DECLARATION

DECLARATION BY THE CANDIDATE

This thesis is my original work and has not been presented to any other University for the award of a degree. This work should not be reproduced without the authority of the author and /or University of Eldoret.

…… ……

PETER A. NYARIBO Date

EDU/PGT/1009/11

DECLARATION BY THE SUPERVISORS

This thesis has been submitted to the School of Education with our approval as the candidate's research supervisors.

……. ……..

PROFESSOR JOHN SIMIYU, Date

Lecturer,

Department of Technology Education,

University of Eldoret.

…… …….

PROFESSOR PETER OKEMWA, Date

Lecturer,

Department of Technology Education,

University of Eldoret.

DEDICATION

This study is dedicated to the Lecturers in the Department of Technology Education, University of Eldoret, Kisii County Works Office and staff of Gusii Institute of Technology, Department of Building and Civil Engineering and all construction workers for the support and encouragement during this study.

ABSTRACT

Construction sites have been regarded as the most dangerous place to work in. Accident and injury rates in construction project sites is very high in comparison with other sectors of the industry. This study investigated the various aspects of safety measures in place in construction sites within Kisii Municipality. The purpose of the study was to establish the critical safety issues affecting the overall welfare and safety of the construction workers in the building construction sites. This study adopted a descriptive case study design. The study employed purposive and snowballing sampling techniques by using questionnaire, observation and interview schedules for data collection. Pilot study was conducted in the neighbouring Ogembo Town. The sample size for the main study was 357 construction workers from active construction sites. The data collected was analysed using SPSS program. Descriptive statistics was used to present quantitative data while qualitative data were organized into themes and narrated using direct quotations. The research findings revealed that contractors did not provide adequate welfare and safety-related facilities to the construction workers. Accidents were most commonly caused by falling objects. The findings also revealed that most accidents and injuries were not reported to the relevant authorities. Further findings revealed that lack of safety equipment,careless worker attitude and training on safety were the major factors influencing the workers' attitudes towards safety on constuction sites. The study concluded that safety measures were not adequately observed on construction sites. The study further concluded that training in safety education and provision of Personal Protective Equipment (PPE) was lacking on construction sites. The study recommends that contractors and other relevant stake-holders should organize periodic seminars and workshops for the construction workers on the importance of occupational safety and health requirements on construction sites.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

HSE:	Health and Safety Executive
ILO:	International Labour Organization
MBAI:	Master Builders Australia Inc.
NGOs:	None Governmental Organizations
NOSC:	National Occupational Health and Safety Commission
OSH:	Occupation Safety and Health
OSHA:	Occupation Safety and Health Administration
PPE:	Personal Protective Equipment

ACKNOWLEDGEMENTS

I would wish to express my sincere gratitude to the Department of Technology Education of University of Eldoret, Kisii County Works Office, Construction firms and Gusii Institute of Technology for the assistance accorded to me during this study. I also wish to thank my supervisors Professor John Simiyu and Professor Peter Okemwa for their valuable advice throughout this study. I am also grateful to the course lecturers and staff in the Technology Education Department, University of Eldoret for their overwhelming support. I would also like to express my appreciation to all contractors, site agents, human resource personnel of the construction firms and all construction workers in Kisii Municipality who made it possible for me to administer the questionnaire. I cannot also forget to thank my classmates at University of Eldoret and colleagues of Gusii Institute of Technology for their support and encouragement. Many thanks also go to my wife Beatrice, my children Ann, Emmanuel and Mark for their moral and financial support. Finally, I cannot fully thank everyone who offered me any assistance. To you all, I say Thank you and God bless you.

CHAPTER ONE

INTRODUCTION OF THE STUDY

1.1: Introduction

This chapter presents the background of the study and highlights the need for the current study. This is then followed by the statement of the problem, purpose of the study, objectives of the study, research questions, justification of the study, importance of the study, scope of the study, limitations of the study, assumptions of the study and the conceptual framework. The chapter ends with the operational definition of some terms used in this study.

1.2: Background to the study

Construction site has been regarded as the most hazardous place in which to work, with a high level of health and safety risks (ILO, 2005, Lingard and Rowlison, 2005; Smallwood et al, 2008). ILO estimates that at least 60,000 fatal accidents happen in a year on construction sites around the world, which is one in six of all fatal work related accidents. In the same vein, occupational health and safety statistics presented by different researchers (Lingard and Rowlison, 2005, Smallwood et al, 2008, Hinze, 2008), reveals that, the injury and fatality rate in construction projects is very high in comparison with other sectors of industry in the majority of countries. Construction projects should be safe workplaces for any worker to work in. Employers and supervisors should ensure that safety and health of the workers is enhanced for high productivity. Developers, contractors and all stake-holders in the construction industry should provide a safe work environment for all construction workers. According to Anaman and Osei-Amponsah (2007), the construction industry plays an important role in any economy and its activities are also vital to the achievement of the socio-economic development goals of providing shelter, infrastructure and

employment. The construction industry provides employment opportunities for unskilled labourers, artisans, craftsmen, technicians and engineers. The industry also employs clerks, accountants and human resource personnel. This, therefore, has provided employment opportunities for a wide range of labourers, both skilled, and the urban poor who do not have many skills (Well and Hawkins, 2007). The industry requires a wide range of both human and material resources which necessitates the need to ensure safety and health of the construction workers. Preventive safety mechanisms and proactive safety approach systems should be put in place to enhance good safety and health best practices in the construction industry. Health is a sound state of the body and mind of people from illness resulting from the construction materials, processes or procedures used in the work place, while safety is the protection of people from physical injury (Hughes et al, 2008).

The main causes of construction site accidents and injuries are low implementation of safety and health regulations, inadequate law enforcement agencies in the construction industry, unethical practices which are sometimes coupled with corruption and unscrupulous contractors who are out to make a quick kill at the expense of the construction workers. However, when compared with other labour intensive industries, construction industry has historically experienced a disproportionately high rate of disability, injuries and fatalities for its size (Hinze, 1997). According to McKenzi, Gibb, and Bouchlaghem (1999), the construction industry alone produces 30% of all fatal industrial accidents across the European Union (EU), yet it employs only 10% of the working population. In the United States of America (USA), the construction industry accounts for 22% of all fatal accidents (Che Hassan, Basha, and Hanafi 2007). According to Bomel (2001), in Japan,

construction accidents account for 30%-40% of the overall industrial accidents. This high rate of accident and injury calls for the need to ensure safety of the construction workers and a good working environment. Safer and healthier working conditions make an important contribution to poverty alleviation and sustainable development as construction is labour intensive, particularly in developing countries (Charles et al, 2007).

According to some findings by Kenya National Bureau of Statistics (KNBS), Kenya's economy expanded by 4.9 per cent, in the first quarter of the year, 2011. Improved productivity in the construction sector was singled out as one of the major factors for this impressive performance. The construction industry plays an important role in any economy and its activities are also vital to the achievement of the socio-economic development goals of providing shelter, infrastructure and employment (Anaman and Osei-Amponsah 2007). According to Ofori (1988) there is strong evidence to show that the construction industry is important to a country's economy worldwide.

According to the Kenya Red Cross Society (2009), in the last couple of years or so Kisii Town has seen a number of buildings collapse all over the place. Some of these include a building in Kisii Town which collapsed on 6th June 2009, where 14 workers were injured. The building, whose construction had reached the fourth floor, reportedly tilted on one side before crashing to the ground, killing one person and burying others in the debris. Another storeyed building under construction collapsed in Mosocho Kisii County in May 2012 and three people were injured. All the above incidences have resulted to accidents, injury, loss of lives and property. Construction sites should be safe places to work in. Safety measures should be put in place to

ensure safety for all construction workers. Developers, contractors, architects and engineers and all stake-holders should put in their best efforts and provide a safe work environment for the construction workers to prevent occupational accidents, injuries and fatalities at construction project sites.

1.3: Health and safety on construction sites

Globally, the construction industry is still considered as one of the most hazardous industries (Hinze, 2008). According to Hammer and Price (2001), regulations, specifications, inspection requirements, and job safety programs all seek to prevent construction site accidents and promote safety awareness on the part of all parties involved in the construction sites. The construction sites should be a place of health and safety and a place where the interests of workers are of primary importance. The construction project sites should be a place where workers are respected, valued and their safety is guaranteed. It should be a place where all workers are treated equally regardless of their gender, ethnicity, political and social economic backgrounds. The major concern is safety awareness and preparedness in creating safe construction sites. The study of Dement and Lipscomb (1999) revealed that the highest rates for compensation cases involving medical costs were observed for being struck by an object, lifting/movement and falls from height. Construction workers should take it upon themselves and ensure that safety is guaranteed at their place of work.

1.4: Statement of the Problem.

Kisii Municipality is a fast growing municipality due to its high population and relative peace which has attracted individuals and companies to invest in the

Municipality. The high population has created the high demand for residential, commercial and institutional facilities. This study was carried out within Kisii Municipality which has a population of about 200,000 people according to the national and housing census of 2009. Kisii Municipality is in Kisii County which covers an area of 1,317 km^2 with a total population of 1,152,282 people and a population density of 874.7 people per km^2 contributing 2.9% to the national percentage (Republic of Kenya, 2009). The Municipality is located on the Kisii-Isebania highway and it is also centrally located in South Nyanza which has made it a business hub. Nairobi-Mwanza road passes through the Municipality. Construction of new buildings has become a common phenomenon in the municipality due to the huge demand for office space, business premises and shelter. As a result of the high demand for housing, there is a proliferation of construction works in the construction industry within the Municipality which has brought with it a lot of occupational safety issues.

1.5: Purpose of the study

The purpose of this study is to investigate the various aspects of safety measures in place on construction sites within Kisii Municipality for the purpose of establishing the critical safety issues affecting the overall welfare and safety of the construction workers on the building construction sites.

1.6: Objectives of the study

The study was guided by the following objectives:

a) Main objective:

i. To evaluate the various aspects of safety coping mechanisms in place on construction sites in Kisii Municipality

b) Specific objectives:

i. To find out the causes of accidents on construction sites in Kisii Municipality

ii. To evaluate whether casualties on construction sites are ever reported to the relevant authorities for documentation in Kisii Municipality

iii. To establish factors which influence the workers' attitudes towards safety on construction sites in Kisii Municipality

1.7: Research questions

The study attempted to answer the following four questions:

a) What are the safety coping mechanisms in place on construction sites?

b) What are the causes of accidents on construction sites?

c) Are the casualties on construction sites ever reported to the relevant authorities for documentation?

d) What factors influence the workers' attitudes towards safety on construction sites?

1.8: Significance of the study

The research was significant in trying to understand the safety situation confronting construction workers and possible reform measures that could be employed to

improve their safety in order to reduce occupational accidents, injuries, fatalities, and illness related costs. Construction materials and equipment are potential sources of danger and measures should be taken at all times to ensure that construction sites are safe places. Construction site rules and regulations should also be observed in order to prevent accidents and injuries at the work place. The findings of the present study may be useful to the County and National Governments in the following ways:

First, the findings of the study should be of use to the Kenya Government and other policy makers in the construction industry to formulate policies and legislation which should ensure that all construction sites are safe zones. These may include finding better ways of enforcing the already existing laws and regulations concerning safety on construction sites.

Secondly, construction workers and other members of the society should use these findings to build support through safety protection programs that minimize the probability of facing risks on construction sites.

Thirdly, the construction workers and other stake-holders should be empowered and educated by these research findings. This may include enhancing existing construction site safety laws and regulations.

1.9: Value of the study

The future of any nation depends on its workers and anything that threatens their safety, more so if it can be avoided, is welcome. Construction materials and equipment are potential sources of danger and measures should be taken at all times to

ensure that construction sites are safe places to work in. In many countries construction work is seen as an occupation of last result, one where it can only attract workers with a low level of education or those who are willing to accept the hardships (Ofori, 1990; Rowlison and Lingard, 1996). The present study is therefore, important to the government especially the Ministry of Public works that is mandated to play the role of ensuring that construction works are done in accordance with the building by-laws of each local authority so as to ensure that all construction sites remain safe zones. These may include finding better ways of enforcing the already existing laws and regulations concerning safety on construction sites. The study is also important to other construction players even in the private sector as it should inform them of studied and documented ways of ensuring safety in construction sites. The study should also enable site managers, policy makers and stake-holders in the construction industry to be aware of the challenges facing construction workers in the implementation of safety regulations.

1.10: Scope of the Study

The study focused on safety measures on construction sites within Kisii Municipality, Kisii County. Kisii Municipality was chosen as a study area because of its ever increasing population and demand for residential, commercial and institutional buildings. The construction sites include commercial, industrial, residential and institutional projects. The high rate of construction works within the Municipality has increased the number of construction activities. This therefore, has provided employment opportunities for a wide range of labourers, both skilled, and the urban poor who do not have many skills (Wells and Hawkins, 2007). The present study

therefore, concentrated on occupational safety issues confronting workers on the building construction sites within Kisii Municipality.

1.11: Limitations of the study

This study investigated the various aspects of safety measures in place on construction sites within Kisii Municipality. A study involving all municipalities in the 47 counties was not necessary as construction is generally done in nearly the same way. The study of all municipalities was therefore, not necessary and could also be very expensive and time consuming. Construction sites have all categories of workers some of whom do not know how to read and write. Although this study investigated various safety aspects on construction sites within Kisii Municipality, the results can be generalized to other areas if construction activities have similar characteristics in terms of labour, materials and construction practices.

1.12: Assumptions

The following assumptions were made about this study:

i. There were various safety issues which affects construction workers within Kisii Municipality.
ii. There were various factors which influence the implementation of safety rules and regulations on construction sites within Kisii Municipality.
iii. The responses from employees were independent from the responses of the employers.

1.13: Conceptual Framework for Construction Site Safety

This study investigated the various aspects of safety measures in place on various construction sites within Kisii Municipality. This section presents the conceptual

framework that underlined the study. Orodho (2005) defines a conceptual framework as a model of representation where a researcher conceptualizes or represents relationships between variables in the study and shows the relationship graphically or diagrammatically. According to Orodho (2005) a variable is an empirical property that is capable of taking two or more values. The variables were of two types namely the independent and dependent variables. The independent variables for the study were the safety measures used in the construction sites whereas the dependent variables were the casualties at the sites. It was assumed that the number of casualties were dependent upon the safety measures used at the construction sites. The purpose of the conceptual framework illustrated in figure 1.1 was to discover the various factors and their consequences towards numerous hazards that have been caused at the construction sites. The present study adopted the independent and dependent variables of the study conducted by Abdelnaser et al. (2008) in the conceptual framework. This was done by borrowing and modifying the independent and dependent variables utilized by Abdelnaser et al. (2008).

Safety issues on construction sites are important aspects and should be given attention and guidance in order to improve safety management in the site. The huge demand for commercial, residential and institutional buildings at all levels necessitated the need to develop a safety frame-work to ensure that safety requirements were met on all construction sites. The conceptual framework assumed that because of the demand for business and institutional structures for shops, banking halls, office space and shelter, there were many safety issues to be addressed. Safety depends on organizational structures and implementation of safety guidelines. This means that in well-organized construction sites accidents, injuries and fatalities are minimized and

vice versa. Safety management, safety awareness and risk minimization were the areas that were addressed on construction site safety. Reduction of occupational safety issues means improved safety and health of the site workers. This translates into reduced economic issues on safety and health-related costs and higher productivity. Therefore, the following conceptual frame-work for construction site safety guided this study (figure 1.1).

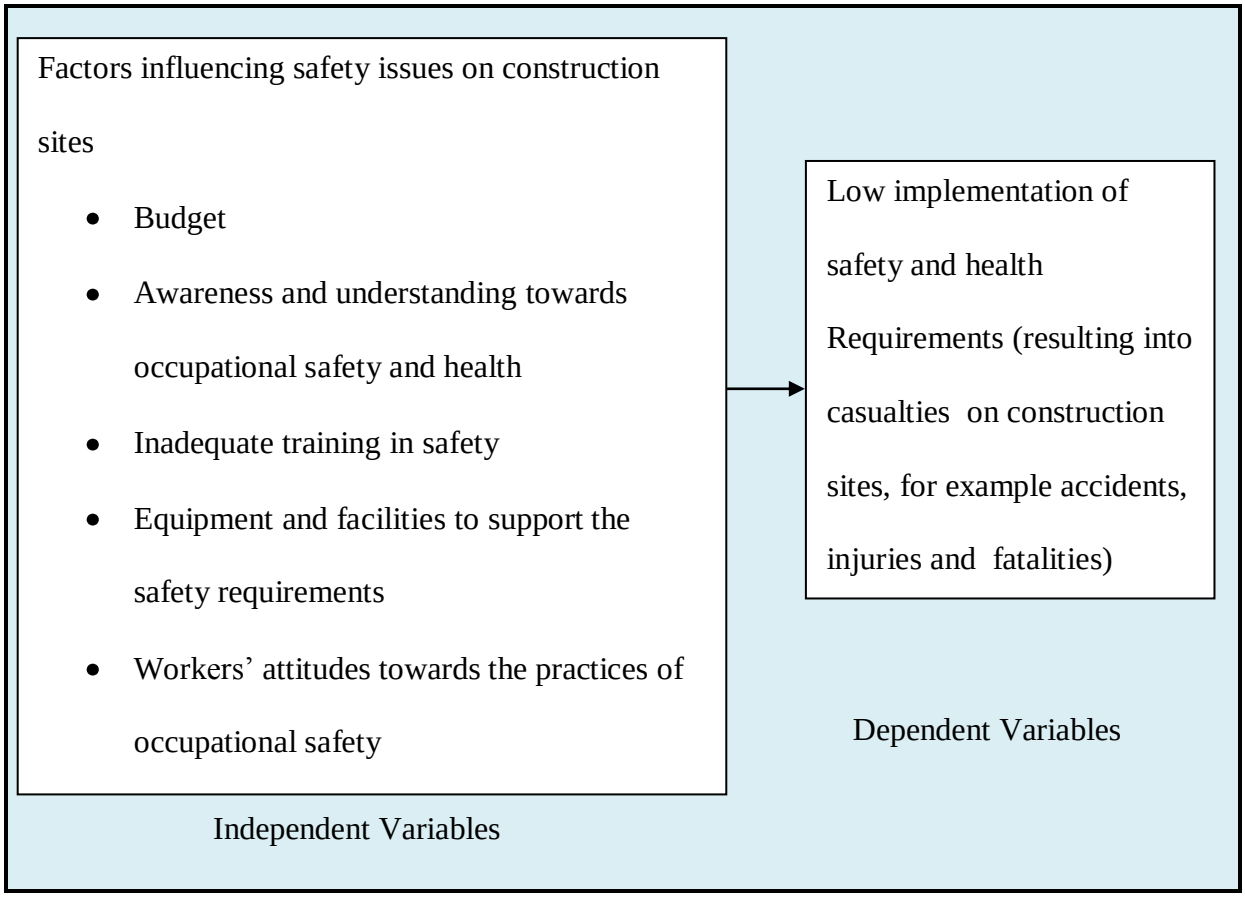


Figure 1.1: Conceptual Framework (adopted from Abdelnaser, et al., 2008, and modified)

1.14: Operational definition of terms

Casualties in construction sites: These are the victims of accidents, injuries and fatalities and any other incidences on construction sites.

Construction workers: These are foremen, skilled labourers (masons, carpenters, plumbers, steel fixers and operatives) unskilled labourers.

Hazards: Events that threaten to adversely affect human life to the extent of causing accidents, injuries or panic.

Health: This is freedom from any illness, injury or pain that may be caused by any construction activities.

Occupational safety: This is safety related to the protection of construction workers in construction sites as a result of their occupation.

Occupational accidents: This is any type of accident that will cause injury or harm to a worker while at work.

Site: This is any place where construction activities are going on or any place in/near used for the storage of materials or construction plant machinery and equipment.

Safety: This is freedom from any incidence that may cause accidents and injury to the person involved in any construction activities.

Safe zones: An identifiable physical space that is of conducive environment for the safety of construction workers and any other visitors.

Relevant authority: This is the ministry of labour and the ministry of public works

Top management: means anybody in the category of clients, contractors, architects, engineers, quantity surveyors and clerk of clerks

Workers: This is any person(s) working in a construction site and includes the following: contractors, architects, engineers, quantity surveyors, clerk of works, foremen, skilled and unskilled labourers.

CHAPTER TWO

LITERATURE REVIEW

2.1: Introduction

This chapter presents the review of relevant literature to the study. The literature reviewed for the purpose of this study was that based on construction workers' safety on construction sites. The study investigated the various aspects of safety measures in place in the construction project sites. This chapter discusses general and related literature of this study. The chapter covers most of the health and safety issues that were reviewed in this study. These include attitudes towards safety on construction sites, safety and health on construction sites, site safety environment, and safety management on construction sites, personal protective equipment (PPE) and clothing, electrical /fire safety, safety equipment, welfare and safety of construction workers, accident statistics in some countries, and safety on construction sites in Kenya, public awareness, hoarding and fencing of the construction sites.

