

**ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY
COLLEGE OF NATURAL AND SOCIAL SCIENCE
GRADUATE STUDIES**



**Assessment of Construction Safety Awareness in Addis Ababa
Housing Construction Project: The Case of Koye Feche III
Condominium Construction Workers**

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**February, 2018
Addis Ababa/ Ethiopia**

**Assessment of Construction Safety Awareness in Addis Ababa
Housing Construction Project: The case of Koye Feche III
Condominium construction workers**

By: Ephrem Hailemichael

**A Thesis Submitted to School of Graduate Studies in Partial Fulfillment of
the Requirements for the Degree of Master of Business Administration in
Construction Management**

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Declaration

Title of the Thesis:

Assessment of Construction Safety Awareness in Addis Ababa Housing Construction Project: The Case of Koye Feche III Condominium Construction Workers.

I, the undersigned, declare that this thesis is my own and original work and has not been presented for a degree in any other university, and that all sources of material used for the thesis have been duly acknowledged.

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Confirmation

The thesis can be submitted for examination with my approval as a research advisor

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Approved by Board of Examiners

Title of the Thesis:

Assessment of Construction Safety Awareness in Addis Ababa Housing Construction Project: The Case of III Condominium Construction Workers.

Acceptance Approval Form For the Final Thesis of Master's Program

Thesis Title: Assessment of Construction Safety Awareness in Addis Ababa Housing Construction Project: The Case of III Condominium Construction Workers.

This is to certify that Ephrem Hailemichael has incorporated all the comments forwarded to him by the thesis committee during the thesis defense held on February 13, 2018.

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Abbreviations

BLS	Bureau of labor statistics
CSA	Central Statistical Authority
EEA	Ethiopian economic association
FDRE	Federal Democratic Republic of Ethiopia
FNG	Federal Negarit Gazeta; Ethiopia
FY	Fiscal Year
GDP	Gross domestic product
GTP	Growth and transformation period
HBC	Hollow concrete block
IHDP	Integrated low cost housing development program
ILO	International labor organization
LTCE	Long term contract employees
MDG	Millennium Development Goal
MoFED	Ministry of Finance and Economic Development
MOLSA	Ministry of Labor and social affairs
OSH	Occupational safety and health
PPE	Personal protective equipment
SPSS	Statistical Package for Social Sciences
TE	Temporary employees
WB	The World Bank
WHO	World health organization

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Abstract

The major purpose of this study was to assess construction safety awareness in Addis Ababa Housing Construction Project at Koye Feche III Condominium Construction Workers. More specifically, the objectives of the study gave emphasis to assess extents of safety awareness among construction workers; to examine frequently occurring injuries; and to identify the major causes of safety problem among housing construction workers at Koye Feche III project site. Even though tremendous efforts are taking to tackle the problems associated with construction workers safety and health in the country; particularly in Addis Ababa, many condominium construction activities are inherently exposed for health and safety risks at present. Consequently, survey research design was used to accomplish the objective of the study. Mainly a five point Likert scale questionnaire was distributed to two groups of respondents that included engineers, foremen, carpenters, masons, bar benders, site supervisors and construction engineers in the construction contractors and consultants to collect the data on the construction safety awareness of workers. The data were collected through the questionnaire, were initially distributed to a total of 220 respondents. Among the distributed questionnaires, 94.09% had appropriately filled and returned. The analyses of the data were made using descriptive statistics, like frequency, percentage, mean, standard deviations and ranges. In addition, t-test and p-value was used to test the presences of significant differences between two groups of the respondents in responding items of the questionnaire. Accordingly, the findings of this study confirmed that, there is no safety inspector at all and no enforcing rules to push the contractors and consultants to keep the construction workers health and safety, noting has been done to enforce the contractors to provide the basic types of PPE like helmet and safety shoe to the workers. Above all, practically nothing has been done related to construction safety training in the last three years. In conclusion, out of the total participants' majority of the workers never heard about construction site safety before this study. The study also exposed that greater than half of the participant fail to agree that construction site accident could cause permanent disability that could be extended to death. So based on the responses from the above specific questions related to construction safety awareness and responses of other sequence of questions related to safety awareness such as their exposure to construction safety related information and their understanding of work place safety rules, there is low level of construction safety awareness among Addis Ababa housing construction project office construction workers. The study also found out that the most common injuries were foot and hand injury, followed by falling from height, and Collapse during excavation. Moreover, the highly rated causes of the injuries are lack of personal protective equipment (PPE), lack of safety awareness, and lack of enforcing rules at Addis Ababa housing construction project office construction site. From these it is possible to recommend that, unless an immediate action is taken on time, the mentioned accidents and their causes can strongly affect the life of construction workers and the development of the sector. So, it calls the action of Addis Ababa Housing construction project office and other stakeholders to take their parts in order to improve construction safety awareness among construction workers in the study area.

Key words: Construction, Safety, Awareness,

CHABTER ONE

1. INTRODUCTION

1.1. Background of the Study

Safety is relative freedom from danger, risk, or threat of harm, injury, or loss of personnel and/or property, whether caused deliberately or by accident. In short safety is refers to a state in which anybody is not in danger or at risk. Moreover, Occupational safety and health (OSH) is defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the work place that could impair the health and well-being of workers, taking in to account the possible impact on the surrounding communities and the general environment (Benjamin, 2008).

In this regards, the World Health Organization (WHO, 2001), states that occupational health and safety is a multidisciplinary activity which covers at the protection and promotion of the health of workers by preventing and controlling occupational diseases and accidents by eliminating occupational factors and conditions hazardous to health and safety at work; the development and promotion of healthy and safe work; work environments and work organizations; the enhancement of physical, mental, social well-being of workers and support for the development and maintenance of their working capacity as well as professional social development at work and enabling workers to conduct socially and economically productive lives and to contribute positively to sustainable development.

Construction work is a hazardous job. Some construction site jobs include: building houses, roads, tree forts, workplaces and repair, and maintain infrastructures. This work includes many hazardous tasks and conditions such as working with height, excavation, noise, dust, power tools and equipment. The most common fatalities are caused by the fatal four: Falls, Struck by object, Electrocutions, and Caught-in/between (CDC, 2017). Construction work has been increasing in developing and undeveloped countries over the past few years. With an increase in this type of work occupational fatalities have increased. Occupational fatalities are individuals that pass away while on the job or performing work related tasks. Within the field of construction it is important to have a safe construction site (Das, 2015).

While there are countless methods used to protect workers from injury, each method shares a common root. The genesis of all injury prevention methods is an understanding and awareness of the hazard to which a worker may be exposed (John, 2017). In other words, the company and

the worker must be aware of a hazard before starting any construction activities. Safety awareness includes not only recognition of potential hazards, but also an understanding of what is happening in the immediate work area and how the activities may impact on employees' safety (Nielsen, 2015).

While some sectors and tasks are seen as inherently riskier than others, in the absence of objective standards, awareness of risk is subjective and fluid. It is influenced by personal experience and confidence, workplace and cultural norms, the functional and emotional support, resources available, and human factors such as wellbeing and focus. Employers and employees may view a high risk task as low risk because they feel that they have taken every precautions, have experience and feel confident. Some people view risk in terms of functional requirements. For example, grinding a reinforcement bar is a dangerous task because the blade is sharp, while others view in terms of the human factors. Any task will be more risky if the person conducting the task lacks awareness, tired, ill, poorly trained, etc. Across all sectors, people can become complacent to risk especially if the task is habitual and if they are under pressure. Not having proper awareness, working closely and often with physical risk can give people a strong sense of self confidence which results in the risk downplayed (John, 2017). Thus, creating awareness and offering training to the employees on construction safety become mandatory.

