., batters, trench boxes, shoring), Machinery types best equipped to mitigate dust, and Stable structures during deconstruction or reconstruction (Kemei et al., 2015). Apart from the above, structured review processes that facilitate interrogation of design are also critical to improving OHS. These reviews involve eliciting safety issues and concerns from multiple stakeholders such as clients, architects, electrical and mechanical engineers, builders, end users, end-user maintenance authorities, and core product or service representatives. Rizwan (2015) suggested that stakeholders should be requested to review designs and identify potential safety issues. They should also be encouraged to provide suggestions for improvement (Suraji et al., 2001).

Finally, with respect to design, (Williams et al. 2018), advocated that coordination among designers and architects is also facilitated by means of design administrator programs. In these programs, a design administrator is responsible for generating and administering a building components library, to which database designers may add information. This system tracks and follows up all communication among all the design parties, yet also administers pending changes and tracks change proposals. In addition, the design administrator conducts regular meetings in order to discuss designers' comments on any proposed changes, review pending changes, and monitor work progress (Leo, 2014).

2.7.4 Safety Plans and Programs

Safety plans and programs are another component of best practice in OHS. These sorts of plans and programs are beneficial since they allow different construction parties to agree collaboratively on a plan of action for safety (Vinoldkumar et al., 2010). They operate on the premise that OHS issues would be better managed if program standards, implementation criteria and monitoring responsibility were clearly defined before any work is contracted (Chiocha et al., 2011).

Abubakar (2015) indicated that these documents allocate responsibility for safety to authorized persons, require competent individual to conduct regular site visits and audits, and document the faults and corrective actions in a safety logbook. The literature advocates that these plans should be submitted with tender documents and be reviewed and refined at regular intervals—and at different stages—of the construction process.

Regular performance appraisals should also be conducted in order to determine the effectiveness of safety initiatives (Fass et al., 2016).

Ismail et al., (2012) stated that at the construction planning stage, i.e., before any work is performed onsite, employers should undertake risk assessments with a view to identifying specific dangers that workers may encounter. In order to mitigate the potential for harm to occur, the provision of protective safety equipment and other risk minimization actions should be carried out (Teoh *et al.,* 2020). Contractors should also provide safe work statements that address medium to high risks that are likely to be encountered onsite. These statements should be reviewed by all construction parties before the commencement of work on site (Mulcherij &Arora, 2017).

In another case, worker involvement in developing these safety programs and plans is also fundamental to enhancing OHS performance. Since construction workers are the project personnel most immediately exposed to potential hazards, they are best positioned to identify safety issues and develop practical solutions (Ajmal et al. 2020). This course of action also increases worker morale and perceptions of management commitment to safety. Before workers become involved in safety program development, safety audits and identification of solutions, they should also undergo behavior based training and be educated about safety programs (Grill et al., 2017).

Workers selected to participate in the development of safety plans, programs and policies should also demonstrate trust in management goals. Safety programs should also be supplemented by regular onsite meetings and safety committees. These safety committees should be comprised of representatives from different construction parties. Such committees not only encourage interaction between parties but also help to

improve trust and communication Mazzetti et al., (2020). Furthermore, they promoted effective accident prevention strategies. Regular onsite meetings focusing on the identification of OHS problems and the development of accident prevention strategies and solutions are also useful in this regard (Fruhen et al., 2019).

2.7.5 Safety Training and Education

Linguard & Rowlings (2005) both practitioners and scholars agreed that safety training and education is critical to enhanced OHS performance. The literature suggests that safety training must be specific to the problem areas and safety situations that frequently arise within a construction project. Thus a generic model of safety training is impractical and unnecessary. In support of this, Durham et al. (2002) added that training should provide an overview of basic OHS theory and first-aid procedures. Training material should also include the indirect, personal and emotional costs of accidents, the criticality of good safety performance, the safety objectives of the organization, legal obligations, and the contractual relationships with clients (Ladewski & Al- bayati, 2019).

In addition to this background information, Hale & Borys (2013) wrote in their work that worker training initiatives should focus on improved hazard and danger recognition. Studies have shown that a safety training flowchart enhances OHS performance Vinodkumar& Bhasi (2010). This flowchart reflects the relationships among the various dimensions of health and safety training. Once the need for training has been identified and specific training needs have been listed, learning objectives, activities, materials and specifications should be developed. Pre-training evaluation data should be collected. Furthermore, the training should be evaluated and necessary

improvements made (Hanafi et al., 2018). Worker training should be conducted before the commencement of onsite work. Refresher training should also be required periodically. Specific training instruments and tools should consist of, audience participation, Audience questions and comments, Personal stories, Use of prop sand objects, Pictures and examples and Experimentation on the part of the training facilitator (Kirchsteiger 2005). Competitions that mostly revolve around the topic, are challenging, and establish their purpose up front; and Practical elements where participants actively develop an item of practical significance. Construction workers should also be 'inducted' into their jobsite and briefed about the key safety issues and prevention strategies before any on site work is performed (Fruhen et al, 2019).

In addition to these training and education tools, Cheng et al., (2012) indicated that positive and negative reinforcements for the enhancing of onsite safety should be built into the overall safety program. Positive reinforcements include monetary rewards, bonuses and job promotions. These positive reinforcements should be used with caution since they have the capacity to promote safety as a novelty and not as a necessity (Manu et al., 2010).

2.7.6 Provision and Use of Safety Equipment

The provision and use of safety equipment is considered a form of best practice with respect to OHS. Lew & Lentz (2010) has stated that it is necessary to understand the limitations and potential obsolescence of items of safety equipment before their use. Maintenance must also be conducted regularly on this equipment.

2.7.7 Use of Computer-based Safety Applications

Asanka & Ranassinghe (2015) identified a role for computer-based safety tools that have the potential to be used in reviewing projects, identifying hazards, documenting suggestions to eliminate or reduce hazards and documenting, and generating safety reports. The use of an electronic safety database has been found to result in high levels of hazard identification. Computer-based safety tools also provide formal feedback methods. The use of technology, particularly the Internet, also provides a vehicle for OHS communication. Monthly email newsletters with OHS updates not only ensure that different construction stakeholders remain informed about safety developments, but also promote awareness of safety initiatives and issues (Menzel & Gutiernez, 2020).

2.8 Influence of Attitudes of Site Operatives on Health and Safety Performance.

Attitudes simply stated, are defined as a tendency to react positively or negatively towards an object or a person (Choudhry, 2012). Behavioral Safety on the other hand, describes attitudes as either explicitly or implicitly related to people, events, actions, ideas or institutions". In other words, an attitude has an 'object' (the term 'object' here is used to denote any aspect of the world, including people and ideas, towards which we have an attitude) (Farrokhi-Asl & Manavizadeh, 2017). Wachter & Yorio (2014) indicated in their research findings that attitude is a tendency to respond positively and/or negatively to certain persons, objects or situations. Individuals are different in their perception of risks and willingness to take risks. Successful safety programs can be achieved if the positive attitudes of employees towards safety are achieved (Alhajeri, 2011).

Some further characteristic is that attitudes express the way a person evaluates the degree of positive or negative feelings he/she has towards the object in question, for example: attitudes towards aspects of work, people, or even safety procedures in the construction industry. Christaian et al., (2009) stated that "attitudes are relatively enduring, and that, if you know a person's attitudes, you can usually predict what he/she will say or think in future reactions to that object or similar objects. Attitudes therefore, must be based on some underlying physiological/experimental system inside people (Grill et al., 2017).

From the above illustrative definitions, it becomes apparent that "attitudes" generally, and "safety attitudes" especially are specifically not tangible; they are only inferred. The concept of "attitudes", or "safety attitudes", therefore is indeed nothing but an abstraction. It is used to denote certain consistencies in a person's behavior, statements/opinions, and presumably, experiences and beliefs (Grill et al., 2017). Huang et al., (2016) has described "attitude" as "the predisposition of the individual to evaluate some symbol or object, or aspect of his/her world in a favorable or unfavorable manner". Attitudes include the affective, or feeling core of liking or disliking, and the cognitive or belief elements which describe the effect of the attitude, its characteristics, and its relations to other objects.

Worker attitudes and work conditions onsite heavily impact the implementation of OHS at the jobsite (Kartam et al. 2000). As cited in (Sulastre et al. 2011), Safety is synonymous to safety behavior. Behavior is therefore explained as everything a person does that are observable and measureable (Potdar et al., 2018). Safety behavior describes the behavior that support safety practices and activities such as providing

safety training, and safety compliance explains the core activities that need to be carried by employees according to occupational, safety and health requirements to prevent workplace accidents (Mahmood, 2010). Safety behavior is the key to reducing the injuries at the workplace and indirectly influencing the outcomes of the event before the injuries or accidents occur (Johnson, 2003). The ABC model of safety behavior by Frederick (1982) as cited in Abdullah et al., (2005), explained that behavior is influenced by two distinct factors: activators and consequences.

First, activators tell people what they should do. For example, roadways sign instruct the driver to comply with speed limit and the other is activators influenced the driver to take shortcut such as seeing others exceed the posted speed limit (Schein, 2004). Faced with these competing activators, the driver will perform certain behavior, which comes to the consequences the driver expects to gain or avoid. Hence, the enforcement on safety behavior factors plays the crucial to encourage safety compliance before the consequences occur (Lingard & Rowlinson, 2005).

2.9. Influence of Operatives Age on Attitudes on Construction Projects Sites.

According to Choudhry (2012) safety culture perceptions are influenced by demographic factors such as age, education, and experience. Workers who had been working for almost two decades are better informed and had better views about the importance of safety. On the other hand, employees at an early stage of their career would be interested in safety but gradually decrease due to company policies. They would prioritize safety at the peak of their career. Maturity may play roles later in their service life, equipped with experience that helps them address safety aspects and identify hazardous situations. A study indicated a positive relationship between age and

safety perception. The study found that those older workers had the best perceptions on safety, indicated the highest level of job satisfaction, were the most compliant with safety procedures, and recorded the lowest accident involvement rate.

A study conducted by Khomairoh, and Widajati, (2020) on the relationship of age, working period, and work attitude with complaints of carpal tunnel syndrome on workers in the summer Batik Industry Indonesia. The population of the study were made up of all worker in batik who worked using *canting*. The sample size was 32 workers out of 47 workers in the population. The findings revealed that there is a relationship between age, working period and work attitude with CTS complaints

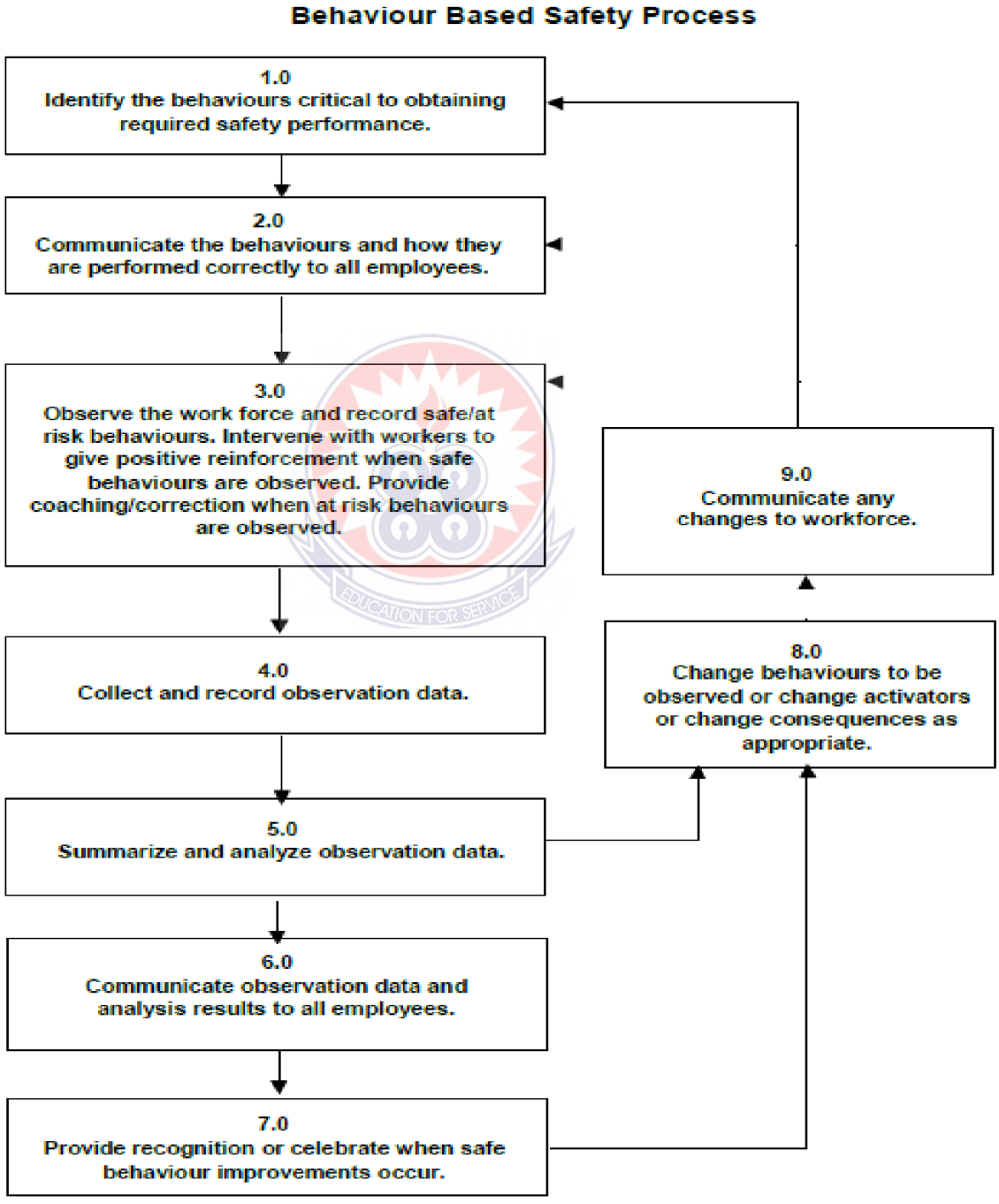
2.10 Behaviour Based Safety or Safety behaviour in the construction Industry

Behaviour based Safety (BBS), refers to the systematic application of psychological research on human behaviour. It is an analytic or data- driven approach, where critical behaviour get identified and targeted for change (Chowdhury *et al.*, 2007). However, the guideline of Behaviour Based Safety by The Construction Owners Association of America (COAA) defined Behaviour Based Safety (BBS), as a process which work groups can identify, measure and change their behaviors. This guideline added that, analysis of incidents shows +/- 90% of them have the behaviour of the person(s) involved of a key contribution factor. On the other hand, the rest of the 10% of the incidents occur due to a person which is not directly involved in the incident, as a contributing factor. According to Li *et al.,* (2015), BBS has been widely used in many European and North American industries for over 20 years. BBS has four main components which are;

- Identification,

- Observation,
- Intervention
- and Review or follow up (Li *et al.,* 2015).

