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ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY COMPLIANCE IN THE NIGERIAN CONSTRUCTION INDUSTRY

by

ARUM CHARLES IFEANYI

216085655

Submitted in partial fulfillment of the requirements for the degree

MAGISTER INGENIERIAE

in

ENGINEERING MANAGEMENT

in the

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

at the

UNIVERSITY OF JOHANNESBURG, JOHANNESBURG

SUPERVISOR: PROF. C.O. AIGBAVBOA

2017
2017

ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY COMPLIANCE IN THE NIGERIAN CONSTRUCTION INDUSTRY

ARUM CHARLES IFEANYI

SUPERVISOR: PROF. C.O. AIGBAVBOA

A MINOR DISSERTATION, submitted in fulfilment of the requirements for the award of the degree Magister Ingenieriae in Engineering Management in the Faculty of Engineering and the Built Environment, at the University of Johannesburg, Republic of South Africa.

JOHANNESBURG, November 2017
DECLARATION

I, ARUM CHARLES IFEANYI, do hereby declare that this minor dissertation is a result of my own research and investigation and that all the sources I have quoted or used have been indicated and acknowledged by means of a comprehensive list of references. It was submitted to the University of Johannesburg (Engineering Management Department), as a requirement to obtain a MAGISTER INGENIERIAE degree in Engineering Management.

____________________________________  ______________________
Signature                                      Date

University of Johannesburg
ACKNOWLEDGEMENTS

My ultimate gratitude goes to Almighty God for His love, favour and grace that have led me this far in life. Without Him, this dream would not have become a reality. I thank the Lord for His protection and unlimited blessings.

I wish to express my sincere gratitude and appreciation to the following people for their guidance, assistance and important contribution to the realization of this study. My greatest indebtedness goes to my amiable supervisor, Prof. Clinton Aigbavboa, for his professional and motivational guidance throughout the course of this research study. In fact, I never in my imagination believed that I could achieve this dream. I pray that God will continue to enrich him with knowledge, wisdom and good health. I could not have completed this arduous task without his advice and guidance.

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Finally, I acknowledge my wonderful wife and pillar of strength, Chekwube Bettina, for her prayers and support that sustained me all through the period of my study.
DEDICATION

I dedicate this minor dissertation to a beloved father and a brother, Samuel A. Obayemi, Assistant Corps Marshal (ACM) of the Federal Road Safety Corps and Mr. Ndubisi Henry Ezenwa for believing in me and supporting me all throughout the duration of the study. I am forever grateful for everything they endured to ensure the realization of this dream.
ABSTRACT

Health and safety in the workplace pose a great threat globally towards the sustenance of development of the society. Work-related accidents and illnesses contribute significantly to the yearly death ratio, thereby leading to a substantial loss in a country’s labour force. However, the construction industry which employs almost half of Nigerian’s labour force is a major source of occupational related accidents, injuries and ill health within the country. The construction worker has the greatest chance of being killed at work compared to other occupations. In order to curb the occupational hazards in the construction industry, different policies have been proposed but the occupational hazards remain insurmountable. Thus, this study examines the level of compliance to health and safety policies in construction firms in Nigeria. It also evaluates the causes and prevalent forms of accidents on construction sites and establishes the challenges confronting the site manager in ensuring the safety of construction workers on the construction sites. Finally, it examines the cost implications of implementing health and safety management on construction sites. The study obtained data from both primary and secondary sources. The secondary data was collected through a detailed review of the extant literature. The primary data was gathered through a questionnaire that was distributed to construction professionals who are active in the Nigerian construction industry. One hundred and twenty-six (126) questionnaires were received from one hundred and fifty (150) sent out, representing an 82 percent response rate. Of the one hundred and sixty-eight (168) copies of the questionnaire sent out, only one hundred and thirty-eight (138) were used for the analysis, representing an 86 percent response rate. Towards ensuring the reliability of the research questionnaire, Cronbach’s alpha coefficient reliability test was conducted on the scaled research questions. Findings from the research were analysed using descriptive statistics, exploratory factor analysis (EFA) and the Mann-
Whitney test. The study reveals that Nigeria’s construction industry is still at the infancy stage with no specific regulation providing direction in health and safety management in the country. The study found that most construction firms have their own policy for health and safety usually mounted and installed on their construction site. Despite the provision of the policy most of the construction firm’s compliance level is below average. The poor compliance with occupational health and safety has resulted in frequent occupational hazards occurring on construction sites within the country. Apart from the low compliance with the stipulated health and safety requirements, the construction professionals lack a proactive approach to health and safety activities owing to their perception of health and safety as a luxury and not an essential part of the project. This finding shows that health and safety is a non-disposable cost that is essential for the growth of any project because the health and safety of the construction workers has a significant impact on influencing the quality of the construction project. Finally, the study concludes that to improve health and safety in the construction industry the construction professionals and safety personnel should go beyond merely providing safety equipment for the workers; they should train the workers on the use of the equipment and report all accidents on site to enable learning from previous mistakes. The study recommends that construction firms should create a unit that will be charged with the responsibility for ensuring that every construction worker on site complies with the stipulated occupational health and safety policy. In addition, the safety personnel should be included at the design stage of the project to ensure that the design can be implemented at a minimal risk to the construction workers.

**Keywords:** Construction industry, Compliance, Occupational health and safety, Safety regulations
# TABLE OF CONTENTS

DECLARATION .................................................................................................................. 3

ACKNOWLEDGEMENT ..................................................................................................... 4

DEDICATION ................................................................................................................... 5

ABSTRACT ....................................................................................................................... 6

TABLE OF CONTENTS ...................................................................................................... 8

LIST OF FIGURES .......................................................................................................... 13

LIST OF TABLES ............................................................................................................. 14

LIST OF ABBREVIATIONS ................................................................................................. 15

CHAPTER ONE .................................................................................................................. 16

INTRODUCTION

1.1 BACKGROUND ......................................................................................................... 16

1.2 STATEMENT OF THE RESEARCH PROBLEM ..................................................... 18

1.3 RESEARCH QUESTIONS .......................................................................................... 20

1.4 AIMS AND OBJECTIVES OF THE STUDY ............................................................ 21

1.5 SIGNIFICANCE OF THE STUDY ............................................................................. 21

1.6 LIMITATIONS OF THE STUDY ............................................................................... 22

1.7 ORGANISATION OF DISSERTATION CHAPTERS ............................................... 22

1.7.1 Introduction

1.7.2 Overview of health and safety ............................................................................. 23

1.7.3 Overview of health and safety in developing countries ..................................... 23

1.7.4 Overview of health and safety in Nigeria ............................................................ 23

1.7.5 Research methodology ....................................................................................... 23

1.7.6 Data analysis and discussion of findings ............................................................. 24

1.7.7 Discussion of findings ....................................................................................... 24

1.7.8 Conclusion and recommendation ....................................................................... 24

1.7.9 Conclusion .......................................................................................................... 25

CHAPTER TWO ............................................................................................................... 26

OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY .............................................. 26
2.0 INTRODUCTION.......................................................................................................... 26
2.1 THE RISE OF OCCUPATIONAL HEALTH AND SAFETY .............................................. 26
2.1.1 The International Labour Organization (ILO) ............................................................. 27
2.1.1.2 Responsibility of the employer .................................................................................. 28
2.1.1.3 Responsibility of the employee .................................................................................. 29
2.1.2 The World Health Organisation.................................................................................... 29
2.2 A GENERAL OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY ................. 29
2.3 BARRIERS TO GOOD STANDARD OF HEALTH AND SAFETY ..................................... 33
2.4 REASONS FOR OCCUPATIONAL HEALTH AND SAFETY ......................................... 34
2.4.1 Moral reasons................................................................................................................. 34
2.4.2 Social reasons ............................................................................................................... 34
2.4.3 Economic reasons ......................................................................................................... 34
2.5 ROLES OF GOVERNMENT IN ENSURING GOOD OHS ............................................. 34
2.5.1 Global statues of occupational health and safety ............................................................ 35
2.6 HAZARD RISK MANAGEMENT ............................................................................... 36
2.6.1 Identification, assesment, risk control & monitoring ..................................................... 37
2.7 ESTABLISHING A SUCCESSFUL OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT .......................................................... 37
2.7.1 Policy ............................................................................................................................ 38
2.7.2 Organizing ..................................................................................................................... 38
2.7.3 Planning and implementation ......................................................................................... 38
2.7.4 Measuring performance ................................................................................................. 38
2.7.5 Auditing and reviewing performance ............................................................................. 38
2.8 OCCUPATIONAL HEALTH AND SAFETY AND SUSTAINABLE DEVELOPMENT ................................................................. 39
2.9 LESSON LEARNT ........................................................................................................ 41
2.10 CHAPTER SUMMARY ................................................................................................. 42

CHAPTER THREE ...................................................................................................................... 43
OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY IN DEVELOPING COUNTRIES ................................................................. 43
3.1 INTRODUCTION ........................................................................................................ 43
3.2 OCCUPATIONAL HEALTH AND SAFETY IN GHANA .............................................. 43
3.3 GHANA CONSTRUCTION INDUSTRY ................................................................. 46
3.4 HEALTH AND SAFETY LEGISLATION RELEVANT TO THE CONSTRUCTION INDUSTRY IN GHANA ................................................................. 48
  3.4.1 The Factories, Office and Shops act ................................................................. 48
  3.4.2 The Labour Act .............................................................................................. 48
  3.4.3 The Workmen’s Compensation law ............................................................... 49
3.5 HEALTH AND SAFETY IN SOUTH AFRICA CONSTRUCTION INDUSTRY ...... 49
  3.5.1 Occupational Health and Safety Act No.85 of 1993 ............................................. 49
  3.5.2 The Construction Regulation (CR) 2003 ............................................................. 50
3.6 THE SOUTH AFRICA CONSTRUCTION COMPANY COMPLIANCE TO OCCUPATIONAL HEALTH AND SAFETY ..................................................... 51
3.7 IMPACT OF HEALTH AND HIV/AIDS ON SOUTH AFRICAN CONSTRUCTION WORKERS ......................................................................................................... 52
3.8 LESSONS LEARNT .................................................................................................. 54
3.9 CHAPTER SUMMARY ............................................................................................ 55
CHAPTER FOUR ............................................................................................................. 56
HEALTH AND SAFETY IN NIGERIA ............................................................................. 56
4.1 INTRODUCTION ..................................................................................................... 56
4.2 DEVELOPMENT OF HEALTH AND SAFETY IN NIGERIA ................................. 56
4.3 NIGERIAN CONSTRUCTION INDUSTRY ............................................................. 58
4.4 HEALTH AND SAFETY IN NIGERIAN CONSTRUCTION INDUSTRY .................. 59
4.5 DEVELOPMENT OF HEALTH AND SAFETY IN NIGERIAN CONSTRUCTION INDUSTRY ................................................................................................. 60
4.6 CHALLENGES OF HEALTH AND SAFETY IN THE NIGERIAN CONSTRUCTION INDUSTRY ................................................................................................. 61
4.7 HEALTH AND SAFETY AMONG INDIGENOUS AND FOREIGN CONSTRUCTION FIRMS IN NIGERIA ................................................................................ 63
4.8 COMPARISON OF HEALTH AND SAFETY IN NIGERIA, GHANA AND SOUTH AFRICA .............................................................................................................. 63
4.9 LESSONS LEARNT .................................................................................................. 65
4.10 CHAPTER SUMMARY .......................................................................................... 65
CHAPTER FIVE .......................................................................................................................... 67
RESEARCH METHODOLOGY AND DESIGN ........................................................................... 67
5.0 INTRODUCTION .................................................................................................................. 67
5.1 RATIONALE OF THE STUDY ............................................................................................. 67
5.2 RESEARCH APPROACH AND STRATEGY .......................................................................... 68
5.3 RESEARCH AREA ................................................................................................................ 68
5.4 TARGETED POPULATION ................................................................................................. 69
5.5 SAMPLING ........................................................................................................................... 69
5.6 DATA COLLECTION ............................................................................................................ 70
5.7 INSTRUMENTS OF DATA COLLECTION .......................................................................... 70
5.8 DATE OF DISTRIBUTING QUESTIONNAIRE .................................................................... 71
5.9 DATA ANALYSIS ............................................................................................................... 71
5.9.10 Mean item score ............................................................................................................ 72
5.9.11 Exploratory factor analysis (EFA) ............................................................................... 73
5.12 RELIABILITY .................................................................................................................... 74
5.13 CHAPTER SUMMARY ..................................................................................................... 74
CHAPTER SIX ............................................................................................................................ 75
DATA ANALYSIS AND INTERPRETATION ............................................................................. 75
6.1 INTRODUCTION .................................................................................................................. 76
6.2 QUESTIONNAIRE ADMINISTERED .................................................................................. 77
6.3 PERSONAL INFORMATION OF THE RESPONDENTS .................................................... 77
6.4 ORGANISATIONAL CHARACTERISTICS ...................................................................... 78
6.5 OBJECTIVE ONE ................................................................................................................. 80
6.6 OBJECTIVE TWO ................................................................................................................. 81
6.7 OBJECTIVE THREE .......................................................................................................... 82
6.8 OBJECTIVE FOUR .............................................................................................................. 85
6.9 CHAPTER SUMMARY ..................................................................................................... 85
CHAPTER SEVEN ....................................................................................................................... 86
DISCUSSION OF FINDINGS ...................................................................................................... 86
7.1 INTRODUCTION .................................................................................................................. 86
LIST OF FIGURES

Figure 2.1: Occupational neglect circle
Figure 2.2: Model for successful health and safety management system
Figure 2.3: Relationships between occupational health, safety, and sustainability
Figure 3.1: Construction occupation and HIV prevalence
Figure 6.1: Age of respondents
Figure 6.2: Respondent categories of contractors


LIST OF TABLES

Table 5.1: Questionnaire survey

Table 6.1: Response rate from respondents

Table 6.2: Personal information of respondents

Table 6.3: Organization management and type of ownership

Table 6.4: Organization activity

Table 6.5: Client type

Table 6.6: Compliance with occupational health and safety

Table 6.7: Prevalent forms of accident on construction site

Table 6.8: KMO and Bartlett’s Test

Table 6.10: Rotated component matrix

Table 6.11: Cost implications of implementing health and safety management

Table 6.12: Mann-Whitney U test for significant differences between foreign and indigenous construction firms
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organisation</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standard Organisation</td>
</tr>
<tr>
<td>NBS</td>
<td>National Bureau of Statistics</td>
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<tr>
<td>OHSA</td>
<td>Occupational Health and Safety Act</td>
</tr>
<tr>
<td>SABS</td>
<td>South African Bureau of Standards</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
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<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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</tbody>
</table>
CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Health and safety in the workplace poses a great threat to the sustainable development of societies globally. The International Labour Organisation (ILO) (2001) posited that accidents and illness related to work contribute significantly to the yearly death ratio, thereby leading to a substantial loss in a country’s labour force. Despite the threat of health and safety to the sustainability of society, Umeokafor, Issac, Johnson, Umeadi et al. (2013) suggested that its development in Nigeria’s construction industry is still at the infancy stage with no precise regulation providing direction in health and safety management in the country. Spee (2006) proposed that the poor development of health and safety culture in the construction industry could be attributed to the low level of awareness towards occupational safety and health (OHS) in Africa as compared to the rest of the world. For instance, in the Western part of Africa, more focus is given to health problems such as malaria, water quality, cancer, child mortality and HIV/AIDS which have overshadowed occupational health problems.

