

**UNIVERSITY OF NAIROBI**

**AN ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY  
PRACTICES AT CONSTRUCTION SITES IN NAIROBI CITY  
REGION, KENYA**

**OGETII JOB BOUNDI**

**C50/71877/2014**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE AWARD OF THE MASTER OF ARTS DEGREE IN  
ENVIRONMENTAL PLANNING AND MANAGEMENT IN THE DEPARTMENT OF  
GEOGRAPHY AND ENVIRONMENTAL STUDIES, UNIVERSITY OF NAIROBI**

**2019**

**DECLARATION**

This research project is my original work and has not been presented at any other institution for an academic award

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## **DEDICATION**

To my lovely wife; Alice and my children; Stacy and Crispaul.

## **ACKNOWLEDGEMENTS**

To this far, to God be the glory for the gift of life, good health and knowledge. Throughout my studies, I wholeheartedly acknowledge His unwavering protection and providence. Out of it, it has enabled my achievement in academic heights. I will forever praise you Lord.

I also extend my gratitude to my academic mentors who have imparted educational knowledge to me. I really appreciate the lecturers and the entire Department of Geography staff, University of Nairobi, who tremendously, contributed to my studies in this masters programme.

With regards to this project, I specifically acknowledge my supervisors; Prof. Elias Ayiemba and Dr. Martin Marani for their professional guidance in carrying out this study right from the beginning to its conclusion. Your contribution is immeasurable. I greatly appreciate for your time and advice. Despite your busy schedule, you were there for me.

To college colleagues and many other friends who supported me in this course, I too appreciate you. To recognise but a few, I appreciate Mr. Mogaka, Mr. Mose, and Mr. Kuya for your encouragement, financial and technical contributions during my study. This has indeed enabled me to climb to this academic heights.

Lastly, I thank the city hall officials, NCA and DOSHS officials and the visited construction sites for their cooperation and their readiness for sharing information sought to make this study possible.

## ABSTRACT

Construction industry is one of the adequately regulated sector but still rated amongst the most risky place to work in. Accidents and the subsequent losses are common in this sector. Regulations have been enacted to control these risks. So as to understand applicability of these regulations, this study was designed to assess how Nairobi City region's housing construction workplaces have implemented the occupational safety and health practices. The study objectives were to: profile occupational safety and health regulations governing construction workplaces; establish compliance to basic OSH practices at construction workplaces; establish the extent of construction project stakeholders' intervention to influence adoption of OSH practices and; analyze the challenges facing the county's construction workplaces in the implementation of the OSH practices. The targeted population were 871 approved housing construction projects that were in operation between April and May 2015. Multi-stage sampling design was used in selecting sample sites for the study through which, 60 sites were randomly selected that served as units for data collection. Data was collected through administering questionnaires to site safety representatives, interviews as well as use of observation schedule. The study established that 90% of the sites had complied with the legal requirements of registering their work places with National Construction Authority against 30% that had registered their workplaces with the Directorate of Occupational Safety and Health Services. 25% of the sites had been inspected by government regulatory bodies out of which 69.2% of these inspections were made by NCA officials, 30.8% by county public health officials and none by the Directorate of Occupational Safety and Health Services officials. On a Likert scale of 1-5, contractor management and clerk of works were both ranked at 1 (to a large extent on their level of influence on adoption of OSH practices) while government institutions and general workers were both ranked at 4 (to a small extent on influencing OSH adoption). The study established that full compliance to OSH requirements had been hindered by high safety cost with a 76% response rate, lack of knowledge on advanced safety practices by 60%, lower productivity by 56%, lack of management commitment by 42% and negative expected impact on project schedule by 26%. The study recommends that sites be subjected to meeting safety standards with a workplaces registration certificate number displayed on the signboard issued once full compliance is proofed. The study also recommends that monitoring bodies be supported to give them capacity to monitor all industry players to ensure they provide a conducive working environment and adhere to statutory laws and regulations on health and safety.

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## ABBREVIATIONS AND ACRONYMS

ANSI	American National Standards Institute
BIM	Building Information Modelling
CAK	Competition Authority of Kenya
CBD	Central Business District
CIDP	County Integrated Development Plan
CoW	Clerk of Works
CSD	Construction Sites Directive
DOSHS	Directorate of Occupational Health and Safety Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
IAPA	Industrial Accident Prevention Association
ILO	International Labor Organization
KNBS	Kenya National Bureau of Statistics
KWS	Kenya Wildlife Services
NCA	National Construction Authority
NCA	National Construction Authority
NEMA	National Environment and Management Authority
NGO	Non-Governmental Organizations
OHSA	Occupational Health and Safety Management
OSAC	Overseas Security Advisory Council
OSH	Occupational Safety and Health
OSHA	Occupational Health and Safety Administration
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RIDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
SIC	Standard Industrial Classification
WHO	World Health Organization

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the Study

As a way of improving the quality of life, people opt to work. The construction industry is such one place which has played a key role in offering employment opportunities. It is a field that attracts both professional and non-skilled workers. Engineers, architects, surveyors, and project managers are among the diverse skilled people that work in this industry. Its employment capacity has absorbed large working population in the world. It is the best employer in most of the South Saharan countries that has supported up to 20% of the entire working population (Sethunya & Seoke, 2013). Early statistics show that, in the Kenyan's economy, construction industry accounts for 5% of the country's GDP and employs about 1 million people with an estimated annual wage bill of Ksh. 3.2 billion (Kirombo, 2012). The sector supports the economy through provision of basic needs like housing and other infrastructural developments. All over the world, the sector has been a power behind growth of cities, road networks, tall buildings, great boundaries, power lines, telecommunication systems among others (Kayumba, 2013; ILO, 1995).

On the other hand, the construction sector has significantly impacted the work environment and is regarded as one of the major risk sector characterized with the wide spectrum of health and safety hazards (Kayumba, 2013). For example, in USA, statistics show that in the year 2011, 721 fatal work injuries were reported in the private construction industry alongside other non-recorded minor injuries. Cumulatively, over two million people lose their lives yearly due to accidents and work related diseases (Kupiec *et al*, 2013).

The global economy suffers an estimated loss of up to 4% of the GDP for reasons of accidents and diseases at workplaces. The adverse impact of injury and loss of life in the industry has been linked to socioeconomic problems in many families and whole countries as the losses and injury are associated with early or forced retirements, loss of trained staff, additional training costs, and high insurances charges (Kupiec *et al* 2013). Some of these occurrences affect workers directly and even trickles down to family miseries.

Countries keep track of safety conditions at workplaces in both private and public places. Accidents is one of the indicators that is used in measuring safety in workplaces. According to United Kingdom’s safety report, there was 0.44 deaths per 100,000 people in the 2013/2014 financial year, 3.5 deaths per 100,000 construction workers in China and South Africa recorded 25.2 deaths per 100,000 construction workers also in the 2013/2014 financial year (Kemei *et al*,2015). Although DOSHS has not maintained standard accident records as required by ILO standards, the 2011/2012 national profile on occupational safety and health report indicated that different economic sectors recorded 249 fatal accidents and a total of 5774 non-fatal accidents (ILO, 2013) as shown in table 1 below;

**Table 1: Showing Fatal and Non-fatal Accidents in various Sectors of the Economy**

<b>Economic Sector</b>	<b>Fatal</b>	<b>Non-Fatal</b>	<b>Total</b>
Agricultural industry	14	1 350	1 364
Mining industry	15	40	55
Plastic manufacturing industry	1	146	147
Food and beverage production industry	8	664	672
Tobacco manufacturing industry	–	–	0
Textile industry	–	441	441
Tanning Industry	–	1	1
Wood and furniture manufacturing industry	3	93	96
Paper manufacturing industry	2	81	83
Media publications	2	38	40
Chemical manufacturing	–	22	22
rubber manufacturing industry	–	17	17
machinery and metal fabrication industry	1	176	177
Electrical and electronics industry	3	14	17
Other manufacturing industries	1	763	764
Electricity, gas and hot water supply	2	41	43
Water accessibility	1	7	8
Construction	40	383	423
Trade industry	3	126	129

<b>Economic Sector</b>	<b>Fatal</b>	<b>Non-Fatal</b>	<b>Total</b>
Automotive fuel industry	–	3	3
Motor vehicles industry	–	56	56
Hotels industry	–	83	83
Transport and telecommunications industry	77	453	530
Warehousing	–	84	84
Banking industry	3	12	15
Research industry	3	34	37
Defense ministry	10	25	35
Health ministry	1	29	30
Sewage and solid waste	–	22	22
Recreational activities	–	176	176
Other service industries	59	394	453
<b>Total</b>	<b>249</b>	<b>5 774</b>	<b>6 023</b>

Adopted from ILO (2013)

The construction industry is broad that is categorized according to the end product; road works, domestic housing, industrial facilities, commercial properties, public buildings among others. According to United Kingdom's health and safety executive 2003 accident notification report on the construction sector, 36% of the accidents were related to domestic housing with road works at 8%. These accidents were found to occur throughout the different levels of the construction process. 45% of the accidents were reported to have taken place during construction, site preparation and demolition accounted for 1% each, 27% during refurbishment and 19% during repair (Bomel Limited, 2003).

There have been several efforts that have been employed to prevent, reduce and mitigate accidents and diseases at the construction workplaces. At global level, the ILO-OSH 2001 guidelines were formulated to propel workplaces to continual improvement on matters occupational safety and health. The organization has formulated policies to guide the development of national standards and to set forth the principles that should promote social welfare of the workers working at the construction industry.

ISO also designed the ISO 45001 series regarded as the occupational safety and health systems requirement. The series proposes the standards with which the workplaces are required to abide by so as to reduce risks, improve employee safety, and create better and safe working conditions. The role of the policies are to promote a serene work environment free from health risks to workers and the public. With such amble environment, it is practical workers will be motivated to improve productivity. These interventions therefore, promote employee well-being, give a competitive edge, and protect investors from incurring avoidable losses (Francis, 2016).

As a recommended from these international organizations, nations and states are required to enact safety and health legislations to control workplaces occupation safety and health conditions in their respective countries. Countries have come up with policies that regulate safety and health conditions of workplaces. For instance, the USA enacted its OSH Act in 1970 whose impact had been felt in subsequent years through reduction of accidents. The European Union in 1992 enacted directives known as the Construction Sites Directive that are binding to all EU member states. In these directives, work specific conventions were cited out and states were advised to accommodate these provisions to their local legislations. These directives sealed a number of identified loopholes mostly in the management of the construction industry. For example, it made construction workplaces' health and safety matters a shared responsibility instead of leaving it as a contractor's agenda. The immediate project stakeholders like the financiers, contractor, employees, government regulatory organs and the project supervisors have responsibilities and obligations for enforcing occupational safety and health standards at construction workplaces (Dias, 2009).

Kenya, as a party to international labor conventions enacted OSHA 2007. The Act is progressive and has laid down strategies for promoting occupational safety and health conditions at workplaces in the country. The Act recommends for an occupational safety and health management structures in workplaces. It gives a direction for administration of safety at workplaces and gives direction for additional rules and regulations to be adopted in these workplaces. The Act establishes the duties of the employers and employees so as to ensure that safety, health and welfare conditions at workplaces are not compromised (Bernstein, 2013; Muiruri and Mulinge, 2014).

Compliance to occupational safety and health regulations is therefore a legal requirement that can attract penalties if not abided by. Safety and health parameter has set a new frontier for competition amongst competing industries and investors. When fully implemented, for instance in the



construction industry, safe working conditions have been traced to aid in; minimizing accidents to workers and visitors and other stakeholders, and gives an assurance of meeting the project deadline to minimize liability costs (Francis, 2016).