The Behaviour Based Safety guideline of COAA gives a clearer picture of the BBS process which has nine steps as follows;



2.11. Safety Attitudes and Worker Behavior on Construction Site

Jayakumar (2007) posited that behavior can be referred to as all the observable actions that an individual exhibit which can be measured. Therefore, Safety behavior describes the physical behavioral support that an employee contributes in terms of safety practices and activities such as providing safety training and safety compliance (Mahmood, 2010). In other words, Safety behavior is one of the fundamental keys to minimizing the rampant occurrences of the numerous fatalities at most construction sites (Johnson 2003).

Worker attitudes and work conditions onsite heavily impact the implementation of OHS at the jobsite (Kart am et al. 2000). In furtherance to this, Teo et al. (2005) investigated the safe work behavior of onsite construction workers in Singapore. The study identified two reasons for unsafe behavior, which includes lack of awareness and poor attitude towards safety. Cheyne et al. (2002) who also conducted a study on employee attitudes towards safety in the manufacturing sector in UK, came out that health and safety could be greatly influenced by factors such as personal involvement in safety planning, communication, workplace hazards and physical work environment as factors that enhance safety activities. The study further added that a good physical working environment and employee involvement were key factors that contributed to safety activities in organizations.

In examining the impact of worker safety attitudes on construction safety outcomes, McCabe et al. (2005) surveyed construction workers and supervisors. The research revealed that employee demographics influence safety attitudes. Siu et al. (2003) observed similar results in their study into the impact of age differences in safety

attitudes and performance among Hong Kong construction workers. It was found that older workers exhibit more positive attitudes to safety than younger workers and that an impetus exists for safety programs to reflect this trend. Conversely, Harris et al., (2014) observed that risk of injury was unrelated to operator age or experience. Keeping within this theme of worker demographics and accident causes, Chau et al. (2004) examined the relationship between individual characteristics and OHS injuries in the French construction sector.

Their case-control study involved surveying 880 male workers who had experienced one or more workplace injuries within a two-year period. Chau *et al*. (2004) observed that, although young age, sleep disorders, smoking, disabilities, sporting activities and experience influenced the likelihood of occupational injuries, the risk for individual workers was dependent on their specific position within the construction supply chain. Teo et al. (2005) observed that technical and safety training has the capacity to minimize the lack of safety awareness inherit in the construction workforce. These authors also noted that poor safety attitudes can be overcomed through the systematic application of operant conditioning techniques that incorporate behavior modification. Teo *et al*. (2005) explained that, operant theory defines the changes in behavior as the result of individual responses to events that occur in the environment.

Since operant conditioning consists of both responses and consequences, favorable or positively reinforcing consequences indicate that the likelihood of similar responses is higher if consequences are punishing in nature (Teo *et al.* 2005). Under operant conditioning theory, positive reinforcements motivate workers to perform tasks in a safe fashion. As a result, contractors should offer monetary rewards, bonuses and job

promotions as incentives (Teo *et al*. 2005). Conversely, in order to motivate workers to maintain safe work practices, negative reinforcements such as criticism or threats by management may be necessary (Teo *et al*. 2005). While extinction involves limiting dysfunctional behaviors by eliminating their reinforcements, punishment refers to undesired or negative consequences being administered in the event of dysfunctional behaviors, with punishment taking the form of pay cuts, temporary suspensions, demotions and dismissals (Teo *et al*. 2005). The research revealed that positive reinforcements, both monetary and nonmonetary, were most effective. The findings also indicate that close and strict supervision, appropriate OHS training and fines for misconduct were the most effective means of enhancing safe behavior among workers (HSE, 2012).

In both cases, raising OHS awareness and developing positive safety attitudes (Holland & Hinze, 2000), suggest that a clear role exists for construction managers and employers. Krause (2005) also indicated that employee behaviour is a direct result of management system and is the common pathway of most incidents. However, ignorant behaviour and attitude from the employers and employees contribute to rise of issue on behavioural safety non-compliance (Jamal Khan, 2006) to OSH requirements such as Occupational Safety and Health.

2.12. Perception of Risk and Health and Safety Management in Construction

Kirchsteiger (2005, 34) defines risk as the possibilities that technological activities or natural events lead to consequences that affect what humans value. Haines et al., (2004), elaborated in their work that risk management is a three-stage process. They went on to explain that risk management involves the identification of hazards in the

work environment, the assessment of the risks posed by the hazards and the selection of appropriate risk controls according to a risk control hierarchy (Mearns & Yule, 2009).

Risk perception is the way in which a stakeholder views a risk based on a set of values of concerns (IEC, 2002). Carter & Smith (2006) posited that the perception can vary due to different factors such as experience, how dreaded and how unknown the risk is and if people feel that they have control over the risk. Risk perception may affect the behaviors of employees which in turn can affect the likelihood of accidents (Haines *et al*., 2004). It is significant to indicate that it includes issues such as "how safe the employee think their work is, the perceived likelihood that they will get injured or cause injury to others; the experience of having influence on safety at work; trust for middle management concerning safety at work and the belief that work is carried out with good safety margins" (Ek, 2006).

Also, Ghosh et al., (2014) defined safety perception as "how workers view safety related policies, procedures and other workplace attributes concerned with safety". They further explained that, an individual's perception depends on different external environments, personal characteristics, and individual opinion. From the perspective of management, generalized perception includes consciousness and response at the initial stage (Onubi et al., 2019). It is therefore significant to note that, the most relevant perceptual indicators in this regard are formal and informal policies, procedures, and practices concerning focal organizational facets, such as service and safety Zohar (2000). Safety perception is correlated with accident rates, quality of the safety climate, workers' working attitude, management and equipment, organizational culture and

management support. Safety climate and safety culture are mutually related but distinguishable (Whittingham, 2012). In another development, Safety culture expresses itself through the safety climate as features that can be discerned from workers' attitudes and perceptions (Schein, 2004). Safety culture refers to 'the attitudes, beliefs, and perceptions shared by natural groups as defining norms and values, which determine how they react in relation to risks and risk control systems' (Hale 2000). The usefulness of safety climate as a diagnostic tool ought to reside in its ability to identify detailed and precise challenges critical to safety improvement (Meliá *et al*. 2008). Each constituent in the construction supply chain differs in their understanding of risk management.

For instance, various studies around the world have shown that employers consider OHS hazards to be created by employees and therefore consider risk control the employee's responsibility (Hu et al., 2020). According to Huang et al., (2020) the best way to further elaborate this occurrence is by using the attribution theory, especially whereby both employers and employees share different opinions on the causes of workplace accidents and the way in which safety performance problems should be addressed. They went on further to suggest that self-protection and self-other biases exist in three areas of safety management comprising, individual risk perception, supervisor responses to safety incident, and management influence on safety climate (Fang *et al*. 2004).

2.13. Accident Causation Models and Theories in Health and Safety

2.13.1 Domino Theory

The accident causation model was propounded by Heinrich in 1930, which related the causes of most accidents to the interaction between man and machine, the acts, the management role in accident prevention, the costs of accident, and the effect of safety on efficiency. In developing the theory, Heinrich used five factors to in his model. These included ancestry and social environment, fault of a person, unsafe acts and condition, accident, and injury. In using the accident causation model in their contribution, (Abdel Hamid and Everett, 2000), said that through inherited or acquired undesirable traits, people may commit unsafe acts or cause the existence of mechanical or physical hazards that result in injury. It is important to note from this theory that people's behaviors and attitudes are the fundamental cause of accidents. It is important to note that most of the accidents which occur on construction sites are caused by unsafe behavior of the worker therefore, management must take several methods to prevent the frequent occurrences of accidents on construction sites (Jacobson, 2001, p 33).

From the above, this means that, management should provide workers with safety facilities to prevent the workers from hazardous environment. It can therefore be seen that Heinrich's theory was instrumental in safety and health management around the world. However, in the late 1960s, Bird updated the dominion theory by proposing five factors in relation to the causes of accidents. These five elements were as follows control – management, basic causes – origins, immediate causes – symptoms, incidents – contact, and people – property – loss. Bird's approach has emphasized more on the management role to prevent losses.

2.13.2 Multiple Causation Model

This model was presented by Petersen (2000) that has totally different concept with the domino theory that influenced many researchers during Heinrich time. The model was inspired by his believe that many contributing factors, causes, and sub-causes are the main culprits in an accident scenario. Under this concept, the factors combine together in random fashion, causing accidents. By using multiple causation models, the surrounding factors to the accident would be revealed (Abdel Hamid and Everett, 2000). The set questions will be used to identify the root causes of the accident. For example, for stepladder accident, the question would be "why the defective ladder was not found in normal inspection, why the supervisor allowed its use, whether the injured person knew that he should not use the ladder, and so on. The questions asked is not pointed only to the injured person, but also to the management, supervisor, and other person or department that relate to the accident.

The answer to these questions could be used to identify the root cause of the accident, and also can be used as an improvement tools for inspections, supervisions, training, better definition of responsibilities, and pre-job planning by supervisors. Multiple causation models also pointed out that the root causes of accident normally relate to the management system such as management policy, procedure, supervision, effectiveness, training, etc. (Abdel Hamid and Everett, 2000).

2.13.3 Attribution Theory and OHS

Given that supervisors retain responsibility for performing safety inspections and hazard audits, investigating accidents and recommending corrective actions, providing safety training to workers, and motivating members to adopt safe work practices.

(Jamal, 2015) argues that supervisor bias may be inherent in risk assessments and that the concerns of other stakeholders are often not considered in hazard identification. As a consequence, self-other attribution and self-serving bias are believed to exist—a factor which causes the number of accidents assigned to behavioral causes to be grossly overestimated (Mohammadi et al., 2018). Numerous opportunities exist for attribution bias to exist in OHS initiatives, especially when accident reports are completed by supervisors in the same department in which the incident occurred (Daily Star, 2017).

According to (Ilo.org. 2018) supervisor attributions have the capacity to influence safety initiatives in a negative fashion, to the extent that safety-related problems become exaggerated rather than mitigated. The attribution bias of supervisors is believed to initiate inappropriate safety policies and program decisions that decrease overall program effectiveness and concomitantly increase organizational conflict. Fang et al. (2004a) illustrates this issue of attribution bias in OHS programs in the following statement: Incorrect attributions by top management regarding accident causation can lead to inappropriate safety policies and programs that magnify rather than correct the problem. A safety problem created by unrealistic production deadlines may be responded to with stepped-up enforcement or unnecessary training. Further, these incorrect attributions may be imposed on lower level supervisors and set up a situation where the first-line supervisor is caught between satisfying the boss and not magnifying the existing problem. On account of the fact that supervisors are often too involved in hazard identification and risk appraisal to be sufficiently objective, upper-level managers have been observed to retain a heightened bias towards internal attributions (Shourav et al., 2015).

Ahmed et al., (2018) stated that high-level managers are unlikely to have extensive experience in performing floor-level jobs and this lack of experience creates a predisposition towards internal attributions; and Upper-level managers often compare groups of workers rather than individual workers and develop internal attributions. Ahmad et al., 2016) also argues that perceptions and understandings of risk heavily influence the conception of risk-control strategies. It has been suggested that effective technical risk evaluation may be hindered when workplace actors do not have a shared understanding of risk and its control (Hossain et al., 2018).

This is especially so when disparity exists among key construction parties with regard to the source of the potential hazard. When considers the highly fragmented nature of the construction sector with various trades, contractors and subcontractors working on multiple sites, such disparity poses a particularly challenging concern (Walker 1996a; 1996b). The time and cost constraints of competitive tendering imposed within this amalgam of different firms pursuing distinct agendas further exacerbates the complexities of ensuring that a shared understanding of risk exists among the various parties working on a construction project (Huang, et al., 2016).

In order to ensure that a shared understanding of risk management exists, Kirchsteiger (2005) recommends a participatory approach to risk management. This involves all stakeholders working collaboratively with a view to characterizing and assessing risks, and then integrating risk assessment practices into a risk management program (Kirchsteiger 2005). The success of this participatory approach is dependent on whether the needs of all stakeholders are accommodated. Success, therefore, is not always guaranteed.