2.2: Attitudes towards safety on construction sites

Attitudes can be passed on to the learners by parents; or they can be learnt from older members of the society. Learners can also acquire attitude on their own. According to Evans (1972) attitude and interest can be learnt; what form they take is not determined at birth or earlier, but depends on the environment in which they grow up and treatment they receive. As the child grows, he/she comes into contact with other socialization agents like the church, school, peer groups and the wider society. Such

interaction may change the previously held attitude and lead to development of new ones. According to Gross (1996) these attitudes change to conform to those held by the community. The attitude held by construction workers is of great importance as it helps in the adherence to safety rules. Aksorn and Hadikusumo (2008) indicate that attitude is a tendency to respond positively and/or negatively to certain persons, objects or situations. According to Oppenheim(1992) attitudes are learned pre-dispositions to respond positively or negatively to certain objects, situations, institutions or persons. When attitudes are favourably directed towards a target, then they are said to be positive. When attitudes are directed unfavourably towards a target, then they are said to be negative. Individuals have different attitudes towards safety and willingness to ensure that positive safety attitudes are adhered to depends on each individual. Having a healthy disposition or attitude towards construction safety is very important and it is also every company's responsibility to provide a safe working environment along with adequate safety training and attitude development (BrassMein, 2010). Fang (2006) states that with increased social responsibilities, people will have a better perception of their work environment as well as better safety attitude and beliefs.

2.3: Safety and health on construction sites

Health is a sound state of the body and mind of people from illness resulting from the materials, processes or procedures used in the workplace, while safety is the protection of people from physical injury and/or harm (Hughes, 2008). All construction workers are confronted with some of the most dangerous working conditions encountered by employees in any industry. As a result, construction works on construction sites call for heightened safety measures. According to Hammer and

Price (2001), regulations, specifications, inspection requirements, and job safety programs all seek to prevent construction site accidents and promote safety awareness on the part of all parties involved in the construction sites. Construction sites are dangerous places and safety measures must be put in place to keep workers and visitors safe in or around a construction site. All over the world, construction is one of the most hazardous due to its unique nature (Jannadi and Bu-Khamsin, 2002). The construction industry is a complex institution and the safety of workers is a complex phenomenon while the construction industry's rapidly changing conditions, associated work hazards, and the characteristics of construction organization further aggravate the situation (Choudhry and Fang, 2008). The construction industry is an industry that requires a wide range of safety measures to prevent incidences of serious accidents, injuries and fatalities. Mbuya and Lema (1996) believe that in most developing countries, safety consideration in construction project delivery is not given a priority and the employment of safety measures during construction is considered a burden. Enshassi et al. (2008) in their study discovered that in many developing countries, the legislation governing OHS is significantly limited when compared with UK and that there are rarely any special provisions for construction on workers' safety and the general conditions for workers are often not addressed. Lee and Halpine (2003) in their study, also opine that in many of the countries where safety legislation exist the regulatory authority is weak or non-existent and employers 'pay lip service' to the regulations.

Worldwide occupational injury rates in construction are highest for all major industries (Lehtola et Al. 2008). Unlike other industries such as manufacturing, construction is composed of a transient workforce (Kadefors, 1995; Dubois and

Gadde, 2002) where project personnel from different cultures and backgrounds are expected to work together in a constantly changing work organisation and structure. Construction is always risky because of out-door operations, work-at height, complicated on-site plant machinery and equipment operation coupled with worker's attitudes and behaviour towards safety (Choudhry and Fang, 2008). Lawrence (2007) said that there is a great demand for the safety measures as it will help the companies to grow.

Developing countries also are not keen in capturing data of injuries at the construction sites. In some of the developing countries reporting systems are inadequate and poor. Contractors generally fear prosecution and therefore, they do not like records or accident and injury data to originate from their own sites. Koehn et al. (1995) asserts that in developing countries, injuries are often not reported and the employer only provides some form of cash compensation for an injury to the employee. It has been observed that most accidents and ill-health problems are not reported (Mombeki, 2005). According to Loewenson (1999), in Africa there are major sources of bias in current reported data on safety due to the poor coverage of certain groups of workers, the poor ascertainment of occupational disease, and the effects of some legal and bureaucratic features of the reporting systems. The resulting implication is high incidences of unreported accidents and injuries (Idoro, 2007 and 2008). All accidents to workers causing loss of life or serious injury should be reported forthwith to the relevant authority and an investigation of these accidents should be made (ILO, 1992). These accidents should be reported to the relevant authority for documentation. The relevant authorities should use the documented data for policy formulation on construction safety issues and for enforcing the already existing safety rules and

regulations on construction sites. In Kenya documented site records is scanty. Many of the site accidents and injuries' data are not available. This has resulted into poor accident and injury records in Kenya.

2.3.1: Site safety environment

Many accidents occur as a result of human factors. 'Human factors refer to environmental, organisational and job factors, and human and individual characteristics which influence behaviour at work in a way which can affect health and safety. A simple way to view human factors is to think about three aspects: the job, the individual and the organisation and how they impact on people's health and safety-related behaviour (Health and safety excutive, 1999).

Enshassi et al., (2008) conducted a study which identified complexity or difficulty caused by problematic site conditions, workers' awareness of required work tasks and the associated hazards, the need to speed up work to complete a project on time, bad weather and type of owner or employer as some of the factors that affect accident and injury rates in every construction industry. Sawacha et al., (1999), Abdelhamid and Everett (2000) found that accidents at work occur because of either unsafe working conditions or unsafe workers' acts, and both studies agree that the latter is the most significant cause of accidents at construction sites. Aksorn and Hadikusumo (2007) identified some of these unsafe acts as working at improper speeds as or faster than normal speeds; improper lifting, handling and moving of objects; incorrect use of tools and equipment; use of defective equipment and tools; and refusal to wear Personal Protective Equipment (PPE) at work.

When necessary to prevent danger from falling objects, working platforms, gangways and stairways of scaffolds should be provided with overhead screens of adequate strength and dimensions. The study by Dement and Lipscomb (1999) revealed that the highest rates for compensation cases involving medical costs were observed for being struck by an object, lifting/movement and falls from height. Before construction commences and during the progress thereof, adequate steps should be taken to ascertain the presence of and to guard against danger to workers from any live electrical cables or apparatus which is under, over or on the site (ILO, 1992). Many construction companies have prioritized safety and health requirements as such to ensure that their employees are all well protected (Fernandez, 2007). Adherence to safety rules and regulations should be encouraged in order to minimize site risks. Furthermore, improving the health and safety risk management of the construction projects has repeatedly been shown to save lives, time, and money, and to increase business goodwill and good reputations (Rwamamara, 2007; Kikwasi 2010).

A study by Adane et al. (2013) on occupational injuries among building construction workers in Gondar City, Ethiopia, revealed that occupational injuries were common among building construction workers. Therefore, counter measures such as creating awareness of risk factors, avoiding overtime work, providing training and personal protective devices could be effective to decrease prevalence of occupational injuries. Furthermore, most of the building construction workers in this study were unaware about the presence of occupational health hazards associated with their work and they denied access to personal protective equipments and health and safety trainings.

Danso, (2010) carried out a study on the occupational health and safety of the Ghanaian casual worker on the building construction sites for the purpose of establishing the critical issues affecting the overall welfare and safety of casual workers on building construction sites, and, therefore, made a recommendation towards addressing the shortfalls on construction sites. The study revealed that occupational health and safety of casual workers in the Ghanaian construction industry have been compromised as result of the drive of economic and social behavior of both employers and casual workers, coupled with the lack of implementation of safety legislation and policies on construction sites.

A study by Mortis (2009) on the safety environment of the construction industry in Belize (formerly British Honduras), Central America, indicated that the Belizean construction workers are engaged in unsafe work behavior because of the influence from a number of factors, these include: 1) No rules or procedures; 2) No obligation by most workers to wear PPE; 3) No encouragement from management to work safely; 4) No discouragement from management when work is performed in unsafe manner; 5) Personal dislike by workers for use of PPE; 6) Alcohol and drug abuse by some workers; 7) Lack of education; 9) Cost saving of managers by not providing for safety; 10) Poor enforcement of proper safety practices by managers: and 11) The lack of safety legislation. Contractors and construction managers exhibited a very low commitment of management to safety on sites. This was evidenced by: 1) The low priority of safety as opposed to that of production; 2) The lack of adequate safety systems; and 3) Heavy work pressure placed on workers. The study also indicated that governments and non-governmental agencies are unable to ensure that proper safety practices are adhered to on construction sites. The study indicated that trade

unions within the country of Belize had no effect on ensuring a safe working environment for workers in the construction industry. Literature review on trade unions contribution to ensuring a safe work environment in Kenya is scanty. The contribution of trade unions to a safe work environment in Kenya is similar to that of trade unions in the Belizean construction industry in which literature reviewed indicates that governments and non-governmental agencies are unable to ensure that proper safety practices are adhered to on construction sites. Details of the Kenyan enforcement authorities are also scanty and therefore, it is difficult to get any documented data on the occurrence of accidents and injuries on construction sites in Kenya.

2.3.2: Safety Management on Construction sites

Abdelnaser (2008) carried out a study on the implementation of safety and health requirements in the construction industry in Libya. The objective of the study was to identify the factors that contribute to the low implementation of safety and health requirements in Libya and to identify the dimensions that contribute to the satisfaction level of the workers towards the implementation of those requirements by their companies. Among factors identified were budget, safety awareness and understanding towards occupational safety and health, inadequate training, equipment and facilities to support the safety requirements and workers attitudes towards the practices of occupational safety. According to the study, the safety and health of the employees in the construction industries are important as it is in other industries. The study revealed that the safety and health record in Libya needed to be upgraded and monitored so that workers could be protected from all the hazards. The present study adopted the independent and dependent variables of the study conducted by

Abdelnaser et al. (2008) in the conceptual framework by borrowing and modifying its independent and dependent variables utilized.

Belel (2012) in a study on the assessment of the safety culture of the construction industry workforce in Yola, Nigeria, indicated that construction workers' attitude towards safety was influenced by their perception of risk, safety rules and procedures. In this study lack of training of workers was ranked the most severe factor that hinders workers' safety on site. Reduction of accident cost was ranked the most important benefit of safety on site while poor understanding of the risks associated with the work was ranked second and these could all be attributed to the poor safety culture in the industry.

El-Mashaleh, et al. (2010) in a study on safety management in the Jordanian construction industry revealed that lack of safety training, occasional safety meetings, occasional safety inspections, unavailability of safety protection measures, hesitance of workers to use safety equipment, high labour turnover rates and non-compliance with safety legislation are among several factors of poor safety management.

According to a study conducted by Idoro, (2011) on the effect of mechanisation on occupational health and safety performance in the Nigerian construction industry, the study evaluated the level of mechanisation and its relationship to the Occupational Health and Safety (OHS) performance of the Nigerian construction industry. The study revealed that the mechanization of construction operations increased the occurrence of accidents and injuries to workers in the construction industry in Nigeria. The workers were not sensitized on the dangers associated with mechanization. The findings indicated that the drive by construction contractors in Nigeria towards adopting mechanized production methods was not complemented by efforts to control the hazards associated with mechanization; therefore, mechanization

actually worsened the OHS performance of the industry. The study also revealed that the level of mechanization varies from one operation to another, concluding that additional plant and equipment employed by contractors were likely to increase the rates of worker accidents and injuries in the industry.

Idoro, (2011) conducted another study which compared the management efforts and performance of construction contractors in Nigeria with regard to Occupational Health and Safety (OHS). The study revealed that contractors' OHS-related management efforts were not correlated with the scope of their operations. The study also revealed that the accident and injury rates in the Nigerian construction industry are high. The findings also indicated the need for effective risk management and regulation and control of OHS in the Nigerian construction industry.

According to Phoya, (2012) in a study aimed at ascertaining the current practice of health and safety risk management on Tanzanian construction sites, focusing on risk assessment, risk communication and risk control, the following were some of the findings of the study:

i. The responsibility for construction site health and safety lies with the main contractor, resulting in many designers, consultants and clients absolving themselves from responsibility if accidents occur on the site.
ii. That no systematic methods were used, but risk was assessed by brain storming, checklists and health and safety regulations.
iii. That Personal Protective Equipment (PPE) is the main item used for risk control. However, there was not enough Personal Protective Equipment (PPE)

on the sites and, comfort, the weather and work pressure were mentioned by workers as reasons for not wearing Personal Protective Equipment (PPE).

iv. Individual characteristics such as experience of those working on construction sites, their educational background and knowledge of health and safety matters also influenced health and safety risk management. It was observed that risks were assessed based on experience and educational background.

v. The work environment such as site layout and location, the nature and the size of the project, working methods and working team influence health and safety risk management.

In Tanzania, construction sites have been ranked as the second most dangerous places in which to work after mines (Mbuya and Lema (2002), International labour organization (ILO), 2005).

2.3.3: Personal Protective Equipment (PPE) and Clothing

The term Personal Protective Equipment (PPE) describes any device or appliance designed to be worn or held by an individual for protection against one or more OHS hazards (HMSO, 2002). Tanko and Anigbogu (2012) carried out a study which focused on the factors that determine the use of personal protective equipment (PPE) on construction sites in Nigeria, including its availability, maintenance, user-friendliness and training in the use of PPE. The study revealed that the vast majority of workers understand the need for PPE and want to be protected against accident, injury and illness. Employers should provide all workers with the personal protective equipment and protective clothing on site. These include, goggles and face shields, safety helmets or hard hats to protect the head from injury due to falling or flying

objects, or due to striking against objects or structures, safety glasses, safety boots, rain gear, hearing protection, knee pads, gloves, safety nets, flashlights, ladder scaffold, platforms, hoisting equipment among others. According to Hands (2010), sometimes PPE is considered the most boring of all the facets of health and safety. Moreover, better safety results occur if foremen carry out positive safety behavior on site including the provision of appropriate personal protective equipment and regular safety signals to workers (Langford et al., 2000). Most construction workers do not wear personal protective equipment (PPE) on construction sites in Kenya. Most Contractors in Nigeria and Kenya seem to share similar characteristics on the issue of wearing safety related facilities.

2.3.4: Electrical /Fire safety

All electrical equipment and installations should be constructed, installed and maintained by a competent person, and so used as to guard against danger. All parts of electrical installations should be so constructed, installed and maintained as to prevent danger of electric shock, fire and external explosion (ILO, 1992). This is another area of great concern. Workers should be sensitized on the importance of proper electrical installations and maintenance so as to prevent danger of electric shocks and fire.

2.3.5: Safety Equipment

All vehicles and earth-moving or materials-handling equipment should be of good design and construction taking into account as far as possible ergonomic principles particularly with reference to the seat, be maintained in good working order, be properly used with due regard to safety and health, be operated by workers who have received appropriate training in accordance with national laws and regulations (ILO,

1992). Earth-moving or materials-handling equipment should be maintained regularly to enhance safety of the operatives. Poorly maintained construction plant and equipment have a likelihood of causing harm to the operators.

2.3.6: Welfare and Safety of Construction Workers.

ILO (2001) has indicated that, casualisation in the construction industry has led to debilitating effect upon occupational health and safety issues especially in the developing countries. The greatest casualties of the construction site accidents are the casual workers mainly so because of negligence of basic safety rules. In many construction sites, casual workers are increasing in number because construction firms largely rely on the use of casual workers as they are easily available and cheap to pay. A case study conducted in Tanzania by Mitullah et al, (2003) revealed that about 70% of casual workers were not provided with welfare related facilities and safety materials at most of the project sites resulting in accidents and sometimes fatal on construction sites. In Nigeria for example, Aladekomo (2004) noted that groups of casual workers arrive at road intersections as early as 6.00 a.m. in the morning carrying their baskets or bowls, cutlass, shovel and digger, to be picked up by contractors / builders for the day's job of bricklaying. High poverty levels compel workers to accept work in unacceptably high risky situations without complaining or demanding that their employers put in place health and safety measures (Khan, 2007).

2.4: Accident statistics in some countries

In order to understand the statistics and causes of accidents and injuries, this study focused on accidents, injuries and site incidences in the United Kingdom (UK),

United states (U.S), China, Australia Japan, European Union (EU), Nigeria, Tanzania and Kenya.

2.4.1: United Kingdom (UK).

A study by HSE (2006) evaluated the causes of accidents and injuries in the Scottish construction industry and compared the OHS performance of the country's construction industry with that of the rest of Great Britain. The study found that, for the period of 1996/97–2000/01, Scottish bricklayers suffered 835 fatal and major injuries per 100,000 workers compared to 552 injuries reported in the rest of Great Britain. Scottish plumbers and heating engineers suffered 262 fatal and major injuries per 100,000 workers compared to 176 injuries in the rest of Great Britain. Scottish steel workers suffered 2,106 fatal and major injuries per 100,000 workers compared to 1,252 injuries in the rest of Great Britain. The same study found that, for the period of 1996/97–2000/01, Scottish roofers, tillers and cladders suffered 663 fatal and major injuries per 100,000 workers compared to 1,004 injuries in the rest of Great Britain. Scottish plant operators suffered 160 fatal and major injuries per 100,000 workers compared to 268 injuries in the rest of Great Britain. Finally, Scottish forklift operators suffered 312 fatal and major injuries per 100,000 workers compared to 616 injuries in the rest of Great Britain. The study concludes that the differences in accident and injury rates between Scotland and the rest of Great Britain could emerge from other factors, such as types of construction work, client profiles, physical environment and personal characteristics.

2.4.2: United States (U.S)

According to Taylor (2011), in the U.S. there were 1,225 fatal occupational injuries in the construction sector in 2001 with an incidence rate of 13.3 per 100,000 employed workers; for the same year the construction industry experienced 481,400 non-fatal injuries and illnesses at a rate of 7.9 per 100 full-time workers in the industry. According to the Occupational Safety and Health Administration (OSHA, 2010), one in ten construction site workers are injured every year. The OSHA also reports that fall hazards are the leading cause of injury at construction sites. According to Che Hassan; Basha, and Hanafi (2007), in The United States of America (USA), the construction industry accounts for 22% of all fatal accidents. For developed countries, Loushine et al. (2003) found that the United States (US) construction industry accounts for more than 22% of all occupational fatalities in the US even though it employs less than 7% of the country's workforce.

2.4.3: China

Persistent high accidents rates on sites have caught the attention of many researchers and construction practitioners in Hong Kong (Siebert & Wei, 1998). Hong Kong is also notorious for her high construction accidents rates. Although the accidents rate from 350 per 1000 workers in mid-1980 to 60 per 1000 workers in 2007, it still accounted for nearly 20% of all the industrial accidents in Hong Kong (Li and Poon, 2009). Li and Poon (2009), carried out a study of non-fatal accidents compensation court cases from 2004 to 2008 in Hong Kong. It was found out that approximately one-third of the cases with injured persons was aged between 47 and 56, but the percentage of court cases over construction employees by age group was highest in age group 17-26. In terms of trade/or occupation of workers, General laborers/casual

workers stood the highest, then came electrical technicians and painters/decorators/plasterers. Previous research shows that most of the accidents in Hong Kong involves falling from height, striking by objects etc (Poon et al. 2008). As compared to other places in Asia, such as Japan, South Korea, Taiwan and Singapore, Hong Kong accidents rates on sites stood the highest among all. The number of accidents per thousand employees was one-digit more in Hong Kong than others (Poon et al., 2008). Rowlinson (2003) observed that the cost of accidents accounts for 8.5% of the total tender price in the Chinese construction industry, and the Nigerian construction industry exhibited nearly all of the same characteristics found in developing countries.

2.4.4: Australia

Australia's construction industry is the third most dangerous industry to work in. The construction industry employs approximately 5% of the Australian workforce but accounts for 9% of the workers' compensation claims (Dingsdag, Biggs and Sheahan, 2006). The incidents of workplace fatalities were 9.2 per 100,000 workers in construction, compared with the national average of 3.1 fatalities per 100,000 workers (NOHSC, 2005). The fatality rate is three times higher than all the other industries rate. On average, 49 construction workers have been killed at work each year (Fraser, 2007). The industry's incident rate for workplace injuries and diseases remains at 28 per 1000 workers, which is nearly double that of all other industries (16 incidents per 1000 workers) (MBAI, 2005).

2.4.5: Japan, European Union (EU), Nigeria and Tanzania

According to Bomel (2001), in Japan, construction accidents account for 30%-40% of the overall industrial accidents while construction accidents account for a total of 50% in Ireland and 25% in the United Kingdom (UK). This situation is worse in the developing countries, particularly Nigeria where there are no reliable sources of data for such accident records. This high rate of accidents calls for the need to ensure safety of construction workers and a good working environment. In other countries such as across the European Union (EU), the industry alone produces 30% of all fatal industrial accidents across the European Union (EU), yet it employs only 10% of the working population (McKenzi; Gibb, and Bouchlaghem, 1999). According to Idoro (2011), a study of 40 contractors in Nigeria revealed that the accident and injury rates in Nigerian construction industry are high (in 2006 - the best safety ratios were 2 accidents per 100 workers and 5 injuries per 100 workers). The situation in developing countries is the worst among the nations of the world; studies have found that accident and injury rates in many developing countries, such as Nigeria (Idoro, 2004; 2007), Thailand (International Labour Organization, 2005) and Tanzania, are considerably higher than those in European countries.

According to Phoya (2012), construction in Tanzania as in many countries in the world comes high in the comparative list of accidents and ill-health problems. Statistically, little information is available on the number of accidents rates that happen on construction sites annually. It has been observed that most accidents and ill-health problems are not reported (Mombeki, 2005). However, the limited information available indicates that Tanzania's construction industry is responsible for about 10.1% of all occupational accidents, 9.6% of fatalities, 12.2% of partial

disabilities and 7.4% of minor injuries (Kitumbo et al. 2001). In Tanzania, construction sites have been ranked as the second most dangerous places in which to work after mines (Mbuya and Lema 2002, International labour organization (ILO), 2005).