According to Armstrong (2009) modern job training has taken a new dimension as the employees learn how to perform a job in the safest way possible. They learn how to identify possible hazards and how to avoid them. The author further suggested that the employees must be taught what to do and what not to do on site, if safety training is to be effective. Moreover, this scholar was of the opinion that workers involved in building construction should be trained in the following areas: safety awareness and consciousness; correct operational procedure and activity training; skill acquisitions; and correct operational methods.

So, in regards of effectively managing or ruled for health and safety, the success of whatever a process or system is in place, still hinges on the awareness, attitudes, practice (KAP) and behaviors of people in the organization. All employees should be provided the required awareness and skills to perform their work safely and meet the organization's safety and health goals properly. In addition, as stated by Health and Safety Executive of UK Britain (2013); enhancing awareness and understanding of workplace hazards, such as how to identify risks,

report risks, and eliminate risks, and adhering practical safety measurement have great value for human and economic development.

In relation to this the Ethiopian Labor proclamation No. 377/06 (in Article 92) clearly spells out the fundamental obligations of an employer with regard to putting in place all the necessary measures in order to ensure, work places are safe, healthy and free of any danger to the well-being of workers. Moreover, the proclamation ensure that, workers are properly instructed and notified concerning the hazards of their respective occupations and the pre cautions necessary to avoid accident and injury to health. Ensure that directive are given and also assign safety officer, establishes an occupational, safety and health committee, provides workers with protective equipment, clothing and other materials and instruct them of its use, obliged to register and notify to the nearest labor inspection services occupational accident and diseases (Negart Gazeta, 2004).

Even though tremendous efforts are taking to tackle the problems associated with construction workers safety and health in the country; particularly in Addis Ababa, many condominium construction activities are inherently exposed for health and safety risks at present. Therefore, this study was carried-out to assess the awareness of construction safety among workers of Addis Ababa housing construction project office at Koye Feche III project site.

1.2. Statement of the Problem

Recently, Ethiopia's construction industry has experienced considerable growth in construction activities especially in construction of low cost houses (condominiums).

Enhancing awareness and understanding of workplace hazards, such as how to identify and eliminate risks have great value for the work-forces and the development of the sector in large. If not, the employees will face work place accidents and injuries. In this regards Abera et.al. (2016) noted that work related injuries present a major public health problem resulting in serious social and economic consequences; that could be prevented if appropriate measures are taken. Moreover, according to Adane et al.(2013) a research written as Occupational injuries among building construction workers in Gondar City, Ethiopia; the three leading cause of injuries in the study area were fall from high level; followed by overexertion during lifting and carrying; and fall from height. Besides, in a study conducted by Jimma university scholars; titled as Prevalence of Occupational Injuries and Associated Factors among Construction Workers in Addis Ababa, found that hurt by sharp instrument, fall accidents and injuries caused

by falling, splinting or splashing objects are the major causes of construction site injuries (Hanna, 2016).

Moreover, deaths, permanent disabilities and severe injuries have been on the increase for building workers through major accidents and poor working conditions. This unfortunate scenario has been a monumental threat to the productivity and the overall performance of construction projects as well as diminishing the labor-force and the economy of the housing construction office and the country as a whole.

Going through some of the existing studies in Ethiopia such as the one conducted by Abdurrahman (2016), Seifedin (2014) and Sisay (2013), much of them focus on identifying factors causing accident in the construction industries, the general safety condition and the determinants of safety problems. Hence; they did not attempt to evaluate the awareness of workers about construction safety and health issues.

In addition, an informal observation held at housing construction (condominium) project sites makes to recognize that, accidents and injuries related to construction work was a serious problem that may arise as a result of lack awareness among construction workers. Besides, as far as the researcher's knowledge is concerned, there is no independent study carried out on assessing the awareness of safety among construction workers in the study area.

Therefore, the extent of the above mentioned situations and the gap in the study area concerned the researcher to carry out study on issues related to awareness of safety among construction workers. Thus, this study was aimed at Assessing of Construction Safety Awareness in Addis Ababa Housing Construction Projects at Koye Feche III Condominium construction workers. Thus, the researcher was interested on assessing construction safety awareness among Addis Ababa housing construction project office workers at Koye Feche III project site.

1.3. Objective of the Study

1.3.1 General Objective

The general objective of the study was to assess construction safety awareness among Addis Ababa housing construction project office workers at Koye Feche III project site.

1.3.2 Specific Objectives

- To assess the extent of safety awareness among Addis Ababa housing construction project office construction workers at Koye Feche III project site.

- To examine frequently occurring injuries among construction workers at construction project site of Addis Ababa housing construction project office.
- To identify the major causes of safety problem among Addis Ababa housing construction workers.
- To recommend constructive solutions that enable all concerned bodies to alleviate the problem observed regarding construction safety awareness at Addis Ababa housing construction project office.

1.4. Research Question

The research attempted to get answer to the following research questions regarding the safety awareness of Addis Ababa housing construction project office construction workers at Koye Feche III project site:

1. What is the extent of safety awareness among Addis Ababa housing construction project office construction workers at Koye Feche III project site?
2. Which injuries are frequently occurring among construction workers at construction project site of Addis Ababa housing construction project office?
3. What are the major construction safety problems among Addis Ababa housing construction project office construction sites' construction workers?
4. What should be done by all concerned bodies to alleviate the problem observed regarding construction safety awareness at Addis Ababa housing construction project office?

1.5. Scope of the Study

The research focuses on construction safety awareness of workers at Addis Ababa housing construction project office. It will be more useful investigating the issue of construction safety awareness at all sites and construction levels of the city as it will provide a wide-ranging picture than what this study will contribute.

Since this will be beyond the capacity of the research due to various resource related constraints and to make the study specific and manageable; geographically, the scope of investigation in this study has been limited to selected housing construction branch office sites existed at Koye Feche around Kilinto industry zone.

Conceptually, the study was delimited to investigate the extent of construction safety awareness among construction workers; frequently occurring injuries; and to identify major causes of

construction safety problems among Addis Ababa housing construction project office workers at Koye Feche III project site.

1.6. Significance of the Study

There is very little literature related directly to the safety on construction sites in developing countries like Ethiopia. Existing publications tend to suggest how accidents may be prevented but assume that a strong regulatory body exists to enforce legislation (Pual and Muhammed, 1999). So, assessing the issue of construction safety awareness among Addis Ababa housing construction project office workers at Koye Feche III project site is assumed to generate reliable information that will help all concerned bodies to facilitate effective implementation of construction safety in the area.

Thus, it is believed that the findings of this study will have the following significances.

- ✓ The findings of this study will give insight for sector Government Bureaus working on construction safety affairs to understand actual practices of construction safety awareness among housing construction project workers and to identify aspects and direction of support to be provided for construction project offices at their own level of management. Moreover, understanding the actual situation of the issue will help them to design targeted programs on construction safety awareness of the employees.
- ✓ Moreover, the finding of this study will open the door for Addis Ababa housing construction project office to prepare methods and circumstance to enhance the construction safety awareness of all workers at each project sites and will also help them on preparation of regular construction safety trainings and workshops.
- ✓ In addition, the construction companies, consultants, worker in construction companies and the public are among the beneficiaries of the research outcome.
- ✓ The findings of this study may be utilized by top-level government organs, and help them to formulate policies and regulations on construction safety awareness issues.
- ✓ It may help contractors and construction consultants to recognize the existing circumstances of construction safety awareness among employees at construction site for the course of accomplishing their objectives successfully as a business organization and in their profession.
- ✓ Furthermore, the findings of this study may add bits of information to the existing literature in the areas of construction safety practices and may serve as additional source of information for those scholars interested to conduct further research on the issue.