Bima and Abdulateef (2015) submitted that occupational health problems in the construction industry are an unavoidable aspect of the job but they are manageable as indicated by safety records in the most advanced countries. However, in Nigeria authors such as Koehn et al.(2000), Idoro (2007) and Enhance et al.(2008) opined that in practice the occupational health of the construction workers is poorly managed, coupled with poor safety conditions of construction sites, thereby causing numerous accidents on the sites. Nnedinma et.al (2014) reported that the Nigerian construction industry still have a long way to go in minimizing the rate of accident and fatalities in the construction industry. This is as a result of hazardous
working procedures in the construction industry. Olutuase (2014) avowed that workers employed by large construction firms are less likely to be killed on the job than workers employed by small construction firms. The workers in small firms are often at an increased risk as their employers pay little or no attention to issues regarding OHS owing to the cost of employing a full-time safety and health professional or developing a comprehensive occupational safety and health programme in their organisation.

Regardless of the size of the construction firm, the low culture of OHS could be attributed to the emphasis on cost and time as the most significant measure of construction project performance. Recently Oke and Aigavoboa (2017) ascribed value as a significant measurement of project performance with little credence given to the safety of construction workers. Health and safety should also be recognised as a key performance indicator for construction projects in support of this assertion. Smallwood and Haupt (2005) posited that a construction worker’s performance would increase when the worker recognises that proper safety gadgets and equipment are provided on site, and a good health service is in place to take care of him or her in the case of accident occurrence.

Authors such as Needleman (2000), Edmonds and Nicholas (2002), and Umeokafor, Umeadi and Jones (2015) affirmed that most construction firms have come to recognise the importance of health and safety but its application has not been fully integrated into their daily activities. Most construction firms still approach the preventive form of health and safety with a major concentration on preventing accidents rather than the treatment of accident victimson construction sites. Bluff (2003) opined that another form of preventive approach is ensuring the designation of competent safety personnel on site with responsibilities of implementing and determining the required preventive safety measures to achieve maximum compliance.
Belel and Mahmud (2012) reported that in addition to the preventive strategies, a policy should be put in place to stipulate the procedure for the safety and health of construction workers. Mohammed (2003) indicated that large multinationals firms implied their safety policies and systems from their parent companies, but their construction workers are still confronted with some accidents and injuries on the construction site. This suggests that the absence of policies for health and safety, and not the concentration on preventive strategies by construction firms is the main reason for accidents on construction sites. Accidents on construction sites can be associated with the lack of implementation of or compliance with OHS policies and systems. This opinion led to assessing the compliance level of construction workers regarding health and safety policies and strategies employed by construction firms in Nigeria.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Umeokafor et al. (2015) reported that the Nigerian construction industry is highly segmented and fragmented involving professionals from different backgrounds who are tasked with the responsibility of ensuring the success of construction projects. Most of their meetings are held on the construction sites. Nwaogazie (2011) posited that the majority of the injuries experienced by construction professionals occur on construction sites. Agbede et al. (2015) affirmed that the activities occurring on the construction sites make the location prone to construction accidents. The injuries occurring from the accidents are responsible for the drop in the contribution of the construction industry to the country’s gross domestic product (GDP). Nguyen et al. (2015) expatiated further that when accidents occur, a shortage in construction professionals is experienced on the site, leading to time overrun and cost overrun for the firm regarding the compensation spent on hospital bills. In tackling safety on construction sites, foreign construction companies imported policies from their countries into
the Nigerian construction industry (Mohammed, 2003). Owing to the difference in culture and the structure between the Nigerian construction industry and other parts of the world, it is expected that they may have difficulty in complying with the health and safety policies of the foreign construction companies; hence the need for this study.

Idoro (2008) submitted that the construction industry is one of the major contributors when assessing the rate of occupationally related accidents, injuries and ill health within a country. Likewise, Ju and Rowlinson (2013) reported that all over the world workers in the construction industry have higher tendencies to be killed compared to other occupations with evidence pointing to 30 per cent of health and safety offences committed by the construction sector in Hong Kong in 2010. Baldacconi and Santis (2000) asserted that twenty-five percent out of the total work-related accidents in Italy occurred in the construction sector. The National Safety Council in the United States of America indicated that more than 30 percent of work-related fatalities are experienced in the construction industry. Comparing these situations to that of Nigeria, there is no reliable information or data on the percentage of work-related accidents attributed to construction industry, including the causes and the most prevalent forms of accidents occurring on the construction site.

According to Idoro (2004), there is no specific regulation and reference for health and safety with the majority of the regulations on health and safety developed by the British and Americans. However, in the manufacturing sector, health and safety is controlled by the Factory Act of 1990 in Nigeria, which is a local version of Britain’s Factory Act of 1961 which empowers the federal government of Nigeria to inspect manufacturing industries with the aim of sanctioning factories that do not comply with the statutory health and safety policy. Umeokafor et al. (2015) avowed that within the construction industry such a structure does not exist, thereby leaving the project managers, contractors or site manager to use their
discretion regarding safety issues on construction sites. However, most construction firms and construction clients are often more concerned about the time, cost and quality of their projects than about giving attention to the health and safety of their employees. These challenges become a threat for site managers in incorporating and balancing the health and safety of construction workers with the client’s needs.

Significant research has been conducted on construction workers’ safety and health. Idoro (2008) evaluates health and safety management efforts as correlates of performance in the Nigerian construction industry. Belel and Mahmud (2012) examined the safety culture of Nigerian construction workers and Olutuase (2014) conducted a study of safety management in the Nigerian construction industry. Agbede et al. (2015) evaluated the health and safety management practices in the Nigerian construction industry. All this studies failed to appraise the compliance level of construction professionals to health and safety regulations on site. This therefore creates a gaps in the study for construction health and safety.

1.3 RESEARCH QUESTIONS The questions this research aims to provide answers to are identified below as follows:

1. What is the level of compliance with the health and safety provisions of construction firms?

2. What are the prevalent forms of accident on construction sites within the study area?

3. What are the challenges confronting the site manager in ensuring the safety of construction workers on the construction sites?

4. What is the significant difference between indigenous and foreign construction firms regarding their level of compliance to health and safety provisions?
1.4 AIM AND OBJECTIVES OF THE STUDY

This study aims to assess the OHS compliance in the Nigerian construction industry.

The aim of this study will be achieved through the following objectives:

1. To examine the level of compliance with the health and safety provisions of construction firms;

2. To evaluate the prevalent forms of accident on construction sites within the study area;

3. To establish the challenges in ensuring the safety of construction workers on the construction sites;

4. To compare the levels of compliance between indigenous and foreign construction firms towards health and safety requirements.

1.5 SIGNIFICANCE OF THE STUDY

The findings of this study will be of benefit to the following

Firstly, this research will assist in determining the rate of compliance and enhancing the awareness levels on issues relating to OHS in the Nigerian construction industry. It will also contribute to improving the occupational health and safety culture within the construction industry which is expected to have a positive impact on improving construction project performance.

Secondly, application of the findings from this study will help propose new ideas and recommendations to help curb unsafe acts, unsafe conditions, and unsafe practices on construction sites.
Thirdly, this research will assist in bringing the attention of both international and national health and safety regulatory agencies, both in Nigeria and at the national level, to ways to curb unsafe acts and practices in the construction sector. It will also expose the challenges faced by contractors and site managers in ensuring a safety culture among construction workers on construction sites.

Lastly, it will contribute to the existing literature as a useful source of reference in the field of construction OHS management and act as a guide to further research to refine and extend the present study.

1.6 LIMITATION OF THE STUDY

This research was conducted in Lagos State which is located in the western part of Nigeria. Lagos state was chosen because of the rapid infrastructural development currently going on in the state. In addition, it hosts over two hundred construction companies that are currently handling various federal, state and private developments.

The study also focuses on evaluating the compliance rate among construction workers to health and safety practices. It further evaluates the challenges confronting contractors and site managers in ensuring the safety and health of construction workers, determining the cost implications of ensuring health and safety management and establishing the prevalent forms of accident on construction sites.

1.7 ORGANISATION OF DISSERTATION CHAPTERS

1.7.1 Chapter One: Introduction

This chapter presents the background of the study as well as the statement of the research problems that in return lead to the research questions. This chapter also shows the significance and limitations of the study.
1.7.2 Chapter Two: Literature review: An overview of health and safety

The chapter provides a conceptual and theoretical framework relating to health and safety by reviewing literature from textbooks, conference proceedings, and peer-reviewed journals.

1.7.3 Chapter Three: Literature review: An overview of health and safety in developing countries

This chapter presents the evaluation of the health and safety measures in a developing continent such as Africa. It illustrates the level of compliance and factors that lead to non-compliance in construction sites. This chapter also presents the discussion of findings which entails comparing the findings from this research with previous studies, focusing on two developing countries in Africa.

1.7.4 Chapter Four: An overview of health and safety in Nigeria

The chapter focuses on health and safety compliance in the Nigerian construction industry as well as the conclusion based on the findings from the data analysis. In addition, areas of further research are suggested. Finally, it summarises the challenges facing the health and safety compliance in the Nigerian construction industry and suggests recommendations in the final chapter to improve the existing lapses.

1.7.5 Chapter Five: Research methodology

The chapter explains the research methodology used to assess the level of health and safety compliance in the construction industry. In this section, the researcher randomly selected employees of indigenous and international construction companies in Lagos which is the
western part of Nigeria. A questionnaire was distributed; the responses obtained were regarded as the opinion of the employees in both classifications of the construction companies in Nigeria.

1.7.6 Chapter Six: Data analysis and discussion of data

When the opinions had been collated from the respondents, the data was analysed to determine the level of compliance on matters relating to health and safety on construction sites. The analysed results illustrate the level of compliance towards health and safety on construction sites in Nigeria.

1.7.7 Chapter Seven: Discussion of Findings

The findings from Chapter Seven are discussed and linked to the literature review of Chapter Two to determine whether the research objectives have been achieved and all the research questions answered.

1.7.8 Chapter Eight: Conclusion and recommendations

In this chapter, the researcher provides the answers to the research questions, confirms that the research objectives have been met and provides a further recommendation for future studies.

The recommendations may be measures that must be taken to improve health and safety compliance in the Nigerian construction industry and measures to ensure compliance with health and safety standards.
1.7.9 CONCLUSION

This chapter introduced the study, the various components of the study, and a description of how it was carried out. Moreover, the research problem was highlighted, and the research questions, objectives, and purpose of the study were outlined.

The chapter defined the term ‘occupational health and safety’ and its importance in the construction industry. It also outlined the main contributions to the poor safety culture among construction professionals. Furthermore, this chapter proposed research questions towards examining the level of compliance with health and safety. It also outlined the significance of this research along with the scope and limitation of this study. Finally, the chapter presented the layout of the various chapters making up the study.
CHAPTER TWO

OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY

2.0 INTRODUCTION

This chapter highlights the basic background information on the study, describing the contents of this study which will facilitate an overall understanding. This chapter also provides an overview of Occupational Health and Safety. It illustrates the importance of Occupational Health and Safety in various sectors.

2.1 THE RISE OF OCCUPATIONAL HEALTH AND SAFETY

OHS matters were previously viewed as each company’s own problem, with little attention paid to OHS. After the various industrial-based disasters in Europe, especially the Flixborough accident in 1974 that wiped out an entire village, OHS became a vital part of any organisation (Venart, 2007). However, occupational safety has grown since then so that early in 1980 enhanced safety management principles were introduced by some large multinationals such as Shell (Mohammed, 2003). Ahasan and Partanen (2001) suggested that the safety management system was what led to the establishment of OHS for the workers in the organisation.

LaDou (2003) gave a contrasting opinion and suggested that OHS was developed from the first meeting of the International Labour Organisation in 1950, aimed at promoting and maintaining the best degree of physical, mental and social well-being of workers from all occupations of life. Hudson (2001) also opined that the development was centred on
preventing hazards to workers caused by their working conditions and protecting the workers against physical, emotional and psychological harm.

Asogwa (2007) reported that different bodies had been established to ensure that issues relating to occupational health and safety are given adequate attention. These organisations provide various health and safety policies and regulations to which various sectors must adhere. Jilcha and Kitaw (2017) were of the opinion that the most popular health and safety agencies are the International Labour Organisation (ILO) and the World Health Organisation.

2.1.1 The International Labour Organisation (ILO)
The ILO was established before 1951 in Geneva, Switzerland under the League of Nations to promote international labour standards and the improvement of working conditions (Charnovitz, 2000). Adeogun and Okafor (2013) affirmed that ILO was the first specialised agency of the United Nations (UN) attempting to provide global standards relating to OHS.

The agenda of ILO and their standards along with recommendations were approved and adopted by the annual International Labour Conference held in Geneva. The ILO is a body made up of representatives from governments, employers, and employees (Asogwa, 2007). It has regional offices in Africa, Asia, Europe, Latin America, and the Middle East with half of the members elected from governments and a quarter from the employer and worker groups (Alli, 2008). The health work of the ILO included safety and health for all varieties of workforces ranging from chemical and other industrial risks, hygiene of seamen, social and medical insurance systems and workmen's compensation. Aliyu and Saidu (2011) reported that the ILO collaborates with the WHO in organising numerous conferences relating to
occupational health and safety with the outcome from the conferences published in international magazine guide for slips sanitation.

The conferences focus on improving working conditions and emphasising the improvement of occupational safety and health, working among different working organisations (ILO, 2013).

2.1.1.2 Responsibilities of the employer

The obligations of the employer include the following:

- The employer must ensure that the office or work environment, the equipment used by the workers and the process under their control are without risk to health.
- The employer has a responsibility to ensure that the work is designed, equipped, constructed and operated in a way that employees’ health and safety are not put in danger when performing their duties.
- Adequate protective equipment and clothing must be available to workers with the intention of preventing accidents that could have effects on the health of the workers. The protective equipment should also be in acceptable quantities to prevent sharing of protective equipment among workers.
- The employer should provide health and safety policies that are easily accessible for the employee to assess and read.
- The employer should provide codes of practice to ensure the enactment of health and safety standards.
- Training regarding health and safety must be conducted on a routine basis for the employees, detailing the instructions that will facilitate them to perform their obligations without any risk to their health. The ILO advised that the training must be provided before the employee resumption of work. After the training the employee should be able to identify potential risk and measures to eliminate or reduce risk.
The employer must ensure that a competent accident investigation team performs a thorough investigation in the event of an accident occurring within the organisation with the health and safety representatives on site to ascertain the major cause of the incident with the view to preventing a future occurrence.

They should appoint a representative for health and safety who should be available for monitoring the employees and teaching them about safety cultures.

2.1.1.3 Responsibilities of the employee

- The employees should be responsible for their safety and the safety of others they work with while at work.
- They should be ready to comply with the directions provided by the employer regarding their health and safety status.
- The employees should report a workplace accident to the employer immediately it occurs.

2.1.2 The World Health Organisation (WHO)

In 1948 the United Nations formed the World Health Organisation (WHO) to be a body that specialised in health issues around the world, with its headquarters in Geneva, Switzerland. It has the responsibility for global health. Its mandate was to compile a report on OHS issues at the First Joint WHO/ILO Committee on Occupational Health held in 1950. It also highlighted the purpose of occupational health (Asogwa, 2007). Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in various sectors of industry; the prevention of work-related accidents, injuries, illnesses, diseases and fatalities among workers of different sectors; ensuring the provision of suitable working conditions and a safe environment that will not pose risk or exposure to hazard owing to its negative implications on the well-being of the workers; the placing and maintenance of the workers in a conducive occupational environment suitable to their physiological and psychological well-being; ensuring the provision of adequate and suitable working tools and equipment; and the adaptation of work to man and each man to his job.
2.2 A GENERAL OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY

Verma et al. (2002) define health and safety as a broad subject that combines different subjects such as biology, physics, chemistry, engineering, psychology, and law which implies that health and safety connect with all disciplines. Jilcha and Kitaw (2017) opined that a German philosopher, Schopenhauer, gave a high significance to health and safety when he opined that health is not everything, but without health everything is nothing. The importance of OHS helps in anticipating, recognising, evaluating and controlling hazard at the workplace which poses dangers and impairs the lives and well-being of the workers, not forgetting the damage or destruction on the surrounding communities and the environment in general.