A survey conducted by the Contractors Registration Board (CRB) in Tanzania in 2001 on 63 sites, revealed that there had been three fatal accidents; 33 sites had experienced accidents such as being cut by sharp edges, punctured by nails, hit by hammers and bruises; 27 sites had recorded accidents from the falling of objects and tools; and 23 had recorded accidents from the handling of tools and 45 from equipment and/or plant (Mwombeki, 2005). Fatalities, injuries, health damages or ergonomic are the possible outcomes of a person being exposed to the hazard (Toohey et al, 2005). According to the International Labour Organisation (2013) report on the National Profile on Occupational Safety and Health, there were 40 fatal and 383 non-fatal accidents on construction sites in Kenya in the financial year 2010–2011. It is important to note that in kenya, information about accidents, injuries and other incidences related to occupational safety is very scarce. It is threrfore, difficulty to get records of the number of accidents, injuries, and fatalities occuring on the Kenyan construction sites.

2.5: Safety on construction sites in Kenya

According to ILO, (2013) the OSH services in Kenya are governed by two pieces of legislation: the Occupational Safety and Health Act, 2007 (OSHA, 2007) and the Work Injury Benefits Act, 2007 (WIBA, 2007). The purpose of OSHA 2007, is to secure the safety, health and welfare of people at work, and to protect those not at

work from risks to their safety and health arising from, or in connection with, the activities of people at work. The purpose of WIBA 2007, is to provide compensation to employees for work-related injuries and diseases contracted in the course of their employment and for connected purposes. According to OSHA 2007, a person who designs or manufactures any article for use at work shall carry out or arrange for the carrying out of any necessary research to identify, eliminate or minimize any risks to safety or health to which the design or article may give rise. A person who erects or installs any article for use at work in any premises where that article is to be used by a worker shall ensure, that the way in which the article is erected or installed makes it safe and it is not a risk to the safety and health of the worker when properly used. (OSHA, 2007)

In Kenya, occupational safety data on site accidents and injuries is scanty. As a result, there is, if any, little documentation on construction site accidents, injuries and fatalities. However, according to the International Labour Organisation (2013) report on the National Profile on Occupational Safety and Health, there were 40 fatal and 383 non-fatal accidents on construction sites in Kenya in the financial year 2010–2011. In Kenya , safety on construction sites is regulated by the Occupational Safety and Health Act No.15 (2007). The Act aims at securing the safety, health and welfare of workers and the protection of persons other than the workers against risks to safety and health arising out of ‘or in conjunction with, the activities of persons at work. According to Muiruri (2012) the enforcement of this Act has been weak since there lacks clear and well defined supervising authority in most construction sites in Kenya. According to OSHA 2007 machinery, equipment, personal protective equipment, appliances and hand tools used in all workplaces shall comply with the prescribed

safety and health standards and be appropriately installed, maintained and safe guarded. Every employer shall take necessary steps to ensure that workstations, equipment and work tasks are adapted to fit the employee's ability including protection against mental strain. Necessary precautions including warning signs, shall be taken to prevent injury to employees and other persons at a workplace from mobile plants, falling objects and objects ejected from machines and work processes. Every employer shall provide and maintain for the use of employees in any workplace where employees are employed in any process involving exposure to wet or to any injurious or offensive substance, adequate, effective and suitable protective clothing and appliances, including, where necessary, suitable gloves, footwear, goggles and head coverings and this is what is lacking in construction sites in Kenya. The enforcement of Occupational Safety and Health Act No.15 (2007) has not been fully realised since there is no clear implementation guidelines.

A study was carried out by Muiruri (2012) on health and safety management on construction project sites in Nairobi, Kenya. The objectives of the study included investigating the health and safety measures used on construction sites, evaluating the enforcement mechanisms of health and safety regulations and on construction sites and examining the challenges encountered in the management of health and safety. The findings of the study indicated that health and safety measures on construction sites were inadequate and effective enforcement mechanism of health and safety was lacking. The study concluded that enforcement mechanism for health and safety was weak and lacked clear and well defined supervising authority in most construction sites.

Mutema and Muturi (2013) conducted a study on the factors influencing risk management in construction projects in the petroleum industry in Kenya. The study sought to address the occurrence of incidents in projects undertaken by contractors in the petroleum industry in Kenya and how such incidents can be reduced by the integration of Project Risk Management into the construction projects. The study found that there is a significant relationship between training of project managers on project risk management and risk management practice in construction projects in the Petroleum Industry in Kenya. The study also found that there is a significant relationship between attitude towards risk and risk management in the Petroleum Industry in Kenya. The study found that safety committee meetings, incident reporting and executive management support for safety were important aspects that influence risk management. The study further revealed that most companies rarely carried out all steps of project risk management. These studies have revealed that the risk situation in Kenyan construction sites is wanting and a lot more should to be done to improve the safety of the construction workers. Health and safety enforcement mechanisms should also be improved to enhance the safety situation on the construction sites. Furthermore, improving the health and safety risk management of the construction projects has repeatedly been shown to save lives, time, and money, and to increase business goodwill and good reputations (Rwamamara, 2007; Kikwasi 2010).

2.6: Public Awareness

Many accidents on construction sites can be avoided if construction workers and contractors are sensitized on proper application and awareness on health and safety site procedures. According to Hammer and Price, (2001) regulations, specifications,

inspection requirements, and job safety programs all seek to prevent construction site accidents and promote safety awareness on the part of all parties involved in the construction sites. There is the need to make the public aware of the dangers involved in and around construction sites. Warning signs should be placed at strategic places to inform visitors to keep off sites because of the dangers involved. Construction site safety is a process that requires collaborative efforts of all stakeholders namely, construction workers, foremen, supervisors, architects, engineers, clients /owners and contractors.

2.7: Hoarding and Fencing of the Construction sites

All construction workers should remain safe if hazards are kept inside a fenced construction site. Construction sites in built-up areas and alongside vehicular and pedestrian traffic routes should be fenced to prevent the entry of unauthorized persons (ILO, 1992). Gate keepers should be stationed at all entry and strategic points to ensure that unauthorized visitors keep off sites. Site hoarding should make a construction site more aesthetically pleasing and ensures security against damage to all construction materials and equipment. Entry to construction sites must be controlled to avoid exposing unauthorized people to a number of hazards that could result into accidents and serious injuries. Contractors use fences to protect property from intrusions.

2.8: Environmental Pollution

Haupt (2001) describes the physical working environment as varying with seasons and job site conditions. Variations are seen in work done below ground level, at ground level and at elevated heights, sometimes over or under water. These varying

conditions create an environment which is potentially hazardous. On site, many different operatives handle bulky materials in often repetitive operations on sites that are messy, untidy and hazardous, especially in situations where all structures are being built (Ofori, 1990). Environmental pollution is a health and safety hazard that requires a concerted effort by all stakeholders in the construction industry in order to prevent unnecessary accidents, injuries and illness related cost. The building industry is responsible for using a high volume of natural resources and generation of a great amount of pollution as a result of energy consumption during extraction and transportation of raw materials (Li et al., 2010; Morel et al., 2001). Compared with other industries, construction is a main source of environmental pollution (Shen et al., 2005). Pollution sources from the construction process include harmful gases, noise, dust, solid and liquid waste (Chen et al., 2000). This issue has prompted many construction participants to attempt to control the impacts of their activities by adopting environmental management systems (Lam et al., 2011). Environmental issues arise throughout the life of a construction project. People working in construction have to be aware of their environmental obligations and the benefits that good practice will bring at every stage from the feasibility studies through to design construction planning, and the actual works on site. Environmental protection is an important issue throughout the world (Tse and Raymond, 2001). Various natural resources namely: energy, land, materials and water are used during the typical construction process (Shen et al., 2005). Sources of water pollution on building sites include paint, solvents, cleaners, harmful chemicals, construction debris and dirt. Water pollution is the reason for many infant mortality rates and health problems of people of all ages (Mabogunje, 1985). Safer and heathier working conditions

motivate people to work harder, higher productivity is realised and sustainable development in a nation is also achievable.

2.8.1: Waste disposal

As a secondary effect, OSH also protect construction workers, family members, employees, customers, suppliers, nearby communities and other members of the public who are found to be affected by the work environment (Glendon and Stanton, 2000). Disposal of building debris, waste and rubbish in building construction worksites, if properly managed, can save a lot of workers' lives and prevent unnecessary accidents, injuries and illness related cost. Many of the unnecessary accidents, injuries and illness related cost can be avoided if rules and regulations governing employment on construction sites are observed and adhered to. The protection of the workers' well being and the establishment of a safe working environment are key prerequisites for the achievement of sustainability in construction (Rajendran et al., 2009).

2.8.2: Noise in Construction Sites

Most construction workers are exposed to excessive construction noise. Exposure to longer period can cause tiredness and nervousness. Noise comes from the operation of plant, machinery and power tools, the movement of vehicles and deliveries of materials (HSE, 1998). The noise generated during construction and its influence vary, depending on the nature of the activities, the type and the status of equipment being used, the nature of the surrounding environment, and consideration of environmental and health regulations (Gannoruwa and Ruwanpura, 2007). A noise environment is dangerous to workers and even to visitors. Accidents and injuries can

be minimized if the noise produced by construction plant and equipment and materials is mimized.

2.8.3: Air (dust) Pollution

All construction sites generate high levels of dust (typically from concrete, cement, wood, stone, silica) and air can carry dust for large distances over a long period of time. Dust can penetrate deeply into the lungs and cause a wide range of health problems including respiratory illness, asthma, bronchitis, and even cancer (Gray, 2013). If dust is released into the atmosphere, there is every chance that someone will be exposed to it and inhale it. If the dust is harmful, there is a chance that someone will suffer an adverse health effect, which may range from some minor impairment to irreversible disease and even life-threatening conditions (Huges and Ferrett, 2011). Dust is quite common on building construction worksites. People who live at or close to construction sites are prone to harmful effects on their health because of dust, vibration and noise due to certain construction activities such as excavation (Li et al., 2010).

2.9: Summary

This chapter has reviewed literature on occupational safety related issues affecting construction workers in the construction industry. From these studies, it is clear that construction workers' face enormous safety challenges while at work. The studies revealed that occupational injuries were common among building construction workers in sites studied. The prevalence of injuries and incidences were associated with preventable and modifiable factors for example lack of safety awareness, lack of safety training, lack of persnal protective equipment (PPE), and workers' lack of job

satisfaction. Khan (2007) observed that employers with a low level of education found it difficult to interpret contract documents and health and safety laws. Danso (2005) also observed in his studies, that about 65% of construction artisans, especially the new entrants, do not have any knowledge on construction safety issues.

From the studies, safety is a major concern in all construction sites as it has been depicted from the studies above that accidents have claimed many lives. On the other hand injuries have led to loss of jobs and huge compensations. Safety, though an important area, has been erroneously accorded a relatively low status which is evident from the studies above that have been carried out. Hence, the need for the study to investigate the various safety issues on construction sites, how they are controled and the process of safety management within Kisii Municipality.

In Kenya, there are few, if any, studies on safety on construction sites. This means that, there are few, current statistics on the causes of construction site casualties. It is also difficulty to get any current and accurate documented data on safety records on accidents, injuries and fatalities in Kisii Municipality.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1: Introduction

This chapter discusses the study design and methodology and the procedure used to present the chapter. These include the research design, study area, target population, sample size determination, sampling procedure, source of data, data collection methods and data analysis.

3.2: Research design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Orodho, 2008). This study adopted a descriptive case study design to investigate the safety measures in place on construction sites within Kisii Municipality. The nature of this study is exploratory, as it seeks to examine how safety issues are addressed, and how they are controlled on construction sites and the factors associated with the process of safety management at construction sites. The conduct or behavior of the construction workers in regard to safety issues on construction sites determines the extent to which safety can be managed or controlled. Descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way (Shuttleworth, 2008). This design was useful because there was no manipulation of the variables under study: the independent variables were the safety measures. Safety measures are affected by a multiplicity of factors making it impossible to directly control all the independent variables. The study was concerned with the situation as it was. Data were obtained from the contractors, site engineers/agents/managers, clerk of works,

site foremen and construction workers. Their attitudes towards safety measures were used to establish the relationship that existed between the two variables. The variables were safety measures and casualties on the construction sites.

3.3: Study Area

This research was carried out within Kisii Municipality. The researcher selected Kisii Municipality because it is ever growing in terms of constructions and there are many situations that lead to safety issues that are found in construction project sites, so it was a convenient and appropriate environment for the study. The study involved all the residential estates, the Central Business District (CBD) and all institutional sites within the Municipality. The residential estates are Jogoo, Nyanchwa, Daraja Mbili, Mwembe Tayari and (CBD). Kisii municipality is in Kisii County which is located to the south east of Lake Victoria. The County is bordered by six counties namely; Homa Bay to the north west, Nyamira to the east, Narok to the south, Kisumu to the north, Migori to the west and Bomet to the south east. Kisii Town is located in Western Kenya, on Latitude: 0° 41' S and Longitude: 34° 46□ E. The town is a driving distance of 309 km from Kenya's capital city of Nairobi.

Kisii County covers an area of 1,317 km^2 with a total population of 1,152,282 and a population density of 874.7 people per km^2. By the year 2009 the County had an annual growth rate of 2.75% (census, 2009). Kisii Municipality has a population of about 200,000 people according to the national and housing census of 2009. The county has equatorial climate receiving rainfall almost throughout the year and an average annual rainfall of 1500mm-2000mm. The County is endowed with natural resources which include arable land, wetlands, forests and soapstone. The arable land

is overwhelmed with economic activities which include subsistence agriculture, vegetable farming, dairy farming, coffee and tea farming. Over 77% of land is fertile and wet throughout the year.

3.4: Target Population

Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran, 1992). The target population for the study was defined as all contractors, architects, engineers, quantity surveyors, clerk of works, foremen, skilled and unskilled labourers in the forty eight (48) construction project sites within Kisii Municipality. All the forty eight (48) construction sites within the Municipality (Mwembe, Nyanchwa, Daraja Mbili, Jogoo and CBD) were used in the study (table 3.1) and constituted all categories of workers. Snowballing method was used to identify construction sites within the municipality. A preliminary survey to obtain information about the construction sites and their accessibility was, therefore, conducted. Based on the preliminary survey, forty-eight (48) construction sites were selected to be used as the population of the study as presented in Table 3.1.

Table 3.1: Research population

Division	*Number of Sites*	*Number of male workers*	*Number of female worker*	*Total number of Workers*
Mwembe	13	1093	137	1230
Nyanchwa	9	885	105	990
Daraja Mbili	8	862	110	972
CBD	7	594	74	668
Jogoo	11	1013	127	1140
Total	**48**	**4447**	**553**	**5,000**

Source: Kisii County Works Office (2013)

3.5: Sample size

The selection of construction sites within Kisii Municipality was based on the preliminary survey that was carried out to locate the active construction project sites within the study area. The workers of construction sites generally comprise of contractors, site engineers/managers, quantity surveyors, clerk of works, site foremen, skilled and unskilled labourers. But construction workers comprise of foremen, skilled and non-skilled labourers. All construction workers were sampled for the study based on the sample size, confidence level and sampling error boxes as given by Cohen, Manion and Morrison, (2000). Cohen, Manion and Morrison (2000) is another approach used to determine a sample size for a probability sample in relation to the confidence level and sampling error. The sampled construction sites constituted all categories of construction sites within the Municipality namely, commercial, institutional and residential. The reason for studying all these sample sites was to establish whether safety as a factor affects all construction workers regardless of the category of construction site they work in. All construction workers had equal chances of constituting the sample.

The total number of construction workers sampled within the Municipality was 357. According to Cohen, Manion and Morrison (2000), from a total population of 5000 people, a sample size of 357 is considered to be representative enough to be used in a study. The Cohen, Manion and Morrison (2000), approach is used to determine a sample size for a probability sample in relation to the confidence level and sampling error. Forty-eight (48) construction sites within the Municipality were used in this study (table 3.2). The total number of construction workers sampled from Mwembe was 87 (24.4%). There were 62 (17.4%) workers sampled from Daraja Mbili while

85 (23.8%) workers were from Jogo and 66 (18.5%) workers were from Nyanchwa. The workers sampled from CBD were 57(16.5%). The number of male construction workers sampled was 315 (88.2%) while female workers sample were 42 (11.8%) (table 3.2). From Cohen, Manion and Morrison, (2000) confidence level and sampling error boxes a sample size of 357 workers was used in this study. This research was carried out within Kisii Municipality which has a population of about 200,000 people according to the national and housing census of 2009.

Table 3.2: Construction workers' sample size

Division	*Number of sites*	*Number of male Per site*	*Number of female Per site*	*Workers Sample size per site*
Mwembe	13	77	10	87
Nyanchwa	9	58	8	66
Daraja Mbili	8	54	8	62
CBD	**7**	**50**	**7**	**57**
Jogo	**11**	**76**	**9**	**85**
Total	**48**	**315**	**42**	**357**

Source: Kisii County Works Office (2013)

3.6: Sampling Procedure

According to Abdelnaser et al., (2008) a sample is a subset of the population selected for participation in the study. This was a case study of the entire commercial, institutional and residential construction sites within the area of study. Purposive sampling was used to select the construction workers to be included in the study. It was used because Erbil et al. (2010) has indicated that, the purposive sampling technique allows the researcher to select individuals who have good knowledge on the subject in discussion. The method of selection was also based on purposive sampling because the longer served construction worker is expected to give an in-depth

knowledge of the real situation on their occupational safety issues. Most construction sites have few female workers due to the nature of work. Despite their numbers they were sampled in order to ensure equal proportion of both sexes in the sample. All construction workers were sampled for the study based on the sample size, confidence level and sampling error boxes as given by Cohen, Manion and Morrison, (2000). This gives a sample size of 357 construction workers as shown in table 3.2.

Purposive sampling was combined with stratified random sampling to ensure proportionate gender representation in the construction sites selected in the sample. The purpose of stratified random sampling technique was to achieve a desired representation from various strata of the population. Stratified random sampling was adopted since the target population was diverse. In the sampling selection process, the population was divided into strata. The size of each stratum was determined in terms of magnitude. Then the sample was selected with stratum comparable to that of the population at the same time maintaining their size in the sample. Purposive sampling allowed the researcher to use cases that have the required information with respect to the objectives of the study. Snowball sampling technique was used to identify respondents with the desired characteristics. The few identified subjects then named others that they knew had the required characteristics until the study got the number of cases required.

3.7: Research Instruments

This study used questionnaire, observation and interview schedules as the main instruments to collect data. According to Mugenda and Mugenda (1999) interviews are face to face encounters that enable the study to obtain accurate information.

Interview schedule provides in-depth data required to the specific objectives of the study through interaction and genuine conversation. According to Kindred (1976) the use of questionnaire in measuring the public opinion either from the site personnel or the community members' is one of the most appropriate methods. Questionnaire has an advantage of collecting information from many respondents within a limited time and the respondents are also free to offer information because they are assured of their anonymity. Questionnaire was used to collect information from construction workers because of their ability to sample a large number of respondents within a short period of time. Interview schedule was used to collect information from top management of the construction sites. The top management on site, for example clients, contractors, project managers and site engineers were given one set of questionnaire and on the same site construction workers were selected to respond to another set of questionnaire, and those labourers who were not able to read or write at the time of distribution were guided. The data collection tool used for guidance was the questionnaire.

3.8: Development of the Instruments

In order to achieve the aim and objectives of the study, well-structured close-ended and open ended questionnaire was designed to gather information from building construction sites. Close-ended questionnaire was used because Glasow (2005) has indicated that close-ended questions are easy for respondents to answer and it also help researchers to analyze their data easily. Salant et al. (1994) are also of the view that closed-ended questions with unordered choices, for example the multiple choice questions are useful for ranking items in order of preference. Further, Fowler et al. (1995) suggested that close-ended questionnaire is used to gauge the respondents'

ability to provide informed responses or to identify respondents who believe they are informed and compare their responses to those who do not believe they are informed. Open ended questions give room for free responses in the respondents' own opinion. Questionnaire was used to collect information from construction workers because of their ability to sample a large number of respondents within a short period of time. Interview schedule was used to collect information from top management of the construction sites. Observation schedule was used by the study to collect information that the study required during the time the sites were visited.

Twenty five (25) items were selected and they were designed to measure personal details, welfare issues and safety items or equipment. This was done by borrowing and modifying welfare issues and safety items or equipment utilized by Danso (2005). The respondents were assured that information on the questionnaire was purely for research purposes and was treated as strictly confidential.

3.9: Distribution of the Research Instruments

In data collection, methods chosen should provide high accuracy and convenience to the study, the respondents and the intended consumers of the findings (Warwick and Lining 1975). In carrying out this study, the study made use of three main research instruments namely: questionnaire, interview and observation schedules.

3.9.1: Questionnaire

Questionnaire contained close-ended questions that were designed to elicit short, brief, and precise responses, as well as open-ended questions that gave room for free responses in the respondents' own words. They also contained rating scales where the

Likert scale was used to measure the respondents' perceptions and attitudes towards the various aspects on safety issues on construction project sites. The respondents were asked to rate certain given statements against 1 to 5 point Likert type of scale.