1.7. Limitations of the Study

Due to shortage of time and other constraints it was not possible to study this topic from different perspectives (e.g. company owners, top management, clients, and government). The other limitation of this study was that the construction activities in the specified project sites is in its recession period; hence the research can get as much population size as expect pulse there is no much literature directly related to the topic which are conducted in Ethiopia or other similar developing countries. Moreover, lack of similar studies particularly in Ethiopia made difficult in comparing results.

In addition, this study does not include safety awareness of other related industries like high rise building, highway and other infrastructure construction workers in Addis Ababa or surrounding areas. Sometimes the study respondents were not willing to disclose the whole problems in fear of job insecurity following disclosing the information. There was also unwillingness of some respondents to correctly complete the questionnaires. As a result among 220 questionnaires distributed for respondents, 13(5.91%) of them did not correctly filled and return the questionnaire. Nevertheless, the problems did not have significant impact on the results of the study.

1.8 Organization of the Study

This paper was organized in five chapters. Chapter one presented introductions of the study. In this part of the paper statement of the problem, objective of the study, research questions, scope and limitation of the study were covered. The second chapter of the paper presented review of the related literature. Under this, issues related to construction safety awareness, nature and importance of construction safety, and many more sub-topics from related books, journals and previous research papers were highlighted.

Chapter three has presented the methodology of the study; specifically it made discussions on population of the study, sample size, sampling technique, instrument of data collection, and method of data analysis were covered. In the fourth chapter, the data collected for the study had been analyzed in detail and the findings of the study were presented and discussed. Finally, chapter five has presented the conclusions made based on the findings and recommendations forwarded for future improvement of construction safety in order to properly achieve objectives of construction industry in the City.

CHAPTER TWO

2. LITERATURE REVIEW

A study of relevant books, journal articles, and Academic papers relevant to the study are thoroughly reviewed and are presented as under.

2.1 Construction Industry and Economy

Economic growth is currently an issue of the world as most economies are finding it difficult to create the necessary employment opportunities and achieve meaningful growth. The construction industry also plays a key role in satisfying a wide range of physical, economic, and social needs and contributes significantly to the fulfillment of various major national goals. The following literatures will discuss more on the contribution of construction industry for a national economy.

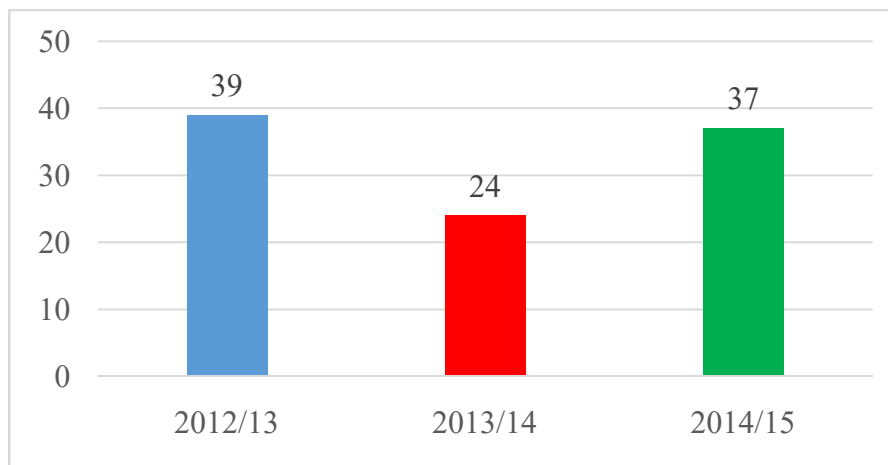
Table 2.1: Growth and Percentage Contribution of Major Industrial Sub-sector

Sub-sector/year	2012/13	2013/14	2014/15
Percentage Contribution of Major Industrial Sub-sectors (in %)			
Mining and Quarrying	11	9.1	5.6
Manufacturing	33.6	33.4	31.8
Large and Medium scale Manufacturing	24	24.9	24.6
Small and Cottage industries	9.5	8.5	7.2
Electricity and Water	8.3	7.6	6.5
Construction	47.1	49.9	56.1
Growth of Major industrial sub-sector (in %)			
Manufacturing and Quarrying	6.3	-3.2	-25.7
Manufacturing	16.9	16.6	15.8
Large and Medium scale Manufacturing	24.2	21.6	20.3
Small and Cottage industries	1.9	4.3	2.9
Electricity and Water	10	6.8	4.5
Construction	38.7	23.9	36.8

Source: Ministry of Finance and Economic Development (MoFED, 2015)

The Ethiopian economy continued to register a notable growth. In fiscal year (FY) 2014/15, the real GDP grew by 10.2% relative to 11.2% growth target set in the first growth and transformation period (GTP) for the FY. The growth of the economy has also been remarkable compared to the 4.4 % growth estimated for Sub - Saharan Africa in 2015. As stated by MoFED (2015) this impressive growth was mainly attributed to service sector (10.2%), agricultural sector (6.4%) and industrial sector (21.6%).

Figure 2.1: Growth of Construction Sub-Sector in percentage



As it is indicated in the graph the growth of the construction industry is somewhat fluctuated during the period of 2012/13 to 2013/14 and 2014/15 from 39% to 24% and to 37%. According to the ministry of economic development and finance this is due to the change in the global market, inflation and other related factors. However the contribution of the construction industry to the GDP of the country was increasing during the entire three years. From table 2.2 the contribution of construction industry in 2012/13 was 47.1% and it was 49.9% in 2013/14 and further incremented to 56.1% in 2014/15.

With regards to the experiences of other countries in 2013, Malaysia's economy grew at 4.7 % with the all sectors registering positive growth. The Services and Manufacturing sectors remained the key engine in terms of supply. Consecutively, the Construction sector continued a double-digit growth by registering 18.6 %. The growth is mainly accountable by the strong growth in the residential sector coupled with the underlying strength in infrastructure and civil engineering projects (Rogers, 2004).

While in Pakistan the housing and construction sector plays an important role in developing aggregate economy and reducing unemployment. It provides jobs to about 5.5% of the total employed labor force or to 2.43 million persons, (2.41 million male and 0.2 million female) during 2003-04. To mention some of the experience of African countries, the contribution of construction to gross domestic product (GDP) of the Nigerian economy ranges between 3 and 6% from independence to the 80's before crumbling to about 1% over the last decades.

The last four years saw an upward progression in its actual contribution, which stood at about 3% in 2012, due to an improved budgetary implementation and private sector participation (Isa, et. al., 2013). In spite of being one of the leading countries in petroleum oil production and extraction of precious natural resources in the continent, Ghana showed a stable construction industry development since the freedom day. A study revealed that the construction sector remains as one of the key sectors in the economy of Ghana in terms of its share of GDP (i.e. 9.1% for 1993-2011 period) and the overall industrial output, i.e., 35.9% for 1993-2011 period (MdUlang, et. al., 2014).

Finally, the research concluded that, the construction sector when given the needed push in terms of capacity building, good strategy initiatives and regulatory guidelines can provide the indispensable impetus for socio-economic development in any country.