Because of its contribution to the economy in terms of employment, provision of housing needs, development of transport infrastructure like roads and railway lines amongst others, construction industry has become a field of interest that calls for research. Within the Kenyan context, it is one of the industry that has a sizeable amount of economic growth through direct and indirect goods and service utilization. Industries linked to the construction industry are mutually dependent. Cumulatively, construction industry is among the leading sectors in providing employment opportunities and market for manufactured and raw materials which are good indicators of measuring economic development (Ng'ang'a *et al.*, 2014).

From the Kenya National Bureau of Statistics Report (2014), Nairobi County is leading in major construction projects. The sector have attracted many direct and indirect employees from all over the country. Most employers in this sector have employed both skilled and non-skilled laborers (Mitullah & Wachira, 2003). The industry has been viewed as one of the risky sectors to work in due to reported and unreported accidents associated with it (Dias, 2009; Muiruri & Mulinge, 2014).

In Kenya, DOSHS is mandated to maintain statistics of accidents, dangerous occurrences and diseases at the country's workplaces. Although the DOSHS records are not comprehensive as recommended by the ILO safety standards, in 2010/2011 financial year, the construction sector recorded a total of 40 fatal accidents and 383 non-fatal accidents and worst case scenarios of collapse of houses under construction over the years. The construction and the transport, post and telecommunications sectors were the notable sectors with most fatal cases (ILO 2013; Nyanga & Kuta, 2014).

## **1.2 Statement of the Research Problem**

As a remedy to occupational safety and health risks in workplaces in Kenya, the government through parliament and the entitled regulatory bodies enacted the Occupational Safety and Health Act of 2007 and other rules that manage workplaces such as construction sites. Even with these regulations, statistics and empirical studies rate the sector the most risk ranging from fatal injuries,

deaths to collapsing houses (Muiruri & Mulinge, 2014; Francis, 2016). This poses a concern as to whether these regulations are adequate or not.

The OSHA 2007 Act and subsidiary construction legislations and other safety rules have defined roles of employers and employees in various workplaces so as to make all workplaces risk free. Construction stakeholders; contractor, client, funding institutions, workers, insurance companies, government regulatory bodies among others are required to ensure full compliance to safety and health practices. From these parties' contributions alongside regular monitoring and audits by independent parties, construction workplaces ought to be safest place ever to work in (Bernstein, 2013). However, statistics shows the opposite. This again raises the concern on whether these parties are really engaging ensuring safe construction workplaces.

So as to understand how construction workplaces Nairobi county are responding to occupational safety and health good practices, the current study was designed to assess how operational county sites have adopted some of the common occupational safety and health practices. The study focused on assessing immediate construction stakeholders' involvement and the existing laws regulating the occupational health and safety at construction workplaces. The study also looked into the challenges encountered in enforcing environmental health and safety management in the Nairobi County. The county was targeted because of its huge housing construction works. Its strategic position and large populations calls for an all season construction works. Nairobi City Council has over the years been considered when measuring the country's economic performance because of its many approvals it handles (CBK, 2014).

### **1.3 Research Questions**

- (i) What are the occupational safety and health regulations governing construction workplaces in Kenya?
- (ii) Have basic occupational safety and health practices been adopted at the construction sites in the county?
- (iii) To what extent have the county's construction project stakeholders intervened to influence adoption of occupational safety and health practices at sites?
- (iv) What are the challenges facing the county's construction workplaces in the implementation of the occupational safety and health practices?

#### **1.4 Research Objectives**

The overall objective of the study was to analyze how the Nairobi County housing construction workplaces have implemented occupational safety and health practices. Specific objectives of the study were to:

- (i) Profile occupational safety and health regulations governing construction workplaces in Nairobi County;
- (ii) Establish compliance to basic occupational safety and health practices at the construction sites in the county;
- (iii) Establish the extent to which the construction project stakeholders intervene to influence adoption of occupational safety and health practices at sites in Nairobi City County.
- (iv) Analyze challenges facing the county's construction workplaces in the implementation of the occupational safety and health practices.

#### **1.5 Significance of the Study**

The aim of this study was to assess how well the construction industry is performing in terms of compliance to the set safe working practices. Investors and other project stakeholders engage in this sector but have limited knowledge on principles guiding this industry and how best to implement safe working practices. Research, which are good in sourcing for information that shape decision making by construction stakeholders provides strategies for improving such workplaces. Nairobi County and Kenya at large is becoming a hub of construction projects. Many of these projects are undertaken by international companies some of them run by foreigners. This study provides important information on how to roll out these mega projects while keeping their workplaces safe and a competitive edge amongst other actors in the sector. The study is important as it helps to bring out how the safety and health policies have aided in improving construction workplaces. Policy makers and responsible regulators can depend on this study to best understand how the intended parties have responded to the existing laws. The study findings can guide in enacting policies and regulations in the future.

#### **1.6 Scope and Limitation of the Study**

The study was meant to explore how construction sites have responded to some of the common occupational safety and health practices. It targeted housing construction projects in Nairobi City region that were in operation in the months of April and May 2015. This was as per the Nairobi

City Hall's planning and development department's sites approval data. Sites that had not sought city hall approval were not factored in the study. Due to financial constraints, few construction sites were sampled for the study.

The management in the construction sites are diverse. The study specifically targeted the senior person on site in charge of the safety and health matters. The study also analyzed the immediate construction stakeholders amongst the diverse construction projects stakeholders. These are the main contractors, clerk of works, DOSHS officials and workers. Some of the challenges the researcher faced include; some sampled project sites were widely dispersed. This meant more costs to collect data which prompted the researcher to use more funds to access to such workplaces. Some days of data collection were rainy that made some sites not to be visited as per the scheduled prepared. Extra days were added to ensure that all sites were visited as sampled.

### **1.7 Definition of Significant Terms**

**Construction:** is defined as an industry which is classified into; construction of buildings, civil engineering and specialized construction activities. An overlap between these divisions gives a general classification of them all under construction. The construction practice is a multi-professional activity involving architectures, and engineers among others but these groups are however not counted as part of the construction in this study. A construction can either be a new building; infrastructure like roads, bridges or ports; repairing or building maintenance; or demolition (SIC 2007; Stephen, 2014; RIDOR, 2013).

**Safety:** is identifying, evaluating and controlling workplace hazards and includes measures, methods or techniques or process to prevent human exposure to unsafe work practices, physical or even chemical agents. This may involve: Improving working conditions and safe methods of work, Reasonable hours of work, Provision of personnel protective equipment, Provision of first-aid and medical facilities (Kironbo, 2012).

**Health:** a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (WHO, 2003)

**Accident:** is an unexpected, unwanted occurrence which interrupts or interferes with the orderly progress of work in an establishment by causing bodily injury to a person making him unfit to resume duty due to partial or total disablement or even death. It can also cause damage or loss to

property, plant, materials or the environment. It can result due to personal factors, job factors, and lack of management control factors. (Kirombo, 2012).

**Occupational safety and health (OSH):** is the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (Alli, 2008)

**Occupational Health and Safety Practices;** are regarded as systems put in place to ensure that the human and the capital resources are well protected. The goal of occupational safety and health practices is to ensure a secure workers, employers, customers, visitors and other members neighbouring the workplace (Ojiem, 2012). OSH practices are more of pro-active rather than reactive that employs a find and fix approach to a possible workplace hazard. These practices ranges from management commitment, employees involvement, hazard identification and assessment, education and trainings and continuous communications (OSHA, 2016)

### **1.8 Organization of Chapters**

Chapter one of this study analyzed the background of the occupation health and safety in terms of the global, regional and national understanding and steps that have been taken towards achieving safety in work places. It highlighted the problem statement and the scope of the research, research questions and objectives. Chapter two is the literature review which gave an appraisal of the empirical studies related to occupation safety and health within and outside Nairobi County. Chapter three is the research methodology which highlighted the study area, study design, target population, sample design, data collection methods, validity of data collection instruments, data analysis. Chapter four is the data analysis and discussion. Chapter five is the summary, recommendations and conclusion of the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter discusses the existing literature on occupational safety and health field. The chapter highlights the available literature on laws and scholarly works for each objective of the study:

- Occupational safety and health regulations governing construction workplaces
- Adoption of occupational safety and health practices at construction workplaces
- Intervention of construction project stakeholders on occupational safety and health at construction workplaces
- Challenges facing adoption of occupational safety and health practices at construction workplaces

Lastly, the chapter outlines the theoretical framework that guided the study, the conceptual framework and the literature gaps that the study intended to fill.

#### **2.2 Construction Industry**

##### **2.2.1 Classification of the Construction Works**

Construction workplaces are best classified based on the number of employees working at the site. As per the European Union of classification, construction workplaces are categorized into; micro enterprises, small enterprises, medium enterprises and large enterprises. Micro enterprises sites have less than 10 employees; small enterprises have more than 10 employees but less than 50. Medium sized enterprises have more than 50 employees but less than 250 while large sized enterprises have more than 250 employees (Dias, 2009).

A study by Bernstein (2013) on employee size and safety demonstrated that there is a strong relationship between them. In his smart market survey, he found out that 92% of large scale firms maintain well-coordinated safety programs as compared to 48% of small scale firms.

Due to ongoing inventions on better management of construction industry, new designs of breaking down works have been adopted many countries. The system of embracing a structural

management of resources in which some works are subcontracted unlike in the traditional system where all the work was performed in-house using the contractor's resources. The current system of dividing such works into different contract units gives the main contractors and the subcontracted parties an opportunity to meet labor needs with flexibility. This has seen subcontractors' employees sometimes being more than the main contractor's (Dias, 2009).

Because of the short term nature of the construction works, many contractors take temporary employees. In the traditional model where the main contractor was solely to look over site matters, the new model where the sub-contractors have more man power than that of the main contractor, site management becomes a shared responsibility. Statistics show that most of the accidents reported in construction sites are mostly from the sub-contractors side. These findings have precipitated the need to have all parties take the shared responsibility of employing safety measures amongst their respective employees especially in the provision of safety gears, insurance covers, and safety trainings among others (Dias, 2009).

### **2.2.2 OSH Requirements in Construction Industry**

The OSHA 2007 Act regulates occupational safety and health matters in all workplaces in Kenya. This Act requires all workplaces to be sensitive to OSH alongside other workplaces concerns. It requires the management to develop internal OSH policies that guides implementation of the policy and propose the strategies for implementing the policy. The top most contractor management team should sign a safety statement as a commitment to its implementation at the workplace.

Construction workplaces mostly have large employee workforce. As a form of employee involvement, such workplaces are required to have safety and health committees whose composition is determined by the total number of employees. As cited in Safety and Health Committee Rules, 2014, the committee leadership selected and they are empowered to carry out their health and safety roles. These members are required to undergo prescribed basic training on occupational safety and health. Other trained health and safety teams that construction workplaces are supposed to have include: first aiders, fire marshals among others.

Since construction has a time span and as a good safety practice, such workplaces should maintain safety records. Such records are regularly used to measure the performance of the workplace in the light of health and safety. Some of these records to be kept include; accident investigation reports, reports of ill health, fire drill reports, training records, medical examinations reports, personal protection equipment issuance records amongst others. Construction workplaces should also conduct regular; OSH audit reports, fire audits, noise surveys and risk assessment and maintain these reports within their workplaces.

Construction industry handles heavy machines and plants like vehicles, trucks, generators, cranes, compressors, excavator, lifts welding and cutting machines among others. Competent persons should be assigned to run these machines. These machines should also be accompanied with operation manuals from suppliers and an internally developed standard operating procedures. The OSHA 2007 requires that such equipment be subjected to regular examinations by competent plant examiners. Machines should be inspected regularly on schedule. Records of these inspections should be kept at sites or other places where appropriate.