Since governments, industry and the public often maintain opposing views regarding risk assessment and management, Kirchsteiger (2005) is of the opinion that multiple stakeholders should be involved in the risk management process. A better understanding of risk and management practice is argued to result from this undertaking, particularly if governments and other organizations within the same industry, in addition to the public, are key participants. The inclusion of these stakeholders in the risk management process is justified by governments being confronted with increasingly complex issues, while the public is becoming more risk averse. Industry-based stakeholders should also be included since they are directly affected as a result of potentially reduced operational freedom (Kirchsteiger 2005). Onubi et al. (2016) proposed that, in order to minimize attribution bias in construction OHS and maximize the control of risk in these settings, it is critical to assign responsibility for health and safety in the planning stage of a project. At the same time, coordination among subcontractors and tradespeople must also be established (Onubi et al. 2016).

2.14. Behavior Change Interventions

2.14.1 Reinforcement Theory

The Reinforcement theory was propounded by Skinner in (1969) which simply states that reinforced behaviour will be repeated, and behaviour that is not reinforced is less likely to be repeated (Montana and Charnov, 2000). For instance, if a construction worker is rewarded for exhibiting good safety behaviour, then the individual is likely to continue to behave in the same manner if that individual wants more reward. On the other hand, a construction worker who does not exhibit or practice good safety behaviour will continue to exhibit these negative consequences of not practicing good

safety behaviour. This theory of behavioral reinforcement or operant conditioning model has been used extensively through behaviour and organizational behaviour modification theory" (Montana and Charnov, 2000, p. 248). From the theory, Teo et al., (2005) proposes four intervention strategies that can be used by managers to either encourage or discourage certain behaviour of workers (i.e. Positive reinforcement, negative reinforcement, punishment and extinction).

2.14.2 Positive reinforcement theory

This theory provides the opportunity for construction workers be rewarded with the consequence for exhibiting the desired safety behavior. According to (Teo et al., 2005), this theory indicates that, to motivate workers to perform their jobs in a safe manner, contractors should offer incentives, praise, monetary rewards, and promotions on the job. Positive reinforcement is one of the most important motivational techniques for the direction of the actions of construction workers (Walker, 1975). It is worth mentioning that most construction companies resort to the use of positive reinforcement in order to increase productivity, decrease absenteeism and workplace accidents. When positive reinforcements are used, the desired outcome is that behavior is reinforced. Workers understand that the behaviour is desirable and will normally repeat it for reward.

2.14.3. Negative reinforcement

Negative reinforcement act as a motivational tool for workers to perform the desired behaviour in order to avoid a negative consequence. Even though, (Jones and George, 2003) contend that negative reinforcements create unpleasant work environment and may lead to resentment of workers towards their managers, it motivates workers to perform their jobs in a safe manner. Therefore, in order to achieve the full benefit of

this theory, contractors may use criticism or threat of losing job and once the workers work in a safe manner, they stop receiving the undesired outcome (Ai Lin Teo et al., 2005). Jones and George (2003) contend that negative reinforcements create unpleasant work environment and may lead to resentment of workers towards their managers.

2.14.4. Punishment

Punishment as a reinforcement tool offers the worker a negative consequence so that the worker can stop performing an undesirable or unwanted act or behaviour. With reference to health and safety on construction project site, punishments may include pay cuts, temporary suspensions, demotions, and firing. However, (Jones and George, 2003) in their research, suggested that punishments should be issued with care for they may lead to resentment, loss of self-respect, a desire for retaliation. In addition, Hamner (1990) advocates that where punishment becomes necessary, it must be done in private in order not to hurt the worker's self-respect, or lower his or before co-workers and make other co-workers uncomfortable.

2.14.5 Extinction

Extinction reinforcement withholds positive consequences to get the worker to stop performing the undesirable or unwanted act or behaviour. On the building and construction project site, a worker who often flouts safety regulations may have his or her appointment terminated to curtail the unsafe practice or act.

2.15 Summary of Literature Review and Theoretical Frame Work

The importance of literature review in any research subject matter is of paramount importance. The review of available literature has revealed shortcomings in the body of knowledge on the subject matter in Ghana. Although recent developments in the field of research within the construction industry have since led to an increase of interest in the subject area of operative's attitudes on health and safety, this interest fails to measure up to the published matter in the country. Even though a greater area of literature was covered during the study, nevertheless, the work examined here constitute only a small percentage of knowledge which exist concerning site operatives' attitudes on health and safety performance on project sites. It is significant to mention here that, most of the published work on the subject matter of safety attitudes of operatives in the Ghanaian construction industry had been mainly concerned with areas of accident prevention as well as accident statistics, rather than upon the human attitude elements on the Ghanaian construction industry.

Meanwhile, these studies remained conceptually and theoretically lacking in great depth as far as specific attitude studies are concerned. The literature has revealed that apart from the structure and characteristics of construction activities, certain attitudes prevailed in the workforce which is greatly influenced by site operatives' safety behaviors. Significant among these factors includes; the influence of organizational behavior on worker attitudes, inherent reluctance of most operatives to wear safety protective equipment, relationships between worker turnover and safety, relationships of worker/management involvement in safety policy and safe working practices, the relationships between top management commitment to safety and it influence upon worker attitudes to safety.

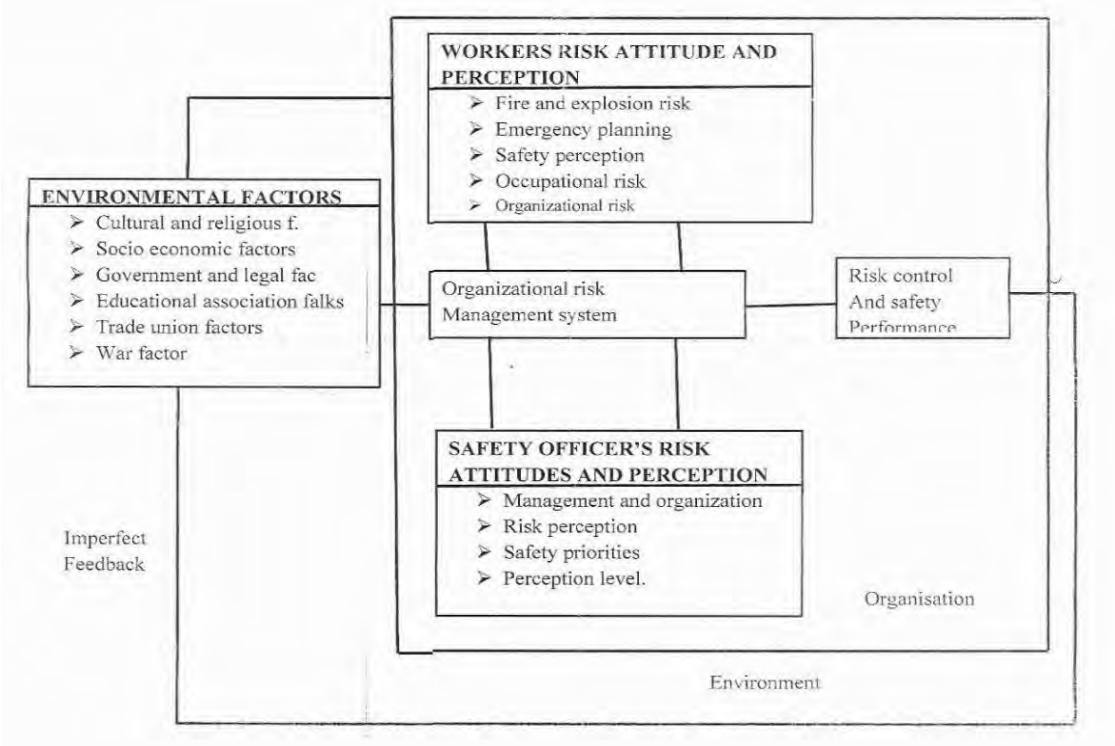


Figure 2.1: Darwish Model of Risk Behaviour

The theoretical framework of the study is adopted from Darwish (1987), model of risk behabiour. The nature of the activities of construction projects in the construction industry, especially from inception to completion has a corresponding effect on the roles, duties and responsibilities played sby construction site operatives. It is worth mentioning that apart from the fact that site operatives play different and varied roles during construction activities, their perception and attitudes towards health and safety might be different.

It is a fact that, construction site operatives, safety officers as well as site managers are always exposed to all degrees of construction accidents due to their constant involvement in operations or activities on site, hence their inclusion in the frame work. It is therefore without doubt that their individual and collective roles concerning their attitudes on health and safety on site will have a corresponding effect on safety performance of construction projects which is the main objective of this research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses how the research was conducted. It is structured under the following sub headings: Research philosophy, Research Design, Population for the Study, Sample and Sampling procedure, Data Collection Instruments, Administration of Instruments, Data Collection Procedure and Data Analysis Plan.

3.2 Research Philosophy

The term research philosophy refers to a system of beliefs and assumptions about the development of knowledge (Gill & Johnson, 2010). Although this sounds rather profound, it is precisely what you are doing when embarking on research: developing knowledge in a particular field. The knowledge development you are embarking upon may not be as dramatic as a new theory of human motivation, but even addressing a specific problem in a particular organization you are, nonetheless, developing new knowledge.

Whether consciously or unconsciously, one is expected to use at least at every stage in research a number of or types of assumptions (Burrell & Morgan 2010). These include (but are not limited to) assumptions about the realities likely to be encountered during the research (ontological assumptions), about human knowledge (epistemological assumptions), and about the extent and ways the researchers own values influence the research process (axiological assumptions) (Keemen & Rumens, 2008). These

assumptions inevitably shape the researchers understanding of the research questions, the methods as well as how the findings of the research are interpreted (Crotty 2020). A well-thought-out and consistent set of assumptions will constitute a credible research philosophy, which will underpin the methodological choice, research strategy and data collection techniques and analysis procedures. This will allow the researcher to design a coherent research project, in which all elements of research fit together. Schwandt (2001) stated some of the most commonly used paradigms includes positivism, critical realism, Interpretivist/constructivism, postmodernism and pragmatism.

Interpretivist researchers try to take account of this complexity by collecting what is meaningful to their research participants (Johnson & Clark). Different strands of Interpretivist place slightly different emphasis on how to do this in practice, so phenomenologists, who study existence, focus on participants' lived experience; that is, the participants' recollections and interpretations of those experiences (De Cock & Land, 2006). Hermeneutists focus on the study of cultural artifacts such as texts, symbols, stories, and images. Symbolic interactionists, whose tradition derives from pragmatist thinking (discussed later in this section) and who see meaning as something that emerges out of interactions between people, focus on the observation and analysis of social interaction such as conversations, meetings, and teamwork (Knudsen, 2003). In general, Interpretivist emphasize the importance of language, culture and history (Crotty 1998) in the shaping of our interpretations and experiences of organizational and social worlds.

Postmodernism (not to be confused with postmodernity, which denotes a particular historical era) emphasizes the role of language and of power relations, seeking to

question accepted ways of thinking and give voice to alternative marginalized views (Mart & Fernanadez ,2013). It emerged in the late twentieth century and has been most closely associated with the work of French philosophers Jean-François Lyotard, Jacques Derrida, Michel Foucault, Gilles Deleuze, Félix Guattari & Jean Baudrillard. Postmodernism is historically entangled with the intellectual movement of post structuralism. Pragmatists recognize that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities (Tsoukas & Knudsen, 2003). This does not mean that pragmatists always use multiple methods; rather they use the method or methods that enable credible, well-founded, reliable and relevant data to be collected that advance the research (Kelemen & Rumens 2008). Positivism is a set of philosophical approaches that seeks to apply scientific principles and methods, drawn from the natural and hard sciences, to social phenomena in order to explain them. So in this way it is a logical system that bases knowledge on direct, systematic observation (Johnson & Clark, 2006).

Apart from the above ,Positivism is a philosophical theory stating that certain ("positive") knowledge is based on natural phenomena and their properties and relations (Dye,2013). Thus, information derived from sensory experience, interpreted through reason and logic, forms the exclusive source of all certain knowledge (Alvesson & Skoldberg, 2000).Verified data (positive facts) received from the senses are known as empirical evidence; thus positivism is based on empiricism. In other words, Positivism is a belief that we should not go beyond the boundaries of what can be observed. To a positivist, science is the single-most important route to knowledge, and only questions that can be approached by the application of the scientific method should concern us

(Mellors –Bourne et al., 2014). Reality exists outside and independently of the mind and therefore it can be studied objectively and as a real thing. They believe that there are social facts which make up the rules of society which are separate and independent of individuals (Reed, 2005). Reality exists outside and independently of the mind and there for it can be studied objectively and as a real thing. They believe that there are social facts which make up the rules of society which are separate and independent of individuals (De Cock& Land, 2006).

3.2.1. The Adoption of Appropriate Research Philosophy

From the foregoing discussion of paradigms, a positivist paradigm was adopted by this study. This is because, the study seeks to solicit the views of respondents on their attitudinal impact on health and safety of construction sites. Certain facts such as rules and regulations on health and safety are concrete and exist independent of the human mind thus amenable to the realist viewpoint. Also, the study implored the use certain theories in attitudinal change such as operant conditioning theory which involves positive and negative reinforcement, punishment as well as the accident causation models.