Nguyen et al. (2015) gave another description of OHS and affirmed that it is the discipline concerned with protecting the health, safety, and welfare of people who are engaged in a work environment or organisation. It illustrates the two opinions with which OHS are concerned which include minimising or preventing the loss that occurs in the workplace. It also includes the protection of human, environmental and physical assets of any workplace. In support of this assertion Mohammed (2003) concluded that OHS is concerned with minimising loss by assisting in the preservation and protection of employees, equipment, and the environment.

Belel and Mahmud (2012) saw issues regarding OHS from a different perspective and concluded that OHS addresses moral, social and economic issues.

A large percentage of a country’s income is derived from its labour force. Therefore Chen (2004) posited that for a country to improve its economy and infrastructural development, it must make issues of OHS its priority. Canning and Bloom (2005) suggested that a country’s economy will keep thriving when the issues concerning the health and safety of the workers
within the country receive adequate attention. It includes helping in the reduction of accident rates, sickness rates, fatality rates, loss of production time, loss of equipment, low staff morale, cost as a result of treating work-related injuries, compensations, penalties, punishment and fines imposed by the health and safety regulatory agencies due to accidents.

Alkilani et al. (2013) inferred that occupational health has the impact on the economy because a healthier labour force will result in enhanced productivity of any organisation. Okolie and Okoye (2012) also stated that occupational health could serve as a tool to break the cycle of poverty because a healthy worker will be more productive and in return earn more salary or wages.

However, despite numerous efforts made by the OHS regulatory agencies towards the realization of a safer workplace that will ensure the reduction of work-related injuries and accidents, it has not made a significant impact in most developing countries owing to the absence of an apolitical mechanism for transforming scientific findings into policy (Dabup, 2012; Tawiah, 2013). Nguyen et al. (2015) asserted that most policymakers in developing countries are more concerned about pressing needs such as the prevalence of malaria, HIV/AIDS, Ebola, water-borne diseases and cancer than forming policies from scientific findings and ensuring the implementation of relevant laws relating to OHS. Dahun, (2013) gave another reason for poor health and safety in developing countries are as a result of poor research into the development of a good health and safety culture. Belel and Mahmud (2012) opined that the reason for poor health and safety in developing countries is attributed to the improper way various research is conducted as occupational health researchers in developed countries concentrate on and investigate the effect of work on health while in developed countries the focus is more on identifying various workplace hazards and eliminating hazards from the source.
Alli (2008) gave another reason for poor health and safety in developing countries and related it to poor enforcement. The author opined that large multinationals own most of the large organisations and as such they are difficult to shut down even when they fail to adhere to various health and safety regulations. Bloom et al. (2004) revealed that occupational health is usually given little or no attention in developing countries. Provided below is an occupational neglect cycle which displays the factors responsible.

![Occupational neglect circle](image)

Figure 2.1: Occupational neglect circle
Source: Bloom et al. (2004)

Koehn, Ahmed, and Jayanti (2000) suggested that OHS issues are worse in the developing countries like especially Africa and Asia. Joubert (2002) reported that Africa is particularly fraught with insecure working circumstances in industries such as mining, construction, and manufacturing. Likewise, Alli (2008) submitted that most countries in Africa give little or no attention to the health and safety of their employees
2.3 BARRIERS TO GOOD STANDARD OF OCCUPATIONAL SAFETY AND HEALTH

Canning and Bloom (2005) opined that the barriers to health and safety in a workplace could be related to the complexity, conflicting demands, and behavioural issues among employees and the employers.

The author went further to illustrate that complexity in the place of work refers to the difficulty in coordinating workers doing diverse activities because if the coordination is not properly handled, it will hinder a smooth and easy organisation of activities which has the potential of increasing the risk in the workplace. The conflicting demands refer to a situation when workers find themselves in a dilemma to choose between performing a task to meet the objective of the organisation without taking into consideration the risk involved in getting the job done. Conflicting demands include concentrating on the quantity of production rather than the safety of the employees. It is often reported that some organisations encourage employees to indulge in unacceptable production processes to meet their demands rather than giving equal attention to the health and safety issues or the risk associated with the production process.

The behavioural attitude is centred on the personal attitude of the worker towards the health and safety policies introduced by the employer. Wesseling et al. (2002) maintained that the behavioural attitude is the most difficult to manage during OHS training because the attitude is subjective, and it varies among different workers.

Olutuase (2014) reported that most organisations in the construction sector focus on making profit rather than giving adequate attention to issues concerning the OHS of the employees. This has a negative impact on the general development of the construction sector.
2.4 REASONS FOR OCCUPATIONAL HEALTH AND SAFETY.

According to Nuwayhid (2004), the motives or reasons for an organisation to manage health and safety are moral, social and economic.

2.4.1 Moral reason: This relates to the ethical obligation that an individual has for another since many people are killed or made sick in the course of performing their job.

2.4.2 Social reason: This encourages the employer to abide by the laws that govern the business of an organisation in ensuring the safety of the employees. Su Li et al. (2016) stipulate that the employer should ensure that the workplace is safe and free from hazards and adequate training should be given to the employees regarding safety precautions.

2.4.3 Economic reasons: This associated with the cost that will be sustained if there is an accident at the place of work. It entails a direct and indirect cost. The direct cost is the money spent on treating the worker, the repair of damaged equipment or buildings, and loss of damaged product, loss of product and loss of production time. This has a direct impact on the organisation. The indirect cost is the money spent on remedial actions such as accident investigation, the cost of treatment and rehabilitation of the injured, loss of staff morale and the low performance of the injured workers.

2.5 ROLES OF GOVERNMENT IN ENSURING GOOD OCCUPATIONAL HEALTH AND SAFETY

According to Nwafor (2005), the government of any country is charged with the responsibility of ensuring that there are improvements and advancements in the OHS of its citizens. Likewise, Belel and Mahmud (2012) stipulated that the onus is on the government to provide a permanent development for the continuous improvement of OHS towards building or creating a preventive safety and health culture. Nguyen et al. (2015) stressed that the
responsibility for drawing up OHS policies and also ensuring the enforcement of the policy falls on the government. The author further stated that the policies have a high chance of being implemented if the workers and employees are involved in the formation of the policy. Aliyu and Saidu (2011) suggested that the government should provide facilities to ensure the investigation and research of hazards to facilitate the prompt identification of hazards around the workplace. Charnovitz (2000) proposed that the government participate by sending surveillance and monitoring systems to ensure that safety standards are implemented.

2.5.1 GLOBAL STATUS OF OCCUPATIONAL HEALTH AND SAFETY.

According to a report by the ILO (2003), about two million occupational accidents occur globally yearly with the occupational hazards related to cancers after exposure to chemicals and falls when working. Ezenwa (2001) stated that the fatality rate is highest in sub-Saharan Africa with approximately 30 out of 100 workers experiencing occupational hazards. In West Africa, especially Nigeria, the occurrence of occupational hazards is high considering the law enforcement and corruption within the country. Also, Gilding et al. (2002) submitted that in some parts of Asia the OHS is also poor. Hämäläinen et al. (2009) observed that in developed countries such as the United States of America and England the OHS has improved, but the reverse is the case in developing countries.

Hughes and Ferrett (2007) suggest that there are numerous indications that have revealed that there are plenty measures of providing data regarding health and safety performance, though most companies prefer a single performance measurement. Olutuase (2014) maintained that no single measurement can completely measure OHS management. Bloom, Canning, and Sevilla (2004) further indicated that the management of OHS issues is still at its infancy stage.
with no precise policy, especially in developing countries in Africa and Asia. The Nigerian construction industry is no exception.

LaDou (2003) reported that the reasons for the maturity of OHS in developed countries could be related to the high awareness and attention given to OHS and the numerous research studies in ensuring the effective OHS of workers. According to Nuwayhid (2004), on the other hand, developing countries, especially the countries on the African continent, still concentrate on increasing the productivity and profitability but sadly while giving little or no concern to their worker’s safety.

Alhajeri (2011) indicated that the WHO and ILO have advanced the development of global health and safety programs especially in developing countries, but the bodies are confronted with challenges such as insufficient funding, corruption, and ignorance of the importance of health and safety. Mberia (2001) opined that health workers and industry owner’s perceptions of health and safety are a major challenge hindering global intervention in OHS in developing countries as most health workers and industry owners still perceive health and safety as a luxury instead of a necessity.

2.6 HAZARD RISK MANAGEMENT

OHS management in an organisation cannot be complete without the identification of risk. Shannon et al. (2001) opined that for an effective OHS practice in any organisation, hazard risk management should be incorporated into their health and safety policy. Idoro (2011) reported that hazard risk management consists of four processes, namely identification, assessment, risk control, and monitoring.
2.6.1 Identification: This process involves preparing a register that contains all the possible hazards within the workplace. Okojie (2010) submitted that this register should be updated on a monthly or quarterly basis.

Assessment: After the identification of the hazard, at this stage the safety officer or administrator groups the hazard risk into major, medium, and minor risk hazards.

Risk control: This step involves controlling the risk with the assumption of reducing or eliminating the risk occurring within the organisation.

Monitoring: This is the last stage. It involves seeking the opinion of the workers about the effectiveness of the risk control measures.

2.7 ESTABLISHING A SUCCESSFUL OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

Authors of Health and Safety Executive (2000), Ramroop et al. (2004) and Adeogun and Okafor (2013) presented a model for successful OHS management. Stewart (2015) describes a model as a representation of a real-life activity which can be in the form of a mathematical equation, diagram or verbal representation. The model adopted in this study is in the form of a diagram presentation and is shown below Figure 2.2: Model for successful health and safety management system Source: Adapted from Health and Safety Executive (2000), Ramroop et al. (2004) and Adeogun and Okafor (2013)

2.7.1 Policy: This is the first step in developing a successful OHS management system. Okojie (2010) suggested that the members of the organisations should be directly involved in the formation of the policy and it should be displayed in such a manner that it is easily visible to all members of the organisation. Wazir (2013) recommended that the policy set the direction for the organisation to follow regarding OHS. The policy should be appropriate for the job function of the organisation.
2.7.2 Organising: This is the next step towards building an effective OHS management system. This step entails the creation of a structure or process that will facilitate the workers, human resource manager, and safety personnel to work effectively towards achieving the objectives of the safety policy. Also at this stage, the organisation needs to stipulate and define the responsibilities of all the parties (the workers, human resource manager, and safety personnel) to promote an optimal health and safety culture while ensuring the continued implementation of the health and safety policy.

2.7.3 Planning and implementing: A successful OHS management system cannot be achieved without adequate planning. According to Aliyu and Saidu (2011), planning entails the strategy for achieving the objectives of the OHS policy. The planning scheduled by the organisation should be able to cover the current situation of the health and safety situation of the organisation, the expected OHS standards, and the means of achieving the health and safety standard of the organisation.

2.7.4 Measuring performance: This is the fourth stage of a model for building an effective
OHS management system. The performance involves the organisations’ measuring the effectiveness of their activities in meeting the policy they formed by them and their plan for developing a positive health and safety culture. Charnovitz (2000) believed there are two major ways of sourcing information regarding performance measurement, namely active and reactive systems.

**Active system:** This involves the monitoring of the compliance with prescribed safety standards. It is achieved by routine procedures to monitor specific objectives.

**Reactive system:** This is done after accidents have occurred. The safety personnel investigates the factors responsible for the accidents with the view to determining whether the factors responsible for the accident are due to the negligence of the worker or the poor health and safety policy of the organisation.

**2.7.5 Auditing and reviewing performance:** This is the last stage that involves obtaining information regarding the efficiency of the health and safety management system and drawing up plans for corrective action. Adeogun and Okafor (2013) proposed that reviewing should be a continuous process, either monthly or quarterly. Auditing and reviewing performance is the last stage of the process of building a successful health and safety management system. This process enables the organisation to manage risk and improve health and safety as they learn from experience using audits and performance reviews.

**2.8 OCCUPATIONAL HEALTH AND SAFETY AND SUSTAINABLE DEVELOPMENT**

Sustainable development can be described as the optimal use of resources. Gilding, Hogarth, and Humphries (2002) affirmed that sustainable development entails the process of meeting
the requirements, needs or wants of the present without jeopardizing the future generations. It should also prevent harm to the present generation environment while protecting their health. This definition recognises that sustainability can be attributed or related to health and safety although, linking or relating OHS with sustainable development. In support of this assertion, Smallwood and Haupt (2005) submitted that the impact of OHS on sustainable development, especially in developing countries, has a low significant implication because the industries are not well developed.

Nuwayhid (2004) stated that health and safety could be related to sustainability because an unsafe and unhealthy workplace means that sustainable development cannot be attained. Jilcha and Kitaw (2017) point out that OHS and sustainable development are developed around three P’s (people, planet, and profit). The authors went further to assert that the people represent the workers of any organisation, the planet accounts for the environment and the profit refers to the economy. Spee (2006) submitted that poor functioning of one of the P’s will hinder the total performance of other P’s; for instance if the workers who represent people are exposed to hazards at work, it will in turn impact the economy (profit) and the environment (profit).

Dahun (2013) presented scenarios where health and safety impact sustainable development by stating that poor OHS reduces the capacity of workers and in turn leads to economic loss of the country. Verma, Purdham and Roels (2002) also asserted that globally occupational accidents and illness are responsible for the loss in gross domestic product which further hinders sustainable development. Joubert (2002) provided a diagrammatic relationship between OHS and the environment and sustainability.
Figure 2.3: Relationships between occupational health, safety, and sustainability

Source: Joubert (2002)

The figure 2.3 shows that sustainability is an integration of all the three P’s and without the improved working conditions and enhanced OHS organisations will not be able to achieve sustainable development.

2.9 LESSON LEARNT

Reviews of the literature indicate that health is a vital part of human capital and it enhances the productivity of workers who in return boost the economy of the nation. A healthy worker is a happy worker, and as such, will be loyal to the organisation. The reviewed literature also shows that an organisation that is fully committed to improving the health of the workers will have a low turnover of staff, high morale, reduced absenteeism, low accident and incident rates, and a low number of work-related fatalities or injuries.
Providing safety equipment alone cannot ensure the effective implementation of a health and safety policy among construction workers without adequate training and re-training of the workers on the importance of health and safety.

2.10 CHAPTER SUMMARY

This chapter presented an overview of OHS as it reviewed the development of OHS, provided definitions for OHS, barriers to OHS, and the listed the responsibilities of the employer /employees, and outlined a successful management policy of OHS in an organisation.
CHAPTER THREE

OCCUPATIONAL HEALTH AND SAFETY IN DEVELOPING COUNTRIES

3.1 INTRODUCTION

This chapter reviews the OHS in developing countries using Ghana and South Africa as case studies. It begins with Ghana as it examines the prevalent OHS policy in Ghana, the construction industry in Ghana and the OHS in the Ghanaian construction industry. It proceeds further to examine the OHS policy in South Africa and the health and safety policy in the South Africa construction industry.

3.2 OCCUPATIONAL HEALTH AND SAFETY IN GHANA

OHS in Ghana was in existence before the Factories, Offices, and Shops Act of 1970, but the Act increased the level of awareness of health and safety features of Ghanaian citizens. Clarke (2005) suggested that, just as in other countries, health and safety in Ghana grew by the development in industrialisation which implies that a substantial section of the Ghanaian population is exposed to physical, chemical, biological and psychological workplace stress.

Kheni et al. (2008) reported that the Ghanaian government recognized the risk of occupational health and safety to their labour force and promulgated legal measures such as the Health Service and Teaching Hospital Act 526 (1999), the Ghana Labour Act of 2003 (Act 651), the Ghana Atomic Energy Act 204 of 1963 that was developed out of radiation protection instrument L1 1559 of 1993, and many others with the intention of protecting their workers. Avotri and Walters (2009) opined that the above legislation and laws operate under different organisationsto facilitate the prompt enforcement of the law. However, according to Amedofu (2002), despite the numerous laws and regulations relating to OHS, Ghanaian citizens are still exposed to occupational health and hazards daily. The author further
associated the poor health and safety culture in Ghana with the high rate of corruption experienced in public organisations.

