INVESTIGATION OF HEALTH AND SAFETY PRACTICES AMONG WORKERS ON CONSTRUCTION SITES IN ABUJA

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ABSTRACT

Construction project sites are considered as one of the most hazardous workplaces to work, due to the increasingly cases of injuries and fatalities across construction sites. This research focused on appraisal of health and safety practices in construction sites by carrying out an investigation among workers on construction sites in Abuja. The data for the study were obtained using a structured questionnaire administered on 15 construction sites in Abuja, Nigeria. A total of Seventy (70) copies of questionnaire were distributed to respondents out of which fifty one (51) were returned representing 73.9% response rate. Data received were analyzed using relative importance index (RII) and the ranking method. The study revealed that identification of hazard ranked 1st position with RII of 0.93, medical provision ranked 2nd with RII of 0.89, lack of Personal protective equipment (PPE) was ranked 3rd with RII of 0.88, fire protection ranked with RII of 0.86 was ranked 4th, risk control ranked 5th with RII of 0.85. The study concludes that employees lack sufficient awareness about construction site safety and health measures, hence the need to focus on training programs in safety and health practices. The study therefore recommends that inherent hazards/risks should be identified on time, implementation of safety practices such as awareness of workers and labourers, commitment of top management to adhering to health and safety practices such as provision of personal protective equipment, ensuring that all workers are properly kitted and the allocation of resources should be accorded top priority.

TABLE OF CONTENT

CHAPTER FOUR

CHAPTER FIVE

LIST OF TABLES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

The construction sector is a major contributor to the development of any giving nation. It generates ten percent of the global gross domestic product (GDP) (Bawane, 2017). The construction industry is significant both economically and socially in many developing countries. (Yoon *et al*., 2013, Gurcanli *et al.*, 2015).

One of the most dangerous places to work is on a construction site, according to World Health Organisation (2010) and Fewings (2010), because of the rising number of injuries and fatalities around the world. Construction-related injuries and fatalities are 7-10 times more likely than in other industries, according to the International Labour Organisation (2012). Accidents and fatalities at the construction sites results in numerous injury and death of worker yearly. According to the International Labour Organisation (ILO) there are 270 million occupational accidents resulting in two million deaths annually (Tadesse & Israel, 2016). International Labour Organisation (2012) acknowledged that construction industry contributes 25 – 40% of the world's occupational fatalities. In the United Kingdom, the death rate of the construction industries was 1.37 fatalities per 100,000 workers, which was more than thrice higher than the average of all other industries (Health and Safety Executive, 2017). The Bureau of Labour Statistics (2016) reported that the fatality rate of the construction industry was 10.1 fatalities per 100,000 workers, which was higher than that of other industries, such as forestry 0.91, transportation 0.75 and fishing 0.24 fatalities per 100,000 workers. The annual work-related death rate of Nigeria is at about 24 fatalities per 100,000 employees According to Hamalainen *et al*. (2009).

The construction industry has a poor safety record internationally, according to the Health and Safety Executive (2017), and it is still one of the most dangerous industries to work in. The construction business, on the other hand, has a bad image for high accident rates and dangerous on-site activity (Tonmoy *et al.,* 2018). The situation in developing countries like Nigeria is worse than what prevails in developed countries; this is due to lack of statutory regulations on health and safety and lack of accurate records of accidents and injuries on site by contractors (Idoro, 2011; Agwu & Olele, 2013). Construction-related incident statistics clearly show that there is an immediate need to reduce the prevalence of fatal and non-fatal injuries in the industry (Berg, 2010; Seo *et al.,* 2015) necessitating continuous measurement of safety activities to evaluate safety performance components on construction sites. Because of their poor safety records, certain countries, like as the United States' OSHA, have invested much in safety standards, aiming for zero-injury policies (Zwetsloot *et al.,* 2017).

Baba and Diugwu (2013) posit establishing a safety and health policy is one of the most effective methods to protect your most precious asset on the job site: your worker. Even if it's only for a short period, losing personnel to injury or illness can cause substantial inconvenience and cost to you, as well as the workers and their families. It can also harm employee morale, productivity, turnover, and reputation in the workplace (Occupational Health and Safety Administration, 2016). Most existing studies such as Mosly (2015); Alarcón *et al.* (2016); Okoye (2016); Gunduz *et al.* (2016); Gunduz *et al.* (2018); Misiurek and Misiurek (2017); Dong *et al.* (2018); has done lots, despite the extensive study and improvements that have been achieved over the years, construction accident rates remain high. This therefore necessitates the need to look into the health and safety practices to

persons and workers on construction site in order to improve safety performance on construction sites.

1.2 Statement of the Research Problem

The construction industry is one of the boosters of any developing country both economically and socially. In order to sustain its significance, the working environment should be hazard free. Preferably, hazard/accident should be managed, controlled and reduced to the minimum.

Construction project sites are considered as one of the most hazardous workplaces to work, due to the increasingly cases of injuries and fatalities across construction sites (Muiruri & Mulinge, 2014; Sanchez *et al.,* 2017). As construction workers perform a great diversity of activities, each activity with a specific associated risk. A worker is directly exposed to risks associated with task undertaking and passively exposed to risks produced by co workers (Pinto *et al.,* 2011). The situation in developing countries like Nigeria is worse than what prevails in developed countries; this is due to lack of statutory regulations on health and safety and lack of accurate records of accidents and injuries on site by contractors (Idoro, 2011).

Establishing a safety and health policy is one of the most effective methods to protect your most precious asset on the job site: your worker (Baba & Diugwu, 2013). Despite the extensive study and improvements that have been achieved over the years, construction accident rates remain high (Mosly, 2015).

The purpose of construction health and safety rules is to protect workers' health, safety, and well-being (Meekel & Hyrmak, 2012). Because of the large incidence of work-related fatal

and non-fatal injuries, the construction sector has been a focus for safety research and treatment. In the last decade, the Federal Capital Territory (Abuja) has seen an influx of building contractors and a growth in construction activity. With the increased volume of construction, it is critical to conduct safety research to inform contractors, clients, construction employees, and the general public about the hazards of ignoring safety precautions on construction sites and how to improve safety performance.

1.3 Research Questions

i. What are the causes of building construction accident?
ii. How can building construction accident be managed, controlled and prevented?
iii. What is the safety measures needed on building construction sites?

1.4 Aim and Objectives of the Research

This study look into the health and safety practices to persons and workers on construction site in order to improve safety performance on construction sites.

The objectives of this study are:

i. To examine the possible causes of accidents at the building construction sites and its effect.
ii. To assess the health and safety measures on building construction sites to curtail building construction site accidents.
iii. To suggest safety strategies needed on building construction sites.

1.5 Justification for the Research

According to Muiruri and Mulinge (2014) and Sanchez *et al.* (2017), construction project sites are considered as one of the most hazardous workplaces to work, due to the increasingly cases of injuries and fatalities across construction sites. The situation in developing countries like Nigeria is worse than what prevails in developed countries; this is due to lack of statutory regulations on health and safety and lack of accurate records of accidents and injuries on site by contractors (Idoro, 2011).

Because of the high number of accidents on building sites, health and safety has become a major concern. The research has a number of theoretical and practical implications.

This study look into the health and safety practices to persons and workers on construction site in order to improve safety performance on construction sites as it provide information on construction site health and safety measures in order to reduce, control, and avoid accidents. As a result, the study's results and recommendations will help raise awareness of health and safety in the construction industry, as well as ensure that workers are provided with appropriate protective clothing and equipment. It also provides a thorough grasp of health and safety measures, which may aid key players in developing policies to make construction sites safer.

1.6 Scope of the Study

This study gathers data from medium-sized building construction sites in Abuja. Only construction sites for buildings were covered. Site staff, including site agents, foreman, and workers, are the target respondents (Skilled, Semi-skilled and unskilled). This was based on evaluating the health and safety measures on building construction sites as well as reviewing the condition of building construction sites.

1.7 Assumptions

From the study carried out there are assumptions that;

i. Only building construction sites was considered.

ii. The number of site visited represents the entire building constructions sites.

iii. The location of the sites, nature of the sites, and the nature of construction techniques employed were all assumed to be constant across the sites sampled by the study.