Construction workplaces are required to develop response plans for a foreseeable emergency at their site like fire, accidents, explosions, terrorist attack amongst others. Sites should establish and ensure workers are aware of the evacuation routes, emergency assembly points. Adequately serviced firefighting equipment should be available and employees adequately informed on how to operate such equipment (Republic of Kenya, 2007)

## **2.3 Regulations Governing Construction Workplaces' Occupational Safety and Health**

For effective management of safety matters, regulations have been enacted to give guideline of achieving safe workplaces. These regulations ranges from international scale to national scale. They include;

### **2.3.1 International Labor Standards**

The International Labor Organizations addresses clearly the main issues faced in the construction industry as well as other places of work. It has established standards of work place practice to guide this course. The organization has set a constitution that protects workers in employment from diseases and fatal injuries. ILO, as it puts it, occupational safety and health has a direct



relationship with economic development. Poor adoption of safety measures in workplaces affects families and economies directly (ILO, 2003)

Because of this fact, ILO has developed principles that it identifies as the fundamental guidelines for occupational safety and health. Most of these principles are discussed on the international level and countries are supposed to ratify them as occupational health and safety conventions. These principles have been evolved over the years since 1981.

At the national level, countries are required to enact OSH policies and establish strategies for subject enterprises to employ so as to ensure compliance to the policies. The 1985 ILO OSH convention postulated enterprise level establishment of occupational safety and health guideline for guiding employers and employees on occupational health and safety issues. It basically requires enterprises to enact their OSH policy that controls their workplaces. The 2006 OSH convention requires the governments in coordination with the representatives of different sectors to establish a national health and safety system, national system and to formulate a national occupational safety and health programme. Such a programme should be monitored and be reviewed regularly by representatives of the various sectors of the economy.

### **2.3.2 OSHA 2007**

History of safety in Kenya can be linked back to even before independence in which safety issues were covered under the Factories and Other Places of Work Act (1951). Safety standards were scattered in a number of Acts. Some of these safety Acts in Kenya covered specific concept they represented. They are regarded as regulations touching on occupational safety and health at workplaces and these Acts are belongs to other ministries. These Acts include; Pest Control Products Act of 1985, revised edition 2012 (Cap 346 of Kenya Laws); Radiation Protection Act of 1982, revised edition 2014 (CAP 243 of Kenya Laws), Environmental Management and Co-ordination Act of 1999, revised edition 2018 (Cap 387 of Kenya Laws); Public Health Act of 2012 (Cap 242 of Kenya Laws); Food, Drugs and Chemical Substances Act of 2013 (Cap 254 of Kenya Laws), Employment Act of 2007, revised edition 2012 (Cap 226 of Kenya Laws) among others (Nyakang'o, 2005; Republic of Kenya 2007; ILO, 2013).

In response to International Labor Organization occupational safety and health principles, Kenya enacted its OSHA 2007. The Act provides guideline for the welfare of employees at places of

work. The Directorate of Occupational Safety and Health Services (DOSHS) is vested with the responsibility of ensuring that the OSH 2007 Act is implemented at places of work. Also the Federation of Kenya Employers, the Central Organization of Trade Unions also collaborates with DOSHS to ensure that workers' rights to health and safe work environment is protected. All these bodies form the National Council for Occupational Safety and Health to oversee the overall role of safety in Kenya (Kituyi, 2013).

The OSHA of 2007 provides a guideline on how safety matters should be handled. Employers are required to consult with their employees on matters related to their safety and most importantly, the employer must have a working plan of implementing systematic management process. It is a condition that all work places are subject to abide by OSHA 2007 and all safety regulations. The Act gives a general provision that requires contractors including subcontractors who are legally contracted to give safety an upper hand in their contractual obligations. They should not expose workers and the surrounding environments including the neighbors into unsanitary or hazardous working conditions that can compromise their health. The employer is required to maintain appropriate programs to manage this course. Such programs should be directed in promoting regular inspections by competent people to ensure that the job sites, materials and job equipment are risk free. Appropriate control measures should be put in place for such materials, equipment or tools and plants which might be found fault. They should be prohibited from being used and if possible be disposed off in any possible manner (OSHA, 2007). On operation of site machinery and tools, the Act, clearly advice employers to abide by good safety practices. Employers are required to have qualified employees either through training or working experience to operate working machines and plants which are deemed to be risk.

Construction sites being areas that absorb large number of employees, the Act recommends that such workplaces to have health and safety teams. If there are more than 20 employees, a safety committee is supposed to be established to roll out the safety matters. The employer should support such teams and at no point is expected to penalize any member of such team especially when carrying out its rightful duties (OSHA 2007). The Safety and Health Committee Rules, 2004 guides the formation of committees in workplaces. It guides on election of committee members, duties and responsibilities of the leadership of the committee, the trainings to be undertaken by the committee members and the mode of conducting their duties.

Legal Notice No. 160 also, recognized as the as the First Aid Rules 1977, gives the guidelines of handling first aid matters in workplaces. It outlines how places of work should appoint first aid givers, the trainings to be undertaken and the contents of the first aid boxes. With construction sites recognized as risk places to work in with apparent injuries, it is a requirement for construction sites to have first aiders in site with full packed first aid boxes.

Safety precautionary measures should be prioritized in construction sites. Amongst these measures, the employer should develop procedures for fire protection and prevention throughout the phases of development. Fire risk reduction Rules, 2007, requires workplaces to have firefighting equipment. Such equipment should be properly maintained and a trained firefighting team in place to attend to fire in instances of emergencies. Construction sites are prone to fire outbreaks following the use of fuels, paints and even lighting fire. Combustible scrap and debris should be removed at regular intervals during the course of construction without necessarily introducing fires at the sites. The employer is responsible for the development and maintenance of an effective fire protection and prevention program at the job site throughout all phases of the construction, repair, alteration, or demolition work (Wells and Hawkins, 2005).

Every work place is required to maintain good environmental health and safety practice. These practices streams from regular risk assessment to actions taken to mitigate the major risks. Contractors should appoint a trained and qualified accident prevention officer to oversee the maintenance of site safety. Among the duties of appointed safety officer is to ensure that workers are trained and receive information and instructions regarding the risks they are exposed to. Employees should be provided with appropriate personal protective equipment and basic first aid with recommended facilities (Wells and Hawkins, 2005).

#### **2.4 Adoption of Occupational Safety and Health Practices at Construction**

The most important means of achieving occupational health and safety measures are through promotion of raising awareness through advocacy, use of legal instruments, laws, regulations and national enforcement. Knowledge development, management and dissemination all plays key roles in the road to safe working conditions. Necessary technical assistance and cooperation through international collaborations compliments management safety so as to prevent occupational

accidents and work-related diseases and promotion of workers' health and well-being at work (Jukka, 2006; ILO, 2003).

There are several practices which can be adopted to promote project safety. The mostly applied safety practices used by many contractors to promote site safety in accordance to Bernstein (2013)'s market research that was conducted in US were rated as; including jobsite workers in safety process (86%), conducting risk assessments prior to construction process (89%), conducting regular safety audits with foremen/workers (81%), assigning safety personnel (78%) and site specific training program for workers and subcontractors (69%).

Safety culture at work places underlies the precautionary safety measures. Safety culture cements the basic right to work in a safe and a health environment. So as to achieve this right, employers, employees and government institutions should work as a unit. Each party should participate. This is best achieved through distribution of duties and responsibilities amongst these stakeholders. Roles of these parties are sufficiently provided in the OSH 2007 Act and in other OSH rules and regulations (Jukka, 2006).

Safety measurement is best analyzed through checking of the basic safety indicators. These indicators include having an occupational, health and health policy manual and policy statement, keeping written procedures for high risk activities such as fall protection, energy control and power lockout, confined space, asbestos removal, radiation safety, emergency evacuation, PPE requirements, permit system for hot works, excavation/trenching, hoists, and dangerous non-routine works. It can also be proved by keeping list of chemicals used to perform the contracted work and the material safety data sheet for all the chemicals in use and documented risk assessments. Employers should maintain safety trend data for injuries, training lists, and employee exposure hours among others (ILO, 1988).

Monitoring of safety performance is paramount to achievement of safety. According to a research conducted by Lansdown et al (2007), safety can be measured through what has been implemented and its indicators can be measured. According to their findings on small management enterprises, it was found out that 80% of such enterprises maintain health and safety policy statement, 72% of the filed risk assessment reports, 80% had accident book, and 68% had a first aids book.

Construction sites performance to safety is equally measured in a similar manner. According to Seoke & Tau (2013), implementation level of OSH guidelines in Botswana's construction sites, the site's responses were ranked as follows; 2% of the sites had firefighting and prevention programs, 25% had of the respondents had implemented electricity safety measures, 11% of them had ergonomic guidelines, 10% of them had hazardous substances guidelines, 50% had welfare guidelines in place, 25% had first aid programs, 48% of them had ladders and scaffold guidelines, 29% had complied to PPE policies while 28% had housekeeping guidelines.

Also, Ng'ang'a et al (2014)'s study on conditions of provision of employees hygiene and sanitation facilities at construction sites revealed a wanting state. Safety measures that ought to be fully implemented were poorly handled. In their research, they analyzed conditions of construction workplaces in Nairobi County in terms of provision of changing rooms, drinking water, provision of sanitation facilities, and access to information on HIV/AIDS. These are among the safety practices that construction workplaces should prioritize on. He concluded that failure to implement important occupational safety and health practices can lead to diseases and accidents.

#### **2.4.1. Common Accidents at Construction Sites**

Safety practices helps to reduce accidents in workplaces. According to Dias, 2009, more than 60% of construction fatal accidents could be best avoided by actions that are performed before the starting of the construction site. According to Britain Health and Safety Executive (2014) analysis, accident rates in the construction industry were on a reducing trend. This observation was supported by improvement of safety in the sector. However, this was a big contrast by Abongomera (2006) findings whose study established that many accidents mostly in developing countries go unreported by workers and contractors as required by the laws. He found out that workers fear taking risks of reporting such injuries to labor organizations and advocates because they do not know their rights and fear of losing jobs. Thereby, employers take advantage and fail to instill serious safety and precautionary measures at their workplaces. Construction sites are required to keep records of injuries recorded in their site in a daily accident books. As part of the regulations, employers, the self-employed and those in control of premises are supposed to report specified workplace incidents to a country's Health and Safety Executives so as to keep track of those accidents (RIDOR, 2013).

In Britain, the construction industry accounted for about 5% jobs, the sector recorded about 31% of fatal injuries, 10% of the national reported major/specified injuries and 6% of over-7-day injuries to employees. The main causes of construction worker fatalities included; fall from height, contact with machinery, strike by object, strike by moving vehicle, contact with electricity, strip or falls within the same level among others (Britain Health and Safety Executive Report, 2014). Workplace injury and work-related ill health also impose costs on employers like sick pay offs; on individuals through; the human costs of pain, grief and suffering; and on the government through health care expenditure (Stephen, 2014; Perttula & Kiurula, 2010).

Most injuries in construction sites have been reported to occur during the material transfer that translates to about 36% of the absenteeism. Continuous manual and mechanical material transfers leads exhaustion of workers that reduces their efficiency in work (Perttula & Kiurula, 2010).

Construction sites are equally associated to a number of ill cases following the type of work and inputs they use. These include musculoskeletal disorders and stress, Vibration white finger, carpal tunnel syndrome, occupational deafness and dermatitis are the most common cases of non-lung diseases. Airborne materials from spray painting, welding or cutting/grinding metals; dusts from stone, cement, brick or concrete are implicated with lung diseases or breathing problems. Construction industry has the largest burden of occupational cancer amongst the industrial sectors, over 40% of the occupational cancer deaths and cancer registrations in Britain were from construction. Most of them were caused by past exposures to asbestos and silica (Stephen, 2014).