The developed questionnaire was distributed to and retrieved from construction offices and active construction sites in person. This process of distribution and retrieving of the questionnaire in person was taken for two reasons as suggested by Ahadzie (2007), first, to make sure that the questionnaire reach the intended recipients and secondly, to help improve the response rate. The questionnaire comprised questions meant to obtain information about problems construction workers face on construction sites and their coping mechanisms within Kisii Municipality. Some of the information sought for by the questionnaire included type of injury, risks, safety measures available, causes of casualties and accident reporting mechanisms. Out of the 357 questionnaire distributed, 291 were retrieved representing a response rate of 81.5%. According to Oladapo (2005), Newman and Idrus (2002) and Ellhag and Boussabaine (1999), a response rate of 30% is good enough in construction studies.

3.9.2: Interview Schedule

The interview schedule was designed for the top management of the construction projects namely: clients, contractors, architects, quantity surveyors engineers and clerk of works. The schedule provided a face to face encounter with the respondents. The schedule was designed to enable the researcher establish a rapport with the respondents, explain in person the nature and purpose of the investigation, and to clarify any aspect of the questionnaire that may have been misinterpreted by the respondents.

3.9.3: Observation Schedule

The observation schedule was designed to assess the real life situation of the safety issues on the construction sites. The study recorded and classified pertinent happenings such as the behaviour dispositions of construction workers and their supervisors in construction site situations. Observations were made within a month during the days the sites were visited for data collection.

All the research tools and instruments addressed the following variables of the study:

1) Safety coping mechanisms in place on construction sites. The various pertinent health and safety issues on construction sites, how they are addressed, the level of satisfaction on site safety and provision of safety and welfare related items.
2) Causes of accidents on construction sites. The questionnaire items were set to find the causes of most common accidents, injuries and fatalities on construction sites.
3) Accident, injury and fatality reporting procedures on site. The questionnaire items were set to find out the following from the workers: level of their safety training, how accidents and injuries are handled, reporting mechanisms and compensation in case of serious or fatal accidents
4) Factors which influence the workers' attitudes towards safety on construction sites. The low implementation of safety requirement as a result of negative attitudes by the workers

This study carefully administered all the interviews, observations and document analyses. This was to ensure an accurate interpretation of facts, opinions, views and attitudes were recorded as provided by the respondents.

3.10: Reliability and Validity of the Research Instruments

Reliability and validity of any research instrument must be established before the research tools are taken to the field for the purpose of collecting data.

Reliability refers to the degree of consistency of scores obtained by the same individual when examined with the test on different occasions and /or at different times. The greater the degree of consistency in an instrument, the greater is its reliability. According to Ranjit (1999) a scale or a test is reliable to the extent that repeated measurements obtained using it under constant conditions will give the same results. Reliability of the questionnaire was determined by using a test re-tests method to find out whether the responses given in the first application correspond to those of the second application. The questionnaire was administered in the pilot study twice, where the respondents were asked to respond to the same items after an interval of two weeks. The respondents were from outside the sample that was used (Ogembo Town). The Pearson Product Moment Coefficient (r) between the two set of scores of the responses from the questionnaire administered on two different occasions were used to calculate the reliability coefficient. Orodho (2009) concurs with Mugenda and Mugenda (1999) that a correlation coefficient of about 0.8 should be considered high enough to judge the instrument as reliable for the study. A co-efficient of 0.852 was obtained from the construction workers questionnaire and 0.844 from the top managers' questionnaire. These scores were checked against a 0.5 level of significance and found to be highly reliable.

Validity on the other hand refers to the extent to which a research instrument performs what it was designed to do. To ensure content validity, the research instruments were ascertained by the researcher's supervisors who critically examined the items and

made comments and suggestions to the researcher. The researcher then used the comments and suggestions put forward by the said supervisors to modify the items in the research instruments. They were also requested to assess if the instruments would elicit the required data and how effective the elicited data could be meaningfully analyzed. The piloting of the study which was done in Ogembo Town, further provided validity of the instruments. Face validity, as the name suggests, is a measure of how representative a research thesis is 'at face value,' and whether it appears to be a good thesis. To obtain face validity it was necessary to have items critically analysed by a number of people to improve the validity of the research instruments.

3.11: Data Collection Procedures

An introduction letter was obtained from the Post Graduate Coordinator, School of Education University of Eldoret to enable application for a research permit from the National Council for Science and Technology. A research permit was therefore, obtained from the National Council for Science and Technology to allow for collection of data from various construction sites selected for the study. Permission to collect data from construction sites within the Municipality was obtained from the County Works Office and the administrators of the construction sites selected for the study. The questionnaire was then given to the selected construction workers with the help of the site managers. The workers were to answer the questionnaire and return them immediately to the site manager/human resource person who in turn handed them over to the investigator. This was done so as to avoid discussion amongst the construction workers which could lead to change of opinion.

3.12: Data Analysis

The data collected was analyzed using descriptive statistics. Descriptive statistics involves tabulating, graphing and describing data, the purpose of which was to enable the study to meaningfully describe distribution of scores or measurements using a few indices or statistics (Mugenda & Mugenda, 1999). Means, percentages, tables, charts and graphs were used to present quantitative data. To analyze data generated from some of the questions in the questionnaire, the options provided as "Strongly Agree" and "Agree", were merged into one category as Agree", whereas "Strongly Disagree" and "Disagree" were merged into "Disagree". Some questions simply required a yes or no response. A computer program called Statistical Package for Social Sciences (SPSS) version twenty (20) was used to compute the empirical data which provided the basis for analysis and description of data.

Data collected from the interview sessions were collated and then edited for clarity and relevance. Thematic analysis was used to derive codes from key quotations, insights and interpretations and then compared for consistencies and differences. Emerging themes were then noted and categorized. The main categories having been evaluated to be in rhythm with the objectives of the study were narrated using graphics and direct quotations.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSION OF THE FINDINGS

4.1: Introduction

This chapter presents the results of the study, interpretations and discussion of the findings of study. The presentation and analysis of data was divided into two broad categories namely general information on the population and the findings on each of the variables of the study. The questionnaire items, interview and observation schedules were first analyzed descriptively and inferentially and then results obtained presented using tables and charts. The analysis of data was done in the light of the objectives and research questions, using Statistical Package for Social Sciences (SPSS) version 20.

This chapter is presented under the following sub-sections questionnaire return rate, demographic profile, safety coping mechanism in place on construction sites, causes of casualties on construction sites, reporting mechanisms on casualties on construction sites, factors which influence workers' attitudes towards safety on construction sites, Pearson correlation coefficient between variables, relationship between responses from employers and employees and summary of the findings.

4.2: The questionnaire return rate

The study sample consisted of 357 construction workers. A summary of the questionnaire distributed and collected for computing analysis is as shown in table 4.1. A total of 357 copies of questionnaire were distributed and 291 copies were successfully collected. The response return rate was 81.5%, which was considered

adequate for data analysis and interpretation. Out of 81.5% return rate, female respondents were 35 (12%) and the rest 256 (88%) were male respondents. Most construction sites had few female workers due to the nature of work done on the construction sites. The implication of this low female turn out (12%) is that construction work is not liked by female workers. The nature of construction work is hard and intensive. The few female workers that were found working on construction sites are those that are resilient and have been hard-pressed by the hard economic conditions or those who just want to make ends meet. It should also be noted that female workers may also be working in other sectors which may not be labour intensive as much as the construction sites.

Table 4.1: The questionnaire return rate

Number of Questionnaire distributed	357
Number of Questionnaire collected	291
Response Return Rate	81.5%

4.3: Demographic profile

The demographic analysis of the respondents was obtained as shown in table 4.2.

Table 4.2: Demographic profile of the respondents' status

Demographic variable	Category	Frequency	Percent (%)
Position/status in company	- Client/Owner	3	1.0
	- Contractor	25	8.6
	- Clerk of works	6	2.1
	- Site Engineer/Architects/ Quantity Surveyor/Manager	17	5.8
	- Site Foreman	41	14.1
	- Labourers	199	68.4
Total		**291**	**100.0**

From the table 4.2 top management (client/owners, contractors, architects, quantity surveyors, site engineer/agent/managers and clerk of works) of the construction firms sampled were 51(17.5%) while construction workers (site foreman and labourers) were 240 (82.5%). From the demographic profile table 4.2, the first analysis was for the position/status of workers in the company, where it was found that most of the respondents were from the group of labourers (68.4%) while Site Foreman (14.1%) who form part of the work force were the second highest group. This is because the respondents were selected based on some level of exposure towards the safety issues on construction sites. The longer served worker was expected to have an in-depth knowledge and experience of the real situation on the occupational safety issues. Construction sites require more labourers and site foremen than the other categories of workers because of the intensity of work/labour requirements and this intensity is clearly reflected on the demographic profile of the respondents' status in which 68.4% of the response was from labourers.

Table 4.3: Demographic profile of the respondents' age group

Demographic variable	Category	Frequency	Percent (%)
Age	18 - 19	8	2.7
	19– 25	66	22.7
	26 – 35	74	25.4
	35– 45	96	33.0
	45 & above	47	16.2
Total		**291**	**100.0**

From the demography category of age of workers table 4.3, it was found that most of the respondents were in the age group of 35 – 45 years which is about 33.0%. The second highest age group was between 26 - 35 years old (25.4%) while the age group

of 45 years old and above was fourth (16.2%). The overall result paints a picture that most construction workers on sites fall within the working productive age in Kenya which is 18 to 60 years. This study also shows that, most activities on construction sites in Kisii Municipality in Kenya are not activities that older people would want to do. Construction work is intense, heavy and require workers to spend long hours at work. The findings indicate that labourers above 45 years do not like working in construction sites because of the age factor, intensity and complexity of construction work.

4.3.1: Education level of construction workers

Construction workers with higher qualifications in education are expected to have more in-depth knowledge of the construction work especially occupational site safety.

Table 4.4: Education level

Workers' Education Level	Frequency	Percent
Never been to school	35	12.0
Standard 8	4	1.4
Form 4	8	2.7
Apprentice	94	32.3
Craft certificate	129	44.3
Diploma	17	5.8
Degree	4	1.4
Total	**291**	**100.0**

On education level (table 4.4), most (44.3%) of the respondents were found to be certificate holders followed by apprentice (32.3%). In general, it is observed from table 4.4 that about 76.6% (44%+32.6%) of the respondents have their educational

level up to either apprentice (32.3%) or craft certificate (44.3%) level. This result indicates that majority (76.6%) of the construction workers have low level of education. This means that the respondents do not have enough education to enable them read and understand the legislation and policies governing their employment and occupational safety on construction sites. It can also be observed that people who have high level of education have better alternative employment opportunities in other sectors other than the construction industry. Construction work is labour intensive, heavy and requires long hours of work.

4.3.2: Workers Experience on Construction Sites

Table 4.5 shows experience of the workers in each category in terms of the duration a worker has been in the construction sites. The duration in terms of months represents work experience of the workers. The longer served worker is expected to be more experienced and, therefore, has more in-depth knowledge of the work.

Table 4.5: Experience on construction project sites

Experience in construction work	Frequency	Percent
0 to 12 months	33	11.3
12 to 24 months	43	14.8
24 to 48 months	74	25.4
48 months and above	141	48.5
Total	291	100.0

From the analysis in figure 4.5, it was found that most (48.5%) of respondents belong to the 48 months and above category while 24 to 48 months category were second (25.4%) which was followed closely with the 12 to 24 months category (14.8%) and

the category of 0 to 12 months (11.3%) was last. The study shows that the most experienced people in the workforce of the category of 48 months and above were 48.5%. The background information gathered on the workers suggests that they were mature, experienced and capable of exercising good judgment and as such their responses could be relied upon for the analysis of data. From table 4.5 observations indicate that the construction workers have been on construction sites longer enough and as such have experienced some of the critical safety issues required in this study. The longer served worker is expected to be more experience and, therefore, has more in-depth knowledge of the health and safety issues in construction sites.

4.4: Safety coping mechanisms in place on construction sites

In order to establish the health and safety coping mechanisms employed at the construction sites, the respondents were asked to respond to various items relating to welfare and safety-related issues. The purpose of this study was to investigate the various aspects of safety coping mechanisms in place on construction sites within Kisii Municipality for the purpose of establishing the critical safety issues affecting the overall welfare and safety of the construction workers on the building construction sites. This findings of study could be helpful in suggesting possible intervention mechanisms that if adopted could alleviate occupational safety issues in construction sites.

4.4.1: Welfare-related items

Welfare-related items deal with the provision of the necessary welfare items on construction sites. The study sought to find out to what extend these items are

provided on the construction sites to the construction workers (labourers and foremen) within Kisii Municipality.

4.4.1.1: Responses from questionnaire by the construction workers on welfare issues

In the questionnaire, construction workers were asked to indicate whether contractors generally provided the welfare-related facilities on construction sites to the construction workers. The construction workers within Kisii Municipality were required to respond to this statement by ticking the appropriate cell to indicate whether they agreed or disagreed with the expression. The construction workers' responses to item 5 in the questionnaire are as presented in table 4.6.

Table 4.6: Responses from questionnaire by the construction on welfare-related issues N=240

Welfare Facilities	Strongly Agree	Agree	Disagree	Strongly Disagree
	F (%)	*F (%)*	*F (%)*	*F (%)*
Safe drinking water	28 (11.7)	61 (25.3)	82 (34.2)	69 (28.8)
Water for washing	23 (9.5)	54 (22.5)	106 (44.2)	57 (23.8)
Toilets & Showers	33 (13.8)	61 (25.3)	76 (31.7)	70 (29.2)
Changing Rooms	30 (12.5)	55 (22.9)	89 (37.1)	66 (27.5)
First –Aid Equipment	55 (22.9)	57 (23.8)	82 (34.2)	46 (19.1)
Average ratings (%)	**14.1**	**24.0**	**36.3**	**25.6**

The abbreviation 'F' represents frequency while figures in brackets ( ) represent the percentages of the frequencies rounded off to one decimal point. Source: Field data (2013)

From the results in table 4.6, the following issues appear to emerge: An average total of about 61.9% (25.6% + 36.3%), of the respondents disagreed with the expression that contractors generally provided the welfare-related facilities to the construction workers. An average response rate of about 63%, of the respondents said that construction workers lacked safe drinking water on construction sites. Among other factors, indications from table 4.6 suggests that water for washing, toilets and showers, and changing rooms were among the main welfare items lacking on sites and had an average rating of 68%, 60.9%, and 64.6% respectively. This is an indication that welfare-related facilities were not regarded as important items to be provided by the contractors on construction sites. This results as presented on table 4.6 shows that a lot of sensitization is required to enable contractors realise the importance of the providing welfare-related facilities on construction sites. If welfare facilities are provided, workers will spend less time looking for them and production should be higher.

Table 4.7: Responses from questionnaire by the top management on welfare-related issues N=48

Welfare Facilities	Strongly Agree	Agree	Disagree	Strongly Disagree
	F (%)	*F (%)*	*F (%)*	*F (%)*
Safe drinking water	5 (10.4)	12 (25.0)	16 (33.3)	15 (31.3)
Water for washing	18 (37.5)	10 (20.8)	8 (16.7)	12 (25.0)
Toilets & Showers	13 (27.0)	15 (31.3)	7 (14.6)	13 (27.0)
Changing Rooms	6 (12.5)	17 (35.4)	14 (29.2)	11 (22.9)
First –Aid Equipment	10 (20.8)	19 (39.6)	12 (25.0)	7 (14.6)
Average ratings (%)	**21.6**	**30.4**	**23.8**	**24.2**

The abbreviation 'F' represents frequency while figures in brackets ( ) represent the percentages of the frequencies rounded off to one decimal point. Source: Field data (2013)

From the results in table 4.7, an average total of about 52% (21.6% + 30.4%), of the respondents agreed with the expression that contractors generally provided the welfare-related facilities to the construction workers. This is the opinion of the top management of the construction sites which may not necessarily reflect the true picture on the sites. The top management may not want the situation to look that bad as the responsibility of providing the required welfare-related facilities to the construction workers fall within their jurisdiction. This results as presented on table 4.7 shows that a lot more should be done by the contractors and other relevant stakeholders to ensure that construction workers are protected by providing them with the relevant welfare facilities. The provision of the welfare related items should also reduce illness related costs.

4.4.1.2: Interview Schedule from the Top Management on welfare related issues

Interview schedule was used to collect data from the top management of the construction firms on welfare issues. Top management of the construction sites include contractors, architects, engineers, quantity surveyors and clerk of clerks. Interviews conducted provided an in-depth data for this study. The result is as presented in table 4.8.

Table 4.8: Responses from the interview schedule from the top management on welfare facilities N=48

Provision of welfare items (%)	YES F (%)	NO F (%)
Safe drinking water	18 (37.5)	30 (62.5)
Water for washing	31 (64.6)	17 (35.4)
Toilets & Showers	26 (54.2)	22 (45.8)
Changing Rooms	29 (60.4)	19 (39.6)
First –Aid Equipment	30 (62.5)	18 (37.5)
Average ratings (%)	**55.8**	**44.2**

The percentages of the frequencies 'F' are represented by the figures in brackets, which are rounded off to one decimal point. Source: Field data (2013).

From the interview schedule table 4.8, an average rating of 55.8% of the respondents was of the view that contractors provided welfare facilities on construction sites. The ratings were from the interviews conducted on the top management (clients, contractors, architects, engineers, quantity surveyors and clerk of clerks) of the construction firms. From the results in table 4.8, the respondents (60.4%) agreed that changing rooms were provided on sites. The results as presented on table 4.8 indicate that the top management generally agreed that welfare-related items were provided on construction sites except safe drinking water. It should be noted that this is the opinion of the top management of the construction sites and may not necessarily reflect the actual situation on the sites. It is important to note that, the construction site top management cannot freely proclaim that they do not provide the welfare-related items for the benefit of the workers. The non-provision of the welfare-related items is likely to compromise productivity of the work and increase illness related costs, including medical care, sick leave and disability benefit costs. All construction

firms have duty of care to ensure that construction workers and any other person who may be affected by construction activities remain safe at all times.

4.4.1.3: Observations made by the study on provision of welfare facilities

The following observations (table 4.9) were made in this study on most construction sites. The term 'YES' in this table mean items that were seen while 'NO' in the table mean items that were not seen during the time the observations were made.

Table 4.9: Observations made by this study on the provision of welfare facilities

N=48

Welfare related issues	NO F (%)	YES F (%)
Safe drinking water	40 (83.3)	8 (16.7)
Water for washing	44 (91.7)	4 (8.3)
Toilets and showers	28 (58.3)	20 (41.7)
Changing rooms	39 (81.2)	9 (18.8)
First - Aid equipment	18 (37.5)	30 (62.5)
Average ratings (%)	**70.4**	**29.6**

The percentages of the frequencies 'F 'are represented by the figures in brackets, which are rounded off to one decimal point. Source: Field data (2013).

From the observations schedule (table 4.9) conducted in this study, it appeared that most (70.4%) construction workers on construction sites were not provided with personal welfare-related facilities. The observations made, revealed that welfare related facilities (70.4%) were not provided at the worksite. Welfare-related items enhance health of the construction workers. Non-provision of the welfare items is likely to compromise the health of the construction workers, lower productivity and increase illness and treatment related costs. A simple way to view human factors is to

think about three aspects: the job, the individual and the organisation and how they impact on people's health and safety-related behaviour (HSE, 1999).

4.4.2: Safety facilities

In order to ensure safety of the construction workers, the provision of the necessary safety facilities on construction sites should be accorded the importance they deserve. The study sought to find out to what extend these facilities are provided and utilized on the construction sites within Kisii Municipality.

4.4.2.1: Construction workers responses on safety items

In the questionnaire, construction workers were asked to indicate whether contractors generally provided the safety facilities on construction sites to the construction workers. This question is related to the best practices of some contractors on construction sites in the context of provision of safety facilities to the construction workers. It was for this reason that construction workers within Kisii Municipality were required to respond to this statement by ticking an appropriate cell to indicate whether they agreed or disagreed to the expression (table 4.10). Some of the items the study sought to know whether they are provided include safety boots, helmets, safety glasses (goggles), gloves, overalls/overcoats, safety nets and ladder scaffold platforms.

Table 4.10: Construction workers responses on safety items N=240

Safety items	Strongly Agree	Agree	Disagree	Strongly Disagree
	F (%)	F (%)	F (%)	F (%)
Safety boots	48 (20.0)	53 (22.1)	79 (32.9)	60 (25.0)
Helmets	51 (21.3)	47 (19.5)	84 (35.1)	58 (24.1)
Safety glasses (goggles)	72 (30.0)	36 (15.0)	87 (36.2)	45 (18.8)
Gloves	34 (14.2)	62 (25.8)	95 (39.6)	49 (20.4)
Overalls/Overcoats	23 (9.6)	67 (27.9)	106 (44.2)	44 (18.3)
Safety nets	50 (20.8)	38 (15.9)	97 (40.4)	55 (22.9)
Ladder scaffold platform	47 (19.5)	53 (22.1)	94 (39.2)	46 (19.2)
Average ratings	**19.4**	**21.2**	**38.2**	**21.2**

The abbreviation 'F' represents frequency while figures in brackets ( ) represent the percentages of the frequencies rounded off to one decimal point. Source: Field data (2013).