CHAPTER TWO

2.0 REVIEW OF RELATED LITERATURE

2.1 Accidents

Accidents as defined by Health and Safety Executives (2017) unanticipated events that results in people being injured, plants, products, or the environment are affected, or a business opportunity is lost. Hale and Walker (2012) opined that the prevention of accident is essential in order to guarantee a healthy and safe construction site in order to avoid the effect of construction-related incidents which cost money.

Safety was defined by Ngowi (1996) as "the prevention of individual injury or property damage as a result of an accident," while Cox and Cox (1996) described it as "a state of freedom from an unacceptable risk of personal harm."In the context of a building site, a practical definition is when an individual can go about his or her everyday tasks without taking unnecessary risks. According to Hinze (2006), an accident is an unforeseen incident that does not always result in injury. Accident is also described by the Advance English Dictionary (AED) as "something that happens abruptly or by chance without a cause."

2.1.1 Causes of accidents

Ferret and Huges (2007) also said and linked hazardous circumstances to three key causes: dangerous worker activities, management reactions, and unsafe working settings. Some accident causes, according to Health and Safety Executive (2004), are the result of unsafe working circumstances. Table 2.1 lists these dangerous activities, as well as additional factors and management-related aspects. The causes described in Table 2.1 are likely to be quite expensive for a contractor (Lancaster *et al.*, 2003). Accidents have a negative impact

on output, raise insurance costs, and are more likely to result in legal action against the company, according to Health and Safety Executive (2006). Accidents also have health consequences, such as breathing issues, vision problems, hearing loss, and psychological stress. Accidents can also:

i. Delay project completion

ii. Decrease worker motivation

iii. Disrupt the building process

iv. Affect the construction industry's reputation, according to the report.

"Management failures" are a key cause of workplace accidents, according to Goetsch (2008). If management is serious about providing employees with a safe and healthy working, it must;

i. Show employees that safe and healthy work habits are anticipated by including them in job descriptions, assessing employee work practices, and leading by example.

ii. Include safe and healthy work practices as criterion in employees' periodic performance assessments;

iii. Provide education in how to work safely, including new employee orientation and ongoing updated training for experienced personnel;

iv. Employees that use safe and healthy work practices should be rewarded and recognized. The following were found by Goetsch (2008) to be the types of accidents on project sites:

i. **Method of work:** this type is made up of the techniques used to execute every activity and may include: unsafe loading practice, poor manual handling, and unprotected shoring;

ii. **Poor quality tools:** this is the case where tools to be used are of poor quality and they contribute to cases of accidents like: tinny rusty particles in the eye;

Table 2.1 Accidents on construction sites and their causes

Acts that are not safe	Conditions that are not safe	Causes Associated with Management
Failure to put on PPE	Guards are scarce or absent.	Insufficient planning
Inability to warn others about a potential risk	Guardrails on the platform are missing.	Unsuitable design
Putting equipment in perilous situations	Tools and equipment that aren't in good working order	Lack of education and awareness
The use of faulty tools	Poor fire warning systems	Lack of communication
Wrong usage of equipment	Contact with electricity	Poor supervision
In position with moving machinery	Noise	Ineffective management policies
Struck by motion vehicle	Fire hazards	Non compliances
Struck by flying object	Dangerous conditions	
Handling is done manually.	Lack of inadequate light	

(Source: Ferret and Hughes (2007) and Health and Safety Executive (2004)).

iii. **Unfortunate error:** this comes about as a result of behaviors, and includes carelessness, poor planning, human error, poor hold of tools, poor observation, and may also lead to slip or fall on wet grounds;

iv. **Set up of site:** organization of the site is very necessary and the placement of tools and equipment also contribute to accident if care is not taken;

v. **Error by plant operator:** this may arise by actions of unguarded machinery, wrong actions taken by the operator;

vi. **Plant failure:** This includes any malfunctioning part of the tool and can cause structural failure or component jam.

2.1.2 Cost of accident n the construction industry

According to Health and Safety Executive (2006), accidents generally affect the rate and productivity of work and also leads to a significant lost to the contractor. The detailed expenditure of accidents is described in different structure. Everett and Frank (1996), stated that there are three major types of expenditure or costs that are important to management or owners in areas where measurement of fatalities, accidents and injuries are involved, which are:

a. ***Direct cost:*** this includes cost of injuries and accidents that comes along with worker's compensation, property insurances;

b. ***Indirect cost:*** this also includes loss in productivity, time for investigations and report, training to replace personnel's, amount paid to injury workers for all the times not working, cleaning up and repairs, claims and other equipment damages;

c. ***Cost of safety programs:*** this also includes salary for medical personnel's, safety meetings on sites, inspections of tools and materials, orientation for workers, inspection on site, PPE. Waehrer *et al.* (2007) also advocated categorizing the costs of workplace injuries and illnesses into three broad categories, similar to those used in other fields:

a. ***Direct costs:*** this refers to victim's lost productivity, which includes wages and administrative costs;

b. ***Indirect costs*****:** this refers to the victim's lost productivity, which includes hospital bills, doctors, rehabilitation, home care, medical items, cost of burier, cost of insurance, police, fire, emergency transport, and property damage;

c. ***Quality of life:*** this also refers to the value assigned to the victims and family's hardships and sorrows as a result of an accident, illness or injury. Waehrer *et al*. (2007) further explained the three types of average cost standard:

a. ***Variable costs:*** these are costs that vary depending on the amount of sick days taken, including sick pay and salary supplements that the employer is compelled to pay;

b. ***Accidents with a fixed cost:*** these are accidents that do not rely on the number of days the wounded worker is away from work, and they include communication and administrative cost;

c. ***Disturbance cost:*** these are based on the accident, the injured person's role, and their characteristics, and they include time lost, production lost and fines if possible. The direct and indirect cost is, however, the most commonly employed in the building business. According to Jallon *et al.* (2011) there are different costs associated with construction accidents but hidden, these cost are sometimes difficult to quantify. The basic lists of indirect cost recommended by Jallon *et al*. (2011) are as follows:

i. Haltage in production immediately after accident

ii. Co-workers become affected

iii. Replacement and training cost of injured worker

iv. Personnel’s in charge for investigating and reporting of accident

v. Quality in product reduction due to accident

vi. Damage of plants and equipment

vii. Legal cost and

viii. Transportation of injured worker.

The failure in identifying and taking into consideration the above indirect cost will have a deep impact on an organisation.

2.1.3 Control of accident

Control is an important aspect of prevention whose main purpose is to minimize risk by means of continuous surveillance and monitoring. Odetoyinbo (1986) observed the following ways as measures of controlling and monitoring of accidents occurrence:

a. isolating hazardous operation and highlighting them to all employees likely to be exposed to the hazard.
b. Providing and enforcing the use of protective equipment.
c. Maintaining plants and equipment.
d. Training employee to avoid risks.
e. Good housekeeping to keep premises and machinery clean.
f. Ensuring by inspection tests and examination that preventive measures are adhered to and bad practices discouraged.

2.2 Health and Safety

The World Health Organisation (1999) defines health as "a state of mental, physical, and social well-being that is not limited to sickness or disease." As a result, health and safety refers to the prevention and mitigation of dangers or risks that may arise as a result of harm, injury, or an unhealthy working environment. The legislation of health and safety, according to Anaman and Osei (2007) outlines a way in which the working environment can be strengthened to ensure the safety and health of those who are likely to be affected by the working environment. These are described by the International Labour Organisation

(1996) as a study that covers a wide range of topics in various special areas and aims to accomplish the following:

i. Maintaining and promoting workers' physical, mental, and social well-being in all aspects of their work environments.

ii. Keeping and putting workers in environments that adapt to their mental and physical demands.

According to the World Health Organisation (1999), a workplace is a place where management and employees collaborate to use regular advancements in technology to safeguard and improve workers' health and safety by taking into account the following factors, which are based on known needs:

i. Workplace resources for personal health

ii. Workplace safety concerns, including work administration and workplace culture.

iii. Concerns about working condition safety

Workplace participation is open to all organizations, such as workers, management, and representatives from various unions, must be dedicated to health and safety programs in order to achieve the goals.