3.3 Research Design

A cross sectional survey design was employed to accomplish the aim and objectives of the present study. Such a design involved the gathering of quantifiable data that make possible the use of statistical tools to analyze and interpret the results (Fischer, Boone & Neuman, 2014). It was adopted to deal with the impact of site operatives attitudes on health and safety performance of selected construction project sites in Northern Region. Therefore, the researcher adopted this method which permitted the sample of

respondents for the study to express their feelings, ideas, thoughts, and beliefs about the health and safety practices in performance at project sites in the Northern Region of Ghana. The cross sectional survey was adopted for this work due to the following reasons:

- The survey questionnaire was structured to elicit information from the population of interest in a systematic and unbiased manner;
- They permitted statistical analysis of data and generalization to a larger population which included both site managers and sit operatives.
- Survey allows to collect a large amount of data about population in an economical way (both in terms of money and time);
- Survey provides standardized answers which allows easy comparison and generalization;
- Survey gives researchers opportunity to save time on design and increase the speed of data collection.

3.4 Research Approach

Three main research approaches that shape characterize social science and management research are deductive approach, inductive approach and adductive approach (Fisher, 2007). Deductive reasoning occurs when the conclusion is derived logically from a set of theory-derived premises, the conclusion being true when all the premises are true (Ketokivi & Mantere 2010). Likewise, a deductive approach seeks to collect data to draw generalizations in order to test theory while an inductive approach seeks to generate theory from data collected with no object of making any generalizations (Kelemen &Rumens, 2008).

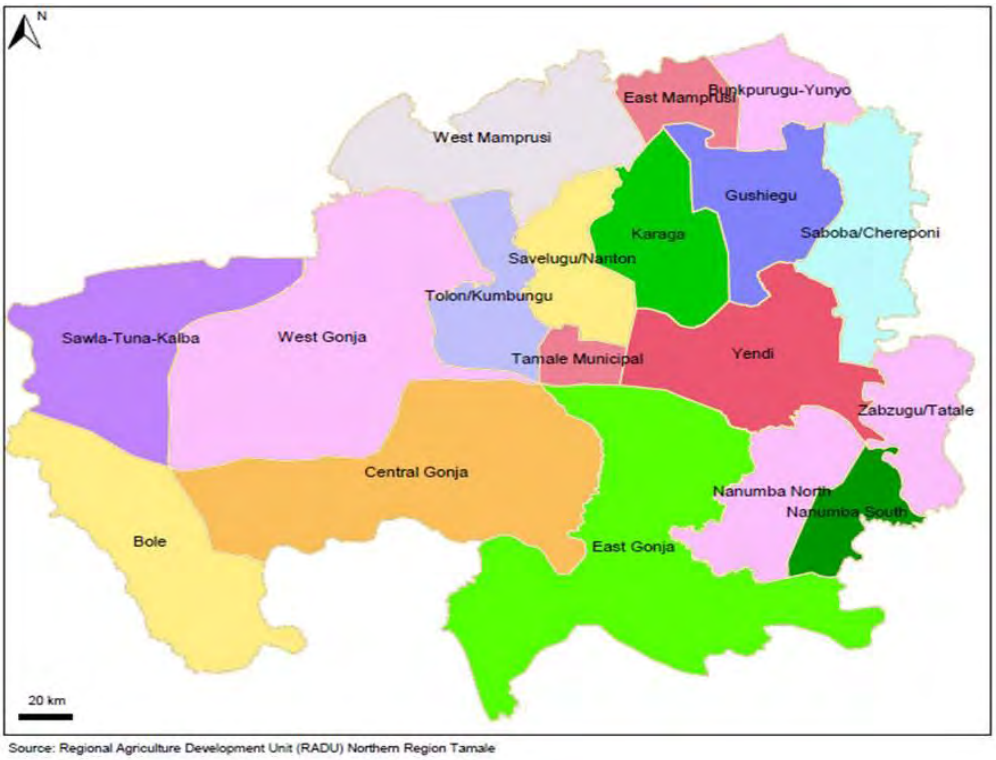
In contrast, in inductive reasoning, there is a gap in the logic argument between the conclusion and the premises observed, the conclusion being 'judged' to be supported by the observations made (Ketokivi & Mantere 2010). The third approach to theory development that is just as common in research is adductive reasoning, which begins with a 'surprising fact' being observed (Ketokivi & Mantere 2010). This surprising fact is the conclusion rather than a premise. Based on this conclusion, a set of possible premises is determined that is considered sufficient or nearly sufficient to explain the conclusion. It is reasoned that, if this set of premises were true, then the conclusion would be true as a matter of course (Fisher, 2007). This is because the set of premises is sufficient (or nearly sufficient) to generate the conclusion, this provides reason to believe that it is also true. Based on the above discussions on the various research approaches, the study adopts Dedicative approach. According to Boone & Neuman, (2014), Deductive approach offers the following advantages to researchers. In the first place, it provides the opportunity to explain causal relationship between concepts and variables. Secondly, it offers the possibility to measure concepts quantitatively. Lastly, deductive Approach offers the advantage to generalize research findings to a certain extend (Ketokivi & Mantere 2010).

3.5 Description of the Study Area

The Northern Region is one of the sixteen regions of Ghana. It is located in the northern part of the country and was the largest of the sixteen regions, covering an area of 70,384 square kilometers or 31 percent of Ghana's area until December 2018 when the Savannah Region and North East Regions was created from it. The Northern Region is divided into 14 districts. The region's capital is Tamale.

The Northern Region is bordered on the north by the North East region, on the east by the eastern Ghana-Togo international border, on the south by the Oti region, and on the west by the Savannah Region. The Northern Region is much drier than southern areas of Ghana, due to its proximity to the Sahel, and the Sahara. The vegetation consists predominantly of grassland, especially savanna with clusters of drought-resistant trees such as baobabs or acacias. Between January and March is the dry season. The wet season is between July and December with an average annual rainfall of 750 to 1050 mm (30 to 40 inches). The highest temperatures are reached at the end of the dry season, the lowest in December and January. However, the hot Harmattan winds from the Sahara blows frequently between December and the beginning of February. The temperatures can vary between 14 °C (59 °F) at night and 40 °C (104 °F) during the day.

More than 75% of the economically active population is agricultural. The low population density is partly caused by emigration, in addition to geography and climate. The Northern Region has a low population density, and, along with the official language of English, most inhabitants (52%) speak a language of the Oti–Volta subfamily in the Niger–Congo language family, such as Dagbani, Mamprusi or Konkomba. The Dagbon Kingdom, of the Dagomba people, is located in the region.



Source: Regional Agriculture Development Unit (RADU) Northern Region Tamale

Figure 3.1: Map of Northern Region

3.6 The Population of the Study

Fraenkel et al. (2012) defined population as "the group of interest to the researcher, the group to whom the researcher would like to generalize the results of the study" (p. 92). The population of the study comprised of all site operatives, contract or project managers and safety managers working with construction firms in the entire 14 metropolitans, municipal and districts within Northern Region of Ghana. However, the target population will comprise of all site operatives, site managers and safety officers in the Tamale Metropolis, Savelugu municipal, Tolon District and East Gonja municipalities and municipal. The involvement of Site managers and safety officers in the study is crucial because they are in charge of the day to day supervision of construction sites including health and safety issues and therefore could provide vital information to find answers to the research questions and also to achieve the research objectives stated in chapter one. Additionally, to assess the health and safety attitudes, it is important to solicit information from site operatives themselves. To access the site

managers and safety officers as well as the site operatives, a list of registered contractors in the Northern Region was obtained from the Association of Building and Civil Engineering Contractors Association (ABCECG) and The Association of Road Contractors (ASROC) in the Northern Region. However, none of the registered contractors had a safety officer. The population of registered contractors in good standing was 90 as at 2019.

3.7 Sampling Technique and Sample Size

3.7.1 Sampling Technique

According to Sanders et al., (2011), sampling is a procedure to select a sample from individual or from a large group of population for certain kind of research purpose. Sampling in research has the advantages that it saves time and money as well as it gives more accurate results (Elfil et al., 2017). Chaudhuri & Stenger (2005), indicated that sampling can be categorized into two main types. Namely, probability and non-probability sampling. Probability sampling also known as random sampling is the type where randomization is used instead of deliberate choice, while non-probability sampling involves the selection of units from a population using subjective methods (Daniel, 2012).

With regards to this research work, the study adopted a purposive sampling technique which is an example of a non- probability sampling and the census sampling technique. The census sampling technique was used in the selection of prospective construction firms selected for the study and the purposive sampling for the selection of site operatives.

Purposive sampling technique was adopted in selecting the site operatives employed on active construction sites of the registered construction companies. The criteria used in selecting the operatives based on their level of education (being able to complete a questionnaire form) and belonging to a trade category. Purposive sampling, also known as judgmental, selective or subjective sampling, reflects a group of sampling techniques that rely on the judgement of the researcher when it comes to selecting the units (e.g. people, case/organizations, events, pieces of data) that are to be studied (Hendlin et al., 2011).

Myneni (2015) indicated that purposive sampling is a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. According to Adolph Jenson (2004) a purposive selection denotes the method of selecting a number of groups of units in such a way that selected groups together yield as nearly as possible the same average or proportion as the totality with respect of those characteristics which are already a matter of statistical knowledge.

Purposive sample is a non-representative subset of some larger population, and is constructed to serve a very specific need or purpose. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions (Martinez & Mesa, 2016). Purposive sampling was chosen due to the following advantages it offers during sample determination (Kelemen &Rumens, 2008). In the first place, it reduces cost and time because it is cheaper to collect data from a part of the whole population. Again, it offers

greater speed in the determination of a cross-section of population and provides the only alternative available if there is limited number of primary data sources available to select from. Again, it provides the opportunity for every member of the population to be selected or included in the study. This purposive technique makes it possible to prove the validity of the information immediately because no one is left out from the sampling process (Burrell & Morgan, 2010).

However, purposive sampling has some limitations. It provides a significant number of inferential statistical procedures that are invalid. It is also pruned to researcher bias, therefore may be challenging to defend the representative nature of a sample (Martinez & Mesa 2016). In addition, a census approach was adopted in the selection of the construction firms. The criteria used to select the site managers were based on experience. Census sampling technique as indicated by (Hendlin et al., 2019), is a statistical research method that studies all the units or members of the population. The information from the sampled units can be used to estimate the characteristics for the entire population of interest. Furthermore, census as a sampling technique provides a more reliable and accurate results. It also rules out possibility of any personal biases and faster in determining the sample size in research. However, census sampling can be time consuming and expensive (Chaudhuri & Stenger, 2005).

3.8 Data Collection Instrument

According to Ponto *et al*. (2010), Survey questionnaires are techniques for gathering statistical information about the attributes, attitudes or actions of a population by structured set of questions. The survey questionnaire was carried out targeting all site operatives including site /project managers as well as safety officers, working on

construction sites within the study area. The questionnaire was divided into two sections, i.e. A and B. Section A represented the demographic information of respondents, whilst B, represented questionnaires for each of the three objectives of the study. The questionnaires captured themes on site operatives 'attitudes on health and safety, factors that affect Health and Safety as well as the influence of safety attitudes on the safety performance on projects performance in the Northern region of Ghana. The Likert scale rating ranging from 1-7 was used. The Likert Scale was found to be appropriate for the design of the questionnaire for the study. Likert scale was adopted because, the respondent is not asked to decide just whether he/she agrees or disagrees with an item, but rather to choose between several response categories, including various strengths of agreement and disagreement. The categories are assigned scores and the respondent's attitude (or opinion) is measured by his total scores. There were questionnaires for site managers and site operatives. Both online questionnaire survey and manual questionnaire were administered

3.8.1 Validation of Survey Questionnaire

It is significant to indicate at this point that, before the major survey, the questionnaire was vetted by my project supervisor and colleagues who were carrying out research into similar areas of study as well as the Research and Publication Department of the Bagabaga University College of Education Tamale. Secondly, pilot survey was carried out in order to authenticate the effectiveness of the questionnaires administered. The pilot study, in other words pre-test is to enable the researcher to address some pertinent issues which might hinder respondents in the course of answering the questionnaire Bell (1996). The aim of the pilot study was to test the wording of the questionnaire,

identify ambiguous questions, test the intended technique for data collection and measure the effectiveness of the potential response.

Furthermore, the questionnaire was pre –tested in some selected areas of the study area which included the Tamale Metropolis, where a Chinese construction firm was carrying out the construction of the Tamale inter-change, Salaga Distract in the Savana Region and Yendi District in the Tamale Metropolis. Also by imploring the purposive sampling technique, the research instruments were pre-tested using a sample of ten (10) selected experienced literate site managers and site operatives each. This sample size is in confirmation with Borg and Gall (1983), who posited that it is highly in appropriate to include more than twenty (20) subjects for a pilot study. It is important to say that all these ten 10 respondents were included in the main survey. These respondents were given the free time to express their feelings on the relevance of the questionnaires. The pre-test period lasted for two weeks.

3.9 Data Analysis

Fraenkel & Wallen (2003) posited that data analysis is the process by which the data gathered are simplified so as to make it comprehensible. Therefore, due to the voluminous, complex, and fragmented data, the researcher initially scrutinized and edited the data and took off all unimportant materials so that the data will be made comprehensive. The researcher then collated the useful materials, analyzed, discussed, evaluated or assessed them, drew conclusions and made recommendations based on the facts and conclusions. With data analysis, the data was put into segments and organized under various themes and sub-themes relating to the topic, research questions and

objectives of the thesis. The researcher has also compared and contrasted data gathered from the field with those data that already existing in literature.