2.2 Nature and Importance of Health and Safety

WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity? According to the Study Group World health organization on Early Detection of Health Impairment in Occupational Exposure to Health Hazards, Health connotes rather a way of functioning within one's environment (work, recreation, and living). It not only means freedom from pain or disease, but also freedom to develop and maintain one's functional capacities. Health develops and is maintained through interaction between the genotype and the total environment. The work environment constitutes an important part of man's total environment, so health is to a large extent affected by work conditions (ILO, 1995)

Making working conditions safe and healthy is in the interest of workers, employers and governments, as well as the public at large. Although it seems simple and obvious, this idea has

not yet gained meaningful universal recognition. Hundreds of millions of people throughout the world are employed today in conditions that breed health and/or are unsafe (WHO, 2001).

- Each year, work-related injuries and diseases kill an estimated 1.1 million people worldwide, which roughly equals the global annual number of deaths from malaria.
- 250 million occupational accidents result in more than 300 000 fatalities annually. Many of these accidents lead to partial or complete incapacity to work and generate income.
- Annually, an estimated 160 million new cases of work-related diseases occur worldwide, including respiratory and cardiovascular diseases, cancer, hearing loss, musculoskeletal and reproductive disorders, mental and neurological illnesses.
- An increasing number of workers in industrial countries complain about psychological stress and overwork. These psychological factors have been found to be strongly associated with insomnia, depression and fatigue, and burn-out syndromes, as well as with elevated risks of cardiovascular diseases.
- Only 5-10% of workers in developing countries and 20-50% of workers in industrial countries (with a few exceptions) are estimated to have access to adequate occupational health services. In the USA, for example, 40% of the workforce of some 130 million employees does not have such access.
- Even in advanced economies, a large proportion of work sites are not regularly inspected for occupational health and safety.

In a study conducted in by the title of assessment of non-fatal occupational injuries and associated factors in building construction sector at Adama Science and Technology University, research park construction site found the following statistical data. Occupational injuries in the past 12 months were reported by 34.9% (1.65± 0.48) of workers. The most common body parts injured were lower and upper limbs (73.3% and 16%). The majority of injuries were puncture/cuts/lacerations (75%) and contusions (22.1%). Walking on/Handling of sharp objects (61.4%), falls (10.7%) and injuries by manual tools (10.7%) were the main causes of injuries. All of injured workers (100%) reported complete recovery. Extended working hours, job dissatisfaction, not using PPE, substance usage and job stress were predictors of occupational injuries (Adurahman, 2016).

2.3 Awareness and Knowledge of Construction Safety among the Stakeholders

Oxford advanced learner's dictionary (2015) defines awareness as having knowledge of something or being interested in and knowing about something. According to Armstrong (2009), awareness occurs when an individual is sufficiently informed about a subject that he becomes conscious of its existence and its broader subject matter. Knowledge on the other hand requires a theoretical or practical understanding of the subject. For example, knowledge of a piece of legislation implies that the individual could demonstrate some understanding of the detailed provisions of the legislation.

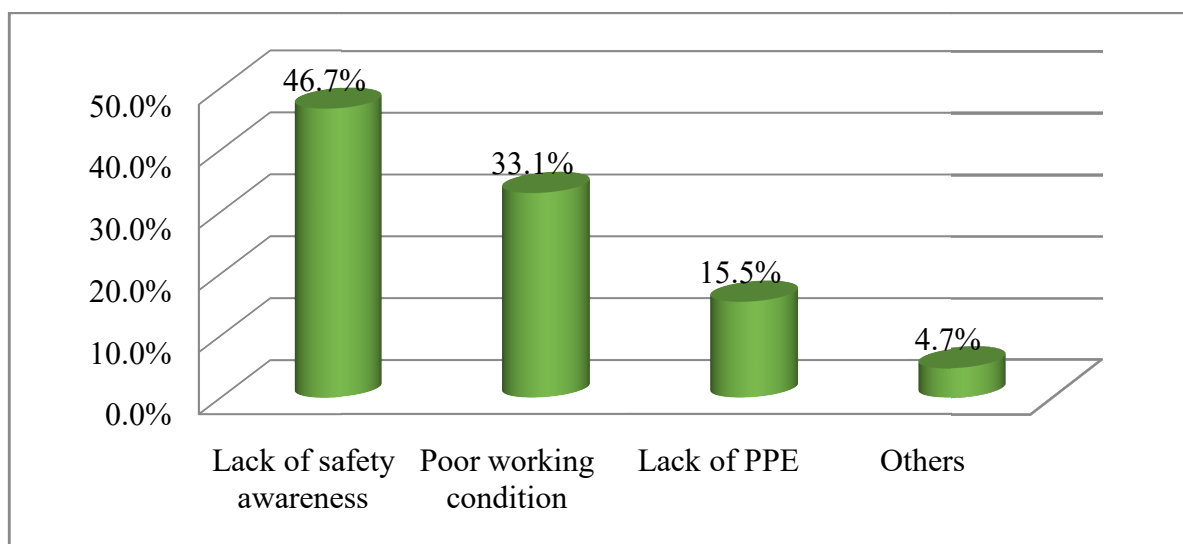
On a research conducted by the title of Awareness of occupational hazards and use of safety measures among welders: a cross-sectional study from eastern Nepal; Overall, 272 (90.7%) welders were aware of at least one hazard of welding and a similar proportion of welders were aware of at least one PPE. However, only 47.7% used one or more types of PPE. Education and duration of employment were significantly associated with the awareness of hazards and of PPE and its use. The welders who reported using PPE during welding were two times more likely to have been aware of hazards (OR=2.52, 95% CI 1.09 to 5.81) and five times more likely to have been aware of PPE compared with the welders who did not report the use of PPE (OR=5.13, 95% CI 2.34 to 11.26) (Budhathoki, et al., 2014).

A study conducted on the awareness of occupational hazards and associated factors among welders in Lideta sub-city, Addis Ababa, Ethiopia indicate that the majority, 86.5 %, of participants were aware of occupational hazards that might occur during the welding process. The highest level of awareness was observed among participants of 94.9 % large scale industries followed by 86.2 % medium scale and 83.5 % small scale (Tadesse, et. al., 2016). Apart from construction industry, a study developed to assess Knowledge and practices regarding safety information among textile workers in Adwa town, Ethiopia showed that from the total study participants about 78.7% respondents heard about occupational health and safety information, 28.5% had knowledge about Material Safety Data Sheets (MSDSs), and 66.2% and 81.7%, respectively knew about safety signs and fire extinguisher. Material Safety Data Sheet is a summary of the health hazards about the material and associated recommended safe work practices (Desalegn. et. al., 2014). According to Emerging Technology for Sustainable Development Congress (ETSDC, 2014) most of the Class-A Contractor in Kelantan Malaysia

aware that the occupational safety and health management system are important and should be practiced to achieve zero accident and death on site. Only a few contractors in Kelantan that still underestimate and not concerned about the importance practice of occupational safety and health management system (OSHMS) in construction industry.

Sebsibe and Dagnachew (2016) noted that lack of construction safety awareness is the primary cause of workers injury at construction sites followed by poor working conditions and lack of use of personal protective equipment in Addis Ababa.