2.3 Inadequate Safety Management on Construction Sites

The importance of site health and safety management has expanded in recent years in new domains. As there has always been a need to protect workers' health, safety, and well-being, according to Rawlinson and Farrell (2010). According to the existing literature on health and safety management, because of the unique characteristics of small businesses, health and safety standards are alternately integrated.

There have been considerable changes in health and safety practices, according to study undertaken by (Kheni, 2008) and (Baldock *et al.*, 2005) on small firms. Bureaucracy, employees' unawareness of their privileges, and time constraints are some of the impediments to contractors putting in place efficient health and safety management systems or schemes (Koehn *et al.*, 1995). Detrimental construction operations, terrible weather conditions, and an incapacitating socioeconomic environment, according to (Gibb *et al.*, 2006), have a negative impact on building site health and safety management in developing countries directors and project managers were often unaware of their responsibilities under the health and safety law that was simply implemented, according to the findings of (Peckitt *et al.*, 2002). In order to achieve a completed project at a reasonable cost, clients and construction teams frequently neglect regulations and necessary procedures (Kheni *et al.*, 2008). Because the contractor's primary goal is to maximize profits, and the industry's small private clients' primary goal is to obtain the complete product at the lowest possible cost, little attention will be paid to health and safety in such a sector unless strict health and safety regulations are implemented. Nonetheless, the number of construction-related accidents has been gradually rising (Reynolds *et al.*, 2008).

2.4 Causes of Poor Construction Safety

2.4.1 The reasons for the poor performance

The nature of construction work, according to the National Institute for Occupational Safety and Heath (2009), has a high risk of safety events, with various built-in hazardous jobs and scenarios. Some of the reasons for the construction industry's poor safety record include:

A. Characteristics of the site and the project

i. Site conditions

a). ***Site slope and nature***: The firmness of materials, personnel, and equipment may be influenced during working hours if the site has an uneven surface. (Ringen *et al.,* 1995). A location with a very steep slope and no precautions in place, on the other hand, has the potential to cause an accident due to its movement.

b). ***Space Constraints***: According to National Institute for Occupational Safety and Health (2009), sites with space constraints have the potential to produce accidents, particularly when heavy equipment and materials are transported from one part of the site to another, as well as worker traffic in construction. It went on to say that working in restricted areas can be dangerous.

c). ***Soil Condition***: Soil conditions differ from one location to the next. Equipment and materials are affected by poor soil conditions. Samelson and Levitt (1993) went on to say that soil in poor condition necessitates a lot of site engineering work.

d). ***Site duration:*** According to Reese and Eidson (1999), the short duration of labor on site makes it impossible to develop an effective long-term safety policy.

ii. The Scope of the project

a) ***Structure height***: Because of its height, the construction is at risk of collapse if appropriate materials are not chosen, resulting in injuries.

b) **Foundation and soil work:** According to National Institute of Occupational Safety and Health (2009), if sufficient protections are not applied, there is always a risk of excavation walls collapsing.

c) **Heavy materials:** Construction materials are frequently heavy and large in size, and as a result, they have the potential to damage workers who are assigned to work with them if they fall or strike them

d) ***Consideration design***

i) ***Unclear design***: According to Rowlinson (2004), unclear designs have a higher risk of causing accidents because personnel may be unfamiliar with project safety considerations.

ii) ***Changing design:*** Rowlinson (2004) also mentioned that certain designs may necessitate a modification on short notice during the construction process, so previous construction site safety planning may not be necessary**.**

B. Workforce structure:

Workers are taken into account:

a) ***Trained workers***: Untrained personnel are more likely to be involved in accidents at the job site. You will likely encounter both trained and untrained people, according to Toole (2002), depending on the nature of the project.

b) ***Experienced workers***: Those with experience in their field of work are less likely to cause on-the-job accidents, those lacking expertise, on the other hand, are more likely to be engaged in workplace accidents.

c) ***Labor consideration***: According to Weil (1992) labor unions are known for providing proper professional safety training through apprenticeship programs, and union workers have been found to perform better in terms of workplace safety. According to Bureau of Labour Statistics (2016), construction trade workers in the United States account for over a quarter of all union members, implying the union's utility and beneficial influence in terms of safety

d) ***Unqualified subcontractors:*** Subcontractors and customized services are in high demand in the sector. The accident rate is likely to rise when unskilled or unqualified

subcontractors are engaged. Some people aren't always well-versed on site safety (Rawlinson & Farrell, 2010).

e) ***Welfare issues***: When there is a welfare issue, it leads to uncaring behavior and resistance to labor, which increases the chance of accidents on the job. (Choudhry *et al.*, 2007; Langford *et al.*, 2000).

C. Industry process

Competitive Tendering: The primary goal of tendering procedure is to find the most cost-effective and responsible bidder. According to King and Hudson (1985), the smaller the offer, the lower the contractor's margin and the less likely it is to factor safety into the project.

2.5 Strategies for Improving Safety in Construction

The Construction Industry Institute (CII), (2003) conducted investigations to identify strategies that show better safety records. The results determined by the CII research team brought out some actions to use. They are as follows:

a. Participation of management in accident investigation:

They recorded that companies with its top management participating in the investigation of injuries and accidents were able to decrease the rate of accidents in their firms. When managements are involved, the following measures are putted in place:

i. Appointment of safety staff.
ii. Ensuring adequate training for staff
iii. Budgets are prepared for safety and managed accordingly.
iv. Ensures the adequate provision of cost and time of safety measures.

Beach (2000) as cited by Yankah (2012) revealed that management involvement in safety has a major influence in the success of the safety story.

b. Safety planning:

The study found out that companies that carry out specific site safety plans and programs is variable to record low accident rate. Safety planning must be done effective and applied to all areas of the job to be executed. He further added that it is important to include all parties in the planning.

c. Training and education on safety

Companies where all workers are introduced to formal safety education always record low incidence of accident. A company safety program is as important as the estimating of the company. The training of the company's staff must be one of an important issue to the firm and also educating the workers to conduct their work in a manner to reduce the risk of accident. The main goal of educating the workers is to develop a positive attitude to work without causing accident.

Davies and Tomasin (1996) stated that the US Occupational Safety and Health Administration has outlined some basic element for a better safety program. They are:

i. Management should always be fully committed to safety above all issues.

ii. Safety program and education should always reflect the size of the project.

iii. It is better to clearly state the responsibilities of safety.

iv. There should be a cordial open communication between management and workers

v. Adequate funds should be allocated for safety programs.

vi. Leadership by example. All management needs to be involved.

vii. Employees also need to participate.

viii. Discipline programs must also be stated clearly.

ix. The need to periodically review safety performances.

d. Participation and involvement.

Safety programs such as behavior based helps to assist in correcting behaviors that are unsafe and help to improve good safety practice. It went further to add, projects which have workers in involvement were found to have lower injury rates.

e. Rewards and acknowledgement

In companies where workers receive incentives on a frequent basis recorded lower injuries due to the fact that all workers were committed to their work.

f. Reporting and investigation of accident

Though reporting and investing of accidents is required by law, the study didn't miss it out. Companies that do not miss any little information were also found to improve in areas of safety, where as those who do miss were found to increasing in injuries.

g. Alcohol and drug testing

The Construction Industry Institute study found safer companies and stated that where companies conduct random testing on alcohol and drugs recorded low accident issues.

2.5.1 Safety procedures to prevent accidents on construction sites in Nigeria

According to Walter (2017) safety measures at construction sites helps to prevent unforeseen accidents. Accidents at construction sites may lead to loss of life and involve huge cost. The occurrence of fatalities in construction sites usually leads to site closure for accident investigation, loss of man/machine hours, loss of output, high labour turnover, loss of corporate reputation, payment of burial expenses/compensation/insurance claims for the dead.