Injuries due to fall remains the most source of fatal accidents in construction sites (Huang & Hinze, 2003). Scaffolding remains the most risk sources of such hazards of fall especially when they are not properly erected. Therefore, protecting employees from scaffold-related accidents would prevent an estimated 4,500 injuries and 50 fatalities each year. Valuable precautionary measures should put in place when working in scaffolds. Scaffold must be sound, rigid and sufficient to carry its own weight plus four times the maximum intended load without settling or displacement. It must be erected on solid footing. Unstable objects, such as barrels, boxes, loose bricks or concrete blocks must not be used to support scaffolds. Any scaffold damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed (OSHA 2007).

## **2.5 Project Stakeholders Intervention on Construction Site OSH Practices**

Companies which have poor management safety interventions have been rated to perform poorly safety-wise (Saari, 2006). Safety ought to be given equal scale with productivity as they are mutually interdependent as per Bernstein (2013) findings whose study demonstrated that 43% of companies researched responded positive outcome from implementation of safety. He established that positive outcome in workplaces can be achieved through the management embarking on a safety culture system (Nielesen, 2013; Sawacha, 1999 & Nielesen, 2013). Some of the positive impacts that results from implementing safety programs as per Berstein (2013) include; a decrease in project schedule that was rated at 50%, decrease of project budget by 1% or more, and a 1% increase in return on investment. The study also demonstrated that improved safety structure attracts other benefits like good contractor and project reputation. From an economic perspective, Richard & John (2009) observed that safety conditions remains the one among the many factors that affects choice of a job.

Construction industry as an investment opportunity, need to be regulated for it to be safe. There are several motivators that can make this industry's safety to be complied with. According to Bernstein (2013)'s findings, the respondents in the market research conducted indicated that 79% of the contractors adopt safety practices because of their concern about worker health and wellbeing, 78% do adopt due to insurance costs, 77% does so because of liability concerns, 65% adopt to avoid business interruptions, 64% does so due to client's demand, 63% does so due to regulatory requirements, 54% of the firms adopt safety due to desire to improve productivity, 51% adopt safety management practices due to the industry leadership in overall safety culture and 50% does so as to gain competitive advantage. Projects are managed by a team who can also influence safety performance management in construction sites. According to Bernstein (2013) owners/clients mostly influence on small projects on a 58% response while in large projects, safety management is left to company leadership on 51% response.

According to Kirombo (2012), occupational safety and health matter is all inclusive agenda. Good safety performance is best achieved if the management takes an active role. In his findings, he concluded that success of construction workplace safety is all dependent on participation of all stakeholders including top management and employees. Senior management have a role of enacting occupational health and safety policy and ensuring that it is adequately communicated to

employees. In his findings, he concluded that supervisors like clerk of works and professional bodies have a duty of checking compliance to occupational health and safety practices, safety advisors have a role in advising the top management on steps to take to control accidents and important investigations. Safety representatives have a duty to link the management to employees and the employees have a duty to take caution at workplaces and to adopt a safety conscious culture. In the same study, it was established that clients' intervention in implementation of occupational safety and health measures was low. Private individuals who double as the clients rarely pay attention to occupational safety and health practices. He found out that these clients prefer profits than to incur safety costs.

## **2.7 Challenges to Achievement of Safety Practices**

Small scale business enterprises are mostly pressed than large scale businesses. Apart from environmental health and safety compliance constraints, they equally have challenges on effective framework of cash flow management, production and staffing. Many businesses, construction industry included rarely give priority to knowledge gaining through organizing and attending training sessions. They attribute this either to costs or lack of time for them due to project timescales. Even if free trainings are designed, rarely you get firms send even one representative for them. Poor perception has also been implicated as another cause which makes such industries not to see the essence of trainings. The view that health and safety will not add value especially in economic terms to the organizations hinders safety trainings. However, there is need for the employer and the employee to understand that safety has an added economic value in it through limiting time lost due to consequential accidents from non-compliance (Lansdown, 2007).

Muiruri & Mulinge (2014) found out that construction sites compliance to health safety face many challenges. In their survey they found out that provision of personal protection equipment was very low. Management support to health and safety was very minimal and this contributes to poor enforcement mechanisms. Provision of welfare facilities was also poor and low performance in the creation of safety awareness. Evaluations which help in pin pointing action areas for effective plans are rarely performed in construction sites. Some of these challenges are dominantly contributed by poor budgetary allocation to health and safety concerns.



In Kirombo (2012) study, it found out that implementation of occupational safety and health practices is wanting because it is expensive. This is partly because of cost benefit analysis especially by private project developers who will rather consider profits than to incur costs in provision of such safety measures. According to Bernstein (2013)'s study, firms are discouraged from investing in safety measures because of several reasons. In his findings, it was established that 35% workplaces blames increased safety costs, 32% claimed lower productivity, 31% reported the lack of organizational commitment, and 24% claimed the lack of knowledge on advanced safety practices and 22% blamed negative expected impact on project schedule as the contributor.

## **2.8 Gaps in the Literature Review**

The following are some of the literature gaps from comparative studies that the current study addressed;

- (a) Ng'ang'a et al (2014) study on Health And Safety Conditions at Construction Sites in Nairobi County, Kenya, analysed on provision of hygiene and sanitation at construction workplaces. It only considered a portion of the practices and gave no attention on how stakeholders can participate in ensuring compliance
- (b) Kirombo (2012) examined the factors affecting implementation of occupational health and safety measures in the construction industry in Kenya. He cited Mombasa County as his case study. The current study sought to assess occupational safety and health practices in a different geographical location, Nairobi County.
- (c) Ojiem (2012) also examined a similar study on occupational safety and health practices. However, the study targeted the electronic media house in Kisumu. The current study sought to extend a similar study but on the construction industry in Nairobi County.
- (d) Muiruri & Mulinge (2014)'s study that sought to investigate the health and safety management on construction sites in Nairobi County. The study reviewed the health and safety measures employed in the construction industry and the mechanisms of enforcement. It however did not consider the interplay of project stakeholders in enforcing the occupational safety and health that the current study finds as a gap to fill

## **2.9 Theoretical Framework**

### **2.9.1 Heinrich's Domino Accident Causation Theory**

Heinrich's Domino Accident Causation Theory is recognised as among the first studies to be conducted on occupational safety and health. Herbert Heinrich put forward this theory in his 1931 publication on *Industrial Accident Prevention: A Scientific Approach* (Erick, 2017). This theory has been adopted by many researchers especially when analysing health and safety matters in workplaces. In his theory, Heinrich posited that accidents occur through a sequence of events involving inappropriate social and environmental conditions; fault or carelessness of a person performing the assigned duty, unsafe acts or technical failures that leads to accidents and subsequent injuries. To endorse this theory, Heinrich designed a scientific study in which he analysed 75,000 insurance accident cases reported from workplaces. From the analysis, he deduced that 88% of accidents are caused by unsafe act of workers, 10% due to unsafe conditions while 2% are due to natural disasters. From the study findings, he judged that accidents can be controlled through a sequence of corrective actions that are commonly regarded as the three 'E's. They include; the engineering measure that entails product design and process change; the education measure which covers training the workers in all facets of safety and management awareness to ensure that safety pays off. The last corrective measure he posed is the enforcement corrective measure that ensures that all internal and external rules, regulations and standard operating procedures are strictly adhered by the management and the workers (Cleveland State University, 2007).

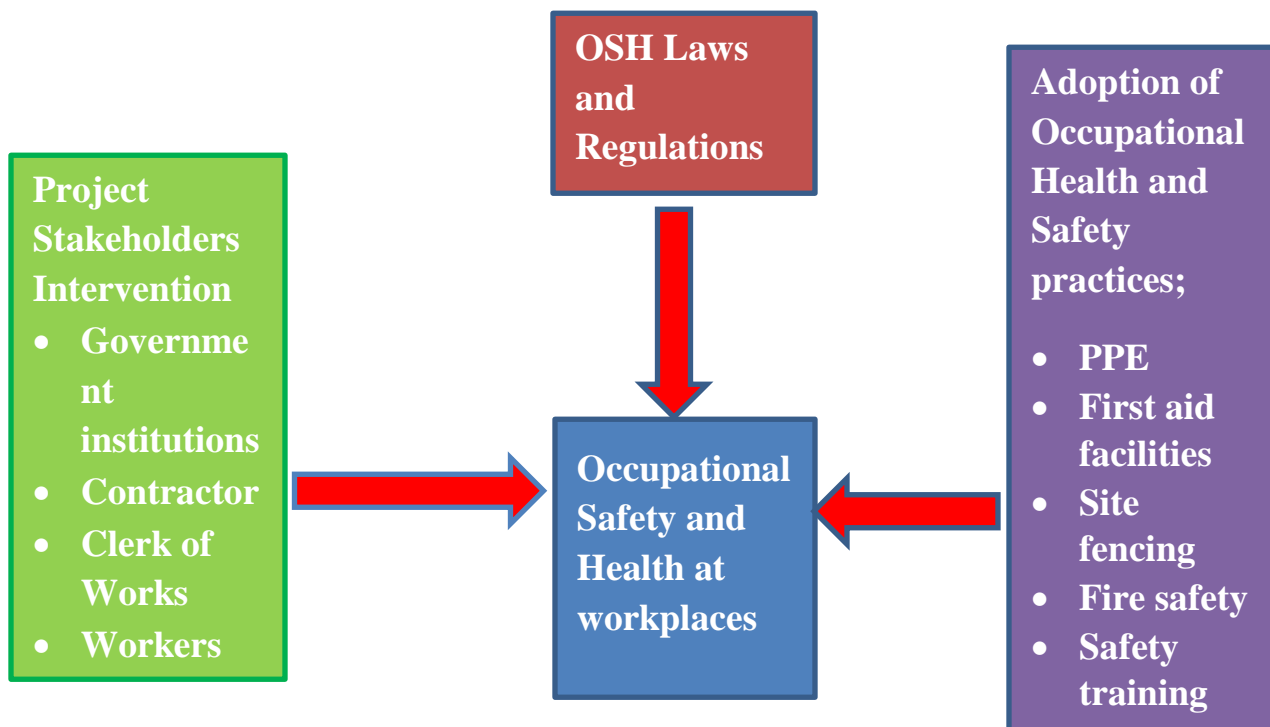
Although this theory was later criticised by other researchers as being too simplistic, it has still remained applicable in guiding studies related to occupational health and safety. Some of the techniques for safety management proposed by Heinrich which can be applied in construction workplaces include; management supervision; safety rules; workers safety trainings, safety conscious information through posters and films; risk assessments; regular safety audits; accident investigation; job analysis; production of accident analysis sheets; inspection of equipment, and changes in work procedures or processes; establishment of safety committees and arrangements for emergency and first aid. All these needs the intervention of relevant project stakeholders like the government bodies, management team, employees amongst others (Priscilla et al, 2014).

## 2.10 Conceptual Framework

Researchers have applied Heinrich's Domino Accident Causation Theory as their research foundation. For example, in Priscilla et al (2014)'s study, it was conceptualized that management support the implementation of safety programmes in a number of ways; through procurement of safety equipment, enacting and guiding implementation of the safety and health policy, contracting safety advisors and training elected or selected safety teams. In the study, implementation of occupational safety programmes was the dependent variable that was measured against the management's willingness to provide safety equipment and occupational health and safety programmes as independent variables.

Implementation of safety practices at workplaces is an interplay of many factors and players, rather than a company top management only affair as conceptualized by Priscilla et al (2014). So as to adopt Priscilla et al (2014) foundation, this study employed occupational health and safety practices a dependent variable that is measured against government policies, adoption of safety practices and stakeholders intervention on OSH practices as independent variables as shown in the diagram below;

**Figure 1: Occupational Safety and Health Conceptual Framework**



Adopted from; Priscilla, *et al.*, (2014).