Danso (2005) maintains that the poor health and safety culture in Ghana that is responsible for frequent work-related injuries, illness, low productivity of workers and property damage is due to the low level of awareness of health and safety. Agbenorku et al. (2010) submitted that the lack of prescribing rules and regulations for health and safety coupled with under-reporting of occupational hazards by most industry administration hinders the growth of OHS in the country. Amweelo (2010) related the poor performance of health and safety in Ghana to the failure in ratifying the International Labour Organisation Convention number 155 which implies that OHS in Ghana is not in full compliance with the international requirements. The subsequent section examines the existing situation of health and safety in Ghana with the view to determining the gap in health and safety in Ghana and type of accidents in Ghana.

Clarke (2005) reported that the common factor in the numerous acts and legislation related to OHS in Ghana is that all the laws have an inspectorate division that guides the companies or organisations regarding the implementation of safety guidelines and investigations into occupational hazards. Annan et al. (2015) pointed out that the inspectorate is also responsible for inspecting the safety equipment and features of an organisation before the granting of permission on establishing an organisation. Ackerson and Awuah (2010) posited that the inspectorate is more effective in the mining industry compared to other industries. According to Annan (2010), the inspectorate in the mining industry of Ghana is effective because it is made up of representatives from all the mining companies with meetings once a quarter. Taiwiah and Mensah (2016) stated that despite this good initiative in the mining sector and
another sectors in Ghana, the level of OHS is still regarded as low compared to developed nations owing to corruption and a lack of adequate resources.

Gyekye (2006) related the inferior performance of health and safety in Ghana to the policies surrounding health and safety as most of the policies are reactive like the workmen’s compensation law that is concerned about compensating injured workers: low concentration is placed on monitoring the working conditions of the worker. The Ghana Health Service (2007) provided another reason, stating that Ghana is confronted with the challenges of implementing OHS and relates it the absence of a comprehensive national OHS policy in the country. Annanet al. (2015) opined that there are some legal provisions for health and safety in Ghana, but they are restricted to certain sectors such as mining, manufacturing, and shipping while excluding other sectors such as the construction industry which contributes significantly to the economic development of the country. Amedofu (2002) submitted that the available legal provisions for health and safety in the country require substantial modifications or alterations to meet international requirements and standards.

Muchiri (2003) pointed out that another drawback to the effective implementation of OHS in the country could be attributed to inadequate and untrained OHS professionals or practitioners, coupled with a lack of appropriate supervision and investigation into occupational diseases and injuries. Another challenge with OHS in Ghana is because of frequent exposure of Ghanaian workers to risk and diseases (Ghana News Agency. 2009). Ghana’s National Disaster Management Organisation reported in 2013 that approximately 11,000 Ghanaian workers were affected by a fire outbreak that was responsible for numerous cases of property damages and loss of lives. Avotri and Walters (2009) buttressed that the lack of or inadequate sanitary facilities such as poor toilet facilities and accessible running
water poses some form of health challenges to workers as they are exposed to diseases such as diarrhoea, cholera, and malaria.

Danso (2005) stated that the educational sector has not been able to contribute to the awareness of OHS in Ghana as there is no accredited course for specialisation in studying OHS with the available training programmes run by international agencies. There is also inadequate research into OHS (OHS) in Ghana with most of the research concentrated on the causes of OHS issues such as OHS diseases in Ghana (Agbenorku et al., 2010; Amedofu, 2002). Avotri and Walters (2009) examined women’s health in their workplace and other research indicated that there was only a concentration on health risks in the workplace. The findings from this research indicated that there are numerous occupational risks in the construction and mining sector in Ghana.

3.2 THE GHANA CONSTRUCTION INDUSTRY

The Ghanaian construction industry, like every other construction industry in the world, contributes to the economy of Ghana by providing the infrastructure which accounts for almost 21.9 per cent of the industrial output. It also employs a considerable number of youths as it employs both skilled and unskilled labour (Baah-Nuakoh, 2002). Laryea and Mensah (2010) affirmed that the construction industry in Ghana could be divided into two sections, namely the formal and the informal sectors. The authors went further to assert that the formal sector was inherited from the British before independence. Wells (2001) proposes that this system should be abolished because some of the institutional structures, especially the procurement system proposed by the British colonial masters which are not effective because the level of development and industrialisation in Ghana is different from that of the British. The informal sector is characterised by small builders and clients concerned about erecting
single dwelling houses for their families with the labour mainly comprising of family members and artisans.

Gibb (2005) reported that the construction industry in Ghana adopts labour-intensive methods rather than equipment or capital-intensive method for constructing infrastructures such as dams, bridges and much more owing to the cheap labour available in the country. Kaplinski, (2002) posited that apart from cheap labour contractors, Ghana adopts labour-intensive methods owing to the difficulty in providing capital for equipment and machinery as most contractors in Ghana experience difficulty in accessing credit from banks. Nuwayhid (2004) pointed out that the construction industry in Ghana consists of foreign and indigenous firms, with the foreign firms undertaking large construction projects and the domestic firms undertaking and bidding for small construction projects. It can be confirmed that the construction industry in Ghana is still indirectly controlled by foreigners owing to foreign construction companies undertaking the large projects. It can also be deduced that the banking sector does not provide support for small-scale or local construction industry within the country owing to the fear of uncertainty of their funds.

Mustapha et al. (2016) investigated health and safety accidents in the Ghanaian construction industry and discovered that the industry is responsible for the highest rate of deaths related to the workplace. Kheni et al. (2008) evaluated OHS practices among indigenous Ghanaian construction firms and discovered that there is inadequate government support for health and safety regulatory institutions. Lack of skilled human resources and poor institutional frameworks regarding OHS are the major barriers to good OHS within the construction industry.
3.4 HEALTH AND SAFETY LEGISLATION RELEVANT TO THE CONSTRUCTION INDUSTRY IN GHANA

There are no precise health and safety regulations for the construction industry in Ghana despite the high-risk nature of the construction industry, although there are some OHS policies that can be adopted for the construction industry. These are discussed in the subsequent sections.

3.4.1 The Factories, Offices, and Shops Act (1970)

The Factories, Offices and Shops Act that was enacted in 1970 and as the name says, the Act caters for factories, offices, and shops (Brace et al., 2009). Kheni et al. (2008) reported that under this Act the construction industry is categorised under offices and factories with the construction site being regarded as a factory. Yankah (2012) stated that the Act empowers the minister for labour and development works to enforce the law. Various sections of the law cover building and civil engineering works, such as section 5, 7, 6, 8, 12, 20 and 25. The Act enforces construction firms to register their sites, provide protective equipment for construction workers, and make basic amenities available such as toilet facilities and drinking water. In addition, the machines on site should be recorded and a record kept. Annan (2010) stated that hazards according to this Act were classified as noise, manual handling, and vibrations, among others with the stipulation that medical supervision should be given to construction workers on site. Puplampu and Quartey (2010) reported that the Act has not been effective owing to the absence of standards, thereby making the Act difficult to enforce and achieve full compliance.

3.4.2 The Labour Act (2003)

This Act is not mainly about OHS, but section 15 of the Act 2003 stipulates that every employer should ensure that the employees work under satisfactory health and safety
conditions. This Act can also be adapted to the construction industry by ensuring that the contractors make sure the workers are safe on site (Ackerson & Awuah, 2010).

3.4.3 The Workmen’s Compensation Law
Danso (2005) opined that this law is a reactive law because it only functions after hazards have occurred at the workplace. Hamid et al. (2004) stipulated that the law imposes employers to pay the cost of the treatment of the injured employee that was injured while performing his duty at the workplace. However, there are exceptions to the law as the employers will not be held liable when the employees are under the influence of alcohol or drugs, where the employees deliberately inflicted harm on themselves or when the employees provide false information regarding their health status.

3.5 HEALTH AND SAFETY IN SOUTH AFRICAN CONSTRUCTION INDUSTRY
The major acts that apply to the construction industry of South Africa regarding health and safety are the Occupational Health and Safety (OHSA) Act no 85 of 1993 and Compensation for Occupational Accidents, Injuries and Diseases of 1993. Both health and safety acts substituted the Machinery and Occupational Safety Act, and the Construction Regulations of 2003 as stipulated by section 43 of the Occupational Health and Safety Act of 1993. This study concentrates on the Occupational Health and Safety Act of 1993 and Construction Regulations of 2003 as important requirements for the site during an inspection are sourced from these acts.

3.5.1 Occupational Health and Safety Act no.85 of 1993
This legislation is an important legislation controlling occupational health and safety in South Africa which concentrates on individuals within and outside the workplace. The individuals outside the workplace include the family of the workers. The Act defines the
workplace as any location or place where an individual performs a duty to his or her employer. For a construction worker, a workplace may be any location where work-related activities are performed and provides consultation to the client with the view of doing the client’s bidding. This implies that the site or office can be a workplace for a construction worker. The Act also defines an employer as anybody that creates a job for any person while also paying such individuals. The employer is responsible for the health and safety of the employees, including any individual that enters the workplace. Under the Act, the work environment is ascribed as safe when the systems, machinery, and substances that can cause harm are secured with adequate knowledge provided for the employees on the use of the substances. The Act defines an employee as an individual that works under the supervision of an employer towards meeting the objective of the employer in return for remuneration. The Act recognises that the employee is the one exposed to occupational hazards and thus impose on them the onus for reporting hazardous conditions or incidents that occur in the workplace.

The OHSA has many regulations and guidelines that safeguard workers working in numerous industries, and it provides rules that the employers and employees should comply with while working. Weil (2001) perceives OHSA as an effective tool for creating a society that is aware of their OHS towards building the value of human dignity, equality, and freedom. The OHSA Act was established for every type of work in South Africa as opposed to the Construction Regulations of 2003 that were specifically created for the construction industry.

3.5.2 The Construction Regulations (CR) 2003

The Construction Regulations were developed for the construction industry because of the poor health and safety practice record of the construction industry, with the intention of reducing OHS hazards by promulgating legislation and rules that apply to the construction industry. The Act recognises every member of the project team, including the clients,
designers and quantity surveyors, with each member having different responsibilities and roles (Smallwood & Haupt 2005). For instance, the client is expected to relate to the contractor regarding the health and safety of the site and make sure that the contractor makes financial provision for health and safety on construction sites. The designers are expected to inform the client and contractor about the hazards or dangers occurring from implementing a design and also specify the protective equipment to use for a particular design. The quantity surveyor is expected to identify the hazards and provide a financial sum that will be required as a result of the damages from the hazard.

According to Smallwood et al. (2009), the Construction Regulations have made a positive impact towards eliminating the OHS accident hazard in the construction industry as awareness among construction project team members has increased regarding the importance of health and safety. Agumba and Haupt (2009) opined that creating health and safety legislation increases the effectiveness and awareness of occupational hazards identification to implement corrective measures that will provide guidance, regulations, and rules to enhance the eradication of unsafe practices, unsafe conditions, and hazards elimination. Management skills are essential for the effective implementation of OHS practice. Windapo (2010) opined that the Regulations facilitated the integration of OHS at various stages of construction projects.

3.6 SOUTH AFRICA CONSTRUCTION INDUSTRY COMPLIANCE TO OCCUPATIONAL HEALTH AND SAFETY

Compliance can be described as the process of following and abiding by a prescribed rule and standard (Ally & Esau, 2010). It further illustrates the procedure by which construction professionals adhere to certain rules and regulations relating to their profession. Goldenhar et
al. (2000) concluded that compliance is a process where a group of individual completely accepts the constitutional paradigm that is embodied in the legislation.

However, despite the enforcement strategies put in place to ensure compliance with the OHSA, the OHS compliance records have not improved significantly, thereby making the OHS a major form of concentration for construction researchers, industry stakeholders and the government (Agumba & Haupt, 2009). Likewise, Smallwood et al. (2009) and Goldenhar (2002) reported that the South African construction industry contributes to a large proportion of occupational injuries when compared to other industries and is ranked the third highest death rate industry. The Bureau of Labour Statistics (2002) documented that construction work is one of the most dangerous occupations. Smallwood et al. (2009) submitted that part of the reason OHS is poor within the construction industry is that contractors do not comply with the requirements of the OHSA and the Construction Regulations (CR) 2003 in South Africa.

3.7 IMPACT OF HEALTH AND HIV/AIDS ON SOUTH AFRICA CONSTRUCTION WORKERS

Initially, the focus of the South Africa construction industry was concentrated on safety with low concentration placed on health. However, the need to eliminate work related illness and diseases that result from the work processes and procedures have been given prominent attention by numerous contractors. Smallwood and Haupt (2005) affirmed that construction worker’s health became a matter of urgency in the construction industry as a result of factors such as the cost associated with treatment and rehabilitation of the injured worker, and the reduction in productivity as a result of the accident.

Bowen et al. (2008) reported that HIV and AIDS are the major cause of health problems in the construction industry with the industry accounting for the third highest prevalence of HIV
infected workers. Esti (2010) opined that the industry experience lost workdays due to the absenteeism of HIV infected workers which in return lead to an increased cost of construction because of rising overheads. Bowen et al. (2008) examined the prevalence of HIV in the construction industry regarding the occupation of the construction worker and discovered that operators and drivers in the construction industry have the highest HIV prevalence followed by skilled workers and labourers (See fig. 3.1). The authors concluded that the loss in the skill of workers in the construction industry could be attributed to HIV prevalence among construction workers.

![HIV Prevalence in Construction Occupations](image.png)

**Figure 3.1:** Construction occupation and HIV prevalence

*Source: Bowen et al. (2008)*


3.8 LESSONS LEARNT

Construction is as an injury-prone industry owing to the physical environment of the work, the nature of the construction work operations, hazardous construction procedures and materials, the use of heavy tools and machinery, and the physical properties of the construction project itself. The construction industry in Ghana is dominated by the British and they still adopt the British method of OHS. Most construction company in Ghana still adopt the British procurement system which makes it difficult for some institutional structures. It was observed that Ghana adopt labour intensive method than using advanced mechanized construction techniques due to the difficulties in accessing loans from the banks for construction projects but this method is not effective because of construction activities. Most developing countries lack access for adequate funding to secure advanced construction equipment when compared to the construction industry in developed countries. Also, the OHS in Ghana perhaps does not receive sufficient attention owing to the absence of comprehensive OHS practices, lack of infrastructures, low awareness of OHS and poor support from the government and the employees.

The study discovered that the implementation of different regulatory bodies in Ghana concerning health and safety have not solved the problems regarding OHS. The study linked the failure of the regulations of health and safety in Ghana in curbing occupational health problems to the failure in incorporating the ILO Convention policies and regulations.

To improve the health and safety compliance in Ghana requires the creation of strong OHS policies in all sectors of the economy. The government must ensure the scrapping or merging of OHS regulatory agencies with duplicated functions and responsibilities nationwide.
The merging of the agencies will enable a stronger and more effective health and safety regulatory agency whose roles and responsibilities can easily be defined.

The health and safety in the construction industry in South Africa is more developed compared to Ghana owing to the well-structured health and safety regulations in South Africa. Despite these regulations, occupational hazards are still prevalent within the country and can be attributed to the low compliance to OHS regulations among construction project team members. The major regulations concerning OHS in South Africa are the OHSA of 1993 and the Construction Regulations (CR) of 2003. The OHSA comprises prescriptive legislation which illustrates all the guidelines designed to ensure compliance regarding occupational health and safety. The construction regulation is more of performance legislation as it targets improving the performance of OHS by describing what has to be achieved in order to comply with OHS.