Accident can be defined as an unforeseen circumstance or event which happens abruptly to cause damages to property and injury to the person(s) involved. Any of such occurrences that may interrupt or interfere with the orderly progress of activities in a construction site can therefore be termed as an accident (Walter, 2017). The main types of accidents which cause death or serious injury on construction sites include falls, incidents with site vehicles, collapsing materials and contact with overhead power lines. According to Walter (2017) to avoid such accidents, the following safety procedures must be observed at construction sites.

a. Personal protective equipment (PPE)

These are to be supplied to all the personnel's working on site and even for the personal who are temporarily visiting to the site.

According to the constructor magazine, Personal Protective Equipment (PPE) can be classified as: Minimum Personal protective equipment (PPE) and Additional Personal protective equipment (PPE). They include the following;

i. Hard hat or helmet

Hard hat or helmet is issued to each and every personnel working on site. It has to be worn all times at job site.

ii. Safety glasses

Safety glasses are required at construction site every time debris is filled in air due to activities on site.

iii. Hand protection gloves

Hand gloves are supplied to all personals to protect against cuts when handling material or equipment's, during cleaning operations, cutting metal studs or similar works.

iv. Safety vests

Safety vests also called as high visibility shirts. Purpose of safety vest is to keep the person always clear in view, even in the dark and he should be visible to everyone.

Safety vests are of different bright colors like red, green, yellow so it's easy for workers to see and locate each other (Walter, 2017).

v. Proper clothing

Shirts, long pants and hard soul shoes, a 6-inch-high boot is recommended.

vi. Hearing protection

It is compulsory to wear hearing protection equipment near any equipment, tool or machinery which makes loud noises. As per standard practice if you are 2 foot away from somebody and you need to shout to talk, putting hearing protection is necessary.

vii. Respiratory protection

Sometimes as voluntary respiration policy dust mask is supplied, any employee looking for additional comfort or safety while working with fiber glass, fire proofing, cleaning the floors or handling debris (Walter, 2017).

viii. Face shields

A full face shield should be worn along with safety glasses when working in a high debris, operating grinder or any spark producing activity or similar activities or when done on site. An approved welding shield is compulsory to wear during all welding operations.

ix. Safety harness

The safety harness is an attachment between a fixed and mobile object and is usually fabricated from rope, cable and locking hardware.

Full body safety harness to be used as a procedure for fall protecting system, ignorance can result in severe physical harm. Safety harnesses keep workers safe and are helpful in freeing their hands for work even while hanging on the side of a building (Walter, 2017).

b. Material storage

Material on the job site should be stored properly when not in use to prevent injury and wastage of materials. Ensure proper storage and good housekeeping.

Proper storage can prevent the falls of the materials leading to material damage and accidents. Weight of the material stored should be within safe loading limits of the building floor (Walter, 2017).

Keep the passageway always clear for walking of personal and prevent injuries. Always store the material away from traffic. Store material at least 6 feet away from the openings in the floor and 10 feet from the edge of the floor if the wall is not built on edge of floor (Walter, 2017).

c. Manual material handling

The personnel should be aware of his weight lifting capacity and if required take the help of another person if required instead of taking all load himself and use proper lifting techniques. Always need to wear the safety equipment's while working on construction site (Walter, 2017).

d. Mechanical Material Handling

Mechanical material handling also requires same amount of safety as in case of manual material handling. Equipment Operator needs to take care of the weight lifting capacity of the equipment like forklifts, cranes and other similar to avoid accidents.

Ground personnel should be in machine operator's vision always and should be aware of the safety procedures while working around the heavy mechanical equipments (Walter, 2017).

e. Health and safety training

In order to promote safety awareness on maintenance site, the operators of the site at all levels should be trained for the safety and health on site. This training programme are to be arranged at least once every month and must be compulsory for all site operators (Walter, 2017).

The issues to be treated are listed below;

i. Causes of accidents

ii. Cost of accidents

iii. Accident preventions

iv. Health and safety regulations

v. Duties and responsibilities of participants

vi. Emergency procedures

vii. Machine and equipment testing, inspection and maintenance

f. Health and safety policy

This a legislative instrument put in place to ensure that at all times , the safest and healthiest working conditions is provide at a work site using measures of international standard. It also states the responsibilities at the top management to the general to the general workforce. Health and safety methods will ensure the construction site has good design, good planning and uses tried and tested safety techniques (Walter, 2017).

The health and safety policy should include the following;

i. The management will make known all the risk and health hazard as far as the construction site is concerned.

ii. The management of the firm will ensure a qualitative training of personnel as regards safety on site.

iii. The maintenance manager / safety manager will identify the main hazards on the construction site and set additional rules and regulation.

iv. In the case of accidents, the procedure laid down for accident reporting will be followed and the result of accident analysis will be available to management and the health and safety committee.

2.5.2 Basic safety precautions at construction site

According to Walter (2017) in any construction project for basic safety precautions to be implemented are:

i. Guard rails to be installed at open scaffold areas, all openings in the building floor, in the excavated areas, at mobile elevated platforms.
ii. Yellow stickers with safety notes to be pasted where necessary.
iii. All the working platforms should be stable, properly braced, should not be overloaded and safe for the working personnel.
iv. All the working areas and passageways should be free from waste or debris or any of obstruction like stored material.
v. The site should be clean all the times and the material should be stored safely.
vi. There should be proper arrangement of collection and disposal of waste materials.
vii. First aid should be available at all times on site for cuts burns or any mishaps.
viii. Fire extinguishers to be placed on site on proper locations in case of any fire.
ix. That should be proper lighting arrangements on the site especially when the work is carried out during the night stand.

2.6 Construction Sites Cautionary Safety Measures

Different cautionary measures can be taken into consideration during construction to prevent site accidents and injury in the event of occurring. These are as follows:

i. Personal protective equipment

Davies and Tomasin, (1996), Personal Protective Equipment (PPE) should at all times on the site be worn. Huang and Hinze (2003) also indicated that PPE could help prevent

injuries and also reduce the effect of injury at site. They further explained that. Basic PPE includes reflective jacket, helmet, and safety eyewear.

ii. Safety nets

Safety nets are tools that fasten a construction worker to a point by strengthening and supporting him/her to carry their duties at height. They further added that it decreases the events of falling from heights (Reese & Eidson, 1999).

iii. Protective rails

Protective rails can also be installed around work areas that are of height. This rails when installed will prevent the worker from falling off (Reese & Eidson, 1999).

iv. Signals and signs

When Signs and signals are allocated to alert workers on site safety and hazardous conditions it helps minimize the risk of injury. Davies and Tomasin, (1996) added that signal and sings informs the workers in taking extra caution to avoid injury.

v. Disposal of waste

Reese and Eidson, (1999) indicated that in order to prevent individuals from slipping, trips and falling, it is important to clear the construction area of tools, materials, waste and debris and other accidents and injury can also be prevented through the implementation of this measure.

2.7 Construction Parties Responsibilities in Safety

Kheni (2008), stated that safety in the construction industry must at all times be the primary first ranked interest of the employers, employees, participants of the project and the government.

In addition, the groups accountable for construction safety in the industry are:

i. Client

ii. Main contractor

iii. All Regulatory agencies

iv. Employees.

Table 2.2 summarizes the key responsibilities of the stakeholders involved in the building sector.

2.7.1 Safety duties of government agencies:

According to Laryea and Sarfo (2010), government agencies often bring out laws and instructions that will guarantee all construction projects are safe to sue and to maintain. They continued further that an excellent planning of safety ensures all projects are managed very well with minimal problems and cost.

2.7.2 Safety duties of employer:

Since the client always influences much of how work is done, they do not look at the safety side but always look at the end side. Where health and safety risks are minimum, little is required from the client but where there is a higher risk involved, clients are expected to do more (Kheni, 2008).

2.7.3 Safety duties of the contractor

It is the duty of the contractor to check and confirm that all subcontractors do comply with safety rules by providing PPE for all their workers (Kheni, 2008).

2.7.4 Duties of employees on safety

According to Kheni (2008) employees should be made aware of their responsibilities for properly wearing PPE, as well as taking good care of all equipment and reporting any flaws. Employees should also be informed that any misuse of personal protective equipment will result in disciplinary action. It also needs to be noted that the equipment is provided for their protection. There are certain questions relating to safety issue that needs to be attended to;

i. Are there any sufficient first aids on construction sites?

ii. Are there safety officers in construction sites?

iii. Do regulatory bodies in Nigeria ensure safety rules are complied?