From the results in table 4.10, an average total of about 59.4% (21.2% + 38.2%), of the respondents disagreed to the expression that contractors generally provided safety related items or equipment on construction sites for construction workers. Among the items lacking most were safety nets, overalls, gloves and safety boots with an average rating of 63.3%, 62.5%, 60% and 57% respectively. Safety facilities essentially are won to prevent work-related injuries at places of work and to a larger extent reduce treatment related costs. The results in table 4.10 indicate that most of the necessary safety facilities were not provided. This means that construction workers were doing without the most essential safety facilities. This implies that the construction workers were exposed to injuries and to some extent construction site accidents. The resulting implication is high incidences of accidents and injuries on constructions sites. Workers should use/or wear safety facilities for example helmets as a means of taking precautions against head injuries from falling objects.

Table 4.11: Top Management Responses from questionnaire on Safety items (clients, contractors, architects, engineers, quantity surveyors and clerk of clerks) **N=48**

Safety items	Strongly Agree F (%)	Agree F (%)	Disagree F (%)	Strongly Disagree F (%)
Safety boots	9 (18.8)	16 (33.3)	11 (22.9)	12 (25.0)
Helmets	16 (33.3)	15 (31.3)	7 (14.6)	10 (20.8)
Safety glasses (goggles)	15 (31.3)	13 (27.1)	12 (25.0)	8 (16.6)
Gloves	7 (14.6)	18 (37.5)	13 (27.1)	10 (20.8)
Overalls/Overcoats	9 (18.8)	20 (41.6)	12 (25.0)	7 (14.6)
Safety nets	11 (22.9)	19 (39.5)	9 (18.8)	9 (18.8)
Ladder scaffold platform	12 (25.0)	17 (35.1)	12 (25.0)	7 (14.6)
Average ratings	23.5	35.2	22.6	18.7

The abbreviation 'F' represents frequency while figures in brackets ( ) represent the percentages of the frequencies rounded off to one decimal point. Source: Field data (2013).

From the results in table 4.11, an average total of about 58.7% (23.5% + 35.2%), of the respondents agreed to the expression that contractors generally provided safety related items or equipment on construction sites for construction workers. Among the items provided were safety nets, overalls, gloves and safety boots with an average rating of 62.4%, 60.4%, 52% and 62.1% respectively. These were the responses from top management (contractors, architects, engineers, quantity surveyors and clerk of clerks) on safety facilities. The results on table 4.11 indicate that most of the essential safety facilities were provided. It is important to note that this was the opinion of the top management of the construction sites which is opposite the opinion of the construction workers. This implies that the construction workers were protected against the risk to injuries and to some extent construction site accidents. Workers should use/or wear safety facilities for example helmets, overalls, safety boots and

ladder scaffold platforms as a means of taking precautions against site injuries. It is important to note that scaffold platforms are very dangerous if they are not properly and professionally used.

4.4.2.2: Top Management Responses from Interview Schedule on Safety Items

Interview schedules were used to collect data from the respondents for this study. Interview schedules were mainly used to collect data from top management of the construction sites. The top management comprised of the clients, contractors, quantity surveyors, engineers and clerk works. This result is as presented in table 4.12.

Table 4.123: Top management responses from interview schedules on safety items N = 48

Safety items	YES (F %)	NO (F %)
Safety boots	22 (57.9)	16 (42.1)
Helmets	10 (26.3)	28 (73.7)
Safety glasses/goggles	20 (52.6)	18 (47.4)
Gloves	13 (34.2)	25 (65.8)
Overalls/overcoats	12 (31.6)	26 (68.4)
Safety nets	21 (60.5)	17 (39.5)
Ladder scaffold platform	20 (63.2)	18 (36.8)
Average ratings (%)	**46.6**	**53.4**

The percentages of the frequencies 'F' are represented by the figures in brackets, which are rounded off to one decimal point. Source: Field data (2013).

From the results in table 4.12, an average rating of 53.4% of the respondents was of the view that contractors did not provide safety facilities on construction sites. The ratings were from the interviews conducted on the top management of the construction firms. According to 63.2% of the respondents' ladder scaffold platform, was among the safety-related items that was being provided on construction sites.

However, ladder scaffold platforms are among the most dangerous equipment in construction sites if they are not properly and carefully utilized. Also according to 60.5% of the respondents' safety nets were also provided. Training on the use of some of these facilities is required to enable construction workers acquire safety skills on how to use them. Adequate safety training should also reduce accident and injury rates on construction sites.

4.4.2.3: Observations made by the study on safety related items

The following observations (table 4.13) on safety related items were made in this study.

Table 4.13: Observations made in this study on safety related items N = 48

Safety related items	YES (F %	NO (F %)
Safety nets	8 (16.7)	40 (83.3)
Overalls/overcoats	18 (37.5)	30 (62.5)
Safety boots	33 (68.8)	15 (31.3)
Helmets	34 (70.8)	14 (29.2)
Gloves	15 (31.3)	33 (68.8)
Safety glasses/goggles	10 (20.8)	38 (79.2)
Average ratings (%)	**41.0**	**59.0**

The percentages of the frequencies are represented by the figures in brackets, which are rounded off to one decimal point. Source: Field data 2013.

From the observations (table 4.13) made in this study, it appeared that most construction workers on construction sites were not provided with personal safety related-facilities. The observations made, revealed that safety related-facilities (59.0%) were not provided at the worksites. Examples of these facilities are safety nets, overalls/overcoats, gloves and safety glasses/goggles with 83.3%, 62.5%, 68.8%

and 79.2% respectively. Workers are motivated to work hard if the working environment is conducive and safe to work in. Some of the benefits of good working environment are higher productivity, reduced medical cost and good health of the workers.

4.4.3: Health and safety protective equipment

In order to establish whether the respondents working within Kisii Municipality construction sites wore health and safety protective equipment while at work, the respondents were asked to provide their opinion in response to whether workers while on site always wear health and safety protective equipment when they are supposed to. Their responses were as summarized in table 4.14.

Table 4.14: Usage of health and safety protective equipment on site

Item	Frequency	Percent
Strongly agree	24	10.0
Agree	65	27.1
Undecided	18	3.3
Disagree	65	27.1
Strongly Disagree	78	32.5
Total	240	100.0

From table 4.14, an average total of about 59.6% (27.1% +32.5%), of the respondents disagreed that workers on site always wore health and safety protective equipment when they were supposed to. All construction workers were asked this question regardless of the construction site they worked in. This high percentage (59.6%) paints a picture that workers do not always wear safety protective equipment when

they were supposed to. This is an indication that workers who do not make use of personal protectve equipment (PPE) to prevent accidents while at work would become vulnerable to health hazards. All construction workers are required to utilize safety facilities while on site to guard against physical injury and harm. A health work force is likely to produce more and spend less on medical costs and avoid huge compansations from contractors for work-related medical costs.

4.4.4: Factors which contribute to accidents and injuries on site

The respondents were asked to provide their opinion by ranking the factors according to their contribution to accidents and injuries on construction sites by scores from 1 to 5, where '1' represents the most common, 2 represents very common, 3 represents common, 4 represents not common and '5' represents the least common.

Table 4.15: Factors which contribute to the occurrence of accidents and injuries on site N=240

Contributing factors	Most common very common	fairly common	common	least common
	F (%)	F (%)	F (%)	F (%)	F (%)
Lack of safety equipment	52 (17.9)	65 (22.3)	78 (26.8)	70 (23.7)	26 (8.9)
Poor working conditions	135 (46.4)	51 (17.5)	45 (15.5)	47 (16.2)	13 (4.5)
Trade culture/practice	6 (2.1)	15 (5.2)	34 (11.7)	32 (11.0)	13 (70.1)
Lack of safety awareness	82 (11.7)	81 (27.8)	73 (25.1)	68 (23.4)	35 (12.0)
Careless worker attitude	82 (28.2)	78 (26.8)	46 (15.8)	69 (24.1)	16 (5.5)

The percentages of the frequencies are represented by the figures in brackets, which are rounded off to one decimal point. Source: Field data 2013.

The results presented in table 4.15, provides an outline of the factors which contribute to occurrence of accidents and injuries on sites within Kisii Municipality. From the data poor working conditions (46.4%) was ranked as the most common factor that

caused accidents and injuries on site while lack of safety awareness was ranked as very common (second highest) 27.8%. Lack of safety equipment was found to be fairly common with 26.8% while careless worker attitude was found be common with 24.1%. Trade culture/or practice was found to be least common (70.1%). From this analysis it is evident that factors which contribute more to occurrence of accidents and injuries were such as poor working conditions, lack of safety awareness and lack of safety equipment. From the result, it is clear that the working environment is generally not conducive. From the results in table 4.15, the most common factor that caused accidents and injuries is the working conditions. It is also clear from the results that construction workers lack safety awareness. The resulting implication is high incidences of accidents and injuries on constructions sites because of poor working conditions, lack of safety awareness, careless worker attitude among others.

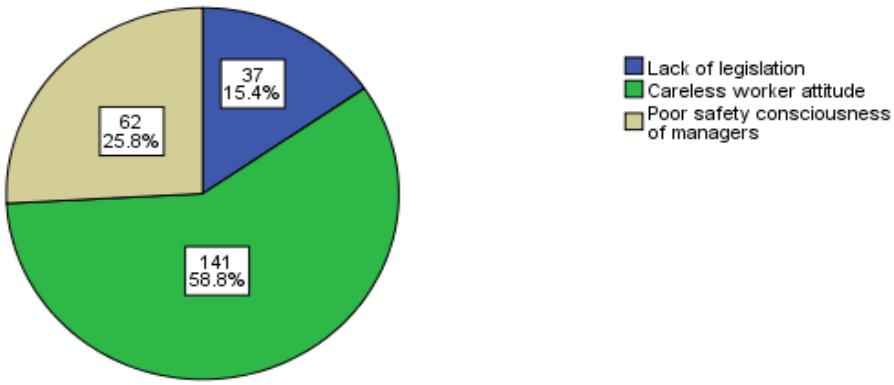


Figure 4.1: Factors contributing to high accident rates on construction sites

From figure 4.1, a total of 58.8% of the sampled construction workers found high accident rates on construction sites to be due to careless worker attitude. Also a total of 25.8% of the sampled population found poor safety consciousness of managers to contribute to high accident rates while 15.4% was as a result of lack of legislation. The resulting implication is a poor working environment, high accident and injury

rates, loss of working hours for going to attend to those who are affected or in hospital and loss of profitability due to huge compensations and medical costs. High accident and injury rates, loss of working hours, loss of profits and compensations can be avoided if employers and employees embrace teamwork and avoid treating each as managers and workers.

Table 4.16: Site safety awareness N = 240

Safety awareness	Strongly agree F%)	Agree F(%)	Disagree (F%)	Strongly disagree (F%)
Lacked safety knowledge	75 (31.2)	84 (35.0)	48 (20.0)	33 (13.8)
Lack of understanding of safety warning signs	48 (20.0)	111 (46.2)	46 (19.2)	35 (14.6)
Safety orientation	117 (48.7)	60 (25.0)	10 (4.2)	53 (22.1)
Health and safety officers on construction sites visitation	32 (13.3)	53 (22.1)	72 (30.0)	83 (34.6)
Average rating	**28.2**	**32.1**	**18.4**	**21.3**

Source: Field data (2013).

From the results in table 4.16, 60.3 % (28.2%+32.1%) of the respondents agreed that there was lack of adequate safety awareness on construction sites. This means that a lot more should be done by contractors and other relevant stake-holders to create adequate safety awareness on construction sites. Adequate safety awareness would reduce incidences of accidents and injuries on site. Table 4.16, provides data where 66.2% (31.2%+35.0%) of the respondents agreed that construction workers lacked safety knowledge. This is an indication that the construction workers had not been trained on how they ought to protect themselves against any possible hazards while on construction sites. From the results in table 4.16, 66.2% (20.0%+46.2%) of the respondents agreed that they lacked understanding of safety warning signs in the

construction industry. This is an indication that warning signs may not even be available on construction project sites. It is also evident that 64.6% of the respondents disagreed that public health and safety officers often visited construction sites. Public and health officers would ensure that safety rules and regulations are followed for the benefit of both employers and employees. This means that implementation of safety and health requirements were not being followed translating into some safety rules and regulations not being observed. The resulting implication is high incidences of accidents, injuries, loss of productivity and profitability.

Table 4.47: Provision of safety services on construction project sites

Provision of safety services	**Agree F (%)**	**Disagree F (%)**
Sensitization of the importance of safety precautions on site	92 (38.3)	148 (61.7)
Workers who had attended safety training courses	83 (34.6)	157 (65.4)
Appointment of company safety officers	145 (60.4)	95 (39.6)
Transport incase of accidents	100 (41.7)	140 (58.3)
Good emergency preparedness	113 (47.1)	127 (52.9)
Average ratings	**44.4**	**55.6**

Source: Field data (2013)

From the results in table 4.17, about 55.6% of the respondents disagreed that safety services were provided on construction project sites. On workers who had attended safety training courses, table 4.17 provides data where 65.4% of the sample disagreed that the respondents had attended any safety training courses. This meant that majority of the construction workers had low level of safety education. It is therefore, very difficult for them to interpret and understand the legislation and policies' governing employment and occupational safety as far as the industry is concerned.

From table 4.17, it is interesting to note that 60.4% of the respondents agreed that most construction companies appointed health and safety officers to be in charge of safety issues on construction project sites.

From the results in table 4.17, about 58.1% of the respondents disagreed that transport for victims was offered by the construction companies during emergencies in construction sites According to the respondents transport in case of emergency was necessary in case of victims who required transport to healthcare facilities. Data from table 4.17 shows that 52.9% of the respondents disagreed that there was good emergency preparedness on construction project sites. Good emergency preparedness should enable accident victims have fast access to healthcare facilities or any other emergency treatment on site.

Table 4.18: Top management on operating budget for safety promotion activities

N =48

Safety budget	Frequency	Percentages (%)
Yes	15	31.2
No	33	68.8
Total	48	100.0

Table 4.18 provides data where majority (68.8%) of the respondents **(**top management) interviewed agreed that contractors did not have operating budgets for health and safety promotion activities. This meant that sensitization of the workers on the need to keep themselves safe at the workplace was ignored to some extent. Training of workers and organizing for safety workshops and seminars was not possible due to non-availability of funds for safety promotion activities. The resulting

implication is that the construction workers are not sensitized and trained on how to protect themselves against construction hazards. Construction companies should set aside operating budgets for safety promotion activities in order to ensure that construction workers are trained on site safety.

Table 4.19: Overall satisfaction of workers on safety items

Satisfaction	Frequency	Percentage (%)
Strongly agree	34	14.2
Agree	70	29.2
Undecided	2	1.0
Disagree	73	30.2
Strongly disagree	61	25.4
Total	**240**	**100.0**

Source: Field data (2013).

Table 4.19 provides data where 55.6% of the respondents were not satisfied on the provision of safety facilities on construction sites. The implication is that workers were not satisfied in the way safety-related issues were being managed on the construction sites. Work satisfaction is essential for an accident free work environment. Work satisfaction ensures higher efficiency, saves budget on cost of accident and on treatment related costs, raises employee morale and increases business profit.

4.5: Causes of accidents on construction sites

In order to determine the causes of casualties on construction sites, the respondents were asked to respond to various items relating to the causes of casualties on construction sites and provide their opinion on the causes of most common accidents

and injuries on site. This was done by scores from '1' to '5', where '1' represents the most common and '5' the least common.

Table 4.20: Causes of most common accidents and injuries on site

Causes of accidents and injuries	Most Common	very common	fairly common	common	not common	not very common	least common
	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
Falls from height	39(16.2)	31(13.0)	49(20.4)	59(24.6)	28(11.7)	15(6.2)	19(7.9)
Falling objects	102(42.3)	65(27.1)	31(12.9)	19(7.9)	7 (2.9)	12(5.2)	4(1.7)
Improperly operating equipment	14(5.8)	44(18.3)	81(33.7)	37(15.4)	34(14.2)	21(8.8)	9(3.8)
Collapse of scaffold and framework	39(16.2)	65(27.1)	43(17.9)	36(15.0)	28(11.7)	19(7.9)	10(4.2)
Electrocution	3(1.3)	4(1.7)	9(3.8)	22(9.2)	38(15.8)	30(12.4)	134(55.8)
Noise	29(12.1)	19(7.9)	15(6.3)	22(9.2)	58(24.1)	64(26.7)	33(13.7)
Air (dust) pollution	18(7.5)	21(8.8)	17(7.1)	38(15.8)	49(20.4)	69(28.8)	28(11.6)

Source: Field data 2013.

From the results in table 4.20, a total of 42.3% of the respondents found falling objects to be the most common. Collapse of scaffold and framework was found to be very common (27.1%) while improperly operating equipment was found to be fairly common (33.7%). A total of 24.4% of the sampled population found falls from height to be common while 24.6% found noise to be not common. Air (dust) pollution was found to be not very common with (28.8%) while electrocution was found to be least common (55.8%). These percentages represent each category. The resulting implication is that adequate preventive measures must be taken to prevent accidents

and injuries due to falling objects and collapse of scaffolds by providing screen walls. Compensation cases involving medical costs, loss of working days and the pain of nursing injuries would be minimized if preventive measures are adopted.

4.6: Handling of accidents and casualties on construction sites

In order to determine the reporting mechanisms employed at the construction sites, the respondents were asked to give their opinion on how accidents and injuries are handled on sites, whether accidents are ever reported to the site managers, and whether accidents and incidences which occur on sites are always immediately reported to the relevant authorities. The responses are as presented in figure 4.2, figure 4.3 and figure 4.4.

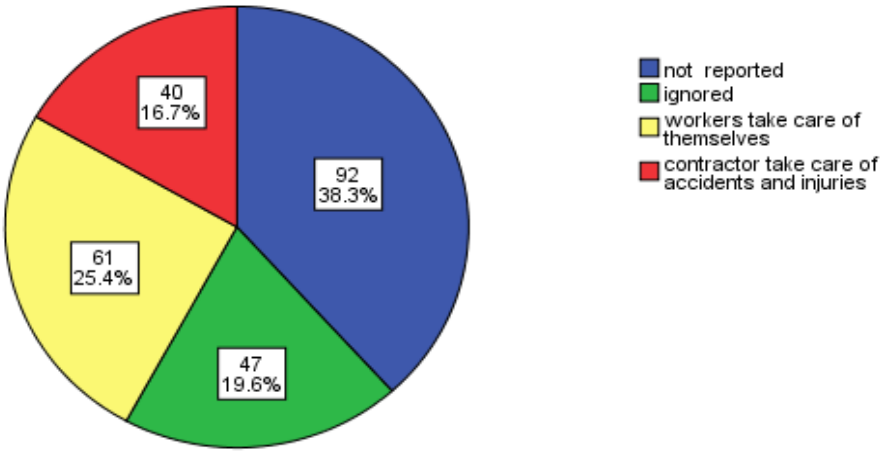


Figure 4.1: Handling of accidents and injuries on construction sites

From figure 4.2, a total of 38.3% of the respondents agreed that accidents and injuries were not reported to the relevant authorities while 25.4% of the respondents agreed that workers took care of themselves. From the results in figure 4.2, 19.6% of the respondents agreed that accidents and injuries were ignored and 16.7% of the respondents agreed that accidents and injuries were being taken care of by

contractors. It can be observed from table 4.2 that reporting of accidents and injuries is not adequate. This implied that it was difficult to get current and accurate accident and injury records on the construction sites. All accidents and injuries should be reported to the site management for record keeping.

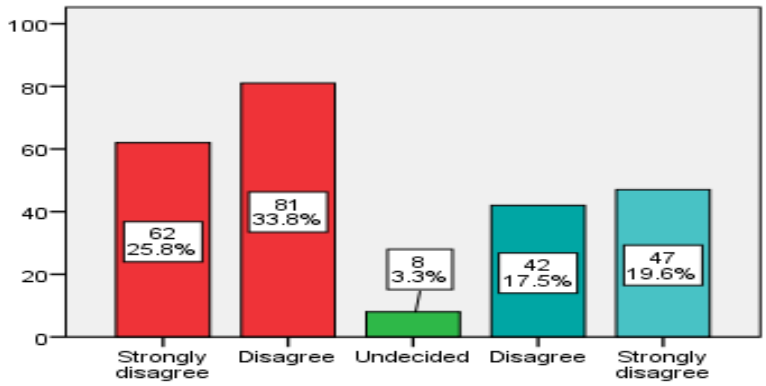


Figure 4.2: Reporting of accidents and incidences to site managers

From figure.4.3, an average total of about 59.6% (25.8% + 33.8%) of the respondents disagreed that accidents and incidences which occurred on sites are reported to the site managers. This implied that it was difficult to get current and accurate accident and injury records on the construction sites. All accidents and injuries should be reported to the site management for record keeping. The site management should also report to either the client or contractor who in turn should report to the relevant authorities in the County or National Government. The County or National Government should use the report to develop accident and injury statistics either at County or National level about the construction industry in general.

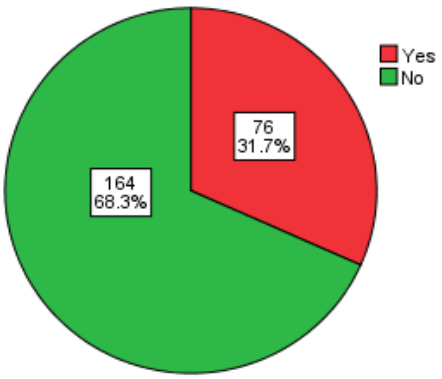


Figure 4.3: Reporting of accidents and injuries to the relevant authorities

Figure 4.4 shows that majority (68.3%) of the respondents disagreed that accidents are reported to relevant authorities. The resulting implication is that, it is difficult to get current and accurate statistics and any other documented data on accidents on the construction sites within Kisii Municipality. This is a common trend especially in most construction sites where contractors do not report accidents and injuries to the relevant authorities for fear that contractors may be required to compensate the accident and injury victims. Koehn et al. (1995) asserts that in developing countries, injuries are often not reported and the employer only provides some form of cash compensation for an injury to the employee.