Table 3.1: Data Analysis Plan

S/N	Research Objective	Constructs/Variables	Method of Analysis	Respondents
1		Attitudes of site operatives	Descriptive statistics; frequencies, mean and Standard Deviation	Site operatives
2		Health and safety performance, causal factors	Descriptive statistics; frequencies, mean and Standard Deviation.	Site managers
3		Influence of site operatives Attitudes on health and safety performances.	Linear Regression	Site managers
4		Relationship between age and site operatives attitudes	Pearsons ® correlation	Site operatives

CHAPTER FOUR

ANALYSIS OF DATA AND PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the Analysis of the results of the study. The chapter is organized into six main sections comprising; an introduction, response rate, demographic profile of respondents, the health and safety attitudes of construction site operatives, the critical determinants of health and safety performance of construction project sites, and the influence, if any, of health and safety attitudes of site operatives on health and safety performance of construction project sites.

4.2 Response Rate

At the end of the field survey, 83% response rate was achieved. The high response rate recorded was due to several efforts made by the researcher. These included personal contacts with respondents and through phone calls. Apart from these, follow up was also made through emails and wats-up pages of respondents. A total of ninety (90) questionnaires were sent to site managers and out of this 40 were hard copies whilst 50 were administered online by using Google forms. Finally, 46 were retrieved from online and 30 retrieved manually.

The retrieval rates and percentages are shown in Table 4.1. The manual questionnaires administered to site operatives were 100 but only 80 questionnaires were finally received. More so, the online questionnaires administered to site operatives were 50 but only 45 were retrieved. This means that a total of 125 questionnaires were received out of the 150 administered to site operatives. The online administration of the survey

questionnaire was necessitated by the COVID, 19 pandemics. It allowed questionnaires to be administered and returned without physical contact between the researcher and the respondents. The researcher has to use this option of questionnaires administration where companies rejected the option of personally administering the questionnaires. Detail of the retrieval rates are shown in Table 4.1 below.

Table 4.1: Retrieval Rates Of Questionnaire

Item	Questionnaires Sent	Questionnaires Retrieved	Percentage (%)
	Construction site managers		
Hard Copies	40	30	33.3
Online	50	46	51
Total	90	76	83.3
	Construction site operatives		
Hard copies	100	80	53.3%
Online	50	45	30%
Total	150	125	83.3%

4.3 Demographic Information of Respondents

This section presents the Demographic information of respondents. Demographics of respondents according to Ferguson & Mulwafu (2004) are significant in research because it has a greater influence on the socio-economic background of respondents, their perceptions and their entire their lives. The demographic information of Respondents in section A was analyzed on two categories of respondents, i.e. site operatives' and site managers' background information. This included their age, gender, work experience, academic qualification and trades as well as their company type or classification.

4.3.1 Age of Respondents

Table 4.2 indicates the age groupings of respondents who took part in the study. The main aim was to find out the average age of the employees who actively participated in the operations within the various companies. In Table 4.2, the number of site operatives whose ages ranges between 21-30 were thirty-five (35) making 28 percent. This is the range of the youthful age and it shows that majority of site operatives are the youth. It is evidence to say that most of the youth in the Northern Region have not furthered their education and therefore, are into contract or manual works which are temporary jobs. These group of workers are mostly inexperienced and are sometimes heedless and ignorant about safety procedures during work. Also, 40 (Forty) site operatives with age group ranging from 31-40 years representing 32 percentages are considered to be the most experienced work force. Ages of workers within 41-50 have life –long experience and still possess the needed energy to operate in technical areas in the building and construction industry as viewed by (Siu *et a*l. (2003), who found that older workers exhibit more positive attitudes to safety than younger workers.

With regards age of site managers, it is evident that majority of site managers were aged. (Thirty-six) 36 managers representing (47.3%) fell between the ages of 51-60 and these ages are still Within the public sector active working age category. Construction sites needs site managers with maturity so that they can effectively manage the affairs of subordinates in their companies especially with issues relating to safety health related issues. Also, a total of (twelve) 12 site managers representing (15.7%), were above the retirement age of Ghana public sector services and this corresponds to Schake *et a*l (2011) assertion that some construction managers still remain in the industry after age 60. but the only problem is that most employers are failing to pay for their social

security contributions, hence, most construction site workers seems not have retirement age as long as they remain strong and healthy.

Table 4.2: Distribution of Age of Respondents

Age Group	Site Managers (%)	Site Operatives (%)
Under 20 years	0 (0%)	0 (0%)
21-30 years	10 (13.1%)	35 (28%)
31-40 years	1 (1.3%)	40 (32%)
41-50 years	17(22.4%)	40 (32%)
51-60 years	36 (47.3%)	6 (4.8%)
60 and above	12 (15.7%)	4 (3.2%)
TOTAL	**76 (100)**	**125 (100)**

Source: Survey Data 2021

4.3.2. Gender of Respondents

This table outlines the gender distribution of respondents. Table 4.3, indicates that male has a greater number of site operatives with a total percentage of 80% than female site operatives with only 45%. This clearly indicates that the nature of work and their associative risks are sometimes determinant factors of which sex should dominate in the working force. However, it was revealed that the percentage (20%) of female in the working force is highly considerable as compared to the past. It is important to state that this considerable number of female workers in the various companies is as a result of the increasing numbers of unemployment in the Northern Region which compels women to all types of jobs, other than the previous assertion that construction and other manual works could only be done by males only due to their difficult nature (Rosalie, 2011).

On the part of gender of site managers, it was revealed that all the (Seventy –Six)) 76 site managers involved were men. It can therefore be concluded that, the construction

industry seems to be a male dominated sector as compared to other sectors like health and services sectors. This view is also expressed by Gyasi (2012), that women as site managers for construction companies is very scarce for the reason that many men have certificates in construction related courses as compared to that of women. In addition, most women find it difficult supervising men on construction sites due to inferiority complex on the side of women.

Table 4.3: Respondents Based on Gender

Gender	Site managers	Site Operatives
Male	76 (100%)	80 (64%)
Female	0 (0%)	45 (36%)
TOTAL	76 (100)	125 (100)

Source: Survey Data 2021

4.3.3 Working Experience of Respondents

In Table 4.4, it was also observed that majority of site operatives were under five (5) years working experience. This clearly shows that, the companies have less experienced site operatives since the number of years a worker does in a company contribute to their experience. In view of the, (Fang et al., 2004) posited that, lack of working experience by years of work in a company does not make a site operative have better knowledge in health and safety issues. Table 4.4 shows that majority of the site managers had less than 5 years working experience. It is obvious to assert that most construction companies in the Northern Region belong to class K1DI and K2DD2 which does not have long standing experience and therefore have low capacity holding in terms of capital and machinery. It also indicates the possibility of changing their managers very

often is high to due to one time off job as well as poor performance. It was also noticed that most contractors who owns the firms act as the site managers as well. This has confirmed the revelation from Table 4.4, which shows that only (four) 4 site managers representing (5.2%) have working experiences above 15 years but less than 30 years. These managers might be managing their own companies as well; hence there is likelihood for them to work for long as long as the companies still exist.

Table 4.4: Respondents Based on Working Experience

Duration (years)	Site Managers	Site Operatives
Under 5years	35 (46.05%)	50 (40%)
5-10 years	0 (0%)	40 (32%)
10-15 years	30 (39.5%)	15 (12%)
15-20 years	2 (2.6%)	5 (4%)
20-30 years	7 (9.2%)	10 (8%)
30-40 years	2 (2.6%)	5 (4%)
TOTAL	**76 (100)**	**125 (100)**

4.3.4 Academic Qualifications of Respondents

From Table 4.4, it can be seen that majority of site operatives representing 40%, are Senior High secondary school graduates. This represents a percentage value of 32%. Again a good number with percentage values 7.2% and 8% respectively completed technician courses. It is clear that when majority of site operatives are literates or have higher educational qualifications, there is better avoidance of hazards at construction sites. This is because, many construction operations are regulated by laws and rules which are mostly documented in booklets and in posters and labels pasted to enhance the education of safety at construction sites. In this light, (Lingard & Rowlinson, 2005) elucidated that site operatives or workers who have literacy background could read and understand labels and posters on health and safety rules and regulations on construction

sites. However, there is also a significant number of workers who have no formal qualification and they make up a percentage of 35%. Most of these workers were those seen mixing and carrying mortar, cement, bricks, sweeping, giving directions to moving vehicles, and among others.

Again, in Table 4.4, (Thirty) 30 mangers representing (39.5%) hold higher national diploma certificates. It is obvious that majority of the site managers attained their certificates from the Technical Universities which are noted for running technical programs like building and construction programs. The Table also shows that only (two) 2 managers representing (2.6%) managers hold master's degree certificates and this indicates that most site managers do not have study leave and chances of upgrading themselves for fear of losing their jobs.

Table 4.5: Respondents Based on Academic Qualification

Qualification	Site Managers	Site Operatives
Master's degree	2 (2.6%)	0%
Bachelor's degree	25 (32.9%)	0%
Diploma (HND)	30 (39.5%)	0%
Construction Technician course (CTC 1)	5 (6.6%)	9 (7.2%)
Construction Technician Course (CTC 11)	6 (7.8 %)	10 (8%)
Construction Technician Course CTC 111)	4 (5.3%)	0%
Intermediate	0%	20 (16 %)
Advance	0%	6 (4.8%)
NVTI	0%	5 (2.2%)
SHS	0%	40 (32%)
Non –Formal	0%	35 (28%)
Total	**76 (100%)**	**125 (100%)**

4.3.5 Trades of Site Operatives

It is clear from Table 4.5 that a reasonable number of site operatives about 45 representing 20% were masons, while 60 site operatives representing 26.7% were carpenters. This could be due to that, masonry and carpentry work are almost

incorporated in all the stages of constructions right from foundation to finishing, hence they recorded the highest number site operatives. Again, carpentry is frequently needed in the construction and installation of formwork and other structures within construction sites as well as roofing and other facilities during construction. In the same regard, 10 as well as 25 operatives making up a percentage 4.4 and 11.1% respectively were plumbers and welders

Table 4.6: Respondents based on trades

Trade	Frequency	Percentage (%)
Mason	45	20
Carpenter	60	26.7
Plumber	10	4.4
Welder	25	11.1
Tyler	4	1.8
Others (Painter)	5	2.2
Casual workers	75	33.3
Total	**225**	**100**

4.3.6 Classification of Companies of Site Managers

It is clear from Table 4.6, that a reasonable number of site operatives were masons and carpenters representing 20% and 26% respectively. This could be that, masonry work is almost incorporated in all the stages of constructions right from foundation to finishing, hence it has more workers of site operatives and Carpentry which is frequently needed in the construction and installation of formwork and other structures within construction sites as well as roofing and other facilities during construction.

Table 4.7: Respondents Based on Companies

Company	Frequency	Percentage
KIDI	2	2.6
K2D2	5	6.6
K3D3	24	31.6
K4D4	45	59.2
Total	**76**	**100**

From Table 4.7 45 (Forty-five) of site managers representing (59.2%) work in K1D1 and K2D2 companies. And since these companies have low capacity holding in terms of capital outlay they cannot employ high and more qualified managers. Again, only 2 site managers representing 2.6% work in K1D1 companies.

4.4 Analysis of Responses Relating to Specific Objectives and Research Questions

Sections 4.5 to 4.7 related are related to the specific objectives and research questions stated in Chapter One Sections 1.3 and 1.4. To gather evidence for the study, a seven point Likert scale rating, 1=strongly disagree, 2=disagree, 3=partially disagree, 4 not sure, 5=partially agree, 6=agree, 7=strongly agree was used. The criterion score of 4.0 was established for the scales. To obtain the criterion score (CS=4.00), the scores were added and divided by the number of scales (that is….7+6+5+4+3+2+1= 28/7=4.00). To understand the mean scores, any item that scored a mean of 0.00 to 3.99 was regarded as low score. Those items/statements that scored a mean from 4.00 to 7.00 were regarded as high scores. Analysis were done using descriptive statistical measures such as; mean, standard deviation. These analytical techniques and interpretations were applicable to all the research questions.

4.5 Health and Safety Attitudes of Operatives on Construction Sites

Table 4.8 presents the views of the construction site operatives on their attitudes relating to health and safety on construction sites. The table presents attitudinal factors that affected health and safety performance on construction projects sites in the Northern Region. Starting with the Kurtosis values, the results show that the variables follow a normal distribution. This is based on the reason that the kurtosis values were within the acceptable limit for normal distribution of ±2 (George & Mallery, 2011). This indicates that the data was normal and as such the descriptive statistics were deemed appropriate for the analysis.

Table 4.8: Health and Safety Attitudes of Construction Site Operatives

Statement	*MS*	*Standard Deviation*	*Kurtosis Statistics*	*MR*
I try to spot health hazards on site that could to lead illness.	6.70	1.17107	6.033	1st
I do not like going to work on weekends.	6.30	.78496	-1.132	2nd
I hate being commanded or instructed to do any work when am hungry or sick	5.65	1.46594	.032	3rd
I think Frequent training on site has affected my attitudes on health safety positively.	5.50	1.21023	-.360	4th
I sometimes believe that Frequent accident occurs when worker management relationship is bad.	5.45	1.43812	-.255	5th
Construction work is difficult, so one must always be ready for the challenges involved.	5.40	1.28708	-.914	6th
I believe that Proper coordination between main and subcontractors can influence safety on site	5.40	1.60177	-.254	7th
If my supervisor is careful about safety that equally makes me	5.25	1.87689	-.618	8th
I do not enjoy working in a group with my work mate	5.25	1.41689	-.495	9th
I believe Management safety attitude determines worker safety behavior.	5.16	6.63282	.027	10th
I usually report accident cases to my boss as soon as it occurs.	5.14	1.76967	-.314	11th
I am not always happy whenever I am given extra-work to do.	5.05	1.81116	-.407	12th
I usually lose concentration when I am tired at work.	4.85	1.86068	-.897	13th
I occasionally take in alcohol to aid my work when I am tired.	4.80	.98473	.052	14th
I follow strictly all the safety rules that my supervisor ask me to do.	4.80	2.14617	-.949	15th
I am worried I will get into trouble if I do not follow safety rules	3.60	2.18812	-1.570	16th
I am not always comfortable working at a height.	3.30	1.59228	-.325	17th
I wear my safety equipment because am compelled to wear them.	3.10	2.26747	-.819	18th
I think old and experienced workers do not usually get injured on site than young and inexperienced ones.	2.75	1.45210	-1.356	19th
I am much concerned with my own safety than others.	2.64	2.59183	24.656	20th
I only follow safety rules only when my supervisors are around.	2.36	1.32207	.287	21st

Key: ***M****= Mean,* ***SD*** *=Standard Deviation* ***MR****=Means Ranking* ***RS****=Retrieved Sample=76*

From the descriptive analysis, the results give evidence to believe that generally, majority of site operatives attitudes that affected health and safety performance on construction projects sites in the Northern Region were generally positive, with a few being negative.