Table 2.2: Construction parties' responsibilities for site safety

Clients	Contractors	Regulatory Agencies	Employees
Delegate the right people	Access on site must be safe	Notes on Advice	PPE is required to be worn.
Make time available	Welfare services are available.	a word of caution	Keeping tools and equipment in good working order

Providing the project team with adequate messages or information	Working on safety precaution	Instruction in health and safety	Reporting of defects
Assuring team cohesion and communication	Scaffolds that are safe	Enforcement	
Ensuring suitable arrangement are in place	Ladder that is secure	Health and safety regulations.	
Providing equitable on-site welfare facilities	Precautionary measures		
Assuring that the workplace is properly designed	Safe excavation		
Appointment of a project manager	Handling must be free and safe		
Provide adequate plans for safety	Loading and offloading of goods must be free from danger		
Keeping files on safety	Safe vehicles and plants		
Public protection	Safe tools and machinery		
	Managing of noise levels		
	Safe emergency procedures		
	Safe hoist and cranes		
	Safe handling, storage and disposal of substances		
	Public protection		

(Source: Lingard and Rowlinson (2005), HSE (2009), Ringen *et al*. (1995)).

2.8 Safety Practices Level of Implementation

Despite the fact that Nigerian construction firms, particularly multinationals, appear to have inherited their parent companies' safety policies and systems, there has been a history of

accidents and injuries, including falls from heights, being trapped by something collapsing or overturning, being struck by a moving vehicle, being struck by electricity or electrical discharge, and being struck by a falling object (Opatunji & Oyelami, 2014). The issue is usually not a lack of knowledge of the need of safety or a lack of a safety policy, but rather poor or non-compliance with safety programs and procedures, as is the situation with many other key players in the Nigerian construction industry. According to Abdulhamid and Everett (2000) and Shamsuddin *et al.* (2015) worker omission is a cause of construction injuries and may be studied through the behaviour and human factor approach. According to the behaviour approach, construction workers are the leading source of fatalities because they make an endless number of costly mistakes at various stages of the building production process. The approach of human factor, on the other hand, suggests that employees were the first victims of construction fatalities, not because of individuals' dangerous programs, but because of the working environment settings.

If construction companies' safety management systems are followed and performed properly, they should naturally result in extremely safe construction sites. According to research, the rate of accidents and injuries is significantly bigger in many developing nations, such as Nigeria, than it is in Europe, the United States, and Australia (Idoro, 2004 and 2007). According to statistics published in Bust *et al.* (2004) by Koehn *et al.* (2000), there are 8 or 9 times as many fatalities and accidents on construction sites in developing nations as there are in rich countries. Smallwood and Haupt (2005), like Awodele and Ayoola (2005), claim that hundreds of construction workers are murdered each year in Nigeria, with many more permanently disabled. Either the existing safety management system is improperly managed, or the safety system does not fully handle all of the critical safety issues involved in each construction project and site, putting people on site at risk.

On project sites, according to Clark (2006), failure to follow proper safety protocols and take precautions against hazards, such as wearing safety gear, is common. Safety measures are not being applied, according to Awwad *et al.* (2016), due to a lack of a robust monitoring system, a lack of safety awareness, and insufficient assistance from safety managers. Site employees like "safety training" since it enhances their performance and minimizes accidents on the job site, according to a study done by Kolawole (2014) in Minna, north central Nigeria, and the government lacks a well-defined safety act for construction activities.

2.9 The Advantages of Using a Safety Management System

Good safety programs, according to Ahmad (2008), would undoubtedly aid in reducing injuries on construction sites, as well as lowering construction costs, increasing productivity and profitability, and, most importantly, protecting the lives of labours or workers, all of which would benefit the construction industry and the country as a whole. The following are the advantages of a safety management system in the construction business, according to Choudhry *et al.* (2007), Loushine *et al.* (2006), Jazayeri and Dadi (2017).

i. Preventing and regulating workplace dangers to reduce the amount of occupational injuries for employees and operations.
ii. Reducing the chances of serious accident
iii. Improving employee morale and productivity by removing hazards from the workplace.
iv. Minimizing production downtime while reducing material and equipment damage.
v. Reducing the cost of insurance as well as the expense of employee absences.

vii. Lowering the legal costs of accident litigation, fines, and emergency supplies.

viii. Time spent on accident investigations is reduced, supervisors' time is diverted, clerical tasks are increased, and expertise and experience are lost.

2.10 Factors Influencing Non-Compliance with Construction Safety Practices

Individual agreement that construction accidents are unavoidable owing to the nature of the activities performed on project sites has led to a common assumption that non-compliance with operational health and safety is a common occurrence (Smallwood & Haupt, 2002). Despite the fact that many writers have worked on construction site health and safety management, compliance with safety measures, which is crucial to workers' productivity, has received little attention. Olutuase (2014) analyzed Nigerian industry's safety management in order to compare compliance levels to international standards. The study's findings showed the existence of safety requirements in building project management. However, the system appears to be undersized due to inefficiency and insufficient documentation. The study recommended that construction managers pay close attention to the provisions of the safety regulations for site management.

Ismail *et al.* (2011) examined the elements that influence the implementation of a construction site safety management system, with a focus on skilled personnel. The most influential safety management aspects were considered to be personal awareness and communication. To develop a sense of safety in their personnel, site managers had to undertake enlightenment programs. The study advocated for the use of workers protection equipment, as well as a reduction in physical labour without overlooking the proper use of equipment and tools. Umeokafor *et al.* (2014) highlighted the owner's effect and insufficient implementation as factors for non-compliance with health and safety laws on

Nigerian construction sites. According to the study, clients should use health and safety records as a requirement document for prequalifying contractors, while safety personnel should consider the importance of implementing safety provisions to attract construction managers and contractors in building a robust safety management on construction sites. In south-east Nigeria, Okoye *et al.* (2014) conducted an exploratory study on the cost of building contractors' health and safety performance, as well as the relationship between cost and project outcomes. Similarly, it validated the view of construction professionals that implementing safety management procedures and standards would result in an increase in overall project costs.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The chosen research design is a descriptive survey study with the purpose of investigating the health and safety practices of construction workers in order to improve safety performance. The descriptive survey study is employed since it provides for a cross section examination of a clearly defined population, as well as the type of data the study wants to acquire. It is a thorough data plan with the goal of answering research questions and analyzing the results not just statistically but also descriptively. The survey technique proved effective in getting information from site supervisors and workers on building construction sites by employing questionnaires and interviews. This study relied on descriptive research to learn about the health and safety protections put in place on construction sites.

3.2 Research Population and Sample Size

The research Population can be seen or defined as a complete set or element in which a sample can be taken from (Bryman *et al.,* 2011). The population of this study are the site personnel, including site agents, foreman and site workers (Skilled, Semi-skilled and unskilled) and all who are directly involve in building construction projects sites. A total sample of Eighty–Five (85) respondents was drawn from the 15 building construction sites visited. A stratified random sample size of the population becomes necessary as it would be impossible for the researcher to gather the views of every respondent due to time and other inherent circumstance that would be beyond the researcher's control. Samples of

Eighty-Fifty (85) respondents were administered questionnaire out of which Seventy (70) were retrieved in which Fifty-One (51) was fit for analysis which represent 73.9%.

3.3 Sample Technique

Sampling is a process through which a portion of a population is selected for a study. Here the stratified sample technique was employed. It was adopted because the population can be divided into known groups and each group sampled. The number sampled in each group should be in proportion to its known size in the parent population. For example, the make-up of different social groups i the population of a town can be obtained and then the number of questionnaires carried out in different parts of the town can be stratified in line with this information.

To achieve the objective of this study, a comprehensive review literature was conducted coupled with questionnaire survey through stratified random sampling technique to collect data for the study.

3.4 Method of Data Collection and Analysis

The following sources were used in the collection of data for this study.

i. Primary data – these were collected through field survey in FCT- Abuja.

ii. Secondary data – these were data collected through existing literature, journals and document obtainable from research publications, doctoral theses, conference articles.