### **3.11 Explanation of Variables in the Conceptual Framework**

Occupational safety and health at workplaces is dependent on a number of factors such as; the existing national occupational safety and health laws and regulations. Some of these laws in OSH include; OSHA 2007, Fire Risk Reduction Rules 2007, First Aid Rules 1977, Safety and Health Committee Rules 2004 among other laws scattered in other subsidiary Acts. Full compliance to the requirements of these Acts and regulations will translate to a safe workplace.

OSH at workplaces is also dependent on performance of the immediate stakeholders' intervention to ensure safe workplaces. Some of these stakeholders in the construction sector include; the client and the contractor who have the main role of setting aside resources for funding occupational safety and health programmes and supporting safety teams. Government bodies like DOSHS has a key regulatory role of monitoring workplaces to ensure full compliance to the set laws. Clerk of works also has supervisory roles. Workers who are the main subject of safety at workplaces also have role of upholding and working through the set laws to avoid/prevent/minimize accidents and losses.

Finally, OSH status at workplaces is dependent on adoption of basic occupational safety and health practices like; provision of personal protective equipment, availability of first aid facilities, adequate site fencing, presence of fire safety prevention and emergency preparedness systems and evidence of trained safety teams and their mandate.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter describes the methods that guided this study. It gives a highlight of the study area, research design, study population, the sample design employed, data collection methods used, and the data analysis procedure employed.

#### **3.2 Study Area**

The study was conducted in Nairobi City Region. The region, commonly regarded as the Nairobi County's description is given below:

##### **3.2.1 Historical Background of Nairobi County**

Nairobi takes its name from the Maasai phrase “enkare nairobi”, which means “a place of cold waters” which was a grazing and a watering point for their livestock. Its growth is linked to the development of the Kenya-Uganda Railway back in 1890s. The railhead in Nairobi led to establishment of commercial and business center of the British East Africa protectorate. By 1900, Nairobi had become a large and flourishing place with the settlement consisting mainly of the railway buildings and separate areas for Europeans and Indians. The colonial destination town grew faster and in 1907, Nairobi was declared as the capital center of the British East Africa. At independence, Nairobi remained as the capital city of the self-rule Kenya (Elizabeth, 2006).

The 2010 Kenya Constitution divided the country into 47 counties. Nairobi city region was declared as county number 047 taking over the former Nairobi City Council functions. The County is sandwiched between three counties: Kiambu to the West and North, Machakos to the East, and Kajiado to the South. It has eight political constituencies; Makadara, Kamukunji, Starehe, Lang'ata, Dagoretti, Westlands, Kasarani and Embakasi (CIDP, 2014). It covers 694.9km<sup>2</sup> with a population size of 1,623,282 people as per the KNBS 2009 census report.

Nairobi County is a commercial and a destination center that receives visitors from within the country and the international world. It is recognized as the hub of production industries and colleges. The many industries enjoy ready market for its products owing to the mass population of

the city. The county has diverse transport network especially roads connecting with other counties and other means connection various destinations in the world like the airports. The city gives Kenya an international role of serving as the head quarter of UNEP and the UN-Habitat. Its main economic activities are industry, manufacturing, trade, financials, real estate/construction and tourism/hospitality. Nairobi National Park, KWS and unique slums like Kibera are some of the main tourist attraction features for the county (NCCPA, 2012).

According to Ngugi (2013), Nairobi County's population is composed of mostly youthful age group of between 15-34 years. It has a transitional population structure due to a shrinking child population, where 0-14 year olds constitute 31%. This is a result of low fertility rates among women as shown by the highest percentage household size of 0-3 members at 62%. Labour migration from the rural areas in search for jobs is the main reason why the county has a very high proportion of the working age population of those aged between 15-64 years old who form 68% of the total population.

The study settled on Nairobi County as a case study because of its strategic role and position in the country. The county has a fast growing population growing each year mostly of the youth coming in to seek for employment opportunities. The demand for more housing opportunities has seen more housing construction projects coming up in the city.

### **3.2.2 Socio-Economic Classification Nairobi County**

Nairobi County is populated with people of all classes occupying high end areas with low end classes as neighborhoods. Common linkages have been established such as common markets that promote interactions between these divides (Mwaura 2006). The county has been classed into five residential clusters based on population density and social mix as depicted by Mitullah (2003);

- A. The upper Nairobi that lies to the West and North of the CBD which is lowly populated but has high income inhabitants. It mostly covers former expatriate residential areas such as Woodley, Kileleshwa, Kilimani, Lavington, Bernard, Thomson and Muthaiga.
- B. Medium populated and medium income areas such as Parklands, Eastleigh and Nairobi South which is mainly occupied by individual land owners.

- C. South and south-east areas that is comprised of Karen and Langata areas which are high income areas with low population densities. Residents in these areas have space for large gardens, housing and paddocks.
- D. Eastlands which is regarded as a marginalized urban fringe to the East and away from the CBD. It represents a low-income densely-populated area. It represents old estates mostly of the colonial regimes. These estates include; Race Course, Ngara, Shauri Moyo, Pumwani, Mathare Valley, Eastleigh, Kariobangi, Kaloleni, Bahati, Jericho, Mbotela, and Dandora.
- E. Mathare valley to the East and Kibera slums to the west are the highly populated areas in the county. They are the largest uncontrolled urban settlements with population densities of 1,250 people per hectare in 1980.

### **3.3 Research Design**

According to Thomas (2009) *“a research design is a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research”*. He further underlines factors guiding choice of a study design are to be informed by the purpose of the study, the theoretical framework a researcher subscribes to and the context with which the research is to be carried in. This study employed descriptive case design to guide the study. This strategy was used as it helps to describe the ‘how’ question of the variables under observation (Robert, 2004). Descriptive case study design is reliable to generate both qualitative and quantitative data that define the state of nature at a given point time (Koh & Owen, 2000) as was with the current study of health and safety conditions of construction sites as at the time the field study was conducted.

### **3.4 Target Population**

Population is the entire group of individuals, events or objects having common observable attributes, in other words, it refers to an aggregate of all that conforms to a given specification (Mugenda & Mugenda 2003). The target population for this research consisted of all housing construction sites within Nairobi City County that were in operation during the months of April and May 2015. As per the data received from Nairobi County’s Department of Planning and Development, a total of 871 had been approved to carry out construction works. These sites were zoned from zone 1A to zone 18 as per the records retrieved from the Department of Planning and Development of the Nairobi City County, see the table below;

**Table 2: Distribution of construction site in Nairobi City County**

<b>Zone number</b>	<b>Locality</b>	<b>Number of sites</b>
1A	CBD	29
1E	Upperhill	14
2	Eastleigh/Pumwani/California/Ziwani/	37
3	Westlands/Parklands/City Park Estate	76
4	Kileleshwa/Springvalley/ /Kilimani	75
5	Lavington/Kiuna/Lolesho/ springvalley	66
6	Muthaiga	25
7	Huruma/Mathare/Kriobangi/Korogoch	9
8	Donholm/Umoja(1&2)/ /Makadara/Buruburu/komarock	62
9	Main Industrial Area	75
9E	Kariobangi Lt/Dandora Industrial zone	3
10	LangataEstates/South,B&C/Nairobi West/Madaraka/Ngummo	78
10E	Ruai/Embakasi/Tassia/Imara	22
11	Kibera/National Housing Corporation	0
12	Karen	116
13	Gigiri/Ridgeways /Kitsuru	64
14	Marurui/Thome/Roysambu	26
15	Dagoretti/Riruta	41
16	Ruaraka/Babadodo/Gumba	10
17	Githurai 44&45//Zimmerman/Kahawa West//Babadodo	22
18	Kasarani	21
<b>Total</b>		<b>871</b>

**Source: Department of Planning and Development, Nairobi City County (2/2/2015)**



### 3.5 Sample Design

#### 3.5.1 Determination of Sampling Size

Sixty (60) sites were selected as the appropriate sample sites for data collection. This formed an ideal sample in accordance to Dworkin (2012), who recommend that a sample size of 50 is adequate for qualitative studies involving in-depth analysis. So as to counter the possible nonresponse rate, 10 sites were added to recommended minimum of 50 sites to make them 60. The sample size was also convenient due to cost effectiveness of data collection.

#### 3.5.2 Sampling Procedure

Multi-stage sampling design was used in selecting sample sites for study. From the Nairobi City County's list of approved sites, each site was classified to the zone it belong. Nairobi City has a total of 18 zones. The eighteen (18) Nairobi zones were further grouped into categories based on the zone's economic status; upper class, middle class and lower class as per Mitullah (2013) classification guideline. One zone was randomly selected from each of the three categories to form the first stage sampling. These zone were; zone 8 (lower class), zone 10 (middle class) and zone 12 (upper class). Proportionally, representative sample sites were calculated from these zones to form the second sampling stage.

In accordance with Pandey & Verma (2008), the allocation of sample subjects from a given strata can be calculated using the proportional allocation method. The sampling formula was used to determine the number of sites proportionately from each stratum. i.e., in each  $i$  stratum

#### Formula 1: Proportional Allocation Formula

$$n_i = n \frac{N_i}{N} \quad i=1,2,3\dots$$

Where  $n_i$  represents the sample size from  $i$  strata,  $n$  represents the sample size,  $N_i$  represents the population size of the  $i$  stratum and  $N$  represents the population size. These sample sites from each stratum was arrived at as shown in the table below;

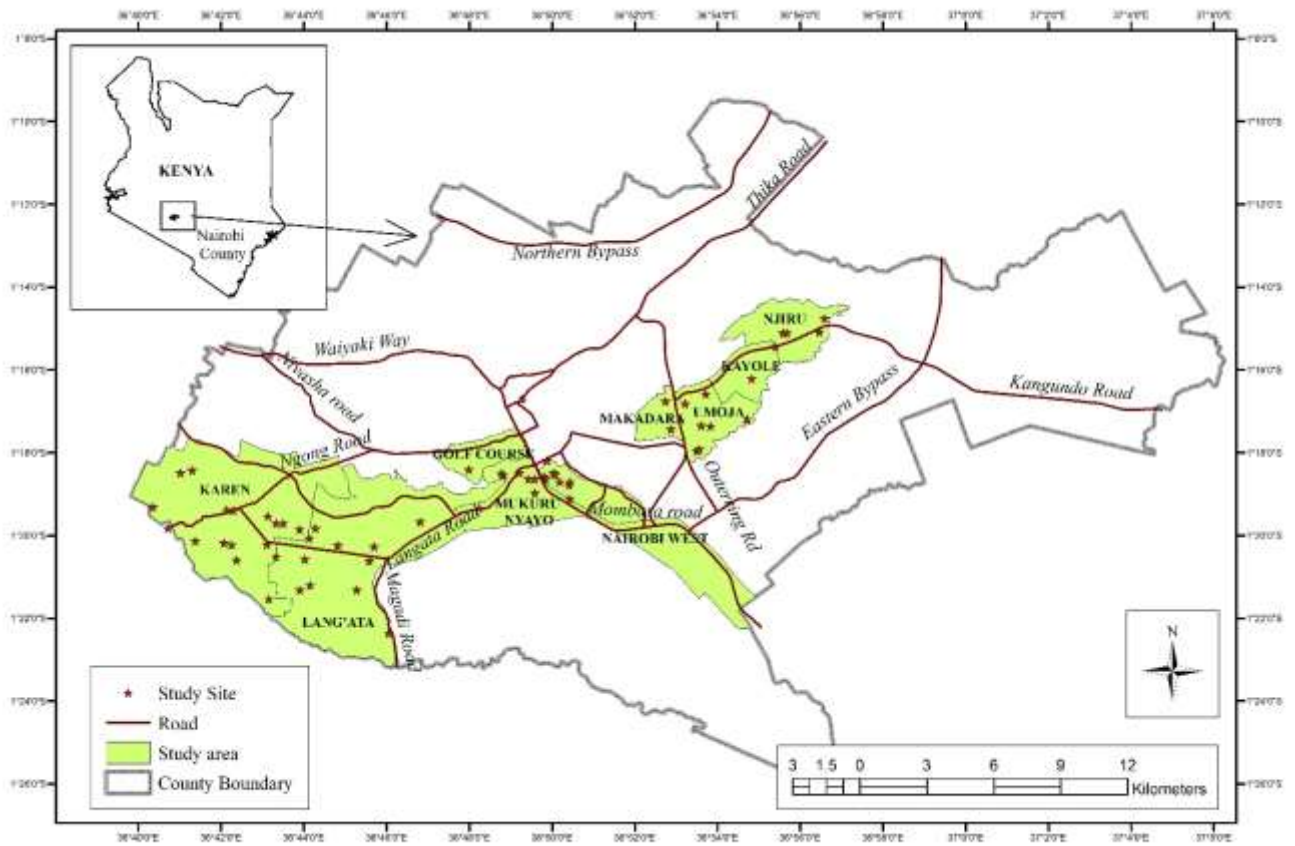
**Table 3: Sampling Plan**

Zone	Number of sites	Sample size	Locality represented	Economic class
8	62	15	Kayole	Lower class
10	78	18	South B	Middle class
12	116	27	Karen	Upper class
Total	256	60		