Figure 2.2: Causes of Construction Site Injury



A senior essay conducted by Hayat, et.al. (2012) assessed the status of health and safety at construction site in Addis Ababa. They concluded that the local health and safety practice was not well exercised, because of the following reasons

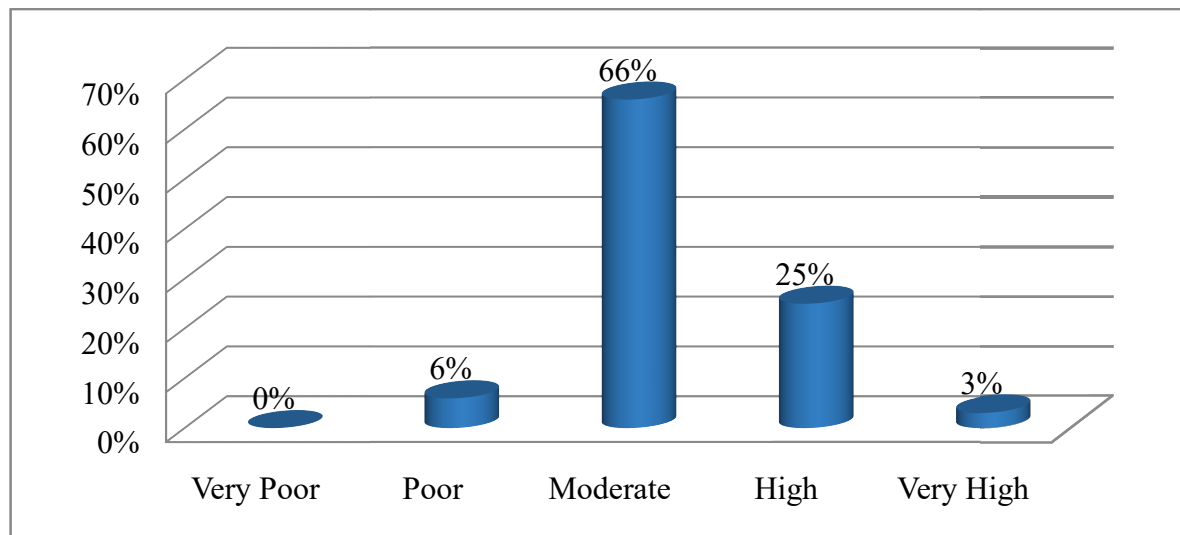
- Lack of strict follow up by regulatory bodies
- Lack of training and investigation
- Lack of awareness of the concept
- Lack of investigation during contact
- Lack of responsibility among stakeholders.

Another study conducted to assess awareness of construction workers on occupational hazards, illness and injuries associated with construction industry in Mombasa discuss that educational

background gender and work experience has a great impact on the awareness of construction safety among construction workers. In the same study it is found that all workers under the study are aware of all hazards, injuries and illness associated with constructions work. More than 80% of the workers had suffered illness or injuries in the course of their duties (Lilian, et. al., 2015).

According to Rogers Ochieng Kenyan researcher discusses that the level of safety awareness on the construction sites surveyed was very low, that is safety systems in construction sites are not working and hence the deplorable safety record. Most of the sites do not comply with almost all of the safety requirements leaving workers exposed to a variety of hazards some of which could easily have been controlled or eliminated if all those concerned had done their parts well (Rogers, 2004). A research paper published in 2014 to assess Construction Site Workers' Awareness on Using Safety Equipment suggested that the construction safety awareness of workers in Malaysia can be explained by the following graph.

Figure 2.3: The level of knowledge of safety among workers



This indicates level of knowledge on the safety been classified in intermediate level. Generally, workers knew not all applicable laws on safety at construction sites. However, they are also be labeled as a workers who cares about safety; although their level of knowledge is not comprehensive, but they know about the risk of accidents at construction sites (MdUlang et. al., 2014).

2.4. Key Problems and accidents Associated with Negligence of Construction Safety

Construction workers are exposed to a wide variety of health hazards on the job. Exposure differs from trade to trade, from job to job, day by day, even by the hour. Hazard is a source or situation with a potential for harm in terms of human injury or illness health, damage to property, damage to the workplace environment, or a combination of these. According to bureau of labor statistics (BLS) the leading causes of worker deaths on construction sites are referred to as occupational safety and health administration (OSHA's) focus four. They are falls, electrocution, struck by object, and caught in or between objects. These "fatal four" were responsible for nearly three out of five (56%) construction worker deaths in 2010, BLS reports (Adurahman, 2016).

Table2.2: Types of accident

No	Types of accident	Minimum score
A	Fall	3.98
B	Electrocution	2.73
C	Struck by object	3.58
D	Caught in or between object	3.03

Total respondent (R) =40 person

As Tewodros (2016), the three leading occupational injuries in Addis Ababa housing construction sites are puncture (21.0 %) followed by hand injury (11.3%), and back pain (9.7%). A recent study titled on Occupational Health and Safety in Ethiopia: A review of Situational Analysis and Needs Assessment indicates that the commonly observed hazards include poor ergonomics (heavy manual lifting), slippery and unlevelled work surfaces excessive noise and dust, UV radiation, vibration, and electrical hazards (Abera, et. al. 2016).

According to McDonald and Hrymak (2002), the literature and statistics highlight that three aspects, that is working on scaffolds, using ladders and working on roofs, account for the most frequent and severe accidents in construction sector. A study, which was conducted in China, revealed that 3,000 workers were killed on construction sites each year (Chen, et. al., 2013). Construction workers in Hong Kong have a 1 in 300 chance of being killed on site. The chance

of that worker being disabled is higher. A minor injury of a construction worker is likely to make him/her temporarily unfit for work (Rowlinson, et. al., 2003). In Hong Kong, 275 accidents per 1,000 workers per year were recorded in 1994. The number of accidents was decreased to 150 accidents per 1000 workers 150 in 2000. However, the number of accidents in Japan is only 10 workers every 1,000 on construction sites per year. In the United States, the industry accounts for up to 18% of work-related deaths and 15% of all worker compensation cases with approximately 1,000 construction workers killed annually. Helander (1991) reported 739 construction fatalities in the UK, 52% of these occurred are due to falls from ladders, roofs, and scaffolds. Falling objects represented 19.4 % of total construction fatalities. Transportation equipment was responsible for 18.5% of the fatalities. He also reported that:

- The decision to wear a safety helmet was left to the individual worker in 25 out of 29 of construction sites in the UK and
- The workers were motive to wear more comfortable helmets.

In South Africa Reportedly, 76% of workers experienced pain in their waist areas, 70% had pain in their shoulder and 66% had back problems while they were involved in traditional construction. Workers sometimes had to handle heavy material manually, worked at heights and experienced noise caused by heavy construction equipment (Luvive, 2010).

2.5 Major Causes Associated with Construction Safety Problems

A study in small scale industry (SSI) construction in Mekele city Ethiopia indicate that use of PPEs, age, and number of years worked in similar job, number of hours worked per week, and job category are significantly associated factors with occupational injury among SSIs workers (Berhe et.al., 2015). As Tewodros (2016), the major possible causes of construction site hazards are absence of protective devices (40.3%); lifting heavy objects (8.1%) and work burden (8.1%).

Another study in Northern Ethiopia (Gonder) has shown that the prevalence of construction safety and health problem becomes the problem of the whole country and not only Addis Ababa's construction industry. This study depicted that occupational injuries are common among building construction workers in Gonder; the prevalence of the injuries are associated with preventable and modifiable factors such as lack of PPE, working overtime, lack of vocational training and workers dissatisfaction with their job(Mesafint et. al., 2009).