The review of literature from both South Africa and Ghana shows that the providing health and safety regulations without effective monitoring and enforcement will not reduce the rate of accident and fatalities experienced within the construction industry.

3.9 CHAPTER SUMMARY

This chapter examined the occupational health and safety of two developing countries, namely South Africa and Ghana. The reviewed literature relating to the study disclosed that South Africa has well-organised OHS legislation compared to that of Ghana regarding the construction industry. Despite the health and safety regulations in the construction industry, the industry still faces a substantial number of occupational accidents and fatalities due to poor compliance with the OHS hazards among construction workers.
CHAPTER FOUR

HEALTH AND SAFETY IN NIGERIA

4.1 INTRODUCTION

This chapter evaluates OHS in Nigeria as it examines the development of health and safety in the country and OHS in the Nigerian construction industry. In addition, it contains a comparison of the health and safety in the Nigerian construction industry between South Africa and Ghana. The chapter concludes by presenting the lessons learned from examining OHS within the Nigerian construction industry.

4.2 DEVELOPMENT OF HEALTH AND SAFETY IN NIGERIA

The word ‘health’ and ‘safety’ are two different words that are complementary in their meaning. Safety, on the one hand, can be described as the condition of being protected from any form of harm, while Health can be perceived as the physical, emotional and mental wellness of an individual while as they relate to their environment (Goldstein et.al 2001). But when the two words are used together and relate to labour, the term becomes ‘occupational health and safety’ (OHS) which can be described as the process of ensuring that an individual or group of people are protected at the workplace by protecting or eliminating hazards at the workplace. Likewise, Kalejaiye et al. (2013) describe health and safety as all the actions combined towards protecting workers’ health and well-being.

Various authors such as Diugwu et al. (2012); Okolie and Okoye (2012) and Adeogun and Okafor (2013) have analyzed the health and safety conditions in Nigeria and concluded that health and safety in Nigeria is below the international standard, often regarded as luxury by some organizations and is a work in progress. Diugwu (2012) attributed the poor health and safety regulations in the country to the dysfunctional law responsible for health and safety in
the country, thereby rendering most of the economy unregulated. Agbede et al. (2015) gave another reason for poor health and safety in the country and related it to the poor enforcement of health and safety legislation, especially from the Federal Ministry of Labour and Productivity (now known as the Federal Ministry of Labour and Employment) in charge of monitoring the implementation of OHS laws. Baldacconi and Santis (2000) opined that the failure of proper documentation is one of the reasons for poor OHS as most occupational accidents are under-reported with the view of creating ways to providing solutions for occupational problems. Oresegun (2009) also concurred with the findings of Belel and Mahmud (2012) linked with the construction industry and proposed that contractors in the Nigerian construction industry do not bother to keep a record of accidents, incidents and near-misses that occur at their construction sites.

The present regulatory act in Nigeria regarding health and safety is the Factories Act of 1990, but the Act has not been given adequate consideration towards curbing occupation hazards. Kalejaiye (2013) reported that the health and safety regulations were first introduced into the country by the Liverpool Medical Examination Board in 1789 charged with the responsibility of ensuring the well-being of slave dealers who migrated from Britain. The OHS regulations was instituted by Lord Luggard who was then the General-Governor of Nigeria while the health and safety regulations were enforced by the British soldiers (Kalejaiye, 2013).

Since then OHS concerns have grown within the country and health and safety legislation was formed in 1990 which was called “the Factory Act” but the Act was perhaps inadequate because it did not cater for all sections of the economy. This shortcoming of the Act led to the establishment of different regulatory authorities that were responsible for the health and safety of different sectors of industries within the country. Such an establishment is the Nigerian nuclear regulatory authority section 1 established nuclear safety and radiation Act of
1995 which functions included the control and regulation of the use of radioactive substances, materials, equipment, emitting and generation of iodising substances. The Nigerian Civil Service Union was formed with the responsibility of ensuring the health and safety of civil servants. Later some private sectors decided to form their associations.

In order to develop the health and safety needs of workers across the country the Labour Act of 2004 was established, including the Workmen’s Compensation Act. Edmonds and Nicholas (2002) reported that although this law is effective, more work is needed to ensure that employers of labour comply with the Compensation Act by ensuring that employees receive accurate compensation as specified by the law in the event of work-related injuries or death.

4.3 NIGERIAN CONSTRUCTION INDUSTRY

The construction industry is regarded as the pillar of the economy in most countries, and Nigeria is not an exception since it helps in boosting the economic performance which attracts foreign investment and creates job opportunities for the youths thereby contributing to the general development of the country. The construction industry has contributed 5 per cent to the gross domestic product (GDP) of the country and it is also responsible for the capital growth of the country (Dye et al., 2010).

The Nigerian construction industry comprises indigenous and foreign contractors who are grouped according to their staff strength, financial capacity and annual turnover. Nguyenet al. (2015) grouped the constructions industries within the country into small, medium and large-scale companies. Small construction firms have a labour size of not more than 100 workers and do not exceed 50 million naira, excluding land cost. The medium-scale companies are those with a labour size of between 101 to 300 employees, and total cost of not more than
200 million naira but greater than 50 million naira and this excludes their land cost. The large-scale construction firms have a labour size greater than 300 employees with a capital of more than 200 million nairas, including work capital but excluding land cost (Poopola et al., 2001).

Okoye (2010) noted that majority of the construction firms within the country are owned and managed by private individuals that are often profit-oriented with little consideration for the occupational safety of their workers. Olutuase (2014) submitted that most of the private construction firms have manuals for OHS, but these manuals are often not effective because some of these construction firms are foreign firms; thereby making the health and safety regulations difficult to understand and comply with, especially for local construction workers. Enobong et al. (2010) affirmed that although there are more indigenous construction firms, foreign firms handle the majority of construction contracts and they also employ more workers than the indigenous construction firms.

**4.4 HEALTH AND SAFETY IN NIGERIAN CONSTRUCTION INDUSTRY**

Despite the significant impact of the Nigerian construction industry on the economic performance of the country, the industry is still characterised by poor health and safety practices (Umeokafor et al., 2015). Hämäläinen et al. (2009) reported that the rate of accidents and injuries experienced by construction workers within the construction industry is higher when compared to that of other developed countries. Umeokafor et al. (2014) attributed the poor OHS within the Nigerian construction industry to the lack or absence of a prescribed health and safety policy for the construction industry (Beleel & Hamound, 2012).

According to Adeogun and Okafor (2013), stakeholders in the industry attempted to improve the health and safety by incorporating the Geneva Occupational Safety and Health Convention of 1981 into the practice of OHS in the country, but the industry continued to
experience accidents. Idoro (2011) also submitted that contractors in Nigeria acknowledge having a high rate of accidents on construction sites as a survey shows that more than 42 out of 70 contractors in Nigeria indicated they have a poor performance of health on their construction sites. In support of this, Ezenwa (2001) reported that the high number of occupational hazards experienced in the construction industry could be attributed to the poor practice of keeping records among construction professionals and hiding facts about the OHS of construction project workers. Various studies’ reports concluded that high rates of occupational hazards occur due to workers who failed to comply with the stipulated safety regulations of their organisations or firm (Diugwu et al., 2012). Likewise, researchers such as Idubor and Oisamoje (2013) and Okojie (2010) affirmed that the compliance with health and safety regulations within Nigerian construction firms is very poor.

4.5 DEVELOPMENT OF HEALTH AND SAFETY IN NIGERIAN CONSTRUCTION INDUSTRY

Findings from Fellows (2004) revealed that the origin of OHS regulations in the Nigerian construction industry derived from the United Kingdom which is as a result of the British colonies in Nigeria. Similarly, Idoro (2004) discovered that all the present OHS regulations in the construction industry originated from foreign countries. Idoro (2004) proposed that the Factory Act of 1990 was adapted from the UK Factory Act of 1961. Likewise, the inspiration for enacting the OHSA of 1970 was adopted from the American regulations. Other regulations include the Substances Hazardous Control Act of 1988, the Personal Protective Equipment at work regulations of 1992, and the Management of Health and Safety at Work Regulations of 1999 were all sourced from European countries. However, Ezenwa (2001) opined that the country can refrain from legislating foreign acts because of the Factory Act of
1994 which recognises the adoption of foreign policy notwithstanding that the adoption does not always work because of the differences in culture

4.6 CHALLENGES FOR HEALTH AND SAFETY IN THE NIGERIAN CONSTRUCTION INDUSTRY

Idubor and Osiamoje (2013) opined that the major challenge in the construction industry is the insight regarding occupational hazards as most construction professionals still believe that occupational hazards are predestined by God and that occupational hazards cannot be eliminated. This perception of the construction professionals has led to the low compliance with safety regulations by construction workers at the workplace. Nnedinma et al. (2014) reported that one of the challenges confronting OHS in the construction industry is striving for maximum profit by most construction firms. The authors further stated that most construction firms are so profit oriented that they are less concerned about the welfare of the workers and also fail to provide protective equipment for workers on construction sites. Faremi (2014) affirmed the importance of the use of personal protective equipment (PPE) for protecting the employees from accidents and hazardous substances on construction sites. Faremi (2014) also illustrated the importance of wearing personal protective equipment which will mitigate and prevent work-related injuries while working on construction sites.

Windapo and Oladapo (2012) reported that failure to comply with occupational health and safety is one of the reasons the construction industry experiences low productivity because a healthy worker will be more productive. Likewise, Smallwood and Haupt (2007) and Nzuve and Lawrence (2012) submitted that an increase in construction worker’s productivity is directly proportional to the compliance with health and safety regulations. The increase implies that an increase in compliance with health and safety will increase the productivity of
construction workers. However, regrettably, in a bid to make profits many construction firm owners pay low interest in the health and well-being of their workers.

Diugwu et al. (2012) reported that the challenges hindering small construction firms from adhering to occupational health and safety regulations are mostly due to the cost of procuring personal protective equipment. This also involves employing some competent health and safety personnel and the cost of training and re-training of employees on health and safety issues. Adenuga (2007) indicated that low awareness of the construction professionals regarding protective equipment poses a great challenge to OHS. Similarly, Idubor and Osiamoje (2013) confirmed the absence of facilities such as OHS protective equipment. They stated that failure of the employers to provide personal protective equipment for the workers contributes to the increasing rate of accidents and fatalities in the construction industry. Achieving a reduction of the accident rate can only be achieved by the provision of health and safety equipment, training and retraining of workers on the use of safety equipment.

Okolie and Okoye (2012) related the challenges of occupational health and safety in the construction industry to the high rate of unemployment as job scarcity makes a labourer undertake a job regardless of the poor working conditions and risk attributed to the job function. Onyeozili (2005) stated that poor enforcement of health and safety regulations poses a challenge for the occupational and safety in the construction industry as the bodies responsible for enforcement is corrupt: they indulge in collecting bribes from defaulting construction firms rather than prosecuting them or issuing fines. These challenges affect the development of health and safety within the construction industry of the country.
4.7 HEALTH AND SAFETY AMONG INDIGENOUS AND FOREIGN CONSTRUCTION FIRMS IN NIGERIA

Indigenous constructions firms are those managed, operated and owned by Nigerians while foreign firms are owned and operated by foreigners, and they are often large multinationals (Idubor & Oisamoje, 2013). Nigerians own the majority of the construction firms in Nigeria with only a few about 7 per cent owned by foreigners, but surprisingly most of the large construction projects are handled by foreign construction firms, thereby indicating their dominance in the construction industry. Idoro (2010) reported that the foreign construction firms obtained their dominance in the construction industry due to their professional track records in ensuring quality performance and a better percentage retention fee after project.

These foreign construction firms are more aware of OHS and have better compliance levels with health and safety regulations than indigenous construction firms (Nnedinma et al., 2014). Revathi (2012) reported that they could comply more with occupational health and safety than indigenous construction firms because of their huge working capital as opposed to indigenous construction firms characterised with low working capital. Indigenous construction firms concentrate more on increasing their profit margin and tend to overlook the provision of safety equipment.

4.8 Comparison of health and safety compliance in Nigeria, Ghana and South Africa.

Construction firms in developing countries such as South Africa, Nigeria and Ghana, especially the indigenous, are confronted with various challenges that could deter their compliance with OHS within the countries. Gibb and Bust (2006) identified the common factors that affect OHS in both countries as low literacy levels, poor site security, extreme weather conditions, and corruption which results in poor enforcement of health and safety legislation.
Cotton, Sohail and Scott (2005) posited that developing countries are characterised by ineffective systems to enforce the laws governing the employment of labour. Thus, construction firms take advantage of these weak systems, thereby not ensuring safe conditions on construction sites. Mitullah and Wachira (2003) also stated that most construction workers are employed on a casual basis and with no specific employment conditions, thereby making them vulnerable as employers provide little or no protection for workers’ health and safety conditions.

The construction industry in Ghana, just as in every other developing country, is marked by poor development, poor performance and a high rate of occupational hazards (World Bank 2003; Anvuur & Kumaraswamy 2006). Puplampu and Quartey (2012) reported that the absence of specific OHS for the Ghanaian construction industry remains one of the occupational hazards experienced in the industry. Laryea (2010) reported that the poor enforcement of OHS practices within the Ghana construction industry is majorly responsible for the occupational hazards experienced within the industry.

On the other hand, Dadzie (2013) related the high rate of occupational hazards experienced in the industry due to the low level of compliance with health and safety regulations. The low level of compliance to health and safety experienced with the industry could be ascribed to poor awareness about safety on site, and the improper or unavailability of personal protective equipment (Arkson et al., 2007; Vitharana et al., 2015).

However, construction firms in South Africa have better compliance with OHS because of their affiliation with international organisations such as the International Standard Organisation (ISO). The South African Bureau of Standards (SABS) helps in educating, training and certifying workers on safety and health regulations (SABS, 2015).
This procedure gave South Africa an advantage over Nigeria and Ghana regarding compliance with OHS regulations.

4.9 LESSON LEARNT

Having discussed the present status of OHS regulations and their compliance among Nigerian foreign and indigenous construction firms and comparing the compliance of safety regulations with the country’s construction industries such as Ghana and South Africa, it was obvious that compliance with OHS in developing countries is poor. However, South Africa still has a better health and safety culture. It is still necessary to create an effective framework that will facilitate construction employers and employee’s full compliance with OHS regulations in their respective countries. The government safety agencies must endeavour to evaluate the implementation of health and safety practices. The health and safety agencies should come up with better strategies to ensure full compliance with the safety policies on the ground. Construction workers should also be educated on the need for ensuring safety at their place of work.

4.10 CHAPTER SUMMARY

The reviewed literature from different authors shows that OHS in Nigeria is still at the infancy stage and requires considerable development and modifications. However, the Nigerian Policy on health and safety indicated the safety measures required by employers, employees and all other stakeholders in the Nigerian construction industry. The Factory Act forms the basis of health and safety in Nigeria, notwithstanding that much work is still needed to be done to improve the overall OHS.

The construction industry in Nigeria is made up of indigenous and foreign contractors rated according to their work volume, technology, staff strength, and financial capacity.
The foreign construction firms have a higher level of compliance to health and safety regulations due to their large capital budgeted for the procurement of personal protective equipment and their employing of competent and qualified safety personnel that will coordinate all activities relating to health and safety on construction sites. Aside from the Factory Act of 1994, no other OHS regulations have been enacted to date. It is the failure of the government to enact new regulations and policies that will improve compliance on health and safety in the Nigeria construction industry. Issues concerning safety and health in the construction industry are also affected by beliefs and perceptions about occupational hazards as most construction professionals still believe that occupational hazards are ordained by God, thereby viewing OHS as a luxury. Also, the unemployment rate makes many construction workers embark on a job that without taking their health and safety into consideration.