This study adopted both primary and secondary sources of data collection which include the use of structured questionnaire and review of relevant literatures. The primary source used was the distribution of questionnaire to respondents on building construction sites. Information was collected from site employees, agents, supervisors/foremen, and site workers using a well-structured questionnaire.

Interviews were employed as one of the key data collection methods. The interviews were done with site personnel, including site agents, foremen, and laborers, who participated in explaining and clarifying any information that was needed; questionnaires were the major data gathering technique. They were distributed to construction workers, both skilled and unskilled, as well as site management and supervisory personnel. The surveys were self-administered, which meant that they were given to the respondents by hand and they were responsible for filling them out. Guided construction site visits were also used to examine and document the highlighted dangers, responsibilities, job site organization, work procedures, equipment, and tools. All the data and information acquired through literature review, questionnaires, and observations, interviews were gathered, summarized and analyzed. The obtained data were analyzed using a descriptive statistical method such as relative relevance index (RII), the ranking method and tables displaying frequency and percentages and the results would be shown in the form of graphs such as pie chart with the aid of Microsoft Excel software. There were no standardized standards for selecting building construction workers. The construction sites seen were in the Federal Capital Territory of Abuja.

3.5 Research Instrument

The health and safety practices of employees on Nigerian building sites were studied, identified, and evaluated using a structured questionnaire survey approach. The literature study was utilized to develop the research questions, as well as the research's goal and objectives, and the questionnaire.

A self administered questionnaire was used; the questionnaire has three sections in order to capture the respondents' actual response for both the independent and dependent variables.

A five-point Likert scale was employed in the questionnaire, ranging from one (strongly disagree) to five (strongly agree). There were three primary portions to the questionnaire. The demographic features of respondents were covered in the first section. The second section of the questionnaire raised response on the factors causing accident on building construction sites and provision of safety facilities/material for workers on building construction sites**,** the third section of the questionnaire raised response on the safety procedure employed in building construction sites.

The RII for each factor is calculated as shown below:

$RII = \sum W / A \times N \qquad (0 > RII \leq 1$

Where:

RII = Relative Importance Index

W = Respondents assigned a weighting to each factor. (ranging from 1 to 5)

A = Highest weighting (i.e, 5 or 4 where applicable); and

N = Respondents number.

The RII values vary from 0 to 1 (0 not inclusive); the closer the RII result is to 1, the greater its influence on the building construction site's performance.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Demographic characteristics of Respondents

A total of 51 questionnaires were collected from the 69 distributed, accounting for 73.9 percent of the total disseminated. Figures 1 through 4 show the gender, age bracket, years of construction experience, and labour class percentage distributions of the respondents, respectively.

The results of the analysis of Respondent Demographic Characteristics are shown in Table 4.1. In terms of gender, the results show that 86.27 percent of them are males and 13.73 percent are females. The bulk of respondents are between the ages of 18 and 24, with 31.37 percent falling between the ages of 25 and 34, 17.64 percent falling between the ages of 35 and 44, and 9.80 percent falling between the ages of 45 and 44.In terms of worker quality, skilled workers account for 45.09 percent, semi-skilled workers for 35.29 percent, and unskilled workers for 19.60 percent. In terms of respondents' years of construction industry experience, the majority (41.18%) have between one and five years of experience, 37.25 percent have between six and ten years of experience, and 21.57 percent have more than ten years of experience.

Table 4.1 Respondents' Demographic Characteristics

Category	Classification	Freq	Percent	Valid Percent	Cumm. Percent
Respondents Gender	Male	44	86.27%	86.27%	86.27%
	Female	7	13.73%	13.72%	100.00%
	TOTAL	**51**	**100.0%**	**100.0%**	
Respondents age bracket	18 - 24 years	21	41.18%	41.18%	41.18%
	25 - 34 years	16	31.37%	31.37%	72.55%
	35 - 44 years	9	17.65%	17.65%	90.20%
	45 years and above	5	9.80%	9.80%	100.00%
	TOTAL	**51**	**100.00%**	**100.00%**	
Workers	Skilled	23	45.10%	45.10%	45.10%
	Semi –Skilled	18	35.29%	35.29%	80.39%
	Unskilled	10	19.61%	19.61%	100.00%
	TOTAL	**51**	**100.00%**	**100.00%**	
Years of experience in construction	1 – 5 years	21	41.18%	41.18%	41.18%
	6 – 10 years	19	37.25%	37.25%	78.43%
	Above 10 years	11	21.57%	21.57%	100.00%
	TOTAL	**51**	**100.00%**	**100.00%**	

Source: Researcher's analysis (2019).

Table 4.2 clearly illustrates that 76 percent of respondents are aware that it is the employer's responsibility to supply the appropriate safety material on a building construction site. While 24% of those polled claim they are unaware that it is the employer's responsibility to supply basic safety equipment on construction sites. This is in consistent with the OSHA's regulations and guidelines (Occupational Health and Safety Administration , 2016).

Question	Number of response "YES"	Number of response "NO"	Percentage (%) response "YES"	Percentage (%) response "NO"
Are you aware that it is the employer's responsibility to offer appropriate safety items on a construction site?	39	12	76%	24%

Table 4.2 Awareness of provision of safety material on site by employer
Source: Researcher's analysis (2019).

4.2 Possible Factor Causing Accident at Building Construction Sites

One of the specific goals of this research was to find out what construction employees thought about the likely causes of construction accidents. Five key variables causing construction accidents were identified based on the responses. Table 4.3 shows the distribution of these characteristics.

Table 4.3 Causes of accidents at site

Factors	Frequency response	Percentage response
Unsafe site condition	13	25.49
Lack of knowledge and training	9	17.65
Poor attitude towards safety	19	37.25
Defective material	2	3.92
Lack of safety equipments	8	15.69

Source: Researcher's analysis (2019).

From Table 4.3 above, 13(25%) of sampled population said unsafe site condition constitutes a major factor causing accidents in building construction sites, 9(18%) said lack

of knowledge and training is a factor causing accidents on sites. 19(37%) said poor attitude towards safety causes building construction sites accidents, while 2(4%)

and 8(16%) said defective material and lack of safety equipments respectively are factors causing building construction accidents.

Furthermore, respondents were asked to rank the reasons of site accidents on a scale of 1-4 in this survey. Based on the response, ranking was done using the combination of Relative Important Index (RII) and mean score ranking. Where two (2) variables have the same RII, the one with the highest mean is ranked higher. The results of the findings are listed in the table below.

Table 4.4 Factors causing construction accidents

Factors	Total	ΣW	Mean	RII	Rank
Poor usage of PPE	51	201	394	0.99	1
Unsafe working conditions	51	200	3.92	0.98	2
Falling of equipment	51	199	3.90	0.98	3
Poor handling practice	51	146	2.86	0.72	4
Poor planning at site	51	143	2.80	0.70	5
Poor quality tool usage	51	109	2.14	0.53	6
Nature of site	51	62	1.22	0.30	7
Lack of communication tools	51	59	1.16	0.29	8

Source: Researcher's analysis (2019).

Many of these reasons are comparable to those proposed by Abdulhamid and Everett (2000) and Toole (2002); the most crucial factor was a negative attitude toward safety. This finding

is consistent with other studies in the literature, which have identified dangerous behavior as one of the most critical variables contributing to accidents (Sawacha *et al.,* 1999). Construction accidents can be caused by a variety of factors, including unsafe site conditions and a lack of understanding and safety training. Poor safety and health management by the companies can be ascribed to unsafe working conditions, a lack of knowledge and training, substandard products, and a lack of safety equipment. On the other hand, a lack of concern for safety might be ascribed to workers' risky behavior.