**Source: Department of Planning and Development, Nairobi City County (2/2/2015)**

Through systematic random sampling system, respondent sample sites were selected from the approved construction sites list from the county planning and development department. The sampled sites were plotted in the Nairobi County map as shown below;

**Figure 2: Map Showing Nairobi County and the Sampled Sites**



**Source: Researcher**

### **3.6 Data Collection**

#### **3.6.1 Variables and Source of Data**

So as to operationalize the objectives, each objective was classed into measurable variables and the indicators that were used to measure these variables as shown in the table below;

**Table 4: Showing how the Inferences under Study were Measured**

Objective	Variables	Indicators	Measurement	Study
What are the environmental health and safety regulations governing construction works in Kenya?	Environmental health and safety regulations	Project signboard Workplace registration certificate	Number of sites with sign board Workplace registration certificate	Descriptive
To what extent were the Occupational health and safety practices adopted at the construction sites	Fire safety First aid Trainings PPEs Safety notices Site security OHS policy	Firefighting equipment First aid kit/Aider Any safety training Records of PPEs Notice board Fencing	Provision of the indicators	Descriptive
To what extent has the project management team established an environmental health and safety management systems	Government institutions Contractor Clerk of Works General Workers	-Extent of Intervention by these stakeholders	- Number of sites site managers takes safety influence roles -Number of sites visited for inspection -Number of project owners influencing safety	Descriptive

Objective	Variables	Indicators	Measurement	Study
What are the challenges faced in implementing the environmental and safety practices at the construction sites	Safety records Safety costs Managerial role Level of productivity Level of knowledge Time Schedule	- Keeping of safety records -Management commitment Level of productivity Level of knowledge on safety Safety and expectation on time schedule	Number of sites in agreement that these factors	Descriptive

Source: Researcher

**3.6.2 Data Collection Methods**

Primary data was collected through administration of open and closed ended questionnaires to site safety representatives for every site that was sampled. Safety representatives were considered to respond to the questionnaires because they were the subjects responsible for implementing safety matters on site. The study also employed observation schedule data collection method that was enhanced through photography. These methods were preferred because they quickens data collection with capacity to back up data with reliable photographs. Secondary data was collected through referring to published books and journals which gave the context of the safety regulations in the construction industry. It has formed the basis of literature review and guiding in the generation of the questionnaire for this research.

The interviews were also extended to the key informants in the construction sector; the DOSHS officials and the national construction authority officials. These bodies were selected as they are majorly involved the control and regulation of construction works in the county.

### **3.7 Validity of the Instrument**

Validity is the accuracy and meaningfulness of inferences, which are based on the research results (Mugenda & Mugenda 2003). Testing validity helped to justify dependability of the instrument in data collection. Content validity was tested by carrying out pilot testing of the questionnaire. All these were done through issuing the instrument to people with the idea of what was to be researched to respond to the questions in the questionnaire. Recommendations received from these tests helped to revise ambiguous questions, repeated concepts and correct personal issues.

### **3.8 Data Analysis**

The instruments were proof checked to collect errors. During analysis, the collected data was divided into usable and non-usable data. The non-usable data was dropped. The collected usable data was coded and entered into a computer after which it will be analyzed using Excel and SPSS software.

### **3.9 Data Limitations**

This research is entirely based on accessing data from the county offices, Department of Planning and Development. Therefore the data on construction sites was based on those sites which have applied for approvals and inspection of their sites.

### **3.10 Ethical Considerations**

Secondary data was acknowledged by citing the authors and referencing them. Confidentiality, of the data given out by the respondents, was be assured. No respondent was coerced to fill the questionnaire as they filled them out of their consent. The study report does not reveal the respondents' identity.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

This chapter highlights the response rate of the questionnaires distributed and also presents the result of the data collected and the discussion for each objective and views given. Results and discussion are analyzed under each objective, i.e. to;

- Profile occupational safety and health regulations governing construction workplaces in the county;
- Establish compliance to basic occupational safety and health practices at the construction workplaces in the county;
- Establish the extent to which the construction project stakeholders intervene to influence adoption of occupational safety and health practices at sites in Nairobi City County.
- Analyze challenges facing the county's construction workplaces in the implementation of the occupational safety and health practices.

#### **4.2 Response Rate**

The study was to collect data from 60 construction sites which had been approved to be in operation between April and May 2015. These sites were selected through multi-sampling stage. Of the 60 sites selected, 51 sites responded to the questionnaire issued to them and their data was coded for this study's analysis. These represented 83.3% response rate. This response rate was sufficient for statistical analysis as a response rate of above 70% is regarded as excellent as suggested by Babbie (2007) in Francis (2016)'s study.

#### **4.3 Demographic Data**

Data was collected from construction sites ranging from micro enterprises to large scale enterprises. 11.8% of the sites were micro scale enterprises with at least 10 employees, 29.4% were small scale enterprises with more than 10 employees but less than 50. 39.2% of the sites studied

were medium enterprises with more than 50 employees but less than 250 while 19.6% were large scale enterprises with more than 250 employees.

#### **4.4 Occupational Safety and Health Regulations Governing Construction Works**

Construction projects are a highly regulated works in the country through enacted Acts and professional bodies mandated to registrations. The first objective sought to profile the occupational safety and health regulations that govern construction workplaces in Nairobi County region. Data for this objective was collected through secondary and primary methods

##### **4.4.1 Construction Sector in Nairobi County**

According to report by Kenya National Bureau of Statistics (2014), the Kenyan economy grew by 4.9% in the first quarter of 2011 mainly due to improved productivity in the sector in the construction sector. The report indicated that Nairobi County had the largest proportion of this economic contribution. This was attributed to diverse construction projects it commissioned during the period. To determine performance in economic contribution, key industries in the county linked to construction projects like the cement, glass brick making industries among others were analyzed.

According to Muiruri & Mulinge (2014), reliable support from donor countries and finance institutions in terms of finance and technical skills had shaped the pace of construction industry in Nairobi County. Local and international contractors have invested in construction industry in the county owing to better returns and ready market for the housing sector. Countries like China, Japan, Germany, Sweden and India have greatly boosted the construction industry in county through construction of roads and housing. Some of these projects that have been built through the support of these countries include; the Hazina Trade Centre for National Social Security Fund constructed by the China Jiangxi International, International Airport Terminal 4 and the standard gauge railway project built by the China Communications Construction Company Limited.

##### **4.4.2 Registration of Construction Projects in the County**

The study found out that the construction sector is one of the professionally guided segment in the county. The regulatory bodies charged with this responsibilities in this sector include; Board of Registration of Architects and Quantity Surveyors, Engineers Board of Kenya, National



Construction Authority, County Planning Departments, National Environment and Management Authorities among others. Other inspection bodies like the Directorate of Occupational Safety and Health Services, Public Health Board and county inspectors also play a role in monitoring the construction projects.

Before carrying out a construction project in Nairobi County, the project have to be registered through obtaining necessary licenses and permits, completing required notifications and inspections and obtaining utility connections. Once a survey plan has been received from the survey of Kenya, the client, through a registered architecture or firm is required to submit the architectural plan and the structural plan for approval at Nairobi County's City Hall Annexe upon paying the relevant approval fee. Once approved, the project is supposed to be subjected to other regulatory bodies like NEMA for approvals upon conducting and submitting an environmental impact assessment through a registered expert or firm.

Once all these approvals have been obtained the project owner or his/her representative is supposed to register the project with the National Construction Authority. NCA acts as the final body to check the project approvals along with the details of the contractor and the parties to be involved in the construction works. Therefore, for registration of a construction project, the applicant is supposed to submit the following documents; filled NCA project registration form, original approved architectural and structural plans, NEMA approval license, copy of the bill of quantities, a contractual agreement, copy of the contractors registration certificate, copies of; the quantity surveyors practicing license, architect's practicing license and engineer's practicing certificate. (CAK, 2017; NCA, 2017).

Upon receiving the required documents, NCA then issues a compliance certificate. Before construction works take off, the site is supposed to be marked with a signboard showing the details of the project, NCA and NEMA registration details, the contractor and the consulting bodies' details among other details. The NCA officials are mandated to conduct regular monitoring to check compliance with the registration and good work practice. Some of the indicators of compliance include; NCA registered contractor on site, signboard, safety signs on site, personal protective equipment, fencing, NCA compliance certificate and NCA accredited construction workers and supervisors (NCA, 2014).

Before starting the construction works, the site, also regarded as a workplace is supposed to have workplace registration status. The occupier, now the contractor is required by law to register the site with the Department of Occupational Health and Safety Services as per the OSHA, 2007. For such registration to be effected, the Act requires the occupier to furnish DOSHS with the details of the workplace through filling and submission DOSH 21A form alongside DOSH 23 form commonly known as workplace self-assessment report.

#### **4.4.3 Management of Health and Safety in Nairobi County**

The constitution empowers the county governments to foresee construction activities within their areas of jurisdiction. The county governments does this through implementing laws that regulate county planning and development in land survey and mapping, housing, electricity and gas reticulation. Nairobi County carries out its mandate through the development control section that approves development plans on the basis of sound county planning, health and safety (NCA, 2017; Nyanchoka, 2011).

The OSHA 2007 Act also requires all workplaces in Kenya to be registered. All construction sites being such workplaces should be registered with the local directorate of occupational safety and health services. Construction sites in Nairobi County are required to get these services at the DOSHS house. This act also makes provision for the health, safety and welfare of persons employed such places. The Act focuses on, safety teams, chemical safety, machine maintenance, safety precautions in case of fire, gas explosions, electrical faults, and provisions of protective equipment. The Work Injury Benefits Act (2007), requires employers to maintain an insurance policy with an approved insurer in respect of any liability he/she may incur (Nyanchoka, 2011).

National Construction Authority is mandated to register contractors and construction sites in the country. Its duties include; promote and ensure quality assurance in the construction industry; and to encourage the standardization and improvement of construction techniques and materials. It issues proficiency certificate to contractor's workers and supervisors. The project contractors and other supervisors are supposed undergo relevant training to necessitate upholding of the set standards (NCA, 2012). Public Health Board also has a safety role to play at construction workplaces. Its officers are mandated to conduct regular inspections of workplace to ensure that

eating places are clean, welfare facilities such as toilets are provided and hygiene conditions are upheld. All these are meant to prevent disease outbreaks and infections (Public Health Act, 2012)

#### **4.4.4 Technology and Construction Industry**

Construction industry is a dynamic industry which is also shaping itself in line with the global market. Globalization has contributed this industry especially through the introduction of AutoCAD software which aid in the design of standard structures. The use of building information modeling (BIM) and collaborative designs have promoted green goals in construction projects. However, mobile technologies like phones have not been fully utilized in dissemination of safety trainings to employees (Bernstein, 2013).