Finally, the South African construction industry performs better regarding the OHS of their workers than Nigeria and Ghana through their partnership with international agencies such as the International Standard Organization (ISO).
CHAPTER FIVE

RESEARCH METHODOLOGY AND DESIGN

5.0 INTRODUCTION

The methodology adopted for this study in respect of providing solutions to the problem proposed by the study to fulfil the objective of this study is examined in this chapter. Asika (1991) defined methodology as a detailed research plan showing the rules, procedures, and location upon which research is based. Therefore, this chapter examines the research approach strategy, research area, the sampling used, data collection and the instrument used for the analysis.

5.1 RATIONALE OF THE STUDY

The health and safety in the workplace pose a global threat to the sustainable development of society in that occupational hazards and illnesses contribute a large quota to the death ratio, especially within the construction industry that is characterised as one of the riskiest industries in which to work. Different solutions have been provided for preventing occupational hazards within the construction industry but these have not been effective. Thus, this study recognises that poor compliance to health and safety regulations is part of the problem regarding health and safety in the construction industry. Therefore, the level of compliance to health and safety regulations of construction workers, the causes of accidents on construction sites.

5.2 RESEARCH APPROACH AND STRATEGY

The quantitative research approach was used to examine the compliance level of construction professionals to health and safety policies within the construction industry. Researchers such
Blaikie (2010), Muijs (2010), and Almalki (2016) reported that any research conducted and analysed in number format while employing various mathematical methods could be referred as quantitative research. Johnston (2014) opined that the advantage of quantitative research is its capability of being used to capture models, theories, and hypothesis. Since this study stated some hypotheses, it therefore makes quantitative research suitable for this study.

Hughes (2002) affirmed that quantitative research gains information from different individuals through the administration of questionnaires to prospective respondents. Thus, this study retrieved data or information from numerous construction professionals within the Nigerian construction industry through a questionnaire that was administered by the respondents. Quantitative analysis was also used because it is easier to generalise the findings across large number of groups, judging from the large number of construction professionals.

Almalki (2016) affirmed that research could be exploratory, explanatory or descriptive. This study adopted the descriptive form of research to meet the objectives of the ability of descriptive research to give detailed characteristics of the construction professionals regarding their compliance with OHS regulations.

5.3 Research Area

This study was conducted in Nigeria using Lagos State as a case study. The State was chosen because of its booming population which confirms the need for infrastructural provision. This need for infrastructural provision in return leads to the attraction of numerous construction professionals and firms into the state. Construction activities in the State range from the expansion of highways and the construction of light rail system, to the erection of dams and bridges.
The numerous construction activities attract both foreigners and ingenious construction workers to the State and have become a focus for young construction graduates willing to work within the construction industry. Also, the State is home to numerous construction firms, and numerous construction projects were being carried out during this research.

5.4 TARGETED POPULATION

A study population is the total number of all items, respondents, or institutions that possess the characteristics or that have knowledge of the phenomenon being studied (Asika, 2004). It is the collection of individuals or objects known to have similar characteristics. This refers to the number of persons or objects covered by the study or with which the study is concerned.

Since the study is concerned about construction professionals within the Nigerian construction industry such as quantity surveyors, builders, engineers, estate surveyors and many others were the target population for this study. The respondents were selected because it is suspected that they would be able to provide a well-considered solution to the problem statement of the research. Their responses were obtained by requesting them to provide answers to a questionnaire distributed to them.

5.5 SAMPLING

Latham et al. (2007) reported that the technique of choosing a part of a population to represent the whole population could be referred to as sampling. Teddlie and Yu (2007) submitted that statistical sampling includes probability and purposive sampling. Probability sampling is often used for quantitative research and it can be further broken down into random, cluster, and stratified sampling as well as many others. This study adopts the use of random sampling because it gives all the participants (construction professionals) an equal opportunity to be selected. This method was used because the target population almost all
have the same characteristics and it will be easy to generalise the findings on the whole construction organisations within the country.

5.6 DATA COLLECTION

Data are often collected via the relevant literature, interviews, questionnaires, and observations. In order to complete this research, data was collected through questionnaires. The questionnaire was compiled after reviewing relevant literature related to the study.

5.7 INSTRUMENTS OF DATA COLLECTION

The research instrument chosen for this study is the questionnaire as it is considered a valuable method for retrieving information from numerous respondents. A questionnaire can be described as a form containing a series of questions relevant to the study with the questions being easily understandable, unambiguous and capable of being analysed.

The questionnaire comprises a close-ended and an open-ended section. In the open-ended section, the respondents were expected to answer the questions in writing which could result in their own words while providing any details they felt were necessary. In the close-ended section, however, the respondents are not supposed to write what they like but are expected to choose from a set of answers provided to them.

The questionnaire comprises five (5) sections with the first section, referred to as section A, collecting the personal information of the respondents. The second section examines the level of compliance of the respondents to OHS specifications. The third section elicits the causes of accidents and the source of accidents in construction firms; the fourth section looks at challenges of ensuring OHS on construction sites, and the fifth section focuses on the cost implications of implementing OHS.
Out of the one hundred and sixty eight copies of the questionnaire sent out, one hundred and forty were received back, but after a proper screening of the questionnaires, only one hundred and thirty-eight were used for the analysis, representing an 82 percent response rate which was summarised in table 5.1 below:

Table 5.2: Questionnaire survey

<table>
<thead>
<tr>
<th>Survey Responses</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires sent out</td>
<td>168</td>
</tr>
<tr>
<td>Questionnaires received back</td>
<td>140</td>
</tr>
<tr>
<td>Useable questionnaires</td>
<td>138</td>
</tr>
<tr>
<td>Useable response rate (%)</td>
<td>82</td>
</tr>
</tbody>
</table>

5.8 DATE OF DISTRIBUTING QUESTIONNAIRE

The questionnaire was randomly distributed and shared over a period of three months from early September 2017 to the beginning of November 2017.

5.9 DATA ANALYSIS

This research examines the compliance level of health and safety policies among construction professionals within the Nigerian construction industry.

Using a five-point Likert scale, the respondents were asked to rate the level of their compliance with health and safety. They were also asked to rate the frequency of occupational hazards, challenges in ensuring health and safety on construction sites, and the cost implications of health and safety. The data was then analysed by using quantitative techniques which are described as follows:
5.9.10 Mean item score

For this study, a five-point Likert scale was used to determine the level of their compliance with health and safety, the frequency of occupational hazards and challenges in ensuring health and safety on construction sites. The adopted scales were as follows:

1 = Very low

2 = Low

3 = Neutral

4 = High

5 = Very high

Another scale used was as follows:

1 = Not often

2. = Less often

3. = Neutral

4 = Often

5 = Very often

A further scale used was as follows:

1 = Strongly disagree

2. = Disagree

3. = Neutral

4 = Agree
The mean item score was obtained by computing each of the five-point Likert scales which therefore made it possible to rank each item based on the score of their mean. The mean item score (MIS) was then calculated for each item as illustrated below:

\[
\text{MIS} = \frac{n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{N}
\]

Where

\[n_1 = \text{Number of respondents for Very low, Not often or Strongly disagree}\]
\[n_2 = \text{Number of respondents for Low, Less often or Disagree}\]
\[n_3 = \text{Number of respondents for Neutral}\]
\[n_4 = \text{Number of respondents for High, Often or Agree}\]
\[n_5 = \text{Number of respondents for Very high, very often or Strongly agree}\]
\[N = \text{Total number of respondents}\]

After the mathematical computations had been carried out, the individual criteria were then ranked in descending order of their mean item score (MIS) which is from the highest to the lowest.

5.9.11 Exploratory factor analysis (EFA)

Factor analysis can either be conducted using exploratory analysis or confirmatory analysis. The former is usually adopted at the beginning of the research while the latter is often used to confirm a test of theories at the end of the research study. The main reason for using
exploratory factor analysis was to explore the challenges hindering the enforcement of OHS on construction sites

5.12 RELIABILITY

The validity test was completed by first having the questionnaire examined by a statistician who confirmed the quality of the items. Reliability can be defined as the degree of consistency of a questionnaire in measuring the attribute it is supposed to measure. This study adopted Cronbach’s alpha for reliability measurement. Cronbach’s alpha was used because of its consistency in measuring a scale as it describes the extent to which various items in the scale measure the expected construct or concept. The Cronbach’s alpha coefficients of all the variables in the questionnaire ranged between 0.820 and 0.910 which confirms the suitability of the questionnaire for the study. As a general rule is the Cronbach’s alpha should be more than 0.7.

5.13 CHAPTER SUMMARY

This chapter presented the research methodology in terms of the instruments used for data collection, the sample size, the population, and the method used for data analysis. This chapter prepared the background for the next chapter which presents the data analysis and discussions.
CHAPTER SIX

DATA ANALYSIS AND INTERPRETATION

6.1: INTRODUCTION

In this chapter, the analysis and discussion of the data generated are presented. The samples were drawn from construction professionals in Lagos State, Nigeria. Data was gathered using a questionnaire which detailed information needed for the study. Such information includes the personal characteristic of the respondents, respondents organisational characteristics, compliance to OHS, the frequency of accidents on construction sites, challenges in ensuring safety on construction sites, and the significant between indigenous and foreign construction firms. All of these are in a bid to achieve the aim of the research which is assessing the OHS compliance in the Nigerian construction industry. The questionnaire was analysed with the use of the Statistical Package for Social Science (SPSS), version 21. Frequency distribution and mean item score were some of the descriptive statistics used, supported by bar and pie charts.

6.2 QUESTIONNAIRE ADMINISTERED

Table 6.1 presents the total number of questionnaires administered to the respondents. The table shows that out of the one hundred and sixty eight copies of the questionnaire sent out (168), one hundred and forty (140) were received back but after a proper screening of the questionnaires, only one hundred and thirty-eight (138) were used for the analysis, representing an 82% percent response rate.

<table>
<thead>
<tr>
<th>Table 6.1: Response rate from respondents</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total administered</td>
<td>168</td>
<td>100</td>
</tr>
<tr>
<td>Total returned</td>
<td>140</td>
<td>83.3</td>
</tr>
<tr>
<td>Total used for the analysis</td>
<td>138</td>
<td>82.1</td>
</tr>
</tbody>
</table>
6.3 PERSONAL INFORMATION OF THE RESPONDENTS

This section examines the personal information of the respondents, which includes the professional background of respondents, their educational qualifications, working experience, professional affiliations as well as the grade of membership. The outcome is presented in Figure 6.1 and Table 6.2.

![Figure 6.1 Age of respondents](image1)

Figure 6.1 depicts the age of respondents. The chart shows that 39.1% of the respondents are within the age bracket of 21-30 years, 30.4% accounts for the age 41-50 years, 23.9% for 31-40 years and while the rest (6.5%) are younger than 20 years of age.

Table 6.2 shows that 41.3% of the respondents are safety personnel, 19.6% are quantity surveyors, an equal proportion of 8.7% are mechanical engineers and builders while 6.5% are architects.

Regarding the working experience, the table shows that 78.3% of the respondents have work experience between 1-10 years and 21.7% between 11-20 years. The survey on professional affiliation shows that 69.2% of the respondents are affiliated to the Nigeria Society of
Engineers (NSE), 23.1% to the Nigeria Institute of Quantity Surveyors (NIQS) while the rest (7.7%) are affiliated to other professional bodies such as the Nigerian Institute of Building (NIOB), Royal Institution of Chartered Surveyors (RICS), Council of Regulations of Engineering in Nigeria (COREN), Nigerian Institute of Town Planners (NITP).

Table 6.2: Personal information of respondents

<table>
<thead>
<tr>
<th>Professional background</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect</td>
<td>9</td>
<td>6.5</td>
</tr>
<tr>
<td>Quantity surveyor</td>
<td>27</td>
<td>19.6</td>
</tr>
<tr>
<td>Builder</td>
<td>12</td>
<td>8.7</td>
</tr>
<tr>
<td>Safety personnel</td>
<td>57</td>
<td>41.3</td>
</tr>
<tr>
<td>Mechanical engineer</td>
<td>12</td>
<td>8.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working experience</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 years</td>
<td>108</td>
<td>78.3</td>
</tr>
<tr>
<td>11-20 years</td>
<td>30</td>
<td>21.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>138</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional affiliation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSE</td>
<td>81</td>
<td>69.2</td>
</tr>
<tr>
<td>NIQS</td>
<td>27</td>
<td>23.1</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
<td>7.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Membership level</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate member</td>
<td>63</td>
<td>53.8</td>
</tr>
<tr>
<td>Corporate member</td>
<td>54</td>
<td>46.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Concerning the level of membership of the respondents, 53.8% of the respondents are graduate members while 46.2% are corporate members.

6.4 ORGANISATIONAL CHARACTERISTICS

This section presents the organisational characteristics such as the class of contractor, organisation management, type of ownership, organisation activity and client type.
Figure 4.2 presents the class of contractor of respondents. The chart shows that 78.3% of the respondents are main contractors, 8.7% are nominated sub-contractors while 6.5% are sub-contractors.

Table 6.3 presents the respondents’ type of organisation ownership and management style. The table shows that 47.2% of the respondents are affiliated to organisation limited liability company. A total of 23.8% are public limited companies, 15.2% are partnerships and 13.0% are sole proprietorships.

**Table 6.3: Organisation management and type of ownership**

<table>
<thead>
<tr>
<th>Type of ownership</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole proprietorship</td>
<td>18</td>
<td>13.0</td>
</tr>
<tr>
<td>Partnership</td>
<td>21</td>
<td>15.2</td>
</tr>
<tr>
<td>Limited liability company</td>
<td>66</td>
<td>47.8</td>
</tr>
<tr>
<td>Public limited company</td>
<td>33</td>
<td>23.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>138</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
The form of organisation management shows that majority (71.7%) are fully expatriate. Fewer are both expatriate and indigenous, (21.7%) while only 6.5% are fully indigenous.

Table 6.4 presents the organisation activity. The table shows that the respondents’ organisations embark on diverse civil engineering infrastructure projects. The major projects in which the respondents’ organisations specialise are road and steel works. However, the respondents’ organisations also specialise in airports and jetties but not as many as the former. Their organisations are also involved in other types of construction projects to a lesser degree.

Table 6.4: Organization’s activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>43.5</td>
<td>1</td>
</tr>
<tr>
<td>Steel works</td>
<td>43.5</td>
<td>1</td>
</tr>
<tr>
<td>Bridges</td>
<td>43.5</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>41.3</td>
<td>2</td>
</tr>
<tr>
<td>Airports</td>
<td>23.9</td>
<td>3</td>
</tr>
<tr>
<td>Jetties</td>
<td>23.9</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 6.5 presents the respondent’s type of client. The table shows that the foremost client of the respondents is government, having ranked first a mean score of 3.96. This is followed by corporate bodies and individuals, ranked second and third with mean scores of 3.82 and 2.87 respectively.

Table 6.5: Client type

<table>
<thead>
<tr>
<th>Client Type</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>3.96</td>
<td>1</td>
</tr>
<tr>
<td>Corporate bodies</td>
<td>3.82</td>
<td>2</td>
</tr>
<tr>
<td>Individual</td>
<td>2.87</td>
<td>3</td>
</tr>
</tbody>
</table>
6.5 OBJECTIVE ONE: LEVEL OF COMPLIANCE WITH HEALTH AND SAFETY REQUIREMENTS IN CONSTRUCTION FIRMS

This objective was achieved by asking the respondents to rate the level of compliance of their organisation to the following health and safety provisions using a five-point Likert scale from very high to very low, and their responses are presented in table 6.5. The table shows that the construction firms within the study area do not comply with OHS requirements judging from the low mean score attributed to all the OHS regulations.