In a study conducted in Sri Lanka titled as health hazard, risk and safety practice in the construction site explores some items as the major factor of injuries in construction site in developing countries. According to this research, dislike to wear personal protective equipment (PPE) which is categorized as safety equipment is often identified as the cause of poor safety practice. In addition low level of awareness towards using PPE was also frequently identified a possible cause of poor safety practice. Unavailability of PPE also contributes to poor safety practices. Workers fall from height and electric shock are identified as frequently happening construction site safety problems (Vitharana et. al., 2015).

2.6. Construction Safety Regulation and Directives

Construction safety regulation has a higher influence on increasing the awareness of workers about safety at construction sites: this can be achieved through preparing enforcing rules and regulations, indicating the necessity of information and training to aware all the construction site participants. Globally and locally there are certain construction safety regulations and directives amended by concerned international and national organizations to help create the correct construction safety awareness for construction site workers.

2.6.1. International Safety Regulations and Directives

2.6.1.1. The International Labor Organization (ILO)

The international labor organization (ILO) which seeks to promote safe and decent work in all countries of the world is a member of the united nation organizations. It is responsible for the formulation of international labor standards in the form of conventions and recommendations. Since the 1919, the international labor organization has approved and published nearly 190 conventions, which are binding international treaties related to various issues regarding work and workers. They cover a wide range of working conditions such as hours of work, rights of associations for workers child labor, employment discrimination, labor inspection, maternity leave, health and safety workers compensation, medical examination, minimum working age, holiday with pay and contract of employment for indigenous workers. Hogstet and pieris (2000) identified the major objective of the ILO in relation to occupational safety and health as enabling countries extend social protection to all groups in society and to improve working conditions and safety and health at work through focused program which covers working conditions. The objectives of the safe work program are

- To create worldwide awareness of the dimensions and consequences of work related accidents, injuries and diseases.
- To promote the goal of basic protection for all workers in conformity with international labor standards ; and
- To enhance the capacity of member states and industry to design and implement effective preventive and protective policies and programs.

2.6.1.2. Information and Training

According to ILO (1995) construction site workers should be adequately and substantially

- Informed of potential safety and health hazards to which they may be exposed at their work place, be instructed and trained in the measures available for the prevention and control and protection against, those hazards.
- No person should be employed in any work at a construction site unless that person has received the necessary information, instruction and training so as to be able to do the work competently and safely. The competent authority should, in collaboration with employers, promote training programs to enable all the workers to read and understand the information and instructions related to safety and health matters.
- The information, instruction and training should be given in a language understood by the worker and written, oral, visual and participative approaches should be used to ensure that the worker has assimilated the material.
- National laws or regulations should prescribe:
 - The nature and length of training or retraining required for various categories of workers employee in construction projects;
 - That the employer has the duty to set up appropriate training schemes or arrange to train or retrain various categories of workers.
- Every worker should receive instruction and training regarding the general safety and health measures common to the construction site, which should include
 - General right and duties of workers at the construction site
 - Means of access and egress both during normal working and an emergency
 - Measure for good housekeeping
 - Location and proper use of welfare amenities and first-aid facilities provided in pursuance of the relevant provisions of this code;

- Proper use and care of the items of personal protective equipment and protective clothing provided to the workers
- General measures for personal hygiene and health protection
- Fire precaution to be taken;
- Action to be taken in case of an emergency;
- Requirement of relevant safety and health rules and regulations
- Copies of the relevant safety and health rules, regulation and procurers should be available to workers upon the commencement of and upon any change of employment.
- Special instruction and training should be given to:
 - Drivers and operators of lifting appliances, transport vehicles, earth moving and materials handling equipment and plant, and machinery or equipment of a specialized or dangerous nature;
 - Workers engaged in the erection or dismantling of scaffolds;
 - Workers engage in excavations deep enough to cause danger, or shafts, earthworks, underground works, or tunnel;
 - Workers handling explosives or engaged in blasting operations;
 - Workers engaged in pile-driving;
 - Workers working in compressed air, cofferdams and caissons;
 - Workers engaged in the erection of prefabricated parts or steel structural frames and tall chimney, and in concrete work, formwork and such other work;
 - Workers handling hazardous substances;
 - Workers working as signalers;
 - Other specialized categories of workers;
- Whenever required by national laws and regulations, only drivers, operators or attendants' holding a certificate of proficiency or license should be employed to operate particular vehicle, boilers or other equipment.

2.6.1.3. World Health Organization (WHO)

The world health organization was established in 1948, to improve the health status of working population. WHO has an occupational health program with emphasis on data collection and analysis, research, formulation of strategies and recommendations for hazard prevention and control, human recourse development with special emphasis on developing countries? It is

responsible on for offering technical advice and expertise on health and safety by setting hygienic standards, promoting medical services and medical examinations.

WHO's way of solving health problems vary substantially according to the national and local needs, conditions and cultural influences, resources and other local factors. Currently there is a network of occupational health institutes assigned as WHO celebrating centers. The policy objective of this collaboration is a global strategy for occupational health for all with priority objectives. The objectives according to WHO (2001) include; strengthening of national policies for health at work and development of policy tools, development of healthy work environment , development of healthy work practice and promotion of health at work , strengthening occupational health services, establishment of support services for occupational health, occupational health and safety standards based on scientific risk assessment ,development of human resources for occupational health, establishment of information systems, strengthening of research and development of collaboration in occupational health with other activities.

2.6.2. National Safety Regulations and Directives

Ethiopia has had a regulation on Occupational Safety and Health (OSH) since the 1940's. The Ministry of Labor and Social Affairs (MOLSA) is the state organ that regulates workers' safety and health in work places, both private and state owned. MOLSA and its regional networks have an organizational structure lined to the periphery. Ethiopia is one among the many countries from around the world that have adopted ILO Convention No. 155 of 1981 in 1991 which resulted in two major regulations: Labor Proclamation No. 377/2003 (Negart Gazeta, 2004) and Labor Proclamation No. 515/2007 on public civil servants (MoLSA, 2006).

2.6.2.1. The Labor Proclamation no. 377/06

Unlike many countries, in Ethiopia there is one comprehensive labor law that is operating in order to address all aspects of ensuring labor relation to be governed with basic fundamental rights and obligation focusing on industrial peace in all work places. The law is also formulated in order to guarantee and maintain all fundamental rights at work and to define the powers and duties of the organ charged with enforcing of the implementation of the ideals of the law which is tantamount to the labor inspectorates. In relation to this article 92 and 93 of the labor proclamation No.377/2003 states Obligations of an Employer and employees as follows;

Obligations of an Employer

An employer shall take the necessary measure to safeguard adequately the health and safety of

the workers; he shall in particular:

- Comply with the occupational health and safety requirements provided for this Proclamation;
- Take appropriate steps to ensure that workers are properly instructed and notified concerning the hazards of their respective occupations and the precautions necessary to avoid accident and injury to health; ensure that directives are given and also assign safety officer; establish an occupational, safety and health committee of which the committee's establishment, shall be determined by directives issued by the Minister;
- Provide workers with protective equipment, clothing and other materials and instruct them of its use;
- Register employment accident and occupational diseases and notify the labour inspection of same;
- Arrange, according to the nature of the work, at own expense for the medical examination of newly employed workers and for those workers engaged in hazardous work, as may be necessary.
- Ensure that the workplace and premises do not cause danger to the health and safety of the workers;
- Take appropriate pre-executions to ensure that all the processes of work shall not be a source or cause of physical, chemical, biological, ergonomically and psychological hazards to the health and safety of the workers;
- Implement the directives issued by the appropriate authority in accordance with this Proclamation.