Firstly, it was revealed that, majority of the construction site operatives tried to spot health hazards on site that could lead to illness (M=6.70>CS (4.00), SD=7. 171, K=96.033,), this was closely followed by the factor that some site operatives do not like going to work on weekends (M=6.30>CS (4.00), SD=.78496 K=-1.132,).

Again, a good number of site operatives conceded that they hate being commanded or instructed to do any work when hungry or sick (M=5.65>CS (4.00), SD=1.46594 K=.032,) being aware that 'a hungry man is an angry man'. In addition, site operatives acknowledged that frequent training on construction site has a positive effect on their attitudes towards health and safety performance. (M=5.50>CS (4.00), SD=1.21023 K=-.360,), while others were of the opinion that their attitudes were shaped based on their relationship with management, whether good or bad. (M=5.45>CS (4.00), SD=1.43812 K=-.255,). Moving forward, it was also expressed by operatives that Construction work is difficult, so one must always be ready for the challenges involved (M=5.40>CS (4.00), SD=1.28708 K=-.914,). Apart from the above, there was also the opinion by some respondents that their attitudes towards health and safety was based on the fact that if their supervisors were careful about safety, that equally makes them careful too (M=5.25>CS (4.00), SD=1.87689 K=-.618,), followed by the expression by others that they did not enjoy working in a group with their work mates (M=5.25>CS (4.00), SD=1.41689 K=-.495,). In another development, site operatives also believed that

management safety attitudes determines their safety behavior (M=5.16>CS (4.00), SD=6.63282 K=78.027,), while others indicated that they were willing to report accident cases to their bosses as soon as they occur *(M=5.14>CS (4.00), SD=1.76967 K=-.314,)* Again, a cross section of site operatives also expressed the dissatisfaction that they were not always happy whenever they were given extra-work to do after the day's work *(M=5.05>CS (4.00), SD=1.81116 K=-.407,)*,while others lamented the fact that they usually lose concentration whenever they were tired at work *(M=4.85>CS (4.00), SD=1.86068 K=-.897,).* Apart from the above, a number of site operatives conceded that they occasionally take in alcohol to aid their work when they were tired *(M=4.80>CS (4.00), SD=.98473 K=.052,)* while others acknowledged that they followed strictly all the safety rules that their supervisors asked them to follow *(M=4.80>CS (4.00), SD=2.14617 K=-.949,).*

Notwithstanding the above, there were other negative attitudes expressed by site operatives on Construction sites in the Northern Region. These include the following: Firstly, a cross section of site operatives expressed the fear that they will be punished if they did not follow safety rules on construction site (M=3.60<CS (4.00), SD=2.18812 K=-1.570,), while others opined that they were not comfortable working at a height (M=3.30<CS (4.00), SD=1.59228 K=-.325,). Other revelations by respondents were that, they only wore safety clothing because they were compelled by management to wear them. (M=3.10<CS (4.00), SD=2.26747 K=-.819,). In addition, some operatives indicated that they did not think old and experienced workers usually get injured on site than young and inexperienced ones (M=2.75<CS (4.00), SD=1.45210 K=-1.356,). Apart from the above, site operatives indicated that they were concerned with other's safety more than themselves (M=2.64<CS (4.00), SD=2.59183 K=24.656,). Lastly,

others indicated that they only followed safety rules only when their supervisors were around (M=2.36<CS (4.00), SD=1.32207 K=.287,).

4.6 Critical Determinants of Health and Safety Performance on Construction Sites.

Table 4.9 presents respondents' views on critical determinants or some of the factors that contribute to health and safety performance on construction project sites. Reporting on the Kurtosis values, the results show that the variables follow a normal distribution. This is based on the reason that the kurtosis values were within the acceptable limit for normal distribution of ±2 as suggested by George and Mallery (2011).

Thus the data was normal and as such the descriptive statistics was deemed suitable for the analysis. Table 4.9 suggests that many factors critically determined health and safety performance of construction project sites in the Northern Ghana. This is evident from the scores of the items, in which most of which have mean values greater than the Criterion Score (>CS=4).

Table 4.9: Determinants of Health and Safety Performance

Statements	*M*	*Standard Deviation*	*Kurtosis Statistics*	*MR*
Health and safety can be improved through effective communication.	6.65	1.27776	2.280	1st
Provision of adequate protective clothing will help minimize accidents on site.	6.19	1.04588	.015	2nd
Clients pressure to achieve program time lines affects safety	6.17	.92935	-.527	3rd
Most accidents could be prevented if operatives were more careful.	6.15	.92452	-.216	4th
Individual carelessness on site leads to accidents.	6.11	1.21070	.957	5th
Regular and periodic training for site operatives on health and safety has impacted positively on their attitudes towards safety	6.11	1.14271	-.413	6th
Creating individual awareness will help reduce accidents on site.	6.06	1.12351	-1.021	7th
Operatives do not like doing extra-work after the day's work.	6.05	1.17638	.211	8th

Accidents could prevented if operatives cooperate with	6.05	.86247	-.275	9th
Site safety is more important than productivity.	5.97	1.11921	-1.106	10th
Majority of site operatives do not enjoy working at heights.	5.97	1.05797	-.712	11th
Most site operatives are of the view that their safety attitudes are influenced by management safety behaviors.	5.96	1.20489	-.365	12th
Health and safety can be improved by employee motivation and	5.93	1.03712	-.802	13th
Management commitment improves attitudes to health and safety	5.92	1.11670	-1.109	14th
Most operatives believe that well planned and organized sites help minimize accidents on site,	5.85	.98933	-.920	15th
Most operatives on site are not willing to report	5.73	1.22603	-.639	16th
Most site operatives sustain injuries as a results of work pressure and tiredness	5.73	1.28963	-.762	17th
Most operatives do not like coming work during week-ends.	5.61	1.53160	1.065	18th
Some operatives sometimes take drugs/alcohol while working to	5.25	1.96723	-.316	19th
Contracts awarded to qualified contractors can enhance health and safety.	4.73	1.98909	-1.521	20th
Clear safety rules and obligations can help improve safety performance on site.	4.21	2.42386	-1.559	21st
Health and safety performance can be improved good safety plans.	4.04	1.41836	-.323	2nd
If all workers are educated on safety, this will help improve performance.	3.63	1.48631	-.786	23rd
Most site operatives are willing to report accident	2.96	2.01621	-.559	24th
Site operatives are more concerned with their own safety than their fellow workers.	2.29	1.45891	-.985	25th
All Site operatives are well informed about the health and safety policies in their organizations.	2.13	1.33008	-.495	26th
Older and more experienced operatives are more likely to be injured on site than younger and less experienced ones.	2.12	1.41390	-.203	27th
Operatives are ready to report any hazards identified on site to management.	2.07	1.53480	2.273	28th

***Key: M**= Mean, **SD** =Standard Deviation **MR**=Means' Ranking **RS**=Retrieved Sample*

Considering the individual items, some of the most critical factors that affected safety performance on construction project sites are outlined below: In the first place it was revealed by majority of respondents that Health and safety could be improved through effective communication (M=6.65>CS (4.00), SD=7.07776, K=68.280,), followed by the opinion that health and safety could be influenced by the provision of adequate protective clothing for all employees on construction sites (M=6.19>CS (4.00), SD=1.04588, K=.015,). Moving forward, it was also realized that safety performance could sometimes be affected by clients' pressure on contractors to achieve project

timelines (M=6.17>CS (4.00), SD=.92935, K=-.527,), this was followed by the views expressed by others that, carefulness on the part of site operatives was one of the factors that could affect safety performance on construction projects site in the Northern region. (M=6.15>CS (4.00), SD=.92452, K=-.216,).

Again, a cross-section of respondents said that carelessness of individuals on construction site was one of the leading factors that could affect safety performance on construction sites. (M=6.11>CS (4.00), SD=1.21070, K=.957,) and followed by the assertion by respondents that regular and periodic training for site operatives on health and safety could impact on safety performance greatly (M=6.11>CS (4.00), SD=1.14271, K=-.413,). Apart from the above, respondents also indicated that the creation of individual awareness on safety issues could have greater impact on safety performance on most construction project sites. (M=6.06>CS (4.00), SD=1.12351, K=-1.021, n=76).

Additionally, most respondents were of the view that health and safety could be improved through employee motivation and awards (M=5.93>CS (4.00), SD=1.03712, K=-.802,), In another development, a cross-section of respondents indicated that organizational commitment towards health and safety contributes to effective safety performance on construction sites. (M=5.92>CS (4.00), SD=1.11670, K=-1.109,), while others believed that well planned and organized sites help minimize accidents on site thereby will greatly affect safety performance (M=5.85>CS (4.00), SD=.98933, K=-.920,).

Also, it was indicated by respondents that Safety performance can be achieved when contracts are awarded to only qualified contractors (M=4.73>CS (4.00), SD=1.98909, K=-1.521,) followed by the assertion that, clear safety rules and obligations on construction sites was one of the surest ways by which safety performance could be achieved. (M=4.21>CS (4.00), SD=2.42386, K=-1.559,). It was again noted by respondents that health and safety performance can be improved through the implementation of good safety plans on construction sites (M=4.04>CS (4.00), SD=1.41836, K=-.323,). Notwithstanding the above, some other factors revealed by respondents were that if all workers are educated on safety, it would help improve performance (M=3.63<CS (4.00), SD=1.48631, K=-.786,).

Table 4.10. Accidents and Incidence Rates on Construction Sites

How many accidents have occurred on your project site in the year 2019? ***(Please write it in the column "Figure" or tick in the cells below to represent "Do not know")***

Severity of injury	**Figure**	**Do not know**
Minor injuries requiring less than one day off work	45	[ ]
Injuries requiring one to three day off work	20	[ ]
Four or more days off work including strains, sprains, lacerations etc. resulting in four or more days off work	12	[ ]
Fatal injuries	25	[ ]
Near misses	115	[ ]

Table 4.10. shows the number of accidents recorded by some of construction firms on their sites within the study area from 2019 to 2020. The results revealed that a total of forty- five (45) and twenty (20) minor injuries requiring less than one day off work to 3 days respectively were recorded. Again, the results indicated that a total of twenty – five (25) fatal accidents and one hundred fifteen (115) near misses were recorded during the period under review.

4.7 Influence of Attitudes of Operatives on Health and Safety Performance

This research objective was intended to find out the influence of attitudes of site operatives on the dependent variable (health and safety performance of construction projects). Attitudes of site operatives as an independent variable was measured using 21 items on the questionnaire whiles health and safety performance was measured using 28 items. To answer this research question, the researcher used simple standard linear regression since the independent variable has only one level. This statistics was deemed necessary because, it shows the magnitude of influence and correlation between the predictor variable and the criterion variables. Simple linear regression shows the contribution of the predictor variable on the criterion variable. Prior to the linear regression analysis, assumptions underpinning the linear regression were checked to make sure that none is violated. Table 10 and 11 shows the results obtained from the analysis.

Table 4.11: Influence of Attitudes of Operatives on Health and Safety Performance

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.056	.003	-.041	2.04763	.003	.071	9	203	0.00000982

a. Predictors: (Constant), attitude of operatives

Table 11 shows the analysis of the contribution of the independent variable (attitude of site operatives) on the dependent variable (Health and safety performance of construction project). The results indicate that there is a weak positive relationship between attitude of operatives and Health and safety performance, R= 0.056. This implies that attitude of operatives and the Health and safety performance moves in the same direction that is to say, when attitude of site operatives increases the health and

safety performance too increases. The result that R^2= 0.003 indicates that 0.3% of the variance in health and safety is explained by the attitude of site operatives.

Table 4.12: ANOVA of attitude of site operatives and health and safety performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	2.697	9	.300	.071	0.062
	Residual	851.134	203	4.193		
	Total	853.831	212			

a. Dependent Variable: Health and safety performance
b. Predictors: (Constant), Attitude of site operatives

Table 12 presents the predictive strength of attitude of site operatives on health and safety performance of construction project. The results obtained from the analysis revealed that the independent variable (attitude of site operatives) has no significant influence on the dependable variable (Health and safety performance of construction project) since F (9,203) =.071, P = 0.062. The alternate hypothesis is rejected since the p-value (0.062) is greater than the 0.05 alpha level of significance.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

This chapter of the dissertation presents the detail and overall outcome of the results recorded as shown in chapter 4.4 above. It seeks to outline the general impression and views expressed by respondents during the study through the instrument used (questionnaire). In view of the above, the discussions are based on the main objectives of the study which includes the factors that influence site operatives' attitudes on construction sites, factors that affect safety performance on construction projects sites in the Northern Region and finally the influence of site operative's attitudes on Health and safety performance on construction sites in the Northern Region of Ghana.