Table 6.6: Compliance with occupational health and safety

<table>
<thead>
<tr>
<th>Health and safety regulations</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of PPE</td>
<td>3.81</td>
<td>1</td>
</tr>
<tr>
<td>Signpost indicating danger zone on construction project site</td>
<td>3.76</td>
<td>2</td>
</tr>
<tr>
<td>Provision of health and safety facilities</td>
<td>3.71</td>
<td>3</td>
</tr>
<tr>
<td>Payment of medical bills of injured worker</td>
<td>3.72</td>
<td>3</td>
</tr>
<tr>
<td>Site office health and safety management structures</td>
<td>3.67</td>
<td>4</td>
</tr>
<tr>
<td>Providing health and safety supervisors on construction site</td>
<td>3.67</td>
<td>4</td>
</tr>
<tr>
<td>Head office health and safety management structures</td>
<td>3.62</td>
<td>5</td>
</tr>
<tr>
<td>Safety policy for the company and some selected projects</td>
<td>3.60</td>
<td>6</td>
</tr>
<tr>
<td>Strict measures against contractors who are guilty of safety violation during the execution of project</td>
<td>3.57</td>
<td>7</td>
</tr>
<tr>
<td>Updating health and safety plans after completion of projects</td>
<td>3.53</td>
<td>8</td>
</tr>
<tr>
<td>Health and safety insurance cover for sites</td>
<td>3.50</td>
<td>9</td>
</tr>
<tr>
<td>Open display of health and safety regulations</td>
<td>3.48</td>
<td>10</td>
</tr>
<tr>
<td>Health and safety training for site safety supervisors</td>
<td>3.42</td>
<td>11</td>
</tr>
<tr>
<td>Informing employees about hazards on site</td>
<td>3.37</td>
<td>12</td>
</tr>
<tr>
<td>Rewarding workers for safe work behaviour</td>
<td>3.32</td>
<td>13</td>
</tr>
<tr>
<td>Compliance with health and safety regulations</td>
<td>3.30</td>
<td>14</td>
</tr>
<tr>
<td>Provision of health and safety incentives</td>
<td>3.18</td>
<td>15</td>
</tr>
<tr>
<td>Framework for health and safety implementation in the company</td>
<td>3.00</td>
<td>16</td>
</tr>
<tr>
<td>Proper documentation for accidents and policy violation during the execution of projects</td>
<td>2.90</td>
<td>17</td>
</tr>
<tr>
<td>Undertaking periodic safety management auditing</td>
<td>2.50</td>
<td>18</td>
</tr>
<tr>
<td>Publishing lessons learned from incident investigations</td>
<td>2.00</td>
<td>19</td>
</tr>
</tbody>
</table>

However, the table reveals that provision of PPE for construction workers as mandated by OHS regulatory or enforcement agencies is often adhered to by construction firms. Secondly, requirements are met relating to safety signposts indicating danger zones,
provision of health and safety facilities on the sites, providing safety supervisors on construction sites, developing a health and safety policy for the organisation, and updating health and safety plans after the completion of projects. However, they rarely comply with legislation such as preparing a frame work for health and safety implementation in the company, proper documentation for accidents and policy, undertaking periodic safety management auditing, and publishing lessons learned from incident investigations. It can be inferred from the findings that construction professionals within the study area do adopt a preventive form of complying with occupational health and safety.

6.6 OBJECTIVE TWO: PREVALENT FORM OF ACCIDENT ON CONSTRUCTION SITES

In a bid to provide solutions to this objective, the respondents were presented with possible occupational hazards that occur on construction sites, and the respondents were then requested to rate the most frequent occurring accidents using 5 = very frequent, 4 = frequent, 3 = neutral, 2 = low and 1 = very low and the outcome is presented in table 6.7.

Table 6.7: Prevalent forms of accident on construction sites

<table>
<thead>
<tr>
<th>Accidents on constructions</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaffolding accidents</td>
<td>4.64</td>
<td>1</td>
</tr>
<tr>
<td>Welding accidents</td>
<td>4.50</td>
<td>2</td>
</tr>
<tr>
<td>Stepping on or kicking abandoned objects</td>
<td>4.42</td>
<td>3</td>
</tr>
<tr>
<td>Falls from ladders</td>
<td>4.30</td>
<td>4</td>
</tr>
<tr>
<td>Power tool accidents</td>
<td>4.00</td>
<td>5</td>
</tr>
<tr>
<td>Accidents from faulty machinery</td>
<td>3.97</td>
<td>6</td>
</tr>
<tr>
<td>Lifting equipment failure</td>
<td>3.64</td>
<td>7</td>
</tr>
<tr>
<td>Trench collapses</td>
<td>3.60</td>
<td>8</td>
</tr>
<tr>
<td>Traffic accidents</td>
<td>3.50</td>
<td>9</td>
</tr>
<tr>
<td>Electric shock injury</td>
<td>3.46</td>
<td>10</td>
</tr>
<tr>
<td>Crane accidents</td>
<td>3.40</td>
<td>11</td>
</tr>
<tr>
<td>Forklift truck accidents</td>
<td>3.25</td>
<td>12</td>
</tr>
<tr>
<td>Holes in flooring</td>
<td>3.18</td>
<td>13</td>
</tr>
<tr>
<td>Unsafe safety harnesses</td>
<td>3.12</td>
<td>14</td>
</tr>
<tr>
<td>Compressed gas accidents</td>
<td>3.10</td>
<td>15</td>
</tr>
<tr>
<td>Accident caused by fire or explosion</td>
<td>2.95</td>
<td>16</td>
</tr>
</tbody>
</table>
A critical observation of the table indicates that numerous accidents characterise the construction industry as all the forms of accidents have a high mean score. The table reveals that the major accident or occupational hazards experienced by the respondents are scaffolding accidents, welding accidents, stepping on or kicking abandoned objects, falls from ladders, and power tool accidents with a mean score of above 4.0. Occupational hazards in order of frequency, namely forklift accident, holes in flooring, unsafe safety harnesses, compressed gas accidents, and accidents caused by fire accidents are rarely experienced by the construction professionals.

6.7 OBJECTIVE THREE: CHALLENGES IN ENSURING THE SAFETY OF CONSTRUCTION WORKERS ON THE CONSTRUCTION SITES

Exploratory factor analysis was used to examine the challenges in ensuring the safety of construction workers on construction sites. Twenty (20) challenges identified from the literature were explored using component principal analysis (CPA), otherwise called factor analysis. In the analysis, the Kaiser-Meyer-Olkin (KMO) and Bartlett’s test of sphericity shows good factorability features as shown in Table 6.8. The Bartlett’s test of sphericity gave a chi-square value of 1752.874 at 780 degrees of freedom, significant at a 5% confidence level. This, therefore, suggests correlation among the chosen factors (challenges in ensuring the safety of construction workers) and supportive criterion for factorability.

<table>
<thead>
<tr>
<th>Table 6.8: KMO and Bartlett’s test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin measure of sampling adequacy</td>
</tr>
<tr>
<td>Bartlett’s test of sphericity:</td>
</tr>
<tr>
<td>Approx. chi-square</td>
</tr>
<tr>
<td>Degree of freedom</td>
</tr>
<tr>
<td>Significant level</td>
</tr>
</tbody>
</table>

CPA indicated three (3) components (out of 20 possible components) with an eigenvalue of at least one (1) as shown in Table 6.9. The first components have an eigenvalue of 15.374 while
the third component has 2.278; these represent the variation each of the linear components can explain. The percentage of variance explained by each of these components is given in the third column while their cumulative is in the fourth column. The first component explained the highest variation (38.435%) while the last explained 5.696%. Altogether, the variables explain 51.239% variation by their linear components.

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Component</th>
<th>Initial Eigenvalues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Cumulative Variance</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>15.374</td>
<td>38.435</td>
<td>38.435</td>
</tr>
<tr>
<td>2</td>
<td>2.843</td>
<td>7.108</td>
<td>45.543</td>
</tr>
<tr>
<td>3</td>
<td>2.278</td>
<td>5.696</td>
<td>51.239</td>
</tr>
</tbody>
</table>

By the varimax rotation method, twenty factors (20) factors loaded differently on three (3) components which form the basis for significant challenges encountered in ensuring the safety of construction workers as reported in Table 6.10:

<table>
<thead>
<tr>
<th>Component</th>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of protective equipment</td>
<td>.767</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrong use of protective equipment</td>
<td>.761</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of prescribed health and safety regulations</td>
<td>.707</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low priority given to safety of construction workers by contractors</td>
<td>.677</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negligence of health and safety department</td>
<td>.673</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of prescribed health and safety regulations for the construction industry</td>
<td>.666</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceiving health and safety as luxury</td>
<td>.656</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor funding</td>
<td>.632</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction workers’ low awareness of health and safety requirements</td>
<td>.724</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractors’ low awareness of health and safety requirements</td>
<td>.683</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of hazardous materials on construction site</td>
<td>.666</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor communication between the safety personnel and construction workers</td>
<td>.643</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theft of safety equipment</td>
<td>.641</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underpayment of the safety personnel</td>
<td>.636</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to see safety practices as an integral part of project success</td>
<td>.627</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Low compliance with health and regulations by the construction workers  .722
Failure to include the safety personnel in the design of the building  .665
Construction paying more concern to their work target than safety requirements  .662
Failure to report accident to appropriate authority  .631
Poor enforcement of health and safety regulations  .562

The items are loaded at different degrees, but those with high loading are considered. On the first component, ‘shortage of protective equipment’ and ‘wrong use of protective equipment’ were highly loaded while on the second component, ‘construction workers’ low awareness of safety requirements’ and ‘low contractors’ awareness of health and safety requirements’ are highly loaded. On the other hand, ‘low compliance with health regulations’ and ‘failure to include the safety personnel in the design of the building’ are the highest loading factors in the third component.

The highest items on the same component suggest the factors’ name be given to such components. In line with the three components obtained in the analysis are identified as 1) absence of protective equipment, 2) low awareness of OHS by construction professionals, and 3) low compliance to health and safety regulations. These are the three categories of factors extracted from the CPA which significantly hinder the health and safety of construction professionals.

**6.8 OBJECTIVE FOUR:** To determine the level of compliance between indigenous and foreign construction firms towards OHS requirements.

The study deployed the Mann-Whitney U test, that is a non-parametric alternative of the independent T-test to investigate the difference between indigenous and foreign construction firms on the level of compliance with OHS requirements. The result of the analysis is presented in Table 6.11.
The findings from table 6.11 were produced by merging the safety provisions in table 6.6 and computing them into a dummy variable in SPSS while the respondents’ response on the category (Indigenous and Foreign) of their organization was used as the test variable.

Table 6.11: Mann-Whitney U test for significant difference between foreign and indigenous construction firm on OHS

<table>
<thead>
<tr>
<th>Compliance to health and safety</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>314.500</td>
<td>749.500</td>
<td>-1.653</td>
<td>0.008</td>
<td>Sig.</td>
</tr>
</tbody>
</table>

From Table 6.10, at a 0.05 level of significance and since p > 0.05, a statistically significant difference was found between the compliance level to health and safety regulations among indigenous and foreign construction firms. This suggests that the level of compliance with health and safety requirements is not the same among indigenous and foreign construction firms.

6.9 CHAPTER SUMMARY

This chapter shows the comprehensive data collated from various respondents in the construction industry in Lagos State, Nigeria. It also narrates the findings from the respondents, namely the rate of compliance and the challenges facing construction workers and outlined the prevalent forms of accident on construction sites. It further compared the indigenous and foreign construction firms by examining how they adhere to issues regarding OHS at their workplace and listed the challenges that hinder the compliance rate in the construction industry.
CHAPTER SEVEN

DISCUSSION OF FINDINGS

7.1 INTRODUCTION

The findings are discussed in this chapter. The discussion stemmed from a comparison of the findings with the reviewed literature in a bid to determine the implication of the findings from the study to the body of knowledge. The results findings were presented in line with the research questions.

7.2 RESEARCH QUESTION ONE

What is the level of compliance with health and safety provisions among construction firms?

7.2.1 Findings

The study discovered that the construction firms within the study area do not comply with OHS provisions judging from the low mean score attributed to all the OHS regulations. This finding also corroborates with the study undertaken by Umeokafor et al. (2015), Manu et al. (2014) and Agbede et al. (2015) when they discovered that construction professionals have low levels of compliance regarding their OHS as most of them are often concerned with their individual performance. In Ghana a similar situation was also observed by Annan, (2015), Laryea and Mensah (2010), and AnamanandOsei-Amponsah (2007) when they discovered that construction professionals have a low level of compliance with OHS. Dansoh (2005) related the low compliance with OHS in Ghana to the numerous regulations covering health and safety within the country. In South Africa, a similar result was also found by Agumba and Haupt (2009) and Smallwood and Haupt (2005) when they discovered that construction professionals do not pay much attention to their health and safety. Wells (2001) undertook a comparison of construction workers’ compliance to OHS among developing countries and
concluded that the level of compliance to health and safety is higher in South Africa compared to that of Ghana and Nigeria. Manu et al. (2014) suggested that the compliance with health and safety is low in Ghana and Nigeria and because of the high unemployment rate, most construction workers simply take a job without considering their safety.

7.2.2 Implication of findings

The study discovered that construction professionals only comply by providing protective equipment, followed by the providing signposts indicating danger zones, providing health and safety facilities, providing safety supervisors on construction sites, developing safety policies for their organisations and updating health and safety plans after completion of projects. However, they rarely comply with legislation such as preparing a framework for health and safety implementation in the company, proper documentation for accidents, undertaking periodic safety management auditing, and publishing lessons learned from incident investigations. It can be inferred from these findings that construction professionals within the study area adopt a preventive form of complying with OHS.

7.3 RESEARCH QUESTION TWO

What are the prevalent forms of accident on construction sites among construction firms?

7.3.1 Findings

The study discovered that the construction industry is characterised by numerous accidents which imply that the industry is a risky sector in which to work. Sources such as the CIDB (2010), Goldenhar et al. (2000) and Windapo (2010) also reported that the construction sector accounts for a high rate of fatalities, thereby contributing to almost half of the occupational deaths in the world. Regarding the causes of the accidents within the construction industry, the study discovered that the most accidents or occupational hazards experienced by the
respondents are scaffolding accidents, welding accidents, stepping on or kicking abandoned objects, falls from ladders, and power tool accidents with a mean score of above 4.0. On the other hand, occupational hazards such as forklift accidents, holes in flooring, unsafe safety harnesses, compressed gas accidents, and accidents caused by fire are rarely experienced by construction professionals. It can be deduced from this study that accidents on construction site can be related to poor or inadequate supervision by safety professionals/safety personnels which could have prevented unsafe acts, unsafe conditions and violations by construction workers thereby minimizing the rate of accident on construction sites. The findings also shows that further study can be conducted on automatic monitoring of construction workers activities using technologies like RFID and others.

7.3.2 Implication of findings

The accidents experienced within the construction industry are basic accidents such as scaffolding accidents, welding accidents, stepping on or kicking abandoned objects, tripping, falling from heights, and power tool accidents. The study discovered that in preventing occupational hazards, most construction firms only provide protective equipment without reporting the previous accidents from which construction professionals could learn. However, accidents such falling from scaffolding cannot be eradicated by just providing protective equipment. This implies that the method adopted by most construction firms for combating occupational hazards cannot permanently eradicate the occupational hazards experienced within the construction industry.

7.4 RESEARCH QUESTION 3

What are the challenges confronting the site manager in ensuring the safety of construction workers on the construction sites?
7.4.1 Findings

Exploratory factor analysis was used to find out more information on the challenges confronting the site manager or safety personnel in ensuring the safety of construction workers on construction sites. Twenty (20) challenges identified from the literature were explored using CPA. The factor analysis revealed three important components, namely the absence of personal protective equipment, low awareness of OHS by construction professionals, and low compliance with health and safety. These are the three categories of factors extracted from the CPA which significantly hinder the health and safety of construction professionals. This finding coincides with the studies done by Idoro (2008), Ju and Rowlinson (2013) and Mohammed (2003) in which they discovered that low awareness of OHS and the poor attitude of construction workers regarding their health and safety inhibit the growth of OHS within the construction industry.