Obligations of Employees

A worker shall:

- Co-operate in the formulation of work rules to safeguard the workers' health and safety and implement same.
- Inform forthwith to the employer any defect related to the appliances used and injury to health and safety of the workers that he discovers in the undertaking.
- Report to the employer any situation which he may have reason to believe could present a hazard and which he cannot avoid on his own any accident or injury to health which arises in the course of or in connection with work.

- Rake proper use of all safeguards, safety devices and other appliance furnished for the protection of his health or safety and for the protection of the health and safety of others.
- Obey all health and safety instructions issued by the employer or by the competent authority.

On the other hand, the federal public civil servant proclamation No. 515/2007 on article 54, the under mentioned safety measures are stated to be strictly followed by the participants.

1. Any government institution shall have the responsibility to:
 - a) Ensure that the work place does not cause hazard to the health and safety of civil servants;
 - b) Provide civil servants with protective devices and materials and give them instructions on their utilization.
2. Any civil servant shall have the obligation to:
 - a) Observe directives issued in relation to safety and health;
 - b) Properly use of safety devices and materials; and
 - c) Promptly inform the concerned officer of any situation which he may have reason to believe could present a hazard.
3. The Ministry shall under take studies on methods of maintaining occupational safety and health; and facilitate the provision of training for their implementation in government institutions.
4. The Ministry shall supervise the implementation of occupational safety and health measures in government institutions and shall issue directives regarding safety precaution measures.

2.6.2.2. Occupational Safety and Health Directives 2008

The other significant piece of recent legislation in this area is the Occupational Safety and Health Directive, which was adopted in July 2008. This is also very wide-ranging in its application, covering all employment sectors but with specific provisions for the manufacturing and construction sectors. Without prejudice to the Labor Proclamation, this Directive lays down general duties of employers and the duties and rights of workers, and the need for certain organizational measures such as a safety and health policy and arrangements, and for personal protective equipment. It also specifies measures for controlling a wide range of risks, such as

those from chemicals, noise, radiation, machinery, working at heights, boilers and lifting equipment. There are also specific provisions for the recording and notifying of occupational accidents and diseases.

The occupational safety and health directives issued by the ministry of labor and social affairs establishes the duties of employers, rights and duties of workers, responsibilities of safety inspectors, mandatory conditions on overcrowding, sanitation, fire safety and preparedness. Part II provides guidance on mandatory employer responsibilities. Part III detail s provisions for ambient working conditions and certain hazards and Part IV describes specific and general hazards by work practices or types of manufacturing processes, machinery operations or job performance procedures. Part V covers OSH in construction and part VII the agricultural sector and duties of authorities (MoLSA, 2006).

2.6.2.3. Ministry of Urban Development and Construction Building Codes and Standards

The ministry of urban development and construction include a construction safety and health plan on The Ethiopian building codes and standards (EBCS-14) which can help construction designers, contractors and employees to prepare effective safety plan parallel with the code. It states that a contractor should prepare Safety Plan of Work places which shall incorporate the following; Assignment of a safety officer and/or the establishment of Safety and Health Committee whose members include representatives of employers and workers. The Officer/Committee will be in charge of following up the safety preparations and implementations; on the job training of safety officer and/or safety committee members and the workers. The training includes providing information to workers of any measures applied on the construction site for ensuring safety in understandable ways; displaying pieces of information on list of construction work to be performed on a construction site involving particular risks, the approximate time of performance of the work, the contact details of a person responsible for the work and measures for ensuring the safety of workers; the names and contact details of persons giving first aid, the contact address of nearest place of providing emergency medical assistance and the means of access (Ministry of urban development and construction (Ministry of Urban Development, Housing and Construction, 2013).

CHAPTER THREE

3. Research Methodology

In this chapter issues related to research design, overview of the study area, study population, sample size and sampling technique, data collection tools, and methods of data analysis were presented and discussed.

3.1. Study Area and Study Period

The study was conducted among Addis Ababa housing construction project office construction workers in Addis Ababa specifically located at Koye Fiche III sites namely called Addis Ketema housing construction branch office and project 16 housing construction branch offices.

In Addis Ababa there are 18 project sites that are owned by Addis Ababa housing construction project office. Those all 18 projects have homogenous characteristics. They all involve 100% local contractors and consultants, and same level of man power development and sources of man power under the same client. Among those, Koye Fiche III sites namely called Addis Ketema housing construction or project 16 housing construction sites were selected for this study.

The study area (project site) was located on the south west tip of the city of Addis Ababa in Kilinto area along the Addis-Adama express road. The site is not at all developed. It was being used for farming until recent times. The project area has covered about 110 hectares of land and it was one of the mega housing construction project run by Addis Ababa City administration which was planned to construct 110 G+7 and 139 G+4 buildings; a total of 249 building blocks that will accommodate 12,600 households. The data required for the study were collected from March to April 2017.

3.2 Study Population /Participants

Workers in the above-mentioned projects were the source of population and the required sample size was drawn from them. According to the data obtained from each project branch offices and taking a preliminary mini survey there are 514 workers including supervisors at Addis Ketema branch office and at project 16 branch office. These workers were considered as target population of the study. In this regards in order to manage the sampling of those participants, the research categorizes the population in to two; namely long-term contract

employees (LTCE) and temporary employees (TE). The group of long term contract employees (LTCE) consists of project coordinator, resident engineers, site inspector, and site engineers. Moreover, the group of temporary employees (TE) also included those employees engaged on construction function like Carpenters, Masson, bar benders, and Daily labors in the project site of the study area.

Additionally, a total of three officials (one official from Addis Ababa City Administration housing construction project office, and two project coordinators from the construction project branch offices) were also considered as target population of the study to respond interview questions.

3.3 Sample Size Determination

For the case of Koye Feche III project sites, the population was organized from the two project branch offices of project 16 and Addis ketema. The number of sample respondents (sample size) was determined from the target population using Krejcie and Morgan (1970) formula. Since, this formula is practically tested and used by scholars for more than four decades; this study applied this formula to determine the sample size.

$$S = \frac{X^2NP(1 - P)}{(d^2(N - 1)) + (X^2P(1 - P))}$$

Where:

S= required sample size

X²= the table value of chi-square for 1 degree of freedom at the desired confidence level (3.84).

N= the population size (514).

P= the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d= the degree of accuracy expressed as a proportion (0.05).

Thus;

$$S = \frac{(3.841 * 514 * 0.5) * (1 - 0.5) * 342}{((0.05^2) * (514 - 1)) + (3.841 * 0.5) * (1 - 0.5)} = 220.091$$

Accordingly, among 514 population of the study found in the site 220 (42.802%) of them were identified as a sample size for the study to respond the questionnaire. Then, using population proportion procedure the identified sample size was distributed to the study sites and the two group of respondents as illustrated in table 3.1.

Table 3.1: Target Population and Sample Size

A.A Housing Construction Branch Office Projects	Respondents	Population	Sample size		Correctly Responded		Data Collection Instruments
			Number	%	Number	%	
Project 16 Housing Construction	LTCE	91	39	42.857	37	94.872	Questionnaire
	TE	164	70	42.683	66	94.286	Questionnaire
Addis Ketema Housing Construction	LTCE	79	34	43.038	32	94.118	Questionnaire
	TE	180	77	42.778	72	93.506	Questionnaire
	Total	514	220	42.802	207	94.091	
	Officials	3	3	100	3	100	Interview

3.4. Sampling Techniques

The number of sample respondent illustrated in table 3.1 were selected from the two construction project branch offices using simple random sampling techniques to respond the questionnaire. This sampling technique was used because it assures to be able to represent not only the overall population, but also key subgroups of the population; and it gives each possible sample combination an equal probability of being picked up and to have an equal chance of being included in the sample.