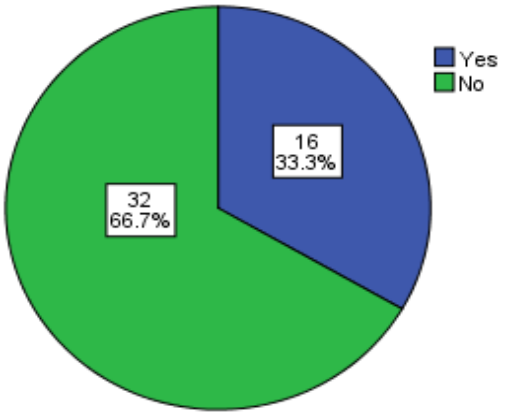


Figure 4.4: Keeping of accident records

On safety and health records (figure 4.5) at the workplace, the respondents (66.7%) indicated that records of accidents and injuries are not kept on sites by the management of the construction firms. The result was from the interviews conducted on top management. This meant that it is difficult to get current statistics on accidents and injuries on construction sites within Kisii Municipality. This indicates that the bureaucratic reporting system is weak and inadequate. The resulting implication is high incidences of unreported accidents and injuries which have resulted into poor accident and injury records.

4.7: Factors influencing workers' attitudes towards safety on construction sites

A site safety attitude refers to the workers tendency to respond positively or negatively towards safety issues. In order to determine factors which influence workers' attitudes towards safety on construction sites, the respondents were asked to respond to various items as indicated in the questionnaire by providing their opinion and ranking the factors by scores from '1' to '5', where '1' represents the most common and '5' the least common.

Table 4.21: Factors which influence workers' attitudes towards safety on construction sites N= 240

Safety attitude	Most common %	Very common %	Fairly common %	Not common %	least common %
Lack of safety training	49(20.4)	48(20.0)	72(30.0)	32(13.3)	39(16.3)
Careless worker attitude	126(52.5)	49(20.4)	35(14.6)	21(8.8)	9(3.7)
Poor safety consciousness of managers	37(15.4)	61(25.4)	38(15.8)	70(29.2)	34(14.2)
Lack of legislation	15(6.2)	34(14.2)	40(16.7)	43(17.9)	108(45.0)
Lack of safety equipment	26(10.8)	83(34.6)	58(24.2)	41(17.1)	32(13.3)

Source: Field data (2013).

From table 4.21, a total of 52.5% of the respondents sampled found careless worker attitude to be most common. Lack of safety equipment was ranked very common (34.6%) while lack of training on safety (30.0%) was ranked fairly common. Also a total of 45% of the sampled population found lack of legislation to be least common. Poor safety consciousness of managers (29.2%) was found to be not common. From the results in table 4.21, it is evident that careless worker attitude was the most common factor that affected workers' attitudes towards safety on construction sites followed by lack of training on safety. Poor safety consciousness of managers, lack of legislation and lack of equipment also contribute but to a smaller extent. Safety attitudes influence a workers' choice of actions and response to challenges, in the construction sites. Positive site safety attitudes are essential for an accident free work environment that ensures higher efficiency, saves budget on cost of accident and treatment related costs, raises employee morale and increases business productivity. On the hand, a negative attitude increases cost of production, reduces profitability, morale and of the workers.

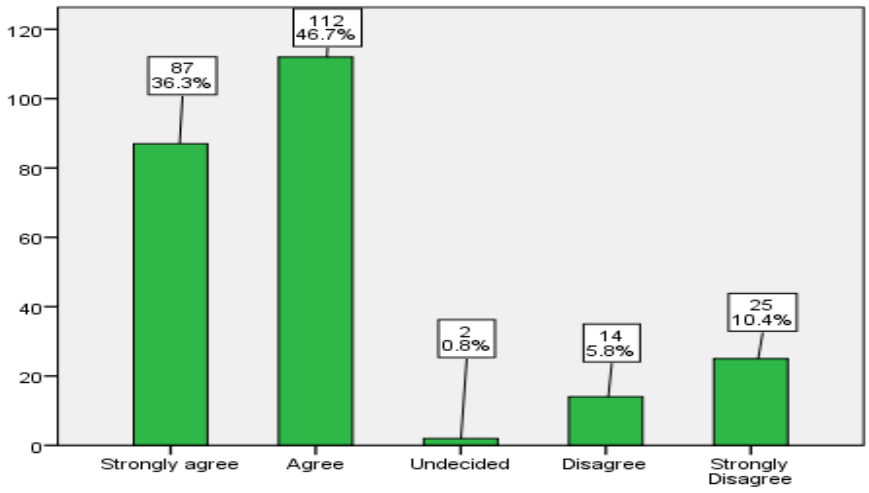


Figure 4.5: Disposal of building debris, waste and rubbish in building construction worksites

From figure 4.6, it is evident that 83%(36.3% + 46.7%) of the respondents agreed that disposal of building debris, waste and rubbish in building construction worksites, if properly managed, could reduce/or prevent unnecessary site accidents and injuries. Contractors should ensure that disposal of building debris, waste and rubbish in building construction worksites is professionally handled in order to enhance worksite safety.

Table 4.52: Productivity is usually seen as more important than safety

Productivity Verses safety	**Frequency**	**Percent %**
Strongly agree	86	35.8
Agree	68	28.8
Undecided	13	5.4
Disagree	30	12.5
Strongly Disagree	42	17.5
Total	**240**	**100.0**

From table 4.22, a total of about 64.6% of the respondents agreed that productivity is usually seen as more important than safety. This was as far as management was concerned. This meant that safety for the construction workers was not accorded the importance it deserves. Construction site safety should be given first priority if accidents and injuries are to be avoided. Safer and healthier working conditions make an important contribution to work satisfaction, high production and reduce accident and injuriy rates on construction sites. Reduction of accident and injury rates on construction sites in turn reduces cost of production, increases profitability, morale and safety of the workers.

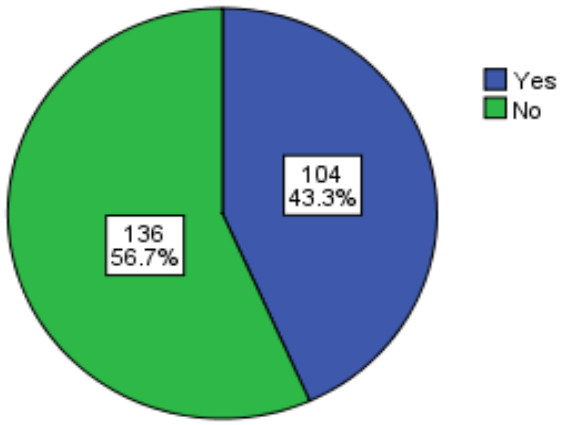


Figure 4.6: Compensation to workers in case of serious or fatal accidents

Figure 4.7 shows that majority (56.7%) of the respondents were not compensated in case of serious or fatal accidents. From the findings, it is therefore, evident that the issue of compensation to construction workers in case of serious or fatal accidents has not been adequately addressed. Contractors and other relevant stake-holders need to seriously address the issue of compensation as this could improve the employee and employer working relationship.

4.8: Pearson Correlation Coefficient between Variables

This relationship was tested using Pearson Product Moment Correlation Coefficient, ('r'). In this study, a correlation between 0.1–0.49 was considered a moderate positive correlation (relationship) and that between 0.5–0.99 was considered a strong positive correlation.

Table 4.23: Correlation Coefficient of Relationship between Variables of the Study

Correlation Coefficient of Variables	Overall satisfaction of construction workers on safety in construction sites	
Workers on site always wear Safety Protective Equipment	Pearson Correlation	.038
	Sig. (2-tailed)	.515
	N	240
Training in safety	Pearson Correlation	.297**
	Sig. (2-tailed)	.000
	N	240
Accidents and incidences are always immediately reported	Pearson Correlation	.051
	Sig. (2-tailed)	.430
	N	240
Are workers compensated in case of serious or fatal accidents	Pearson Correlation	-.042
	Sig. (2-tailed)	.520
	N	240

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed). Source: field data (2013)

Karl Pearson correlation analysis was carried out at 0.01 and 0.05 level of significance using Statistical Package for Social Sciences (SPSS) to determine the relationship between the variables shown in table 4.23. From the results, there was a weak positive correlation between overall satisfaction of workers on safety on construction sites and workers on site always wore safety protective equipment with a correlation coefficint of 0.038 and p value of 0.515. This correlation means that most (59.6%) construction workers were not wearing safety protective equipment while at work. There was also a moderate positive correlation between training in safety and wearing of safety protective equipment with a correlation coefficient of 0.297 and p value of 0.00. This correlation indicates that few workers (29.9%) were trained in the use of safety protective equipment. From the results in table 4.21, there is generally a weak positive correlation between provision of personal protective

equipment (PPE) and overall satisfaction of construction workers in the construction sites. The implication of this weak correlation is that both construction workers and the top management of the construction sites do not observe personal safety at the worksites. The weak correlation shows that contractors do not provide adequate safety-related facilities to construction workers. The poor provision of safety-related facilities has led to the poor implementation of safety requirements on construction sites. From the results, there was a weak positive correlation between overall satisfaction of workers on safety and accidents and incidences are always immediately reported with a correlation coefficint of 0.051 and p value of 0.430. This correlation indicates that accidents and incidences that occur on construction sites are not reported (68.7%) to the relevant authorities. The results on table 4.23 show that there was a negative correlation between workers compensation in case of serious or fatal accidents and overall satisfaction of workers with a correlation coefficint of -0.042 and p value of 0.520. This clearly indicates that most (56.7%) construction workers were not compensated in case of accidents, injuries and fatalities on construction sites.

4.9: Relationship between responses from employers and employees

The results in table 4.24 show observed and expected values of the responses from construction workers (employees) and employers in relation to the provision of safety facilities on construction sites. This test was used to determine whether there was a significant relationship between two categorical variables from the same sample. According to Keller et al. 2004, the Chi-Square (x^2) test of the contingency table is used to determine whether differences exist in responses between two or more

populations. In the present study, Chi-Squared (x^2) test was used to test whether any relationship existed between responses from construction workers (employees) and the responses from employers in relation to the provision of safety facilities. This relationship should assist the study on whether construction workers were influenced to respond in a certain manner which would result into wrong or correct interpretations.

Table 4.24: Chi-Squared (x^2) test on the relationship between responses from employers and the employees

Safety items	Observed values		Expected values		X^2_{cal}
	Employees	Employers	Employees	Employers	
Safety boots	57.0	42.1	50.6	48.5	13.26
Helmets	58.5	73.7	67.5	64.7	
Safety glasses (goggles)	51.3	47.4	50.4	48.3	
Gloves	59.8	65.8	64.1	61.5	
Overalls/Overcoats	60.1	68.4	65.6	62.9	
Safety nets	62.2	44.7	54.5	52.2	
Ladder scaffold platform	57.5	47.4	53.5	51.3	
First-aid equipment	52.9	60.5	60.9	52.5	
Rain gear	68.8	62.5	65.6	60.6	
Hearing protection	56.7	58.3	53.5	51.3	
Knee pads	64.2	63.2	57.5	60.6	
Flash lights	64.1	61.7	67.5	64.7	

$X^2_{cal} = 13.26 < X^2_{table} = 19.675$ (df = 11)

As indicated from the results in table 4.22, $X^2_{cal} < X^2_{table.}$ The resulting implication is that the responses from the employees which indicated that contractors do not provide safety facilities to them were independent from the responses from the employers. Therefore, this was an indication that there was no evidence of a relationship between responses from construction workers and employers on safety-related facilities. From

the findings, it was concluded that contractors generally do not provide safety-related facilities to construction workers on construction sites. Most construction workers are not aware of their obligations like wearing of personal protective equipment (PPE), procedures to be followed while on construction sites and the need to be trained in safety education. The top management is engaged in cost saving by not providing for safety. Contractors should enforce proper safety practices in the construction sites and workers should be discouraged from work that is performed in unsafe environment.

4.10: Summary of the findings

The purpose of this study was to investigate the safety measures in place in construction sites within Kisii Municipality. The objectives of the study were to evaluate safety coping mechanisms in place on construction sites, causes of accidents on construction sites, reporting mechanisms on casualties on construction sites and factors which influence workers' attitudes towards safety on construction sites.

4.10.1: Safety coping mechanisms on construction sites

From the findings, it is evident that majority of the construction workers do not have safety-related facilities every time they are at their workplace for the purpose of protecting themselves against accidents and injuries. The findings revealed that contractors generally do not provide adequate welfare and safety-related facilities on construction sites. Welfare and safety-related items such as water for washing, changing rooms, helmets, safety boots, gloves, and safety nets respectively were found to be lacking on construction sites. This study agrees with the one conducted by Muiruri, (2012) on health and safety management on project sites in Kenya, in which the findings indicated that health and safety measures on construction sites were inadequate and effective enforcement mechanism of health and safety was

lacking. The findings of the present study also agrees with those in the study by Mombeki, (2005) on compliance on Tanzania construction sites, where she found that the majority of workers never wore PPE, using the excuse of loss of productivity. This is an indication that the situation was wanting and their importance in addressing the welfare and safety issues of construction workers on construction sites needed to be addressed. This study also yielded similar results with the one conducted by Danso, (2010), on occupational health and safety issues involving casual workers on Building Construction Sites in Ghana. According to Danso (2010) occupational health and safety of casual workers in the Ghanaian construction industry have been compromised as result of the drive of economic and social behavior of both employers and casual workers, coupled with the lack of implementation of safety legislation and policies on construction sites.

The findings from the construction workers' responses on the high accident rates on construction sites revealed that careless worker attitude, lack of safety equipment, poor working conditions, lack of safety awareness, lack of legislation, poor safety consciousness of managers and failure to appoint safety officers by the ministry of public works to frequently inspect construction sites were among several factors which contributed to the occurrence of many accidents on construction sites. This study yielded similar findings to those of the study conducted by El-Mashaleh, et al. (2010) which revealed several factors of poor safety management. Among these factors were lack of safety training, occasional safety meetings, occasional safety inspections, unavailability of safety protection measures, hesitance of workers to use safety equipment, high labour turnover rates and non-compliance with safety legislation. The present study also agrees with a case study conducted in Tanzania

by Mitullah et al. (2003) which revealed that about 70% of casual workers were not provided with welfare related facilities and safety materials at most of the project sites resulting in accidents and sometimes deaths on construction sites. Further, this study revealed that construction workers had low level of safety education, lacked understanding of safety warning signs, emergency rescue preparedness was lacking and contractors had no operating budgets for safety promotion activities, According to Phoya et al (2011) those workers with higher education are more aware of health and safety risks than those with a low level of education. Proper training on safety should minimize accidents, injuries, treatment and compensation-related costs. This study indicated that most construction workers had entered into the construction work without having enough knowledge about the industry, especially in the area of safety requirements. The implication of having low level of safety education is that it is difficult for them to read, and understand the legislation and policies governing their employment as far as occupational safety at worksites is concerned.

4.10.2: Causes of accidents on construction sites

The present study revealed that falling objects were the most common cause of accidents while collapse of scaffold and framework was second highest. Other types of accidents were falls from heights and improperly operating equipment which also presented a fairly common workplace hazard. The study yielded similar findings with the one conducted by Dement and Lipscomb (1999) in which the highest rates for compensation cases involving medical costs were observed for being struck by objects, lifting/movement and falls from heights. Also, according to the Occupational

Safety and Health Administration (OSHA, 2010), fall hazards are the leading cause of injury on construction sites.

4.10.3: Reporting mechanisms on casualties on construction sites

The third research question in this study asked about the reporting mechanisms on casualties at the construction sites. The study revealed that reporting of accident and injury mechanisms were not adequate. The study also revealed that accidents and injuries are not reported to the relevant authorities. This made it difficult to get any current and accurate statistics on accidents and injuries that occur on construction sites within Kisii Municipality. It was also difficulty to get any current and accurate documented data on such safety issues on construction workers within Kisii Municipality construction sites. This has resulted in poor safety records. The study agrees with the findings of Koehn et al. (2003) who asserted that in developing countries, injuries are not reported and the employer only provides some form of cash compensation for an injury to the employee. Loewenson, (1999) also asserts that in Africa there are major sources of bias in current reported data on safety due to the poor coverage of certain groups of workers, the poor ascertainment of occupational disease, and the effects of some legal and bureaucratic features of the reporting systems.

4.10.4: Factors which influence workers attitudes towards safety on worksites

From the present study, it is evident that in order to enhance safety at the worksites factors which influence workers attitudes towards safety on construction sites must be addressed. Majority (52.6%) of the construction workers had a desire to have the factors addressed for the purpose of protecting themselves against accidents and injuries. But their efforts were always thwarted or frustrated by the contractors who

were not providing the safety facilities and hence they found themselves doing without the essential facilities and the result has been low implementation of safety requirements.

The findings of this study also revealed that lack of safety equipment, training on safety education and careless worker attitude were the major factors influencing the workers attitudes towards safety. Furtermore, productivity, lack of safety knowledge, and disposal of building debris, waste and rubbish in building construction worksites were among other main factors hampering safety and health risk management on construction project sites. The findings of this study, agrees with those of the study conducted by Belel, (2012) on the assessment of the safety culture of the construction industry workforce in Yola, Nigeria. According to Belel (2012) construction workers' attitudes towards safety are influenced by their perception of risk, safety rules and procedures. This study also yielded similar results to those yielded by the study conducted by Phoya, (2012) in a study aimed at ascertaining the current practice of health and safety risk management on Tanzanian construction sites, focusing on risk assessment, risk communication and risk control, in which the study found that Personal Protective Equipment (PPE) was the main item used for risk control however, there was not enough PPE on the sites. Proper safety attire and safety awareness should contribute to positive safety attitudes on construction sites. The attitudes held by the construction workers are of great importance as they should help in observing safety rules and regulations. This in turn affects their attitudes in the way they perceive work. Successful observations of safety precautions lie in the attitudes of both the contractors and the workers.

CHAPTER FIVE:

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1: Introduction

This study was concerned with the safety measure in place in the construction sites within Kisii Municipality. This chapter therefore, presents a summary of the entire study, conclusions that were drawn on the basis of the research objectives, recommendations and suggestions for further research. The main objective of the study was to evaluate the various aspects of safety coping mechanisms in place on construction sites and the specific objectives were to find out the causes of accidents on construction sites, to determine whether casualties at the construction sites are ever reported to the relevant authorities for documentation and to establish factors which influence workers' attitudes towards safety on construction sites in Kisii Municipality.

5.2: Summary

This study investigated the various aspects of safety measures in place in construction sites within Kisii Municipality. The purpose of the study was to establish the critical safety issues affecting the overall welfare and safety of the construction workers in the building construction sites. The subjects of study were construction workers within Kisii Municipality. The study was guided by the research objectives.

The study was limited to a sample of 357 construction workers and a response rate of 81.5% of the sampled population was obtained and used for the analysis. The literature reviewed indicated that construction sites are among those dangerous work sectors in the world. The study employed a case study design and the subjects for the

study were selected through random sampling. The study employed purposive and stratified random sampling techniques by using questionnaire, observation and interview schedules as the main instruments for data collection. Data was analysed using descriptive statistics using Statistical Package for Social Sciences (SPSS) program.

From the results of this study, it is evident that contractors do not generally provide adequate welfare and safety-related facilities to the construction workers at their workplace for the purpose of protecting themselves against accidents and injuries. Welfare and safety related items like water for washing, changing rooms, helmets, safety boots, gloves, and safety nets respectively were found to be lacking on construction sites.

From the findings of the study, falling objects were found to be the most common cause of accidents while collapse of scaffold and framework was second highest. The findings revealed that most accidents and injuries are not reported to the relevant authorities. The findings of this study also revealed that lack of safety equipment, training on safety education and careless worker attitude were the major factors influencing the workers attitudes towards safety. The findings of the study further indicated that productivity, lack of safety knowledge and disposal of building debris, waste and rubbish in building construction worksites are some of the other factors hampering safety and health risk management on construction sites.

5.3: Conclusions

From the findings, the study concluded that safety measures were not adequately observed on construction sites. Furthermore, occupational accidents and injuries were common among building construction workers.

From the findings of this study and the ensuing discussions, it was concluded that contractors generally did not provide adequate welfare and safety-related facilities on construction project sites. It was found that falling objects were the most common causes of accidents while collapse of scaffolds and framework platforms were second highest. Other causes of accidents were falls from height and improperly operating equipment which also presented a fairly common workplace hazard. The findings also revealed that accident and injury reporting mechanisms were not adequate. It was found that accidents and injuries were not reported to the relevant authorities. This made it difficult to get any current and accurate statistics on accidents and injuries that occur on construction project sites within Kisii Municipality. It was also difficulty to get any current documented data on such safety issues within the Kisii Municipality construction sites. This has resulted in poor accident and injury records. The findings of this study also revealed that lack of safety equipment, training on safety education and careless worker attitude were the major factors influencing the workers attitudes towards safety. The findings also revealed that among other factors which influence workers' attitudes towards safety were high regard for productivity, lack of safety knowledge and disposal of building debris, waste and rubbish in building construction worksites. The attitudes held by the construction workers towards health and safety on construction sites determines whether proper training on safety should minimize accidents, injuries, treatment and compensation related costs. Successful observation

of safety precautions lies in the attitudes of workers. Health and safety performance should be enhanced so that the construction workers may stand a chance of working in a sector that minds about the welfare and safety of its workers.