New project funding models are seen as the possible mode of controlling the construction industry. The annuity model has been viewed as the next possible mode of running this industry in Kenya through local partnership with foreign companies. Large capital outlay projects like standard gauge railways, sky rocketing commercial houses and roads are the possible projects to apply this mode.

With vision 2030 as a driving force, and with the increase in population, opportunities exist in the construction of residential, commercial and industrial buildings, including prefabricated low cost housing to cater for the rising demand. The government and private developers have joined hand in developing these structures to meet the local needs. There are possibilities of local-foreign contractor collaborations to control this market.

With the interplay of foreign companies running construction projects in the country, there is need for the government and the county governments to encourage adoption of international safety and health standards. Language barrier is likely to pose a challenge in this industry. This has seen local universities offering courses on languages like Chinese, French among others so as to counter the possible language barriers in interaction. Translation programs enhanced by handheld mobile phones have been utilized also to boost communication when handling people of different dialects.

#### **4.4.5 Compliance to Legal Requirements**

The study sought to establish how construction sites have responded to legal requirements on documentations on registration of their workplaces. The study established that 90% had erected the sign boards and 30% of the sites had workplace registration certificate. Complete sign boards

with NCA numbers indicates that the project proponent complied with the regulations for the site to be registered.

There was low respondents on registration of workplaces with DOSHS. This was partly due to low monitoring of the workplaces by the DOSHS as it is with the case of NCA officials. This findings also conforms to the earlier findings by Ojiem (2014) who also established that workplaces seem to have low compliance to the set safety regulations as far as obtaining safety legal documents is required.

#### **4.4.6 Compliance Monitoring**

So as to ensure compliance, the relevant legislations have empowered bodies to conduct regular monitoring of workplaces. The field officers are required to advice the workplaces to ensure that the set construction and safety standards are strictly adhered to. Bodies mandated to conduct these inspections include NCA and DOSHS and county public health officials. The DOSHS monitoring role can be practiced either by the DOSHS representatives or through DOSHS approved persons or institutions like approved; plant inspectors, OSH advisors, fire safety auditors, and training institutions and approved designated health practitioner.

The study established that a total of 25.5% of the sites had been inspected been inspected by the government mandated institutions. 69.2% of the inspections were conducted by NCA officials. The county public health inspected also visited 30.8% of the sites for compliance monitoring checks. No site reported to have been visited by a DOSHS official. The monitoring inspectors are mandated to issue policy orders of either closure of the noncomplying sites or to issue improvement notices. As per the respondents, the study established 7.8% of the sites received either of the order.

The directorate of occupational safety and health has a duty of registering the work places and ensure workplaces have conducted annual audits like Occupational safety and health audits, fire safety audits and risk assessments among others. The DOSHS respondent among other requirements highlighted the conditions that construction sites must comply to;

- i. To ensure that their sites are registered as required under the occupational safety and health Act 2007.

- ii. They should conduct health and safety audit and risk assessment of their construction activities.
- iii. They should have a documented health and safety policy
- iv. They should train their employees on; occupational health and safety, fire safety and first aid.
- v. In case they are constructing a commercial/industrial building, plans should be approved by the directorate of occupational health and safety services.
- vi. Employees in these sites should be provided with the appropriate personal protective equipment like overalls, safety harnesses, gloves, safety shoes and helmets
- vii. Employees should be provided with toilet facilities, first aid box, clothing accommodation, drinking water, and shed to shelter from extreme weather conditions.
- viii. Construction sites should have a safety supervisor.

So as to check compliance to the above requirements, the study through the DOSHS respondent confirmed that no site visits had been made to check on compliance. This confirms to Muiruri & Mulinge (2014)'s findings of poor enforcement mechanisms as one of the reasons for low compliance of occupational safety and health regulations at workplaces

#### **4.5 Site Compliance to Basic Occupational Safety and Health Practices**

The second objective was; to establish site compliance to basic occupational safety and health practices at the construction sites in the county.

##### **4.5.1 OSH Practices**

So as to understand the whether the construction sites had implemented occupational health and safety practices, the respondents gave views to the following basic OSH practices; fire safety, first aid, personal protective equipment, safety information notices and site security. The findings are presented in the table below;

**Table 5: Showing adoption of workplace best OSH practices**

Safety practice	Frequency	Percentage
Personal protective equipment	38	74.5
First-aid facilities	35	68.6
Safety informational notices	26	51
Site fencing	46	90.1
Fire safety	36	70.6
Safety trainings	10	19.6

**Source: fieldwork 2015**

The study established that 90.1% of the sites had provided public safety and site security through fencing with only 40% of them providing its workers with first aid facilities. 74.5% of the sites provided their employees with the personal safety gears which ranged from reflectors helmets and safety boots. 68.6% of the sites had first aid facilities for responding to emergencies while 51% of the sites had safety notices for alerting and informing its employees about their safety awareness in site. It was also reported from the data that 70.6% of the construction sites had a fire safety measure in terms of firefighting equipment and fire safety team. Safety trainings are poorly practiced in Nairobi construction in Nairobi County as it was lowly safety practice few sites attend to. Only 19.6% of the sites had trained their employees on safety. These safety training ranged from fire safety, first aid or basic workplace safety.

**Plate 1: Informational safety notices displayed**



**Source: Fieldwork 2015**

#### **4.5.2 Occupational safety and health policy and training**

Workplaces are also required to enact a workplace occupation health and safety policies. In the inquiry about having these policies in the study sites, the study established that 68.6% of the sites had enacted their occupational safety and health policy as require by the OSHA 2007 Act. On an inquiry on whether the employees are aware of the policy, it was also established that 35% of the sites that had enacted the policy communicated the provisions of the policy to their employees. Communication channels employed were inductions and regular meetings. 75% of the sites with OSH policy were reported that they were not strict on enforcing the occupational safety and health policy regulations. Poor communication and lack of willingness to enforce an enacted occupational safety and health policy can be a recipe of having risky construction sites. This can also be supported by Ojiem (2012)' findings who found out that workplaces had poor responsiveness to proper communication of the workplace's safety policy and regulations.

#### **4.6 Project Stakeholders Intervention OSH Practices**

The third objective of the study was to establish the extent to which the construction project stakeholders intervene to influence adoption of occupational safety and health practices at sites in Nairobi City County.

In a Likert scale, respondents were asked to rate how; government institutions, the contractor management team, the clerk of works, and workers have intervened in ensuring site safety is complied.

##### **4.6.1 Government Institutions Intervention**

An inquiry to the extent the government institutions have intervened to ensure compliance to occupational safety and health management practices at the sites, the respondents gave the following views as shown in the table below;

**Table 6: Showing the Respondent Views on the Extent Government Institutions Intervention**

<b>Extent of Government Intervention</b>	<b>Frequency</b>	<b>Percent</b>
To a large extent	8	15.7
To a medium extent	16	31.4
To a small extent	25	49.0
To no extent	2	3.9
Total	51	100.0

**Source: fieldwork 2015**

The responses on government interventions showed that 15.7% intervened to a large extent while 31.4% intervened to a medium extent while 49.0% and 3.9% intervened to a small extent and to no extent respectively to ensure compliance of occupational health and safety practices at construction sites. Government institution interventions on sites is effected through regular inspections at the sites. The small extent of influence on occupational health and safety at construction sites is supported by the fact that only 25.5% of the sites had undergone inspections while 74.5% of the sites had not been inspected by any government regulatory bodies.

#### **4.6.2 Contractor Management Intervention**

A similar inquiry about the extent to which the contractor management team have contributed to implementation of occupational safety and health practices at construction sites, the respondents gave the following views;



**Table 7: Showing the Responses on the Extent of Contractor Management Intervention**

<b>Contractor Management Intervention</b>	<b>Frequency</b>	<b>Percent</b>
To a large extent	31	60.8
To a medium extent	15	29.4
To a small extent	5	9.8
Total	51	100.0

**Source: fieldwork 2015**

The respondents on the extent of contractor management intervention on safety showed that 60.8% and 29.4% intervened to a large extent and medium extent respectively while 9.8% on occupational health and safety matters to a small extent. The contractor management's large contribution is supported by the fact that the site is viewed as his workplace and intervention on all site matters is whole controlled by them. The contractor management team supports implementation of occupational health and safety practices through documentation of safety policies where 68.8% of the sites had fully complied, provision of safety practices with which 74.5% had provided personal protective equipment, 68.6% had provided first aid facilities, 51% had provided informational notices, 70.6% had provided fire safety measures and 19.6% had provided safety training programmes.

These findings corresponded with Priscilla *et al* (2014) findings who indicated that management commitment to occupational health and safety practices leads to increased implementation of these practices. The management can be best committed provision of funds to implement the OSH policy in workplaces.

#### **4.6.3 Clerk of Works Intervention**

The study sought to find out the extent to which the clerk of works or site supervisors/or assessors intervened to ensure compliance to the occupational safety and health practices. The respondents gave the following views as given in the table below;

**Table 8: Respondents' Views on the Extent Clerk of Works Intervention**

<b>Extent of Clerk of Work's</b>	<b>Frequency</b>	<b>Percent</b>
To a large extent	27	52.9
To a medium extent	14	27.5
To a small extent	4	7.8
To no extent	6	11.8
Total	51	100.0

**Source: fieldwork 2015**

The response on the extent of clerk of works intervention showed that 52.9 and 27.5% intervened to a large extent and to a medium extent respectively. 7.8% and 11.8% CoW intervened to a small extent and to a no extent respectively in ensuring implementation of occupational health and safety practices at sites.

#### **4.6.4 General Workers Intervention**

The study also sought to find out the extent of general workers' intervention on ensuring compliance to occupational safety and health practices, the respondents gave the following options as shown in the table below;

**Table 9: Respondents' views on the Extent of Workers Intervention**

<b>Workers Intervention</b>	<b>Frequency</b>	<b>Percent</b>
To a large extent	4	7.8
To a medium extent	14	27.5
To a small extent	22	43.1
To a no extent	11	21.6
Total	51	100.0

**Source: fieldwork 2015**

The response on the extent of workers intervention on ensuring enforcement of occupational health and safety practices revealed that 7.8% and 27.5% intervened to a large extent and to a medium extent respectively while 43.1% and 21.6% intervened to a small and to a no extent respectively. Workers intervenes to implementation of occupational safety and health practices when the workplaces have safety and health committees and safety programmes representations. The high percentage of small extent of intervention on implementation of safety matters is due to the fact that 80.4% of the sites did not have the health and safety committees that actively involved employees in matters OSH.

Workers best get involved on sites safety issues when they are well informed about their roles usually through training. Workplaces should have training programs for its various health and safety teams. Some of the mandatory trainings recommended for places of work include; safety and health committee training, fire safety training, basic occupational safety and health training and first aid training. All sites studied reported that they employ skilled laborers with trade certificates especially for masonry and carpentry works. However for mandatory safety trainings, only 19.6% had conducted the recommended safety trainings. This demonstrates the small extent of their involvement on safety matters because they lacked adequate trainings to serve in safety roles that influences safety in sites.

#### **4.7 Challenges Facing Implementation of Occupation Safety and Health Measures**

Although implementation of OSH measures are legal requirements, many workplace management are influenced by intrinsic and extrinsic factors that the study recognized as the motivational factors to implementation of OSH practices.

##### **4.7.1 Motivational Factors for Implementation of OSH Practices**

An inquiry to what influences workplaces to be conscious about implementation of OSH practices, 64% of the respondents cited a legal requirement while 54% were moved by past incidences experienced in the industry. 34% of the sites were influenced by the client demand while 58% preferred to have their sites operating within the law to avoid disruptions from government and county agencies. 42% were influenced to implement OSH practices so as to reduce risks and the potential high insurance costs while 26% were motivated by fear of third party liabilities associated with their projects.