5.2 Health and Safety Attitudes of Operatives on Construction Projects Sites

From, table 4.8, the first most significant attitude revealed by majority of site operatives was that operatives made conscious efforts trying to spot health hazards on site that could lead to illness. This is an indication that personal involvement or an individuals' willingness to participate in the identification of hazards on a construction site is one of the surest ways of minimizing accidents on site. As indicated by (Cheyenne et al.,2002) who stated that active personal involvement of a worker in safety planning, communication, workplace hazards and physical environment are means by which most construction site accidents could be minimized. Management therefore have the obligation to develop and implement behavioral safety management systems which could either have a positive or negative impact on operatives' attitudes on a construction site (Lingard & Rowlinson, 2005).

Secondly, respondents also indicated that they do not like going to work on weekends and Holidays, even though most construction firms had extended their working hours to week-ends as well as holidays in order to meet project time lines. Instead, a good number of operatives preferred to have enough rest and to spend time with their families during these days. It is significant that lack of rest as expressed by majority of these operatives could affect sleep which ultimately lead to the occurrence of accidents and injuries on site.

As a results of this, some operatives resort to the intake of alcohol and drugs which further promotes the occurrences of accidents. These findings confirm other studies such as (Gander et al., 1996) who observed that fatigue leads to higher worker risk, ignoring them can lead to decrements in performance and capability as well as the potential for incidents and accidents that can result in tremendous societal and individual cost.

Apart from the above, respondents also conceded that they hate being commanded or instructed to do any work when hungry or asked to work during break times. This factor being noted by these operatives goes to affirm the assertion by (Stojanovic et al., 2012) that the consequences of fatigue resulting from hunger and excessive long working hours are key contributors to work place accidents. The effects are negative, and this could affect the family, partner, parenthood and the society. Also, the International Labor Organization (ILO , 2020) cautions that all construction managers must not task any employee beyond his or her physical ability in terms of delegated duties.

Moving forward, respondents again acknowledged that frequent training on site had impacted greatly on their attitudes on health and safety positively. As a results, it is recommended that training must be specific and focused on improved hazard identification. This goes to support the works of (Durham et al., 2002), who stated that technical training for workers on sites has the ability to increase the level of experience of a worker towards the awareness in the identification as well as management of accidents on site. To further stress on the significance of the level of training and experience and their corresponding impact on site operatives' attitudes, Teo et al. (2005) observed that technical and safety training have the capacity to minimize the lack of safety awareness inherit on the construction site.

In addition, site operatives also believed that sometimes frequent accidents occur when worker management relationship is bad. Poor management relationship between an employer and employee can result into conflicts which ultimately affects the smooth implementation of safety measures. To curb this, construction managers must create good cordial relations by respecting views of their employees on issues relating to health and safety. Similarly, Ismail et al., (2015) indicated in their study that organizational support can be greatly achieved when there is quality communication of safety issues and good human relations amongst employees and top management thereby improving the quality of health safety relationship within an organization.

However, one factor indicated by operatives which affect their attitudes towards health and safety was they were unwilling to work with other group members. Notwithstanding this, Lew & lenz (2010) indicated that, site operative's good cordial relationship with co-workers helps to improve safety performance on site. They further

stressed that, employee's relationship with co -workers helps report risk hazards and problems that can be the cause of any accident on a construction site. Interestingly, others were of the view that construction work was difficult and dangerous, hence one must always be prepared to face the challenges that existed on construction sites. In relation to this Sawacha et al., (1999), posited that a well-organized work environment would ensure high security for the workers and which finally promotes good health and safety performance.

Apart from the above factors, the role of safety officers was also revealed as one of the influences of operative's attitudes on health and safety. Construction project managers must play a leading role in issues relating to health and safety so as to protect workers against accidents and injuries on site. It is therefore paramount that safety officers actively lead the organization and employees towards achieving this goal. In support of this, (Hsu et al., 2007), added that the extent of supervision exhibited by supervisors towards safety has a corresponding effect on employee's attitudes towards the achievement of good health and safety on site. This is also in line with (Schein, 2004) who also advocated that effective supervision by safety officers has direct impact on the level of understanding of site operative's attitudes. That is to say, a positive attitude on the part of the supervisor has other positive results, namely, that his personnel are much more convinced that working safely does indeed help to reduce the number of accidents.

5.3 Critical Determinants of Health and Safety Performance on Construction Projects Sites

The purpose of this objective was to uncover some of the major factors that affect or influence Health and safety performance on construction projects sites in the Northern region of Ghana. In the first place, majority of site mangers indicated that safety performance could be improved through effective communication between both management and employees. This revelation is supported by Ismail et al., (2007) who posited that when leaders convey vision and values through interaction and communication, it will lead to improved communication channel resulting in decreased in micro accidents and increased in using personal protective equipment (PPE).

In addition, the provision and use of personal protective clothing could minimise accidents and injuries thereby improve health and safety performance. This supports the work of Fuller (2004), who maintained that employer should be responsible for ensuring that first aid, including the provision of trained personnel, is available. According to him, the manner in which first aid facilities and personnel are provided should be prescribed by national laws and regulations and drawn up after consulting competent authorities concerned. Similarly, Franklin (2005) observed that arrangements should be made for ensuring the removal of the injured or sick for medical attention when they suffer an accident or sudden illness.

Thirdly, some respondents expressed the concern that at times clients pressure on contractors to meet project time lines could affect health and safety performance greatly. It is appropriate that construction clients are involved in the design stages of the projects with regards to health and safety measures. As this will ensure that safety

measures are incorporated in the early stages of the design which goes to prevent the occurrences of accidents and injuries on sites. (Liu, 2017). It was also revealed by respondents that if individual were careful, this could lead to the reduction of accidents and injuries on site thereby improving safety performance on construction sites. The above revelation supports the work of (Micheal et la. 2007), indicated that some of the most prominent factors of construction accidents include; the workers' negligence, failure of workers to obey work procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment's and poor worker's attitude to health and safety.

Apart from this, it was indicated by most respondents that regular and periodic training for site operatives on health and safety will have tremendous impact on site operative's attitudes towards health and safety performance. To further stress on the significance of the level of training and experience and their corresponding impact on site operatives' attitudes, Teo et al. (2005) observed that technical and safety training have the capacity to minimize construction accidents and injuries.

In another development, some respondents opined that, the creation of individual awareness on health and safety issues could help reduce accidents on site which will go a long way to affect safety performance. This view expressed by these operatives was further complemented by (Kart am et al., 2000), who found out in their research work that, the acceptance and readiness or willingness of an individual to participate in safety issues on a construction site has direct impact on the implementation of health and safety. In addition to the above, Cheyne, Oliver, Tomas and Cox (2002), also posited

that an employee's personal involvement in safety planning, communication, workplace hazards and physical work environment are factors that promotes safety on a construction site.

In addition, some respondents indicated that health and safety could have improved greatly through employee motivation and awards. In order to promote good working relations between management and employees, management should put in place incentives and motivational packages to employees with good injury and accident free records in relations to good safety behavior. Even though these packages could be indifferent forms, they should be geared towards encouraging workers to continuously maintain good safety habits during their working life (Michael *et al* 2007).

Again, some respondents expressed the view that organizational commitment will contribute effectively to health and safety performance. As advocated (Bakshi et al., 2009), organizational commitment is one of the main fundamental determining factors that explain how employees behave and relate with safety issues within the work environment and continues to promote good health and safety on site.

Furthermore, a good number of respondents believed that well planned and organized sites could help minimize accidents on site which finally will promote health and safety performance. In relation to this, (Sawacha et al., 2000) pointed out that a well-planned and organised site will bring high security to workers. Also, the use of mechanical equipment is also a source of accidents. Management therefore should warn or prohibit entry into such risk zones.

Also, it was indicated that clear safety rules and obligations can help improve safety performance on site and health and safety performance can be improved good safety plans. Best practice with regard to safety also involves contracts that clearly outline the contractual responsibilities of both contractors and subcontractors. In the award of Contracts, specifications must establish specific guidelines in order to control expected hazards by naming the person responsible for overseeing the contractor's performance (Tanko et al., 2017).

It was noted that top managers should play their roles well when it comes to health and safety issues on construction sites. According to both site managers and operatives, management must be seen playing leading roles by wearing safety clothing and following safety rules and regulations on construction sites first. This step of leadership by example will pave the way for all workers on site to emulate. This idea of the role of top level management laying the foundation stone for effective implementation of health and safety in a construction site, has been supported (Yule, Flin & Murdy, 2007) when they clearly stated that top managers play an important role in ensuring safety in the workplace and employees conform to safety rules and procedures when they perceived that the action of their supervisor was fair.

5.4 Influence of Site Operatives' attitudes on Health and Safety Performance

There were several important factors confirmed by site managers to have influences on operatives' attitudes on health and safety performances. Some of these included, demographics of an individual especially the age and experience, level of training and supervision. It was revealed that from Table 4.3 that most of these site operatives were the youth with ages ranging between 21-30. This age group are mostly inexperienced

and therefore lack the knowledge in safety protocols. This age group usually are impatient and exhibit several negative attitudes. As indicated by Siu et al., (2003), that older workers exhibit more positive attitudes towards health and safety than younger and less experienced workers. Another most significant factors influencing operative's attitudes on health and safety performance was the number of years of working experience an operative worked in a company or firm. As indicated on Table 4.4, majority of site operatives had less than 5 years'. And as stated by Schwandt (2001), the number of years of working experience a worker has on a site has a greater impact or influence on his or her knowledge on health and safety issues on a particular project site.

In addition, from table 4.12, the study indicated that the attitude of site operatives has no significant influence on health and safety performance. This implies that the variance in health and safety that is explained by the attitude of site operatives is negligible. A number of studies have shown that workers' lack of safety knowledge is a critical reason for the high accident rate in the construction industry (Chua & Goh 2004; Hadikusumo & Rowlinson, 2004). In this sense, the attitude of workers cannot be considered as the only variables influencing the safety performance on construction projects in the Northern Region of Ghana. Therefore, improving workers' safety knowledge would be a significant way to enhance construction safety. The right training reduces ignorance and increases efficiencies in processes which in turn lower accidents.

However, the study is at variance with the findings by Kundu, Yadav and Yadav (2015) on the effects of Safety Climate and Safety Attitude on Safety Performance: A Study of an Indian Organization. The study findings revealed that three safety attitude variables including improving safety at working area, organization care for workers' health and workers follow the safe working procedure had also positive influence upon the safety performance. It could then be established that the one sure way to ensure safety on construction sites is to inculcate a safety work culture among the workers. Therefore, it is important for managers to ensure that workers who do not care or have a fatalistic attitude to construction safety are encouraged by any means possible to become safety conscious.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This section of the research presents the summary of the analysis of the results and conclusions made based on the objectives of the study. The section also includes some recommendations which are geared towards offering solutions to some of the most important issues that need to be addressed.

6.2 Summary of Findings of the Study

The sections that follow present summary of the findings of the study in relation to the each of the stated specific objectives.

6.2.1 Health and Safety Attitudes of Construction Site Operatives on Project Sites

Some of the major attitudes exhibited by site operatives as revealed from the studies are outlined below.

- In the first place, it was found out that majority of site operatives were aware of some of the dangers involved construction work. As such, most of them made conscious efforts in identifying hazards that could lead to accidents or illness on construction projects sites.
- Secondly, it was also revealed that majority of site operatives were not ready and willing to work during weekends and holidays because weekends and

holidays were for rest and relaxation. Despite the fact that most firms extended work to weekends and holidays in order to meet time times.

- In addition, a good number of Sites operatives expressed the notion that, a hungry man is an angry man, as such they hate being commanded to do any sort of work during break time or after closing.
- Again, majority of operatives indicated that training organized by management on safety on site, has impacted greatly on their attitudes towards the improvement of safety performance on construction sites. In addition, it was revealed by a cross section of operatives that their safety attitudes were greatly influenced by their relationship with management.
- Apart from the above, the study also revealed that site operatives alluded to the difficult nature of construction activities, therefore were always in the position to face the challenges that existed on construction sites.
- Another outcome from the study indicated by operatives was that, the role of safety officers has greater impact on people's attitudes as safety officers are part of the front line staff in terms of safety management on construction projects sites.
- Lastly, respondents were of the view that effective and efficient coordination between main and sub-contractors with regards to safety management has the ability to shape people's attitudes towards the improvement of safety on construction sites.

6.2.2 Critical Determinants of Health and Safety Performance of Construction Sites

On the part of the factors that affect safety performance, majority of site managers indicated the following as the critical determining factors in relation to health and safety performance.

- First and fore-most, respondents indicated that effective communication of safety policies across the length and breadth of the organization was one of the surest ways of minimizing accidents which ultimately could yield positive results in good safety performance.
- Apart from the above, it also came out that management ability to provide adequate and up to date protective clothing also reduces the rate of accidents and injuries on construction project sites thereby leading to the improvement in safety.
- Moving forward, most respondents were also of the view that as a results of pressure that clients put on contractors to meet project time lines, safety performance could have affected negatively.
- Another most important factor revealed by respondents which could affect safety performance was awareness creation on site. This will go a long way to senticise individuals on taking their own safety into their hands by being careful and vigilant on all construction sites.
- In another development, it was also revealed that motivating workers in terms of bonuses and increased in wages and salaries could help greatly in the course of promoting effective safety performance on construction sites.
- Organizational commitment was revealed to be one key factors that could yield fruits in terms of improving safety performance. By this most site mangers

called for effective collaboration between management and staff when it comes to safety management.