The following are the most critical causes of accidents at site

i. Poor usage of PPE
ii. Unsafe working conditions
iii. Falling of equipment
iv. Poor handling practice
v. Poor planning at site
vi. Poor quality tool usage
vii. Nature of site
viii. Lack of communication tools

i. Poor usage of Personal Protective Equipment (PPE)

Due to workers' and management's lack of how to use personal protective equipment effectively, as well as the availability of personal protective equipment, the ineffective use of personal protection equipment was identified as a factor in causing an accident on a construction site. Controlling an accident at its source is the best way to prevent it. Though poor usage of personal protective equipment had an RII value of 0.99, it is equipment which is worn to reduce the exposure of different kinds of hazards and these includes, gloves, eye

and foot protection. It was also noted that employers and employees need to understand the types of PPE, select the appropriate PPE for different circumstances. Indicating that PPE is often not worn by workers on construction sites in Nigeria, this undermines their general health and safety and leads to different types of injuries, (Tanko & Anigbogu, 2012).

ii. Unsafe working conditions

Unsafe working conditions with RII value 0.98 and a mean of 3.92 was ranked as the second factor to cause accidents on building construction site. With the various sites visited, some conditions were laid down as some of the unsafe working conditions that were very common at sites. These include: walking behind, under or walking in the path of cranes or heavy equipment. When such activities are done, it exposes the worker to accident. Taking breaks and lunch should only be at a selected area.

iii. Falling of equipment

This was also ranked to be the third factor to be the cause of accidents at building construction site. Falling of equipment can be in different forms, the placement of equipment at site, the usage of them, coverings of the equipment, therefore making it important to be sure all equipment are placed in good and secure position to prevent them from falling. This also came with a RII value of 0.98 and a mean of 3.90. The digest confirms the falling of equipment at the construction sites and this is an issue of concern and needs to be treated as such. It was also indicated that, employers must provide fall protection and right equipment's for the work to be executed. It is therefore advisable to provide workers with the exact kind of materials to get the work done safely.

iv. Poor handling practice

Poor handling practice brings about fatigues and also leads to injuries such as, neck, back, shoulders and other body parts. It was also identified that there are two major groups of injuries as a result of poor handling practice. Cuts, bruises, fractures, and other injuries caused by unforeseen events such as accidents. Poor handling practice by the respondents

achieved a RII value of 0.72 and a mean of 2.86. Most workers confirmed poor handling practices on tools and equipment which is very bad situation.

v. Poor planning at site

Poor planning at site by the respondents was ranked as the fifth factor that causes accident at site with RII value 0.702 and a mean of 2.80. Due to the nature of most construction sites and more projects at site, also looking at the end product, the tendency of planning at a particular site tends to be reduced. Building construction is like all other works, unsafe and hazardous in its operations. Therefore, proper planning at site should be done in order to prevent accidents at building construction sites.

vi. Poor quality tool usage

Poor quality tool usage at building construction site by the respondent was ranked sixth factor that causes accident at sites with RII value 0.53 and a mean of 2.14. Each building construction tool are used for specific purpose or uses, poor quality or bad tool hence results to accidents at site. The right tools for a particular work ensure speed work delivery and avert accident.

vii. Nature of site

Nature of site by the respondents was ranked as the seventh factor that causes accident at building construction site with RII value of 0.30 and a mean of 1.22. The complexity of construction sites tends to cause accident especially to workers without relevant related skill to work therein.

viii. Lack of communication tools

The effectiveness and efficiency of the construction process to achieve a great result mainly depends on the quality of communication. In view of the respondents, workers do not see construction communication as a major problem but however they admit it causes accident. It was also noted that, warning signs and other signage tools should be placed at vantage positions to warn pedestrians and workers on impending danger that will results in accident. Lack of communication tools by the respondents made this ranked as the eight and with RII value 0.26 and a mean of 1.16.

The questionnaire posed a question on the nature of accidents mostly experienced at building construction sites.

Table 4.5 Nature of accidents experienced

	Frequency of response	Percentage response
Fatal Injury	6	11.76
Major Injury	14	27.45
Minor Injury	27	52.94
Near Miss	4	7.84

Source: Researcher's analysis (2019).

Table 4.5 clearly demonstrates that 12% of the respondents had suffered a fatal injury, 27% experienced major injury, 53% experienced minor injury while 8% experienced near miss injury.

4.2.1 Provision of safety facilities/material for workers at building construction sites

The researcher dug deeper to learn about the availability of safety equipment and materials for workers on construction sites, rate the relevance of its provision and the results are shown in Table 4.6 below.

The provision of personal protective equipment (PPE) was ranked first, with a RII of 1.00 and a means of 5.00, indicating a pressing need for workers to be provided with basic PPE in order to operate safely. For a building site, the Health and Safety Executive only identifies four (4) mandatory, legally required safeguards. Head protection, foot protection, high-visibility clothing, and body protection must all be considered.

Table 4.6 Safety facility/material

Safety Facility/Material	Total	ΣW	Mean	RII	Rank
First Aid Equipment	51	246	4.82	0.96	4
Personal Protective Equipment (PPE)	51	255	5.00	1.00	1
Sanitary Facilities	51	249	4.88	0.98	3
Appointing Safety officer on site	51	245	4.80	0.96	5
Scaffold/Ladder	51	236	4.63	0.93	7
Hoisting equipments	51	242	4.75	0.95	6
Safety Signs	51	252	4.94	0.99	2

Source: Researcher's analysis (2019).

Other PPE considerations

The four types of PPE are generally what a worker needs to be wearing in order to be allowed onto site in the first place, but there are other things you must consider (Walter, 2017). Other forms of PPE may be required for each specific task you are doing. For instance:

i. If you are using a Stihl Saw, you would need safety goggles *(or preferably a full face mask)*, ear defenders, a decent pair of gloves and some form of respiratory protection like a FFP3 rated dust mask.

ii. If you're breaking up old concrete with a pneumatic drill, you'll need ear protection, safety goggles, and a good pair of anti-vibration gloves.

iii. Because laborers handle sharp or harsh objects on the job, they'll need at least a good pair of rigger gloves.

iv. Because brickies/bricklayer work with bricks and mortar all day, a decent pair of abrasion-resistant gloves would be beneficial.

v. Fabricators and welders will require their standard safety eyewear for grinding, as well as welding masks, gloves, and ear protection.

With a RII of 0.99 and a mean of 4.94, the provision safety sign came in second.

Those who may be exposed to hazards in the job are given a specific warning through safety signs. The message could be used to avoid accidents, warn of health risks, show where safety and fire protection equipment is located, or provide emergency assistance and instruction.

With a RII of 0.98 and a mean of 4.88, sanitary facilities were placed third, indicating the need for them since they prohibit the disposal of feces and urine, thereby maintaining hygienic conditions.

With the same RII of 0.96 and a mean of 4.82 and 4.80, the respondents placed the importance of providing first aid equipment and appointing a safety officer on the construction site as fourth and fifth, respectively.

With a RII of 0.95 and 0.93, the respondents ranked the importance of providing hoisting equipment and scaffold/ladder as sixth and seventh most important, respectively, because these ensure that heights may be reached.

4.3 Safety Strategy/Measures Required on Building Construction Sites

The participants in this study were asked to score the safety strategies used on construction sites on a scale of 1 to 5. Ranking was done using the Relative Important Index (RII), which was organized serially as stated in the table below, based on the response.

Table 4.7 lists the safety procedures, together with their RII values and ranking positions. Hazard identification ranked first with a RII of 0.93, medical provision ranked second with a RII of 0.89, personal protective equipment availability ranked third with a RII of 0.88, fire protection ranked fourth with a RII of 0.86, risk control measures ranked fifth with a RII of 0.85, occupational safety and health practices ranked sixth with a RII of 0.80, and finally health and safety training ranked seventh with a RII of 0.80 with the first five safety procedures, on the other hand, were critical in ensuring the safe execution of projects without ignoring other less important procedures.

Table 4.7 Safety strategy/measures required on building construction sites

	Frequency							
Safety procedures	**5**	**4**	**3**	**2**	**1**	**Total**	**RII**	**Ranking**
Hazard Identification	38	7	6	0	0	51	0.93	1
Medical provision	36	2	13	0	0	51	0.89	2
Availability of PPE	35	2	14	0	0	51	0.88	3
Fire protection	32	3	16	0	0	51	0.86	4
Risk control measures	35	0	10	6	0	51	0.85	5
Occupational health and safety practice	6	39	5	1	0	51	0.80	6
Workers' health and safety training	1	37	13	0	0	51	0.75	7
Emergency readiness	0	14	12	25	0	51	0.56	8
Accident investigation	0	9	1	41	0	51	0.47	9

Source: Researcher's analysis (2019).