5.4: Recommendations

On the basis of the findings and conclusions of the present study, it is clear that a lot more attention need to be given to the health and safety issues than what has been accorded to it currently by the Kenya government, contractors, construction managers, policy makers, construction employees and other relevant stake-holders in the construction industry. Following are the recommendations the study came up with:

a) Contractors should be encouraged by Kenya Government to provide adequate welfare and safety-related facilities to the construction workers as these facilities enhances occupational safety at the work site and prevents site accidents and injuries.

b) Construction firms should also be encouraged by Kenya Government and other relevant authorities to incorporate operating budgets for safety promotion activities to enable construction workers to be trained in safety-related education in order to develop positive attitudes towards health and safety at the worksite.

c) Contractors should be encouraged to report all accidents and incidences that occur on construction project sites to the relevant authorities as this should enable current and accurate statistics on accidents and injuries that occur on construction sites to be documented. The records of these occurrences should be maintained by

the both the contractors and the relevant Kenya government ministries for future reference.

d) Construction workers should be provided with proper personal protective equipment (PPE) and clothing by contractors (employers). These facilities should encourage the construction workers to change their poor attitudes towards safety issues on construction sites.

e) The Kenya Government, Contractors and other relevant stake-holders in the construction industry should organize periodic seminars and workshops for the construction workers designed to promote desirable worker characteristics, with the ultimate aim being to improve quality of safety and health on construction sites.

5.5: Suggestions for further research

The occupational health and safety is such a wide area that could not have been fully exhausted in a single study such as the present one. This study, therefore, suggests that arising from the findings of the present study further research be carried out in the following areas:

1) To examine the possible causes of non-provision of safety-related facilities on construction sites.
2) To investigate whether poor attitude held towards safety is the possible cause of the low implementation of health and safety requirements on construction project sites.
3) To investigation the relationship between the contractor's attitude towards safety and the safety achievement of their employees.
4) To investigate the extent to which health and safety budgets influence implementation of safety requirements on construction sites.

REFERENCES

Abdelahamid, T. and Everett, J. (2000). Identifying root causes of construction accidents. *Journal of Construction Engineering and Management*, 126 (1): 52-60.

Abdelnaser, O., Mahmood, A., Aziz, H.A. and Shukri, A.Y.(2008). *Attitude of Malaysian on recycling of solid wastes in Malaysia*, Case studies in the major towns of the east coast and north Malaysia, PhD Thesis Unpublished, University Sains Malaysia.

Abdelnaser, O., Mousa M., and Aziz, A.H. (2008). Implementation of Safety requirements by the Contractors in the construction industry in Libya: Case Studies – *Journal of Engineering. Tome VI.*

Adane, M.M., Gelaye, K.A., Beyera, G.K., Sharma, H.R. and Yalew, W.W. (2013). Occupational Injuries Among Building Construction Workers in Gondar City, Ethiopia. Occup Med Health Aff 1: 125. doi: 10.4172/2329-6879.1000125.

Ahadzie, D.K. (2007). Model for Predicting the Performance of Project Managers at the Construction Phase of Mass House Building Projects, *http*://wlv.openrepository.com/wlv/bitstream/2436/15393/2/Ahadzie_PhD%20thesis.pdf**,** Accessed on 12th November 2009.

Aladekomo, F. O. (2004). Casual Labour in a Nigerian Urban Center, Centre For Industrial Research and Development (CIRD) Obafemi Awolowo University, Ile-Ife, Nigeria.

Aksorn, T. and Hadikusumo, B.H.W. (2007). The unsafe acts and the decision-to-err factors of Thai construction workers. *Journal of Construction in Developing Countries*, 12(1): 1–25.

Anaman, K. A. & Osei-Amponsah, C. (2007). Analysis Of Causality Links Between The Growth Of The Construction Industry And Growth Of The Macro-Economy In Ghana, *Construction Management & Economics*, Vole 25, pp. 951-961.

Belel, A. and Mahmud, H. (2012) Safety Culture of Nigerian Construction Workers – A Case Study of Yola. *International Journal of Scientific & Engineering Research Volume 3, Issue 9.*

Bomel Ltd (2001). Improving Health and Safety in Construction Phase 1: Data Collection,
Review and Structuring. Contract Research Report 386/2001. HSE Books, Sudbury.

Charles, M., Pillay, J. and Ryan, R. (2007). Guide to Best Practice for Safer Construction: Literature review 'From concept to completion, *Cooperative Research Centre for Construction Innovation*, for Icon.Net Pty Ltd.

Che Hassan, C.R., Basha, O.J. and Wan Hanafi, W.H. (2007). Perception of Building Construction Workers Towards Safety, Health and Environment. *Journal of Engineering Science and technology, 2 (3), 271 -279*

Chen Z., Li, H., and Wong, C.T.C. (2000). "Environmental Management of Urban Construction Projects in China". *Journal of Construction Engineering and Management* 126:320-324.

Choudhry, R. & Fang, D. (2008). Why operatives engage in unsafe work behavior: Investigating factors on construction sites. *Safety Science, 46*(1), 566-584.

Cohen, L., Manion, L., and Morrison, K. (2000). *Research Methods in Education* (4th ed.). Rutledge: London

Danso, F. O. (2005). Improving Safety On Building Construction Site On KNUST Campus In Kumasi Ghana, Unpublished Bask Thesis, Faculty Of Architecture And Building Technology, KNUST, Kumasi, Ghana.

Dement, J. M., & Lipscomb, H. (1999). Workers' Compensation Experience of North Carolina Residential Construction Workers, 1986-1994. *Applied Occupational & Environmental Hygiene,* 14(2), 97-106.

Dingsdag, D., Biggs, H., and Sheahan, V. (2006). *Safety culture in the construction industry:changing behaviour through enforcement and education*. Available at:http://2006conference.crcci.info/docs/CDProceedings/Proceedings/P132_Dingsdag _R.pdf [3 Oct. 2007].

Dubois, A. & Gadde, L. (2002). The construction industry as a loosely coupled system: implications for productivity and innovation, *Construction Management and Economics*.20:7, 621-631

Elhag, T.M.S. and Boussabaine, A.H. (1999). *Evaluation of construction costs and time attributes.* Proceedings of the 15th ARCOM Conference. Vol. 2, Liverpool John Moores University, 473-80.

El-Mashaleh, M., Rababeh, S., Hyari, K. and Rababeh M. (2010). Safety Management in the Jordanian Construction Industry. *Jordan Journal of Civil Engineering,* Volume 4, No. 1, 2010.

Enshassi, A. Choudhry, R.M., Mayer, P. E. and Shoman, Y. (2008). Safety Performance of Subcontractors in the Palestinian Construction Industry. *Journal of Construction in Developing Countries,* 13(1), 51-62 .

Erbil, Y. & Akıncıtürk, N. (2010). An Exploratory Study Of Innovation Diffusion In Architecture Firms, *Scientific Research And Essays,* Vol. 5(11), Pp. 1392-1401.

Evans, K.M (1972). *Attitudes and Interest in Education.* Rutledge: London.

Fernandez, R. (2007). Trench Safety: Protect Your Workers Light & Medium Truck. Alexandria; (20), 1, 36.

Fang, D., Chen, Y. and Wong, Y.(2006). Safety climate in Construction Industry. A case study of in Hong Kong. *Journal of Engineering and Management.*

Fowler, J. & Floyd, J. (1995). *Improving Survey Questions*: Design And Evaluation, Sage Publications Vol. 38, Thousand Oaks, CA

Fraser, L. (2007). Significant development in occupational health and safety in Australia's construction industry. *International Journal of Occupational and Environmental Health*, **13**(1), 12-20.

Gannoruwa, A. and Ruwanpura, J.Y. (2007). "Construction noise prediction and barrier

optimization using special purpose simulation", Simulation Conference. pp. 2073-2081.

Glasow, P. A. (2005). *Fundamentals Of Survey Research Methodology*, Washington C3 Center Mclean, Virginia, U.S.A

Glendon, A.I. and Stanton, N.A. (2000). Perspectives on safety culture, *Journal of Safety Science*, (34), 193–214.

Gross, R. (1996). *Psychology the Science of Mind and Behaviour* (3rd ed). Hordder Headline: London, U.K.

Hammer, W. and Price, D. (2001). *Occupational Safety Management and Engineering*. 5th Ed., New Jersey: Prentice Hall.

Hands(2010).Retrievedon05.02.12fromhttp://www.dennismac.co.uk/hands/ppe/index. html

Haupt, T. C. (2001). *The performance approach to construction workers safety and health.* Unpublished. Doctoral Dissertation, University of Frolida, Gainesville Florida.

Health and Safety Executive. (1998). *Managing Health and Safety: Five Steps to Success*. London: Health and Safety Executive.

Health and Safety Executive (HSE). (2006). *An Analysis of the Significant Causes of Fatal and Major Injuries in Construction in Scotland.* Research Report 443, 1–256. London: Health and Safety Executive.

Hinze, J. (1997). *Construction Safety*. Prentice Hall Publications, New Jersey.

Hinze, J. 2008. Construction safety. *Safety Science*, 46(4), 565.

HMSO (Her Majesty's Stationery Office). (2002). *Personal Protective Equipment*

Regulation of 2002. Available at: http://legislation.hmso.gov.uk/stat.htm. The legislation is also available at http://www.legislation.gov.uk/2002/1144. [Accessed on 10 November 2011].

Hughes, P. & Ferrelt, E. (2008), *Introduction To Health And Safety In Construction Industry*, Third Edition, Butterworth-Heinemann, Imprint Of Elsevier, USA, Pp 2-4

Hughes, P. and Ferrett, E. (2011). *Introduction to Health and Safety in Construction: The Handbook for NEBOSH Construction Certificates*. (4th Edition) Routledge, Taylor and Francis Group; New York.

Idoro, G.I. (2004). The effect of Globalization on safety in the Construction Industry in Nigeria. *Proceedings: International Symposium on Globalisation and Construction.* Asian Institute of Technology, Bangkok, Thailand, 17–19 November, 817–826.

Idoro, G.I. (2007). Contractors Characteristics and and Health and safety Performance in Nigeria Construction Industry. In proceedings of CIB World Building Conference on Construction for Development, Cape Town, South Africa.

Idoro, G.I. (2008). Health and safety Management Efforts as Correlates of Performance in the Nigeria Construction Industry. *Journal of Civil Engineering*. 6(23), pp. 75-83

Idoro, G.I. (2011). Effects of Mechanization On Occupational Health And Safety Performance in the Nigerian Construction Industry. *Journal of Construction in Developing countries*. http://web.usm.my/jcdc/input/preview%20manuscript%20Vo1%2016(2)/Pdf

Idrus, A. B. and Newman, J. B. (2002). Construction related factors influencing choice of concrete floor systems, Construction Management and Economics, 20, 13-19.

International Labour Organisation. (1992). *Safety and health in construction:* Code of practice Geneva, International Labour Office.

International Labour Organisation. (2001). *Tripartite meeting on the construction industry in the twenty-first century:* Its image, employment prospects and skill requirements, Geneva.

International Labour Organisation. (2005). *Thailand Occupational Safety and Health in the Construction Industry.* http://www.ilo.org/public/english/region/asro/bangkok/download/background/osh/conth 05.pdf.

International Labour Organisation. (2005a). Prevention: A Global Strategy. Promoting Safety And Health At Work. The ILO Report For World Day For Safety And Health At Work International Labour Organisation, Geneva, Switzerland. Accessed On 15th September 2009 From

Http://Www.Ilo.Org.Pk/Informationfiles/Prevention%20A%20Global%20Strategy.Pdf

International Labour Organisation. (2005b). Global Estimates Of Fatal Work Related Diseases And Occupation Accident, World Bank Regions. International Labour Organization, Geneva. Programme on Safety and Health at Work and Environment (safework), Accessedon On 15th September 2009 94. From;Http://Www.ilo.Org/Public/English/Protection/Safework/Accidis/Globest2005/Index.Htm

International Labour Organisation. (2007), The Decent Work Agenda In Africa: 2007-2015. In: Eleventh African Regional meeting, Held At Addis Ababa, Ethiopia. Report Of The Director General–International Jayawardane, A.K.W. & Gunawardena, N.D. (1998), Construction Workers In Developing Countries: A Case Study Of Sri Lanka, *Construction Management And Economics*, London, E & FN Spon, Vol.16, Pp. 521-530.

Jannadi, O.A. and Bu-Khamsin, M.S. (2002) Safety factors considered by industrial contractors in Saudi Arabia, *Building and environment*, 37(5), 539-547.

Kadefors, A. Institutions in building projects: implications for exitability and change. (1995) *Scandinavian Journal of Management.*11(4), 395–408.

Khan, F.R., Munir, K.A. and Willmott, H. (2007). A Dark Side of Institutional Entrepreneurship: Soccer Ball, Child Labour as Post Colonial Improvement, Organizational Studies pp 1067-1069.

Kenya Law Reports, (2013): *Occupational Safety and Health Act No. 15 of 2007:* http://www.kenyalaww.org/klr/fileadmin/pdfdowloads/act/OccupationanalSafetyandHealth(No.15of2007).pdf (Accessed on 10.08.2013)

Keller, G. & Warrack, B. (2004). *Statistics for Management & Economics*, 6th Edition.

Kikwasi, G. (2010). Client Involvement in Construction Safety and Health; *Journal for Building and Land development,* Ardhi University.

Kindred, L.W (1976). *The school and community relations*. Prentice Hall Inc: New Jersey.

Kitumbo, H.I. and Kirenga, A. P. (2001). Construction Industry in Tanzania, *African Newsletter on Occupational Health and Safety*, 11(1) 8-9.

Koehn, E., Kothari, R.K. and Pan, C. (1995). Safety in developing countries: Professional and bureaucratic. *Journal of Construction Engineering and Management,* 121(3): 261–265.

Lam, P.T.I., Chan, E.H.W., Chau, C.K., Poon, C.S., and Chun K.P. (2011). "Environmental management system vs green specifications: How do they complement each other in the construction industry?". *Journal of Environmental Management* 92:788-795.

Lawrence, G.S. Enhancing long-Term building occupancy and safety buildings. Cedar Rapids, (101), 1, 60-63, 2007.

Langford, D., Rowlinson, S. and Sawacha, (2000). Safety Behaviour And Safety Management: Its Influence On The Attitudes Of Workers In The UK Construction Industry, *Engineering, Construction And Architectural Management*, Vol. 7, pp. 133-40.

Lehtola, M. M., Van Der Molen, H. F., Lappalainen, J., Hoonakker, P. L. T., Hsiao, H., Haslam,R. A., Hale, A. R. & Verbeek, J. H. (2008). The effectiveness of interventions for preventing injuries in the construction industry - A systematic review. *American Journal of Preventive Medicine*, 35, 77-85.

Lee, S. and Halpin, D.W. (2003). Predictive tool for estimating accident risk. *Journal of Construction Engineering and Management*, 129(4): 431–436.

Li, R. Y. M., & Poon, S. W. (2009). Workers' Compensation for Non-fatal Construction Accidents: Review of Hong Kong Court Cases.vol 5 No11

Li, X., Zhu, Y., and Zhang, Z. (2010). "An LCA-based environmental impact assessment model for construction processes". *Building and Environment* 45:766-775.

Lingard, H. and Rowlinson, S.M. (2005). *Occupational Health and Safety in construction project management*; UK Taylor & Francis.

Loewenson, R. (1999). Assessment of the Health Impact of Occupational Risk in Africa: Current Situation and Methodological Issues. Retrieved on 05.02.12 from https://apps.who.int/peh/burden/articles/ Loewenson.pdf.

Loushine, T.W., Hoonakker, P., Carayon, P., Smith, M.J. and Kapp, E.A. (2003). Safety and quality management systems in construction. *Some Insight from Contractors.* [Online]. Available at: http://capi2.engr.wisc.edu/cprc/IJIE2003%20P. [Accessed on 18 March 2006].

Mabogunje, A. L. (1985). The Environmental Challenges in Sub-Saharan Africa. Environment, 4-11

Master Builders Australia Inc. (2005). *Building a safer future: master builders occupationalhealth and safety blue print 2005-2015*. Available at: www.master builders. com. au/pdfs/Blueprint.pdf. [15 Nov. 2007].

Mbuya, E. and Lema, N. M. (2002). Towards Development of Framework for Integration of Safety and Quality Management Techniques in Construction Project Delivery Process. *Proceedings of the 1st International Conference of CIB W107: Creating a Sustainable Construction Industry in Developing Countries*. 11th- 13th November.

Mbuya, E. and Lema, N.M. (1996). Towards development of a framework for integration of safety and quality management techniques in construction project delivery process. *International Journal of Quality,* 14(5): 1–15.

McKenzie, J. Gibb, A.G.F. and Bouchlaghem N.M. (1999). Communication of Health and Safety in Design Phase. Implementation of Safety and Health on Construction Sites. Proceedings of the 2nd International Conference of International Council for Research and Innovation in Building and Construction (CIB) Working Commission w99. Honolulu. Pp. 419-426.

Mitullah, W. V. and Wachira, I. N. (2003). Informal Labour In The Construction Industry In Kenya: A Case Study Of Nairobi, Sectoral Activities Programme Working Paper 204, International Labour Organization, Geneva.

Mombeki, F. (2005). Occupational Health and Safety Challenges In Construction Sites in Tanzania.*Conference proceeding CIB W99 on Rethinking and Revitalisation of construction safety, health Environment and Quality*; Port Elizabeth South Africa 17-20 may 2005.

Morel, J.C., Mesbah, A., Oggero M., and Walker, P. (2001). "Building houses with local materials: means to drastically reduce the environmental impact of construction". *Building and Environment* 36:1119-1126.

Mugenda, O. and Mugenda, A. (1999). Research methods. Quantitative and qualitative approaches. Nairobi, Acts press

Muiruri, G. (2012): Health and safety management on construction project sites in Kenya: A case study of construction projects in Nairobi County.

Mutema, J.K. and Muturi, W. M. (2013). Factors influencing risk management in construction projects in the petroleum industry in Kenya. *International Journal of Social Sciences and Entrepreurship*, 1(5) 668-678

National Occupational Health and Safety Commission (NOHSC). (2005) *National Standard for Construction Work.* NOHSC, Australia.

Ofori, G. (1988). Construction industry and economic growth in Singapore. *Construction Management and economics, 6, 57-70.*

Ofori, G. (1990). The construction industry: aspects of its economics and management. Singapore University Press, National University of Singapore. Singapore.

Oladapo, A. A. (2005). An investigation into the use of ICT in the Nigerian Construction Industry, from Http://Www.Itcon.Org/Data/Works/Att/2007_18.Content.02391.Pdf, assessed on 30 November 2009

Oppenheim, A.N.(1992). Questionnaire, Design and attitude Measurement. London ,Heinemann.

Orodho, A.J. (2005). Elements of Education and social Science Research Methods.

Orodho, A.J. (2008). *Techniques of writing Research proposals and reports in Education and Social Sciences.* Kanezja HP enterprises. Maseno

Orodho, A.J. (2009). *Techniques of writing Research proposals and reports in Education and Social Sciences.* Kanezja HP enterprises. Maseno

Occupational Safety and Health Administration (OSHA), (2010). Retrieved on 02.02.12 from protection /construction.html http://www.osha.gov/SLTC/fall

Phoya , S. (2012). *Health and Safety Risk Management in Building Construction sites in Tanzania:* The Practice of Risk Assessment, Communication and Control.

Phoya, S., Eliufoo H., Pietrzyk, K. and Nyström, M. (2011). Assessment of Health and Safety Risk Perception of Site Managers, Supervisors and Workers in Tanzania Urban Construction Sites; *Conference Proceeding; Prevention: Means to the End of Safety and Health Incidents and Illnesses;* Washington, DC 24th -26th August 2011.

Poon, S. W., Tang, S. L. & Wong, F. K. W. (2008). *Management and economics of construction safety in Hong Kong.* Hong Kong: Hong Kong University Press.

Rajendran, S., Gambatese, J.A. and Behm, M.G. (2009). "Impact of green building design and construction on worker safety and health", *Journal of Construction Engineering and Management*, Vol. 135, No. 10, pp. 1058-1066.

Ranjit, k. (1999). Research Methodology. Sage Publications, London; New Dheli.

Rowlinson, S. (2003). *Hong Kong Construction Safety Management and the Law.* 2nd Edition. Hong Kong: Sweet and Maxwell.

Rowlinson, S. and Lingard, H. (1996). *Behavioral safety management in Hong Kong construction industry :* Success and Limitation. In Alves, D.L.M and Coble, R.J. (eds), Proceedings of the 1st International Conference of CIB WC W99. Implementation of safety and health on construction sites, Lisbon, Portugal, 4 -7 September Rotterdam A.A. Balkem, 281 – 289.

Rwamamara, A.R .(2007). Planning the Healthy Construction Workplace through Risk Assessment and Design Methods, *Doctorial thesis* Luleå University of Technology, Department of Civil, Mining and Environmental Engineering.