- Also, a cross-section of respondents said that well planned and organized construction site was one of the factors that could be helpful in improving safety performance.
- Lastly, it was also revealed that good worker-management relationship was one of the fundamental factors that could be helpful in promoting good safety performance on construction sites.

6.2.3 Factors influencing Operatives Attitudes on Construction Projects sites

With regards to the above objective, the study revealed the following findings:

- In first place, the study revealed that there was a positive correlation between attitudes of site operatives and health safety performance. Meaning that both the independent variable (attitudes of site operatives) and the dependent variable (health and safety performance moved in the same direction).
- Secondly, it again confirmed the demographics of respondents that the number of years of working experience of an operative determines his or her safety attitude towards the effective improvement towards Health and safety performance on a construction projects sites.
- Lastly, the study revealed that the independent variable (attitudes of site operatives) has no significant contribution on the dependent variable (Health and safety performance).

6.3 Conclusion

6.3.1 Health and Safety Attitudes of Site Operatives on Construction Sites

The following were the conclusions made on the study.

To begin with, the conscious efforts made by operatives in trying to spot hazards that could lead to illnesses indicated most of operatives had developed positive attitudes from training received on safety issues which ultimately will lead to the improvement of health and safety performance. Management therefore have the obligation to develop and implement behavioral safety management systems which could either have a positive or negative impact on operatives' attitudes on a construction site. The reluctance of site operatives to work during week-ends and holidays, has called for the need for management of construction firms to pay bonuses and extra-duty allowances to operatives who do over time. Again, the prevention of site operatives from resting on weekends and during holidays will result in fatigue, decrements in performance and capability as well as the potential for incidents and accidents that can lead to tremendous societal and individual cost. Site operative's willingness to participate in safety training means safety training has impacted positively on operative's safety attitudes therefore, technical and safety training has the capacity to minimize the lack of safety awareness inherit in the construction workforce.

In addition, the assertion by site operatives that their safety attitudes were influenced by management safety attitudes, means management must be the pacesetters when it comes to safety attitudes. Site operatives attesting to the fact that construction work was difficult and dangerous, is an indication that accidents and injuries are inherent in construction work therefore, all construction workers must be prepared to protect themselves against injuries and accidents.

6.3.2 Critical Determinants of Health and Safety Performance of Construction Sites

The following are the conclusions on factors that affect safety performance on construction sites.

Firstly, the revelation from site operatives that effective communication is one of the means of reducing accidents and injuries on construction sites, indicates that there should be free flow of information across the length and breadth of the organization to all concerning the need for all to participate in the improvement of health and safety performance.

Secondly, the notion from respondents that provision of protective clothing which will lead to the reduction of injuries and accidents, also leads to reinforcement and compliance of safety rules and regulations on construction sites. Apart from the above, the assertion by respondents that clients pressure on contractors to meet project time lines affects safety performance, suggest that clients must form part of the processes in the design stages of construction so that their views on the maintenance of safety are factored and catered for.

In addition, the indication by respondents that creating the awareness of all workers on the construction site concerning the importance of keeping good safety practices, will further enlighten workers to take their own safety into their hands by being careful and vigilant at all times when working in order to reduce the risk of injuries and accidents on sites. Going forward, the point raised by mangers that employee motivation on a construction site could help greatly in promoting effective safety performance on

construction sites, will go a long way to promote good working relations between management and employees to continuously maintain good safety habits during their working life.

Apart from that, organizational commitment was revealed to be one key factors that could yield fruits in terms of improving safety performance on a construction project site. This will further explain how employees behave and relate with safety issues within the work environment and continues to promote good health and safety on site.

Lastly, the idea that frequent and periodic training for workers could also improve safety performance on construction projects sites, goes to further stress on the significance level of training and experience and their corresponding impact on site operatives' attitudes which have the capacity to minimize construction accidents and injuries.

6.3.3 Factors influencing Operatives Attitudes on Construction Projects sites

The following were some of the conclusions made on the influence of operative's attitudes on health and safety performance.

In the first place, the positive correlation between the operative's attitudes and health and safety performance, means that when there is an increased in attitudes of a worker, it will definitely lead to an increase in health and safety performance.

Secondly, the idea that number of years of working experience of an operative determines his or her safety attitude indicates that more experienced workers exhibit more safety attitudes than less experienced ones.

In conclusion, the idea that the independent variable does not have a significant contribution on the dependent variable, means other factors such as the age of respondents could have influence on health and safety performance.

6.4 Recommendations

The following form the recommendations from the study.

1. Safety Attitudes of Site Operatives on Construction project sites

- It is recommended that Behavioral-based health and safety management systems such as payment of bonuses, award schemes and other negative re-enforcement tools like threats and pay cuts should be adopted by site managers so as to strengthen positive health and safety behaviors of operatives and discourage behaviors that could result in high health and safety risks. In this way, operatives would exhibit positive attitudes towards their own health and safety and that of co-workers on construction sites.
- Construction managers or firms should institute packages including over time allowance which should be paid to all employees who do over time.
- Safety officers or site managers should organize regular and periodic training for all site operatives before the commencement of work on any construction site. This will further reinforce their safety attitudes on health and safety management.
- Management of construction companies should ensure that there is co-operation between management and site operatives on good time management in order to allow times for rest and over time.

2. Critical Determinants of Safety performance on Construction Sites

The following are the recommendations on the factors affecting health and safety performance.

- Construction site practitioners should put in place clear signs and symbols at all work places to complement the effective verbal communication used in educating operatives on the need to following safety guidelines on construction projects sites.
- Safety officers and for that matter construction firms must provide safety clothing and equipment for all workers on site. This will lead to the reinforcement of safety rules and regulations on construction project sites.
- Construction industry players or practitioners should include in all contract documents the contractual responsibilities of both clients and contractors. This will go a long way to reduce the pressure clients do put on contractors with regards to project completion time lines.
- Top management should set up award schemes for site operatives who initiates or make conscious efforts in the identification of hazards and reporting such to management for redress. Also, the best construction worker who has been able to protect him/herself from injuries or accidents for a particular period of time should be awarded. Again, management should pay overtime allowance to site operatives do over time.
- The Association of Building and Civil Engineering Association as well as Association of Road contractors in the Northern Region should organize workshops, symposia and talk shows to educate construction workers on the need to adopt good health and safety practices on their sites during construction activities.

6.5 Recommendations for Further Research

Given the limited scope of the study, it is recommended that the study should be replicated in the other regions of Ghana to enable generalization or otherwise the findings of the study. Also, further research needs to be conducted on behavioral modification strategies that could enhance health and safety performance of construction sites.

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APPENDICES

APPENDIX A (QUESTIONNAIRE)

QUESTIONNAIRE SITE OPERATIVES

UNIVERSITY OF EDUCATION, WINNEBA

KUMASI-CAMPUS

DEPARTMENT OF CONSTRUCTION AND WOOD TECHNOLOGY EDUCATION

This questionnaire is designed with the purpose of finding out the impact of site operatives' attitudes on health and safety performance of construction project sites in Northern Region of Ghana. This is with reference to respondent's educational background, gender, age, as well as safety performance factors that influence site operatives attitudes on construction project sites in the Northern Region of Ghana.

The researcher is a final year M-Phil Construction management student of the above institution and would be very pleased if you could express your views by responding to the following statements as they may be applicable to you in order to enable the researcher contribute immensely to the body of knowledge. The questionnaire is structured based on three objectives of the study, hence Section A is the Demographic information of respondents whilst Section B, is designed to solicit site operatives attitudes on health and safety, factors promoting health and safety, and the factors that affect safety performance on construction projects.

SECTION A: PERSONAL INFORMATION

1. What is your age (*Please tick (√))?*

15-20 years	□	41- 50 years	□
21-30 years	□	Above 50 years	□
31– 40 years	□		□

2. Please indicate your gender. *(Please tick (√))*

Male	□
Female	□

3. How long have been working with the current company? *(Please tick (√))*

Under 5 years	□	5 – 10 years	□
Above 10 but less than 15 years	□	15 – 20 years	□
Above 20 but less than 30 years	□	Above 30 years	□

4. What is your highest academic Qualification? (*Please tick (√))*

No formal qualification	
CTC 1	
CTC 11	
City and Guilds Intermediate	
Advanced Craft Certificate	
NVTI	
Other. Please state	

5. What is your Trade? *Please tick [√] the appropriate option.*

(a) Mason [ ] (b) Carpenter [ ] (c) Plumber [ ] (d) Welder [ ] (e) Tiler [ ]

(f) Other [ ] Please State……

SECTION B: Health and Safety Attitudes of site operatives.

6. To what extent do you agree to the following statements on attitudes you may exhibit on construction site? Please tick (√) only one box in this section to indicate your opinions about the statements made below. Also, note that the interpretations of 1,2,3,4, 5, 6 and 7 on the scale are indicated below:
1=strongly disagree, 2=disagree, 3=partially disagree, 4 not sure, 5=partially agree, 6=agree, 7=strongly agree.

Attitudes	**Rating**						
	1	**2**	**3**	**4**	**5**	6	7
I try to spot safety hazards on the site that could lead to illness or							
I occasionally take in alcohol to aid my work when am tired.							
I usually report accidents cases to my superior as soon as it occurs.							
I am much concerned with my own safety than others.							
I believe management safety attitudes determines worker safety behavior							
I do not enjoy working in a group with my work mates							
I only follow safety rules when my superiors are around							
If my supervisor is careful about safety that equality makes me careful							
I am not always happy when am given extra work to do							
I hate being commanded or instructed to do any work when am hungry or							
Old and More experienced workers do not usually get injured compared with younger and inexperienced ones.							
I am not always comfortable working at a height.							
I think frequent training on site has affected workers attitudes positively							
Workplace pressure and tiredness lead to accident on site.							
I think frequent accident occurs when worker management relationship is							
I follow strictly all the safety rules that my supervisor ask me to follow							
I am worried I will get in to trouble if I don't follow all the safety rules							
Management safety attitude determines worker safety behavior							
Proper coordination between main and subcontractors can influence safety on site.							
I think construction work is difficult one must be prepared for the difficulties involved							
I wear my safety clothing because am compelled to do so							
Other please state							
Other please state							

APPENDIX B

QUESTIONNAIRE FOR SITE MANAGERS

SECTION A: PERSONAL PARTICULARS

1. What is your age category? *(Please tick (√)).*

Under 20 years	□	21 – 30 years	□
31 – 40 years	□	41 – 50 years	□
51 – 60 years	□	Above 60 years	□

2. Please indicate your gender. *(Please tick (√))*

Male	□
Female	□

3. How long have been working with your current company? *(Please tick (√))*

Under 5 years	□	5 – 10 years	□
Above 10 but less than 15 years	□	15 – 20 years	□
Above 20 but less than 30 years	□	Above 30 years	□

4. What is your highest academic qualification? (*Please tick (√))*

Masters degree	□
Bachelor degree	□
Diploma (HND, OTD)	□
Construction Technician Course Part I	□
Construction Technician Course Part II	
Construction Technician Course Part III	
Other. Please specify	

6. What is the classification of your company? (*Please tick (√))* Correct this.

K1D1	□		□
K2d2	□		□
K3D3	□		□
K4D4		Other please specify	

7. To what extent do you agree to the following statements on factors that determine health and safety performance of construction sites? Please tick *(√)* only one box in this section to indicate your opinions about the statements made below. Also, note that the interpretations of 1,2,3,4, 5, 6 and 7 on the scale are indicated below:

1=strongly disagree, 2=disagree, 3=partially disagree, 4 not sure, 5=partially agree, 6=agree, 7=strongly agree.

Factor that influence health and safety performance	**Rating**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Health and safety can be improved through effective							
Provision of adequate protective clothing will help minimize accidents on site							
Clients pressure to achieve program time lines affects safety							
Most accidents could be prevented if operatives were more careful..							
Individual carelessness on site leads to accidents							
Regular and periodic training for site operatives on health and safety has impacted positively on their attitudes towards safety							
Creating individual awareness will help reduce accidents on site..							
Operatives do not like doing extra-work after the day's work.							
Accidents could prevented if operatives cooperate with management							
Site safety is more important than productivity.							
Most site operatives are of the view that their safety attitudes are influenced by management safety behaviors.							
Health and safety can be improved by employee motivation and awards							
Management commitment improves attitudes to health and safety on site.							
Most operatives believe that well planned and organized sites help minimize accidents on site,							
Most operatives on site are not willing to report							
Most site operatives sustain injuries as a results of work pressure and tiredness							
Most site operatives sustain injuries as a results of work pressure							
Most operatives do not like coming work during week-ends.							
Some operatives sometimes take drugs/alcohol while working to aid their work.							
Contracts awarded to qualified contractors can enhance health and							
Clear safety rules and obligations can help improve safety							
Health and safety performance can be improved good safety plans.							
If all workers are educated on safety, this will help improve							
Most site operatives are willing to report accident							
Site operatives are more concerned with their own safety than their fellow workers							
All Site operatives are well informed about the health and safety policies in their organizations.							
Older and more experienced operatives are more likely to be							
Operatives are ready to report any hazards identified on site to management.							
Other, please state							

How many accidents have occurred on your project sites in the year 2020? *(Please write it in the column "Figure" or tick in the cells below to represent "Do not know")*

Severity of injury	**Figure**	**Do not know**
Minor injuries requiring less than one day off work		[ ]
Injuries requiring one to three day off work		[ ]
Four or more days off work including strains, sprains, lacerations etc. resulting in four or more days off work		[ ]
Fatal injuries		[ ]
Near misses		[ ]