4.5 Discussion of Findings

This is done in line with the objectives of the study as follows;

i. In examining the possible causes of accidents on building construction sites and effects, the results revealed that poor attitude towards safety; unsafe site condition and poor usage of personal protective equipment are the major causes of building construction sites accidents This result concurs with the findings of Abdulhamid and Everett (2000) and Toole (2002); that the major causes of accidents on construction sites are related to human behaviour, difficult work site conditions, and poor safety management. As seen in Table 4.3 and 4.4 the following are the most critical causes of accidents at site; Poor usage of PPE, Unsafe working conditions, Falling of equipment, Poor handling practice, Poor planning at site, Poor quality tool usage, Nature of site, Lack of communication tools other causes of accident on building construction sites are lack of knowledge and training, lack of safety equipments, defective material.

ii. In assessing the health and safety measure on building construction building construction sites in order to curtail building construction accidents, the provision of safety facilities/material for workers on building construction sites was ranked in terms of relevance as seen in table 4.6 above. The provision of personal protective equipment (PPE) was ranked first, safety sign, sanitary facilities, and first aid equipment ranked 2^{nd}, 3^{rd} and 4^{th} respectively. The result concurs with Walter (2017) findings on the importance of safety facility on construction sites. The provision of personal protective equipment (PPE) was ranked first, with a RII of 1.00 and a means of 5.00, indicating a pressing need for workers to be provided with basic PPE in order to operate safely. For a building site, the Health and Safety Executive only identifies four (4) mandatory, legally required safeguards. Head

protection, foot protection, high-visibility clothing, and body protection must all be considered.

iii. In assessing the safety strategy needed on building construction sites in order for the site to be safe seen in table 4.7 above. Hazard identification was ranked 1st, this means for the site to be safe, potential hazard/risk should be identified, preferably workers should be proactive on site. Medical provision and availability of PPE are essential as they ranked 2nd and 3rd respectively. This concurs with the findings Uddin *et al.* (2020) that hazard recognition is necessary for maintaining workplace safety.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Many studies have been conducted on the evaluation of health and safety practices in construction sites by conducting an investigation among workers on construction sites in Abuja. The study must be accessed clearly in order to discover the precise health and safety precautions among workers on construction sites in Abuja. The examination of the replies revealed that construction employees lack sufficient awareness about construction site safety and health measures. In accordance with the study literatures evaluations and conclusions, Hazard detection, rapid medical help, and an occupational safety and health program are increasingly considered essential for safe project performance.

5.2 Recommendations

The following suggestions should be taken into account:

i. A practical approach to workplace safety and health management. Contractors should devise a technique for identifying inherent risks in a project before it begins. When dangers are recognized, precautions are taken to prevent them from occurring, as well as efforts to mitigate their impact if they do occur by mistake. Because prevention is preferable to treatment.

ii. To reduce construction accidents, it is suggested that companies focus more on formal training programs in safety and health practices. Furthermore, businesses can communicate with employees and manage their attitudes toward safety and health. This step may help them change their minds about safety concerns. Employees should be given

on-the-job and off-the-job training on their health and safety and how it affects the project's production.

iii. Furthermore, every contracting firm should have a full-fledged safety management committee to oversee the welfare of craftsmen, supervisors, and errant site workers who fail to follow safety rules.

iv. A safety officer is hired by a construction business to ensure or enforce health and safety policies, such as ensuring that all workers on the job site wear safety boots and helmets, and so on.

v. Unsafe site conditions can increase the risk of construction accidents dramatically. As a result, businesses should make an effort to monitor site conditions on a frequent basis in order to avoid mishaps. To achieve superior safety performance, it is evident that all parties participating in a building project should be concerned with the safety requirements.

vi. Employers in the construction industry are required to have a program in place that includes procedures for detecting and correcting workplace hazards. It should be the contracting firm's responsibility to create a road plan for dealing with on-site incidents. This can take the shape of insurance, safety devices, or monetary recompense. Accidents and injuries should be reported so that accident investigations can be conducted, which will aid in successful accident control in future projects.

vii. Nigerian employers should be educated on the need of putting safety first before thinking about profit and other benefits.

5.3 Implication to the Quantity Surveyor

This research is beneficial to the Quantity Surveying Profession in that;

i. lt gives the Quantity Surveyor a broad scope on the basics of health as well as managing and controlling of accident on construction site.

ii. Sound health and Safety, been an important prerequisite to pursue profit, it enable the Quantity Surveyor give client appropriate financial advice.

iii. This also contribute to the development of knowledge of Building Construction, Quantity Surveying and other profession

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SURVEY QUESTIONNAIRE

AN INVESTIGATION OF HEALTH AND SAFETY PRACTICES AMONG WORKERS ON CONSTRUCTION SITES IN ABUJA

Dear Sir/Madam,

This questionnaire forms part of M. Tech research work which aims at studying the health and safety practices to persons and workers on construction site in order to improve safety performance on construction sites.

I am assuring you that all information provided will be strictly confidential and will be used purely for research purposes only. Please tick (√) the appropriate cell for your response. Thank you for your time and valid contribution in advance.

Yours Faithfully,

Ibiang Henry Omori
MTECH/SET/2017/7490

Questionnaire

SECTION A **Personal Information**

1. Are you: Male [ ] Female [ ]

2. How old are you? Under 24 years [ ] 25 -34 years [ ] 35 – 44years [ ]
   45 years and above [ ]

3. Workers Quality, are you: Skilled [ ] Semi-Skilled [ ] Unskilled [ ]

4. How long have you worked in the building construction sector?
   1 – 5 years [ ] 6 – 10 years [ ] More than 10 years [ ]

SECTION B **Factors causing accident on building construction sites and provision of safety facilities/material for workers on building construction sites.**

5. Are you aware it is the obligation of the employer to provide the necessary safety materials on building construction site?
   a. Yes [ ] b. No [ ]

6. From your opinion, what is the major cause of accidents among workers on building construction sites?
   a. Unsafe site condition [ ] b. Lack of knowledge and training [ ]
   c. Poor attitude towards safety [ ] d. Defective material [ ]
   e. Lack of safety equipments [ ]

7. What is the nature of accidents mostly experienced?
   a. Fatal injury [ ] b. Major Injury [ ]
   c. Minor Injury [ ] d. Near Misses [ ]

8. Using the scale of **1 = Not frequent, 2 = Less frequent, 3 = Frequent and 4 = Very frequent,** rate the following causes of accident on building construction sites.

	Causes of Accidents in the Construction Sector	4	3	2	1
A	Unsafe working condition				
B	Poor planning at site				
C	Falling of equipment				
D	Lack of communication tools				
E	Poor handling practice				
F	Poor usage of PPE				

G	Basic hygiene on site				
H	Nature of site				
I	Poor quality tool usage				

9. What is your Opinion to the relevance of provision of the following safety facilities/material for workers on building construction sites?
Using the scale of **1 = Strongly Disagree, 2= Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree**, Please indicate your reaction by checking the appropriate cell.

	Safety Facility/Material	**5**	**4**	**3**	**2**	**1**
A	First Aid Equipment					
B	Personal Protective Equipment (PPE)					
C	Sanitary Facilities					
D	Appointing Safety officer on site					
E	Scaffold/Ladder					
F	Hoisting equipments					
G	Safety Signs					

SECTION C **Safety strategy/measures needed on building construction sites**

10. Using the scale of **1 = Strongly Disagree, 2= Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree**, Please indicate your reaction by checking the appropriate cell.

	Safety procedure	**5**	**4**	**3**	**2**	**1**
A	Identification of hazard					
B	Medical provision					
C	Availability of PPE					
D	Fire protection					
E	Risk control measures					
F	Occupational health and safety practice					
G	Health and safety training of workers					
H	Emergency readiness					
I	Accident investigation					

- Thank You -