Salant, P., & Dillman, D. A. (1994). How To Conduct Your Own Survey, New York: John

Sawacha, E., Naoum, S. and Fong, D. (1999). Factors affecting performance on construction sites. *International Journal of Project Management*, 17(5): 309-315.

Sekaran, U. (1992). Research methods for business: a skill building approach, Wiley, New York.

Shen, L.Y., Lu, W. S., Yao, H., and Wu, D. H. (2005). "A computer-based scoring method for measuring the environmental performance of construction activities". *Automation in Construction* 14:297-309.

Siebert , W. S., & Wei, X. (1998). Wage Compensation for Job Risks: the Case of Hong Kong. *Asian Economic Journal,* 12(2), 171-181.

Siu, O.L., Philips, D.R., Leung, T.W. (2003). Age differences in attitudes and safety perfomance in Hong Kong construction workers. *Journal of safety research, 34, pp.199-205.*

Smallwood, J., Haupt, T. and Shakantu. (2008). Construction Health and Safety in South Africa: Status and Recommendation, *CIDB report*

Tanko, B.L. and Anigbogu, N.A. (2012). The use of Personal Protective Equipment (PPE) on Construction Sites in Nigeria

Taylor, D. (2011). Workwear. Retrieved on 08.02.12 from php? article_id=530Protective Workwear [Apr 2011] http://www.hsimagazine. com /article

Toohey, J., Borthwick, K. and Archer, R. (2005). *OH&S in Australia: a Management Guide,*Thomson, Melbourne.

Tse, Y. and Raymond V. (2001). "The implementation of EMS in construction firms: case study in Hong Kong". *Journal of Environmental Assessment Policy and Management* 3:94 -177.

Wells, J. and Hawkins, J. (2007). Promoting Construction Health and Safety through Procurement: *A Briefing note for Developing Countries,* ILO Geneva

APPENDICES

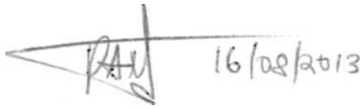
APPENDIX I: COVER LETTER

Dear Respondent:

This questionnaire seeks to investigate safety coping mechanisms in place in construction sites with the aim to examine the occupational safety of the Kenyan construction worker on the building construction sites. The purpose of this study is to highlight the critical safety issues affecting the overall welfare and safety of construction workers on the building construction sites. It is expected that the findings of this research will help to improve the conditions of the construction workers on the sites and protect their rights. This survey is part of a study being conducted by Peter A. Nyaribo, a Master's Degree student at University of Eldoret.

Completion of the questionnaire is completely voluntary and returning the completed questionnaire will highly be appreciated. You are requested to respond to the items as honestly as possible. Please note that there are no correct or wrong responses to these items but what is only appropriate to you. All data held are purely for research purposes and will be treated as strictly confidential. Do not give your name anywhere

Yours Faithfully,



Peter A. Nyaribo
on the papers.

APPENDIX II: SURVEY QUESTIONNAIRE

This questionnaire seeks to obtain information that will be helpful in finding out the safety measures in place in construction sites within Kisii Municipality. The information you provide will only be used for the purpose of this research and will be kept confidential. Therefore, do not write your name on this paper. Completion of the questionnaire is completely voluntary and returning the completed questionnaire will highly be appreciated. You are requested to respond to the items as honestly as possible. Please, note that there are no correct or wrong answers to these items but what is only appropriate to you. .

Personal details

1. Please Tick [√] to indicate your position in the company.

(a) Contractor [ ]

(b) Clerk of works [ ]

(c) Site Engineer/Agent /Manager [ ]

(d) Site Foreman [ ]

(e) Labourer/worker [ ]

(f) Others

(g) Please specify……

2. Please tick [√] to indicate how long you have been involved in the building construction industry

(a) 0 to 12 months [ ] (b) 12 to 24 months [ ] (c) 24 to 48 months [ ] (d) 48 months and above[ ]

3. Please tick (√) to indicate your age

(a) ≤ 18 [ ] (b) 19 - 25 [ ] (c) 26-35 [ ] (d) 35-45 [ ] (e) 45 & above [ ]

4. Please tick (√) to indicate your education level

a) Never been to school [ ]

b) Apprentice [ ]

c) certificate [ ]

d) Others please specify……

Provision of welfare facilities

5. Contractors generally provide the following welfare related items on construction sites for the construction workers. **(**Please indicate your reaction to each statement by ticking the appropriate cell)

Welfare Facilities	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Safe drinking water	[ ]	[ ]	[ ]	[ ]	[ ]
Water for washing	[ ]	[ ]	[ ]	[ ]	[ ]
Toilets & showers)	[ ]	[ ]	[ ]	[ ]	[ ]
Change rooms	[ ]	[ ]	[ ]	[ ]	[ ]
First–Aid equipment	[ ]	[ ]	[ ]	[ ]	[ ]

Others please specify……

Provision of safety facilities and equipment

6. Contractors generally provide the following safety related facilities or equipment on construction sites for construction workers. (Please indicate your reaction to each statement by ticking the appropriate cell)

Welfare Facilities	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Safety boots	[ ]	[ ]	[ ]	[ ]	[ ]
Helmets	[ ]	[ ]	[ ]	[ ]	[ ]
Safety glasses/goggles	[ ]	[ ]	[ ]	[ ]	[ ]

Gloves	[ ]	[ ]	[ ]	[ ]	[ ]
Overalls/Overcoats	[ ]	[ ]	[ ]	[ ]	[ ]
Safety nets	[ ]	[ ]	[ ]	[ ]	[ ]
Ladder scaffold platform	[ ]	[ ]	[ ]	[ ]	[ ]

Others please specify……...

Causes of accidents and injuries

7. This study seeks to investigate, causes of common accidents and injuries on site. Kindly study the various statements specifically in reference to common accidents or injuries on site and respond by ticking the digit that best describes your honest opinion.

Key: 1= most common 2 = very common 3 = fairly common 4= common 5= not common 6 = not very common 6 = least common

item	Causes of common accidents or injuries on site	1	2	3	4	5	6	7
1	Falls from height							
2	Falling objects							
3	Improperly operating equipment							
4	Collapse of scaffold and framework							
5	Electrocution							
6	Noise							
7	Air (dust) pollution							

8. High accident rates on construction sites are due to: (please tick (√) your response)

(i) Lack of legislation [ ] (ii) Careless worker attitude [ ] (iii) Poor safety consciousness of managers [ ]

Others please specify ……

9. The main cause of accidents on site is that the workers lack safety knowledge. (Please circle your response)

1 Strongly Agree 2. Agree 3.Undecided 4. Disagree 5. Strongly Disagree

Workers attitude towards safety

NOTE: Poor working conditions as used in the question simply mean working in untidy areas, poor working relationships with site managers and non-provision of essentials tools/or facilities. Trade culture means the normal work practice or norms while careless worker attitude is working without following the laid down safety rules and regulations if they exist. Relevant Authorities mean ministry of either Labour or Public Works

10. Kindly study the various statements specifically in reference to the factors that influence workers' attitudes towards safety on construction sites and respond by ticking the digit that best describes your honesty opinion.

Key: 1= most common, 2 = very common, 3= fairly common, 4 = common and 5= least common.

Item	factors that affect workers attitude towards safety	1	2	3	4	5
1	Lack of training on safety					
2	Careless worker attitude on the usage of safety facilities					
3	Poor safety consciousness of managers on the provision of safety facilities					
4	Lack of legislation on provision of safety issues					
5	Lack of Safety equipment					

11. Workers on site always wear health and safety protective equipment when they are supposed to: (please circle your response)

1. Strongly Agree 2. Agree 3 .Undecided 4. Disagree 5. Strongly Disagree

Factors that contribute to accidents and injuries

12. Productivity is usually seen as more important than safety by management (please circle your response)

1. Strongly Agree 2. Agree 3 Undecided 4. Disagree 5. Strongly Disagree

13. This study seeks to investigate, factors that contribute to accidents and injuries on site. Kindly study the various statements specifically in reference to the factors that contribute to occurrence of accidents and injuries on site and respond by ticking the digit that best describes your honest opinion.

Key: 1 = most common 2 = very common, 3= fairly common, 4 = common and 5 = least common

item	Factors that contribute to accidents and injuries on site	1	2	3	4	5
1	Lack of Safety equipment					
2	Poor Working conditions					
3	Trade culture/norms or work practice					
4	Lack of Safety awareness					
5	Careless worker attitude					

Handling and reporting of accidents and injuries

14. How are accidents and injuries handled on site? [Tick (√) one]

(a) Reported [ ] (b) ignored [ ] (c) workers take care of themselves [ ]

(d) Contractors take care of accidents or injury [ ]

15. Are accidents ever reported to the site managers? [Tick (√) one]

(a) Yes [ ] (b) No [ ]

16. Accidents and incidences which occur on site are always immediately reported to the Relevant Authorities (Please circle your response). 1. Yes [ ] 2. No [ ]

17. Are workers ever compensated in case of serious or fatal accidents? [Tick (√) one]

(a) Yes [ ] (b) No [ ]

If yes please explain…….

Disposal of building debris in site

18. Disposal of building debris, waste and rubbish in building construction worksites, if properly managed, could reduce or prevent unnecessary site accidents and injuries. (Please circle your response)

1. Strongly Agree 2. Agree 3. Undecided 4. Disagree 5. Strongly Disagree

Site safety awareness on safety issues

19. Are the construction workers sensitized on the importance of safety precautions to be observed while on site? [Please Tick (√) one] (a) Yes [ ] (b) No [ ]

20. Have you ever attended any safety safety courses? (a) Yes [ ] (b) No [ ]

21. Construction workers lack understanding of safety norms/warning signs in the construction industry. (Circle your response)

1. Strongly Agree 2. Agree 3 Undecided 4. Disagree 5. Strongly Disagree

Enforcement of safety legislation

22. Public health and safety officers from the ministry often visit the construction site. (Please circle your response)

1. Strongly Agree 2. Agree 3 Undecided 4. Disagree 5. Strongly Disagree

23. Does the company appoint health and safety officer to be in charge of safety issues on site? (a) Yes [ ] (b) No [ ]

24. Overall, are you satisfied with the safety measures in place on construction sites?

1. Strongly Agree 2. Agree 3 Undecided 4. Disagree 5. Strongly Disagree

25. There is good preparedness for emergency on site. (Circle your response)

1. Strongly Agree 2. Agree 3 Undecided 4. Disagree 5. Strongly Disagree

APPENDIX III: INTERVIEW SCHEDULE

This interview seeks to obtain information that will be helpful in finding out the safety measures in place in construction sites within Kisii Municipality. The information you provide will only be used for the purpose of this research and will be kept confidential. You are requested to respond to the items as honestly as possible. Please, note that there are no correct or wrong answers to these items but what is only appropriate to you.

1. Could you please begin by telling me what your role is in this company?
    a. Contractor [ ]
    b. Clerk of works [ ]
    c. Site Engineer/Agent /Manager [ ]
    d. Others please specify_____

2. Do you have a safety orientation programme for this specific site?

    (a) Yes [ ] (b) No [ ]

3. Do you have someone on this site who is trained in first aid?

    (a) Yes [ ] (b) No [ ]

4. Who would an incident or injury be reported to?

    (a) Foreman (b) Contractor (c) Police (d) Client/projector owner

5. Do you keep records of accidents on this site?

    Yes [ ] No [ ]

6. Does your company offer any of the following emergency safety services at the worksite? i) First- aid equipment Yes [ ] No [ ]

ii) Transport for victims Yes [ ] No [ ]

7. Does your organization offer any of the following preventive safety services at the worksite?

a) Welfare items

i. Safe drinking water Yes [ ] No [ ]

ii. Water for washing Yes [ ] No [ ]

iii. Toilets and showers Yes [ ] No [ ]

iv. Change rooms Yes [ ] No [ ]

v. First –Aid equipment Yes [ ] No [ ]

vi. Others please specify_____

b) Safety items

vii. Overalls/overcoats Yes [ ] No [ ]

viii. Safety boots Yes [ ] No [ ]

ix. Gloves Yes [ ] No [ ]

x. Safety glasses or goggles Yes [ ] No [ ]

xi. Safety nets Yes [ ] No [ ]

xii. Others please specify……

8. Who provides the personal protective equipment (PPE) to the workers?

(a) Contractor [ ] (b) workers buy for themselves [ ] N/A

9. Are there specific emergency plans for this site? Yes [ ] No [ ]

10. Does your company have an incorporated operating budget for health and safety promotion activities?

(a)Yes [ ] (b) No [ ]

APPENDIX IV: OBSERVATION SCHEDULE

This observation schedule seeks to obtain information that will be helpful in finding out the safety measures in place in construction sites within Kisii Municipality. The observation schedule will be used in this study to record information/or observations made during the site visits for data collection. The information obtained will only be used for the purpose of this research and will be kept confidential.

1. This study sought to find out whether Construction Companies provide the following safety equipment to the workers by way of observations

i.	Overall/overcoats	Yes [ ]	No [ ]
ii.	Safety boots	Yes [ ]	No [ ]
iii.	Gloves	Yes [ ]	No [ ]
iv.	Helmets	Yes [ ]	No [ ]
v.	Safety glasses or goggles	Yes [ ]	No [ ]
vi.	Safety nets	Yes [ ]	No [ ]
vii.	Rain gear	Yes [ ]	No [ ]
viii.	Hearing protection	Yes [ ]	No [ ]
ix.	Knee pads	Yes [ ]	No [ ]
x.	Flash lights	Yes [ ]	No [ ]
xi.	Others please specify……		

2. This study sought to find out whether Construction Companies provide the following welfare items to the workers by way of observations

i.	Safe drinking water	Yes [ ]	No [ ]
ii.	Water for washing	Yes [ ]	No [ ]
iii.	Toilets and showers	Yes [ ]	No [ ]
iii.	Change rooms	Yes [ ]	No [ ]
iv.	First –Aid equipment	Yes [ ]	No [ ]

v. Others please specify_____

APPENDIX V: INTRODUCTION LETTER

P.O. Box 1125-30100, ELDORET, Kenya
Tel: 053-2063111 Ext. 242
Fax No. 20-2141257

University of Eldoret
flame of knowledge and innovation

Our Ref: UOE/SOE/EDU/13

31st May, 2013

The Executive Secretary,
National Council for Science & Technology,
P.O. Box 30623-00100,
NAIROBI.

Dear Sir/Madam,

RE: RESEARCH PERMIT FOR- PETER A. NYARIBO - EDU/PGT/1009/11

This is to confirm that the above named Post Graduate Student has completed Course work of his Master of Philosophy in Education Science.

He is currently preparing for a field research work on his thesis entitled: *"An Investigation of Safety Measures in Place on Construction Sites in Kenya. A Study of Kisii Municipality".* The proposal has been approved by this Institution.

Any assistance accorded him to facilitate successful conduct of the research and the publication will be highly appreciated.

Yours faithfully,

CHEPKOILEL UNIVERSITY COLLEGE
Dept. of Technology Education
P.O. Box 1125 Eldoret 30100

DR. H. DIMO
POST GRADUATE COORDINATOR

Copy to: Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 9583-00200,
NAIROBI

APPENDIX VI: LETTER OF AUTHORIZATION

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349, 254-020-2673550
Mobile: 0713 788 787, 0735 404 245
Fax: 254-020-2213215
When replying please quote
secretary@ncstgn.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website:
www.ncst.go.ke

Our Ref: NCST/RCD/17/013/25 Date: 25th June 2013

Peter A. Nyaribo
University of Eldoret
P.O Box 1125-30100
Eldoret.

RE: RESEARCH AUTHORIZATION

Following your application dated **19th June, 2013** for authority to carry out research on ***"An investigation of safety measures in place on construction sites in Kenya: A study of Kisii Municipality."*** I am pleased to inform you that you have been authorized to undertake research in **Kisii Central District** for a period ending **30th September, 2013.**

You are advised to report to **the District Commissioner and District Education Officer, Kisii Central District** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one** soft **copy in pdf** of the research report/thesis to our office.

DR. M.K. RUGUTT, PhD, HSC
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioner The
District Education Officer Kisii
Central District.

APPENDIX VII: RESEARCH PERMIT

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Peter A. Nyaribo
of (Address) University of Eldoret
P.O Box 1125-30100 Eldoret
has been permitted to conduct research in
Location
Kisii Central District
Nyanza Province
on the topic: An investigation of safety measures in place on construction sites in Kenya: A study of Kisii Municipality.
for a period ending: 30th September, 2013

PAGE 3

Research Permit No. NCST/RCD/17/013/25
Date of issue 25th June, 2013
Fee received KSH. 1000

Applicant's Signature

For Secretary
National Council for Science &Technology

APPENDIX VIII: LETTER TO COUNTY WORKS OFFICE

University of Eldoret,
Po Box 1125-30100
Eldoret.
Date: 16th July 2013

County Works Officer
P.O Box 6-40200
Kisii.

RE: RESEARCH AUTHORIZATION

I would like to request for permission to carry out research entitled ***'An Investigation of Safety Measures in place on Construction Sites in Kenya: A Case Study of Kisii Municipality'.***

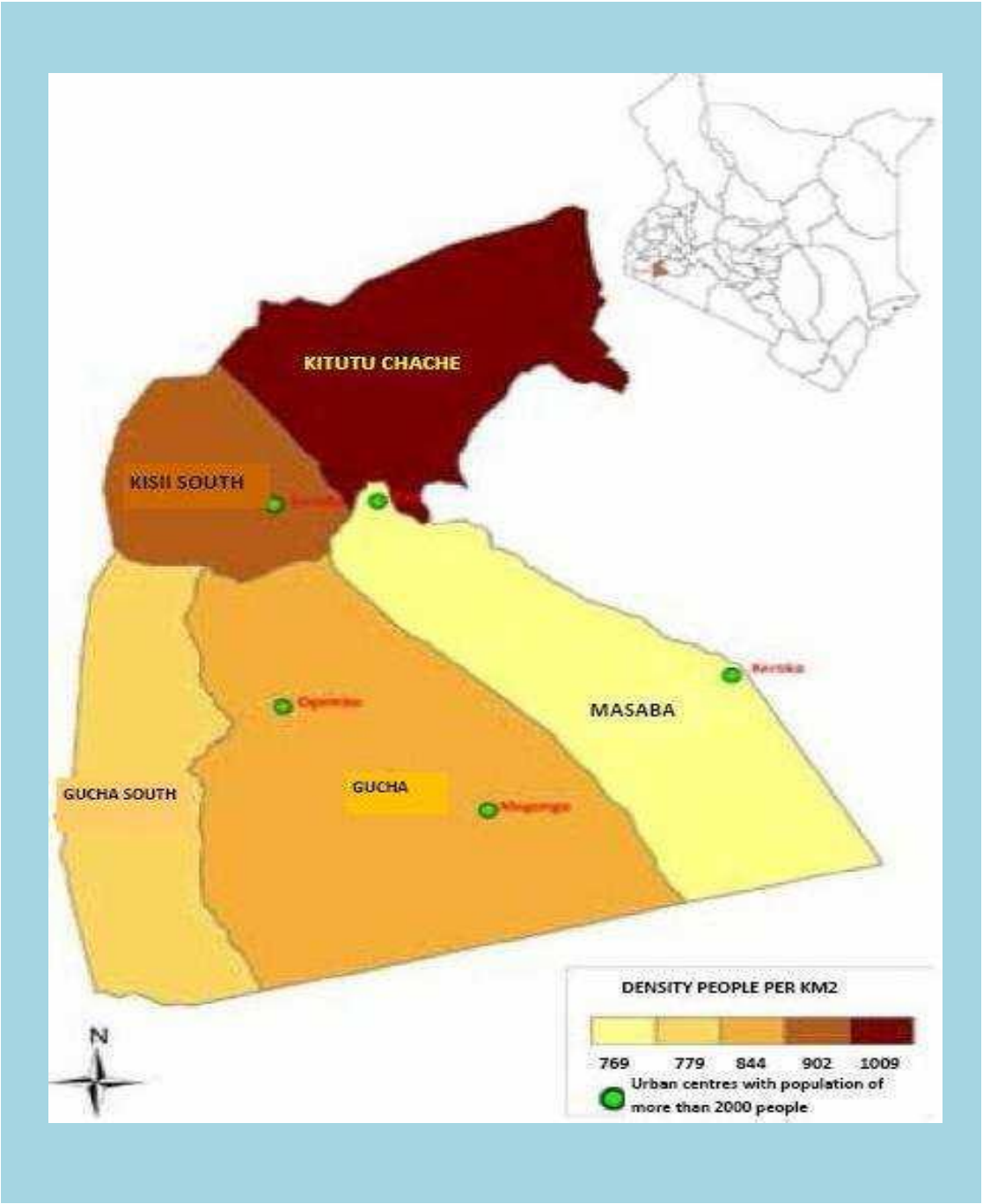
Currently I am a Masters student at University of Eldoret. This survey is part of a study I am conducting in partial fulfillment for the requirements of the award of master of Education Degree in Technology Education (Building and Construction Technology) in the Department of Technology Education, University of Eldoret.

The information that will be obtained will only be used for the purpose of this research and will be kept confidential.

Yours Faithfully,

Peter A. Nyaribo

APPENDIX IX: MAP OF KISII COUNTY



A map of Kisii County (adopted from Kenya Mpya County maps)

APPENDIX X: MAP OF KENYA

A map of Kenya (adopted from NCCK_Regional Maps_2012)