7.4.2 Implication of findings

Over the years, different researchers and authors such as Idoro (2008) submitted that the construction industry is a major source of occupationally related accidents, injuries and ill health within a country. Likewise, Ju and Rowlinson (2013) reported that all over the world workers in the construction industry have a higher likelihood of being killed compared to other occupations with evidence pointing to 30 per cent of health and safety offences committed by the construction sector in Hong Kong in 2010. Baldacconi and Santis (2000) asserted that 25 percent out of the total work-related accidents in Italy occurred in the construction sector. The National Safety Council in the United States indicated that more than 30 percent of work-related fatalities are experienced in the construction industry.

What the authors have in common is that the construction industry is a major source of occupational hazards, but from this study it can be implied that providing effective protective
equipment, increasing the awareness of OHS by construction professionals and high levels of compliance to health and safety regulations will reduce the occupational hazards experienced within the construction industry.

7.5 RESEARCH QUESTION FOUR

What is the significant difference between indigenous and foreign construction firms regarding their levels of compliance with health and safety regulations?

7.5.1 Findings

Umeokafor et al. (2015) and Agumba and Haupt (2009) opined that there is a significant difference in the rate of compliance between the foreign and indigenous construction companies. It was discovered that at a 0.05 level of significance and since \( p > 0.05 \), a statistically significant difference was found between the compliance level to health and safety among indigenous and foreign construction firms. This suggests that the level of compliance with health and safety requirements is not the same among indigenous and foreign construction firms.

7.5.2 Implication of findings

It can be implied from the findings of this study that the level of implementing occupational health and safety provisions is statistically different between the indigenous and foreign construction firms within the study area. It was found that the foreign construction companies have a higher rate of compliance. This is because the foreign companies give more attention to issues relating to the safety and health of the workers while carrying out their daily activities than is the case with indigenous construction companies. The indigenous construction firms tend to maximise their profit by not allocating adequate funds for the provision of personal protective equipment, training and re-training of workers and other safety requirements.
7.6 CONCLUSION

This chapter presented the construction professionals’ feedback on their compliance level with OHS, prevalent accidents on construction sites, challenges of ensuring occupational health and safety on construction sites, and cost implications of implementing OHS management programmes. The findings satisfied the research questions and problem statement of the study.
CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

8.0 INTRODUCTION

The study aimed at assessing the OHS compliance in the Nigerian construction industry. The study selected Lagos State in Nigeria as the study area because of the numerous construction firms within the State. This chapter contains the conclusion and recommendations of the research related to the objectives of the study. The main objectives of the study were the following:

1. To examine the level of compliance with health and safety provisions of construction firms;
2. To evaluate the prevalent form of accident on construction sites within the study area;
3. To establish the challenges confronting the site managers in ensuring the safety of construction workers on construction sites; and
4. To examine the significant difference between indigenous and foreign construction firms regarding their level of compliance with health and safety provisions.

8.1 RESEARCH OBJECTIVE ONE

The first objectives examined the level of compliance with health and safety provisions of construction firms.

The findings extrapolated from the questionnaire survey show that construction professionals have low compliance with OHS regulations. It was observed that the construction
professionals comply with the provision of personal protective equipment to the workers, followed by providing signposts, providing health and safety facilities, providing safety supervisors on construction site, developing safety policies for the organisation and updating health and safety plans after the completion of projects. It was noted that they rarely comply with the legislation relating to preparing a detailed company policy for health and safety, proper documentation for accidents and policy, undertaking periodic safety management auditing, and publishing lessons learned from incident investigations. It can be inferred from these findings that construction professionals within the study area adopt a preventive form of complying with OHS. Hence, from both the reviewed literature and the findings from the questionnaire, the first research objective was well achieved.

8.2 RESEARCH OBJECTIVE TWO

The second objective evaluated the prevalent forms of accident on construction sites within the study area.

The findings extracted from the questionnaire survey show that the major accidents or occupational hazards experienced by the respondents are falling from heights, welding accidents, stepping on or kicking abandoned objects, falling from ladders, and power tool accidents with a mean score of above 4.0. However, occupational hazards such as forklift accidents, holes in flooring, unsafe safety harnesses, compressed gas accidents, and accidents caused by fire are rarely experienced by construction professionals. It can be inferred that from both the literature and the well-structured questionnaire the second research objective was well achieved.
8.3 RESEARCH OBJECTIVE THREE

The third objective established the challenges confronting site managers in ensuring the safety of construction workers on construction sites.

The findings from the questionnaire administered to the construction professionals using exploratory factor analysis examined the challenges confronting the site manager or safety personnel in ensuring the safety of construction workers on construction sites. Twenty (20) challenges identified from the literature were explored. The factor analysis revealed three important components, namely the absence of protective equipment, low awareness of OHS by construction professionals and low compliance with health and safety regulations. These are the three categories of factors which significantly hinder the health and safety of construction professionals as extracted from the CPA. It can be inferred from both the literature and the questionnaire that the third research objective was well achieved.

8.4 RESEARCH OBJECTIVE FOUR

The fourth objective determined the difference between indigenous and foreign construction firms regarding their level of compliance with health and safety provisions.

The study adopted the Mann Whitney test and discovered that at a 0.05 level of significance and since p > 0.05, a statistically significant difference was found between the compliance level with health and safety among indigenous and foreign construction firms. This suggests that the level of compliance with health and safety requirements is not the same among indigenous and foreign construction firms.

8.5 CONCLUSION

This study gives an understanding of the health and safety of Nigerian construction firms, predominantly those located in Lagos State. The study was borne out of the frequent occupational hazards experienced within the Nigerian construction industry. The survey
result may not apply to the whole Nigerian construction industry because this study focused on a specific region of the country. However, the findings from the study can still be used to describe the attitude of the construction workers to health and safety, especially construction workers based in the western part of the country.

The study revealed that construction firms usually have their policy for health and safety mounted and installed on their construction site. Despite the provision of the policy, most of the construction firms’ compliance levels are below average. The poor compliance with OHS has resulted in frequent occupational hazards occurring on construction sites within the country. Apart from the low compliance with the stipulated health and safety regulations, the construction professionals lack a proactive approach to health and safety activities owing to their perception of health and safety as a luxury and not an essential part of the project.

The study also revealed that executing health and safety activities on construction sites has the capacity of increasing the overall cost of the project. On the other hand, failure to comply with health and safety policies also leads to occupational hazards on site, thereby increasing the overall cost of the project. This finding shows that health and safety is a non-disposable cost that is essential for the growth of any project because the health and safety of the construction workers has a significant impact on influencing the quality of the construction project. Finally, the study concludes that to improve the health and safety within the construction industry, the construction professionals and safety personnel should go beyond just providing safety equipment for the workers: they should train the workers on the use of the equipment and also report all accidents on site to enable learning from previous mistakes.
8.5 RECOMMENDATIONS

In line with findings above the study recommends the following:

1. The construction firms should create a unit that will be charged with the responsibility to ensure that every construction worker on site complies with the stipulated occupational health and safety policy.

2. The safety personnel should be included at the design stage of the project to ensure that the design can be implemented at a low risk to the construction workers.

3. There should be a frequent update of the health and safety policy on the construction site coupled with training aimed at improving the awareness of construction professionals of the benefit of OHS.

4. Accidents on site should be reported, and a panel should be formed to investigate the cause of accidents with the objective of learning from them.

5. The government should set up an agency to regulate the health and safety of the construction industry.

8.7 RECOMMENDATIONS FOR FUTURE RESEARCH

This study further recommends the following as areas for further research:

1. The study can be improved by adopting a larger sample size so that it will assist in providing a wider understanding of the compliance level with OHS within the Nigerian construction industry.

2. A further study may also examine the impact of health and safety compliance on construction workers’ productivity.
3 A study of risk management strategies employed within the construction industry can also be conducted.

Finally, alternative methodologies should be considered for conducting future research. For instance, adopting another analysis and research method such as the Delphi technique and multiple regression analysis (MRA) as a means of understanding the compliance level of OHS among construction professionals.
REFERENCES


Annan, S., Addai, E.K. and Tulashie, S.K. 2015. A call for action to improve occupational health and safety in Ghana and a critical look at the existing legal requirement and legislation. Safety and Health at Work, 6(15), 146-150.


Avotri, J.Y. and Walters, V. 2009. You just look at our work and see if you have any freedom on earth: Ghanaian women’s accounts of their work and health. Journal of Social Science and Medicine, 48(11), 23-45.


Dear Sir/Madam

I am conducting a research study on ‘Assessment of occupational health and safety compliance in the Nigerian construction industry’. The findings of this research will provide information that will assist in improving the health and safety culture of construction professionals with a view to eliminating occupational hazards experienced on construction site. This will no doubt enhance construction workers’ performance and promote effective project delivery in an industry with considerable health and safety challenges.

Please be assured that your responses to this questionnaire will be treated confidentially and used strictly for academic research purposes. Your sincere and prompt response would be a worthy personal contribution to the construction industry and the nation at large.

Thank you for your anticipated co-operation.

Yours faithfully

Charles ARUM
SECTION A: RESPONDENT CHARACTERISTICS

Please tick as applicable (√)

PERSONAL DATA

1. Designation of the respondent
   (a) Chief executive officer (  ) (b) Managing Director (  )
   (c) The head, estimating department (  ) (d) Project manager (  )
   (e) Commercial manager (  ) (f) Others (please specify)(Project Engineer)

2. Age as at last birthday
   (a) Younger than 20 years (  ) (b) 21-30yrs (  ) (c) 31-40yrs (√)
   (d) 41-50yrs (  ) (d) 51-60yrs (  ) (e) Older than 60yrs (  )

3. Highest academic qualification
   (a) OND (  ) (b) HND/BSc/BTech (  ) (c) PGD (  ) (d) MSc/MBA (√)
   (e) PhD (  ) (f) Others (please specify) (  )

4. Professional qualification and grade of membership

<table>
<thead>
<tr>
<th>Nigerian Institute of Architects</th>
<th>Nigerian Society of Engineers</th>
<th>Nigerian Institute of Building</th>
<th>Nigerian Institute of Quantity Surveyors</th>
<th>Others (please specify)</th>
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</thead>
<tbody>
<tr>
<td>Graduate member</td>
<td>√</td>
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</tbody>
</table>
5. Years of experience in construction
   (a) 1-10yrs (√) (b) 11-20yrs ( ) (c) 21-30yrs ( ) (d) 31-40yrs ( )
   (e) 41-50yrs ( ) (f) Above 50yrs ( )

6. Professional background
   (a) Architect ( ) (b) Quantity surveyor ( ) (c) Builder ( )
   (d) Civil engineer (√) (e) Mechanical engineer ( )
   (f) Electrical engineer ( ) (g) Other (please specify)__________( )

7. Class of contractor
   (a) Main contractor (√) (b) Sub-contractor ( )
   (c) Others (please specify)_________________( )

   ORGANISATIONAL DATA

8. Type of ownership
   (a) Sole proprietorship ( ) (b) Partnership ( )
   (c) Limited liability company ( ) (d) Public limited company (√)
   (e) Others (please specify)_________________( )

9. Organization ownership and management
   (a) Fully indigenous ( ) (b) Fully expatriate (√)

10. Organization activity
    (a) Road ( ) (b) Steel works ( ) (c) Bridges ( ) (d) Airport ( )
    (e) Jetties ( ) (f) Others (please specify) Rail Project (√)
11. Client type

Please rank the frequency of obtaining projects from the following types of client, using the Likert scale: 1 (Never), 2 (Rarely), 3 (Sometimes), 4 (Usually), 5 (Always)

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<th>4</th>
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<tr>
<td>Government</td>
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<td>Corporate bodies</td>
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<tr>
<td>Individual</td>
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<td>Others (please specify)</td>
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SECTION B: level of compliance to occupational health and safety

Kindly rate the level of compliance of your organization with the following health and safety regulations using very high = 5, high = 4, 3 = neutral, 2 = low and 1 = very low

<table>
<thead>
<tr>
<th>Health and safety regulations</th>
<th>5</th>
<th>4</th>
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<tbody>
<tr>
<td>Provision of PPE</td>
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<tr>
<td>Compliance with health and safety regulations</td>
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<tr>
<td>Provision of health and safety facilities</td>
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<tr>
<td>Site office health and safety management structures</td>
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<tr>
<td>Head office health and safety management structures</td>
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<tr>
<td>Provision of health and safety incentives</td>
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<tr>
<td>Framework for health and safety implementation in the company</td>
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<td>Safety policy for the company and some selected project</td>
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</tbody>
</table>
Proper documentation for accidents and policy violation during the execution of projects

Signpost indicating danger zone on construction project site

Strict measure against contractor who makes safety violation during the execution of project

Undertaking periodic safety management auditing

Publishing lessons learnt from incident investigations

Updating health and safety plans after completion of projects

Rewarding workers for safe work behavior

Health and safety insurance cover for sites

Informing employees about hazards on site

Health and safety training for site safety supervisors

Providing health and safety supervisors on construction site

Open display of health and safety regulations

Payment of medical bills of injured worker

SECTION C: PREVALENT FORMS OF ACCIDENT ON CONSTRUCTION SITES

Kindly rate the most frequent form of accident on construction site using 5 = very frequent, 4 = frequent, 3 = neutral, 2 = low and 1 = very low

<table>
<thead>
<tr>
<th>Accidents on constructions</th>
<th>5</th>
<th>4</th>
<th>3</th>
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<tbody>
<tr>
<td>Scaffolding accidents</td>
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<tr>
<td>Lifting equipment failure</td>
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<td>Welding accidents</td>
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<tr>
<td>Cause</td>
<td>1</td>
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<tr>
<td>Trench collapses</td>
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<td>Stepping on or kicking abandoned objects</td>
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<tr>
<td>Crane accidents</td>
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<td>Forklift truck accidents</td>
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<td>Electric shock injury</td>
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<td>Accident caused by fire or explosion</td>
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<td>Traffic accidents</td>
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<td>Compressed gas accidents</td>
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<td>Falls from ladders</td>
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<tr>
<td>Unsafe safety harnesses</td>
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<tr>
<td>Accidents from faulty machinery</td>
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<tr>
<td>Power tool accidents</td>
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<tr>
<td>Holes in flooring</td>
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</table>

Kindly indicate the causes of the aforementioned accidents on construction site:

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Section D: For Site Manager and Safety Officer

Kindly rate your level of agreement with the following factors hindering the occupational health and safety on construction site using 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree
<table>
<thead>
<tr>
<th>Challenges</th>
<th>5</th>
<th>4</th>
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<tbody>
<tr>
<td>Poor funding</td>
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<tr>
<td>Construction workers’ low awareness of health and safety requirements</td>
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<tr>
<td>Contractors’ low awareness of health and safety requirements</td>
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<td>Shortage of protective equipment</td>
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<tr>
<td>Absence of prescribed health and safety regulations for the construction industry</td>
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<td>Low priority given to safety of construction workers by contractors</td>
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<td>Negligence of health and safety department</td>
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<td>Low compliance to health and regulations by the construction workers</td>
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<td>Failure to include the safety personnel in the design of the building</td>
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<td>Use of hazardous materials on construction site</td>
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<td>Poor communication between the safety personnel and construction workers</td>
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<tr>
<td>Construction paying more concern to their work target than safety requirements</td>
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<tr>
<td>Use of wrong PPE by construction workers</td>
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<td>Theft of safety equipment</td>
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<td>Underpayment of the safety personnel</td>
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<td>Failure to see safety practices as an integral part of project success</td>
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<td>Perceiving health and safety as luxury</td>
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<td>Failure to report accident to appropriate authority</td>
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<td>Wrong use of protective equipment</td>
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<td>Poor enforcement of health and safety regulations</td>
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