This study findings on motivation factors influencing implementation of OSH practices were lowly rated compared to a similar observation made under Bernstein (2013)'s study. This can be argued that construction sites were not well rooted to have purpose to run safety practices in their workplaces.

#### 4.7.2 Limiting Factors to Implementation of Safety Practices

For the study to understand the limiting factors to OSH, it was first crucial to review how respondents perceived OSH practices to be important at their workplaces. 80% of the respondents had a perception that implementing OSH practices helped to reduce injury rates while 68% viewed OSH practices as a scheme that helped to improve the project reputation. 78% perceived that OSH helped to make the construction project to be responsive to the set time frames while 70% viewed safety aided sites to reduce project cost due to reduced accidents and legal cases. On factors limiting sites to be fully compliance to OSH requirements, the respondents gave the following views;

**Table 10: Factors Limiting Implementation of OSH Practices**

<b>Challenge</b>	<b>Frequency</b>	<b>Percentage</b>
High safety costs	37	76
Lower productivity	29	56
Lack of management commitment	20	42
Lack of Knowledge of advanced safety practices	31	60
Negative expected impact on project schedule	13	26

**Source: Field work 2015**

From the study, the respondents pegged high safety cost as the most limiting factor affecting adoption of safety practices at construction sites at 76% followed by lack of knowledge of advanced safety practices at 60%, lower productivity at 56%. Lack of management commitment and negative expected impact on project schedule were lowly rated at 42% and 26% respectively.

Safety is an all-party responsibility. Regulatory bodies, especially, DOSHS has a major role in monitoring performance of implementation of OSH practices at workplaces. But the study also established that institution did not visit any of the construction site as required by OSHA 2007

Act. It was reported by the DOSHS officials that this was due to institutional challenges as discussed below.

#### **4.7.3 Institutional Challenges Facing Workplace Monitoring**

The body responsible for implementing OSH legislation, policies and actions is the Directorate of Occupational Safety and Health Services. They also had a version of their perspective to the reasons why construction industry was ranked as one of the most risk sector in the county. the following were their inputs to their poor performance and their general observation on construction industry;

- a. **Understaffing:** safety house is supposed to oversee all work places in the country. It covers industries, offices, construction sites among others. This requires many inspectors to be employed to carry out this role. However, this manpower was not available. Although registered DOSH expert's helps in conducting audits and safety assessments to guide registration of workplaces, still this system had not fully streamlined the construction sites' safety compliance.
- b. **Unawareness of Safety Requirements;** although it is a requirement for employers to implement safety practices as stipulated to the OSHA 2007 Act, many workplaces still assumes this requirement. Some sites starts operating their sites without having their site registered as required by the Act. For compliance checks requires large workforce which was already understaffed.
- c. **Insufficient funding:** the officials also reported to be incapacitated by inadequacy funds to run its assigned duties. Generally, funding from the government were reported to be inadequate to facilitate the institution's operations of checking compliance.

## **CHAPTER FIVE**

### **SUMMARY OF KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter gives the summary, conclusion and the recommendations of the study. The subjects are discussed as guided by the research objective and research question.

#### **5.2 Summary of key findings**

On the first objective about occupational safety and health regulations governing construction workplaces in Kenya; and guided by the question, what are the occupational safety and health regulations governing construction workplaces in Kenya? The study established that housing construction projects are legally controlled right from registration to registration of the sites as workplaces. Professionals undertaking construction works are also registered persons or groups and are recognized in laws. The study established that 90% had erected the sign boards and 30% of the sites had workplace registration certificate with DOSHS. Complete sign boards with NCA numbers indicates that the project proponent complied with the regulations for the site to be registered. Compliance with these regulations is related to performance of the monitoring bodies in relation to inspections and follow ups. 25% of the sites had been inspected while 75% had not been inspected by the mandated government institutions. 69.2% of the inspections that had been made were conducted by NCA officials, 30.8% by county public health inspected also visited of the sites for compliance monitoring checks. No site reported to have been visited by a DOSHS official.

The second objective on establishing compliance to basic occupational safety and health practices at the construction sites in the county and guided by the question; have basic occupational safety and health practices been adopted at the construction sites in the county? The study considered basic practices; provision of PPEs, first aid facilities, safety informational notices, site fencing, fire safety and safety trainings. The study established that 90.1% of the sites were fenced, 40% had first aid facilities, 74.5% have provided personal gears, 39.2% of had first aid facilities for

responding to emergencies, 51% of the sites had safety notices 70.6% of the construction sites had a fire safety system in place and only 19.6% of the sites had trained their employees on safety.

On the third objective; to establish the extent to which the construction project stakeholders had intervened to influence adoption of occupational safety and health practices at sites in Nairobi City County and guided by the research question; to what extent had the county's construction project stakeholders intervened to influence adoption of occupational safety and health management practices at sites? The study assessed the immediate housing construction project stakeholders; the government, the contractor management, the clerk of works and the workers. Contractor management and clerk of works' extent of influence on adoption of OSH practices were rated to a large extent while government institutions and general workers were rated to have influenced adoption of OSH practices to a small extent.

Lastly, on the challenges facing the county's construction workplaces on the implementation of the occupational safety and health practices, the respondents pegged high safety cost as the most limiting factor affecting adoption of safety practices at construction sites at 76% followed by lack of knowledge of advanced safety practices at 60%, lower productivity at 56%. Lack of management commitment and negative expected impact on project schedule were lowly rated at 42% and 26% respectively.

### **5.3 Conclusions**

From the study findings, there are legal principles and standards controlling construction projects. Kenya building Act 2007; Occupational Health and Safety Act, 2007; physical Planning Act of 1996. Most of the construction sites have complied with the project site registration processes that is undertaken by the National Construction Authority while workplace registration as required by the OSHA 2007 Act has been poorly implemented in Nairobi County's construction sites.

Most construction sites in the county have embraced most of the basic occupational safety and health practices. These practices include; provision of public safety through site fencing, provision of personal protective equipment, first aid facilities and fire safety measures. Safety and health trainings are given low priorities.

On stakeholders' intervention, the NCA's supervisors play key role in ensuring compliance while DOSHS has poorly practiced its monitoring authority due to institutional incapacity. Project parties

have also partially contributed to safe working conditions in Nairobi County's construction sites. From the findings, the factors affecting full implementation of safe working conditions of the construction sites within the county include; high costs involved in full compliance, lack of knowledge on advanced safety practices as captured in the OSHA 2007, lack of top management and other stakeholders' commitment and negative expected impact on project schedule.

#### **5.4 Research Recommendations**

From the study it was established that all construction Acts are almost compressed and implemented by the National Construction Authority. The study therefore recommends that sites be subjected to meeting safety standards with a workplaces registration certificate number displayed on the signboard. The certificate should be given once a site has complied with the OSH Act of 2007.

The study established that monitoring bodies like DOSHS rarely conducts site inspections. Such bodies should be appropriately supported to give them capacity to monitor all industry players to ensure they provide a conducive working environment and adhere to statutory laws and regulations on health and safety;

Construction firms and project managers should be compelled to understand the safety and health laws and regulations through training accompanied with evidence. Implementation of such regulations should be a mandatory requirements to all construction workplaces;

All construction project stakeholders, especially project owners to subcontracted projects, and consultants should be concerned with site safety matters as part of the subject in project inspections and monitoring.

#### **5.5 Recommendations for Further Studies**

The main purpose of the study was analyze the of occupational health and safety practices of construction sites in Nairobi county. The study featured Nairobi and sampled Nairobi only that had been approved by the Nairobi County department of planning and development. Therefore, the findings of the study cannot be generalized. Therefore in the future a similar study should be done across construction in the country so as to generalize the study.



Most construction sites cited poor implementation of occupational safety and health practices are pegged on high costs of such implementations. A further study is recommended to find out the cost benefit analysis of occupational health and safety management practices in construction workplaces.

The study established that project stakeholders like project owners and project team consultants' involvement in the occupational safety and health practices is low. A further study is recommended to find out how project teams can take part on matters safety and health in construction sites

Finally, the study established that all construction sites studied are headed by male. A further study is recommended to unearth the gender disparity especially in management level of construction projects in the country.

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# APPENDICES

## APPENDIX I: RESEARCH QUESTIONNAIRE

### Introduction

I am Ogetii Job Boundi, a student at the University of Nairobi pursuing Master of Arts Degree in Environmental Planning and Management. This is a questionnaire for an academic research on ‘Analysis of Environmental Health and Safety Practices of Construction Sites within Nairobi County’. It will take your 20min to complete it. It is my humble request therefore; that your sincere contribution will be of benefit to my research and this information shared shall be confidentially handled.

Name of the respondent (optional).....

Sex       Male  
             Female

Position held by the respondent .....

Site location/ Zone. ....

1. How many employees are working in this site?

- Less than 10
- Between 10 and 50
- Between 50 and 250
- More than 250

2. Does the site have the following documents/facilities?

- Site Signboard
- Work Registration Certificate
- Work Permit

3. Does the company have a documented environment health and safety policy?

- Yes
- No

4. Does the company’s environment, health and safety policy or regulations communicated to the employees?

- Yes

- No
- Not applicable

5. Which means of communication strategy do you use to communicate environment, health and safety policy or regulations?

- Training
- Induction
- Notice boards

6. A) Has the project experienced any disruption due to safety concerns?

- Yes
- No

b) If Yes to 7a above, who caused the disruption?

- Public Health
- DOSH
- NCA
- Other .....

7. What have influenced your site to adopt safety management practices?

- Insurance Costs
- Liability Concerns
- Avoiding Potential Business Disruption
- Owner/Client Demand
- Regulatory Requirements
- Past Incidents/accidents

8. Which of the following operational measures have you fully implemented as part of your work plan requirement to aid risk control in your working environment?

- Lifting equipment (lifts/cranes)
- Personal protective equipment
- First-aid facilities
- Warning signs and symbols
- Provision of scaffolds ladders/harnesses
- Site fencing



Fire emergency procedure

9. Does the site has the following safety teams?

Safety and Health Committee Team

Fire Safety Team

First Aid Team

10. A) Do you maintain health and safety performance trends?

Yes

No

b) If yes to the question 12a above, which of the following records to you maintain?

Accident Statistics

Training Records

PPE Issuance Records

Others (specify).....

11. What do you see are the benefits resulting from implementing health and safety programs in this construction site?

Improved project reputation

Reduced injury rates

Reduced costs

Responsiveness to project timeframes

Others (specify) .....

12. Has your site experienced an accident since it started?

Yes

No

b) If yes to 12a above, what is the highest kind of accident have you experienced?

Minor

Severe

Fatal

13. To what extent have the following groups intervened to ensure enforcement of occupational safety and health practices

i. Government institutions (NCA, DOSHS, Public Health)

[1] To a Large Extent [2] To a Medium Extent [3] To a Small Extent [4] To a Small Extent [5] Not Applicable

ii. Contractor Management Team

[1] To a Large Extent [2] To a Medium Extent [3] To a Small Extent [4] To a Small Extent [5] Not Applicable

iii. Clerk of Works

[1] To a Large Extent [2] To a Medium Extent [3] To a Small Extent [4] To a Small Extent [5] Not Applicable

iv. General Workers

v. [1] To a Large Extent [2] To a Medium Extent [3] To a Small Extent [4] To a Small Extent [5] Not Applicable

14. What are the factors that are discouraging your site in the investment in safety practices?

- High Safety Costs
- Lower Productivity
- Lack of Organizational Commitment
- Lack of Knowledge of Advanced Safety Practices
- Negative Expected Impact on Project Schedule

15. Which factors do you think can encourage wider adoption of safety management practices in future?

- Reduced Insurance Rates
- Greater Client Requirements
- More Data on Financial Impact of Improving Safety
- Greater Enforcement of Regulations