In addition to long term contract employees and temporary employees, one official from Addis Ababa City Administration housing construction project office, and two project coordinators from the construction project branch offices were also selected as a sample through purposive sampling technique to respond interview questions. Those officials were selected for interview because they are small in number and their position was important in describing construction safety awareness among workers of the project site in the study area. This helped the research to get significant information from them for the study.

3.5 Instrument of Data Collection and Procedures

In this study questionnaire and interview were employed as a primary data collection instrument to obtain the required data from the respondents. In addition, secondary data collection method through document review from government policies and manuals, risks reports, minutes of meetings was conducted.

The questionnaire was the major data collection tool that was used in this study. The questionnaire is found to be appropriate and effective tool to collect data for the study from the sample respondents, because sample respondents found in the study areas have sufficient level of education to understand and respond the questionnaire.

In the questioner a set of close-ended questions for each specific objective of the study were derived from extensive literature as well as a discussion made with professionals. The close-ended questions are developed, with the belief that, it helped the respondents to choose one option from the given alternatives that best fit their responses. The questions in the questionnaire were organized in to different parts based up-on objectives of the study and basic research questions.

The processes of data collection through the questionnaire from all sample respondents were carried out by the researcher himself with the assistant of two trained data collectors. So, the questionnaire were distributed to all sample respondents and collected from them by the researcher and two assistant data collectors.

An interview was used to gather data about the thoughts, outlook and beliefs that the interviewees had about a particular topic. The interview permits greater depth of response which was not possible through any other means. Thus, the purpose of using interview in this study was to collect more supplementary opinion so as to stabilize the data collected through the questionnaire.

Besides, considering the advantages of its flexibility in which new questions could be forwarded during the interview session, semi-structured questions were prepared and used for this study. The interview session were administered with the sample respondents on face-to-face and one-to-one bases by the researcher. This enabled the research to focuses on some specific issues to be raised for different interviewee's separately during the interview session.

3.6 Method of Data Analysis

The data collected for this study were checked from collection to data entry before they were ready for analysis. At the beginning the data collected from all sources were checked and organized with respect to basic research questions and objectives of the study. They were analyzed quantitatively and qualitatively.

The quantitative data were tabulated and processed using Statistical Package for Social Sciences (SPSS V-20). It is preferred to use in this study, since it has the capacity and flexibility to process huge data within seconds and generates an ultimate range of simple and sophisticated statistical results. So, it is believed that using SPSS is appropriate in processing and analyzing the data collected for this study. Moreover, for visual presentation of the results of the study, quantitative data collected from all sources and processes through SPSS had organized and illustrated in tables and graphs.

Then, the analyses of the quantitative data were made using descriptive statistics, like frequency, percentage, mean, standard deviations and ranges. In addition, t-test and p-value was used to test the presences of significant differences between two groups of the respondents (long term contract employees and temporary employees) in responding items of the questionnaire.

Furthermore, analysis and discussions of the data was carried-out following each tables and graphs. Besides, the qualitative data that was obtained from interview responses were presented and narrated under the issues they are associated with quantitative data illustrated in tables and graphs.

CHAPTER FOUR

4. Data Presentation, Interpretation and Analysis

In this chapter, the data collected from primary sources were organized and presented in tables and figures. The data were analyzed and interpreted in accordance with the objectives of the study and basic research questions.

The major purpose of this study was to assess construction safety awareness among Addis Ababa housing construction project office construction workers at Koye Feche III project site. More specifically, the objectives of the study gave emphasis to assess extents of safety awareness among Addis Ababa housing construction project office construction workers at Koye Feche III project site; to examine frequently occurring injuries among construction workers at the project site; to identify the major causes of safety problem among housing construction workers at Koye Feche III project site.

In order to attain these objectives, and to answer research questions of the study, the data were collected through questionnaire, and interview. The questionnaires were initially distributed to a total of 220 respondents (73 long-term contract employees and 147 temporary employees currently working at the project site). Among the distributed questionnaires, 207 (94.09%) that is, 69 (94.52%) long-term contract employees and 138 (93.88%) of temporary employees had appropriately filled and returned. Thus, the analysis and interpretation of the data was based on the responses collected and organized from appropriately filled and returned questionnaires.

Furthermore, the results of an interview administered with higher Officials from Addis Ababa housing construction project office also used in the analysis and interpretation of the data in this chapter.

So, analysis and interpretation of the data in this chapter were divided in to four parts. The first part of the chapter presents about background information of the respondents. In the second part issues related to Construction Safety Awareness in the study site were discussed. Next to this, in the third part of this chapter, issues related to frequently occurring injuries during construction activities in the project site were presented and analyzed in detail. Finally, in the fourth part of the chapter major main causes of construction site injuries/accidents occurred in the study area, were presented and discussed.

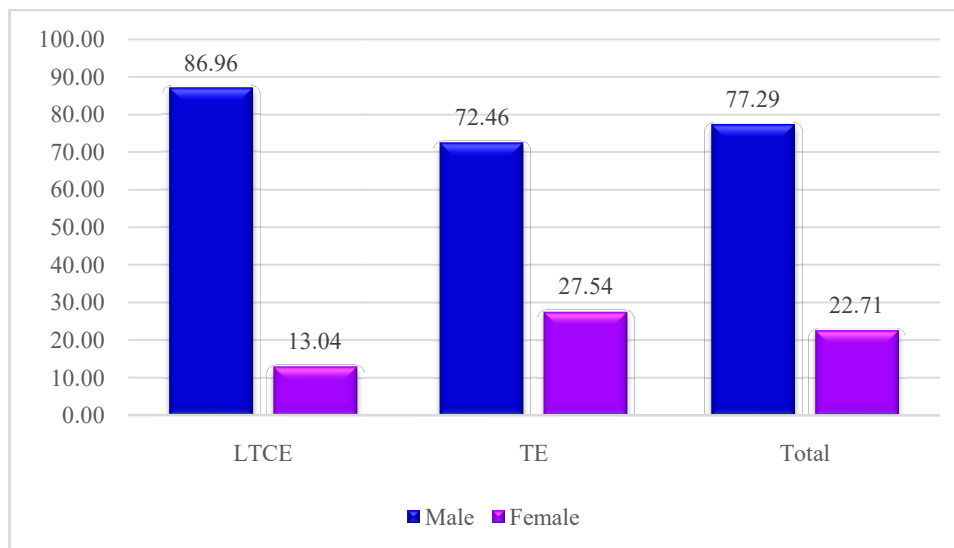
Since, all the respondents were categorized in to two major categories; namely long term contract employees (LTCE) and temporary employees (TE); the analysis and interpretation of the data were made accordingly. The groups of long term contract employees (LTCE) were consisted project coordinator, resident engineers, site inspector, and site engineers. Moreover, the group of temporary employees (TE) also included those employees like Carpenters, Masson, bar benders, and Daily labors engaged on construction function in the study area.

4.1. Background Information of the Respondents

In this part of the chapter, background information of the respondents, which includes gender, age, educational status, and experience of the respondents in the construction area were presented and discussed using the data illustrated in the figures and Table.

Gender may not have an impact in regard to having safety awareness. However, traditionally it is argued that females are more careful than men to protect themselves from accident causing activities. In this regards, the study tried to include both male and female construction works at Koye Feche III project site and their distribution were illustrated in Figure 4.1.

Figure 4.1: Gender Distribution of the Respondents (%)



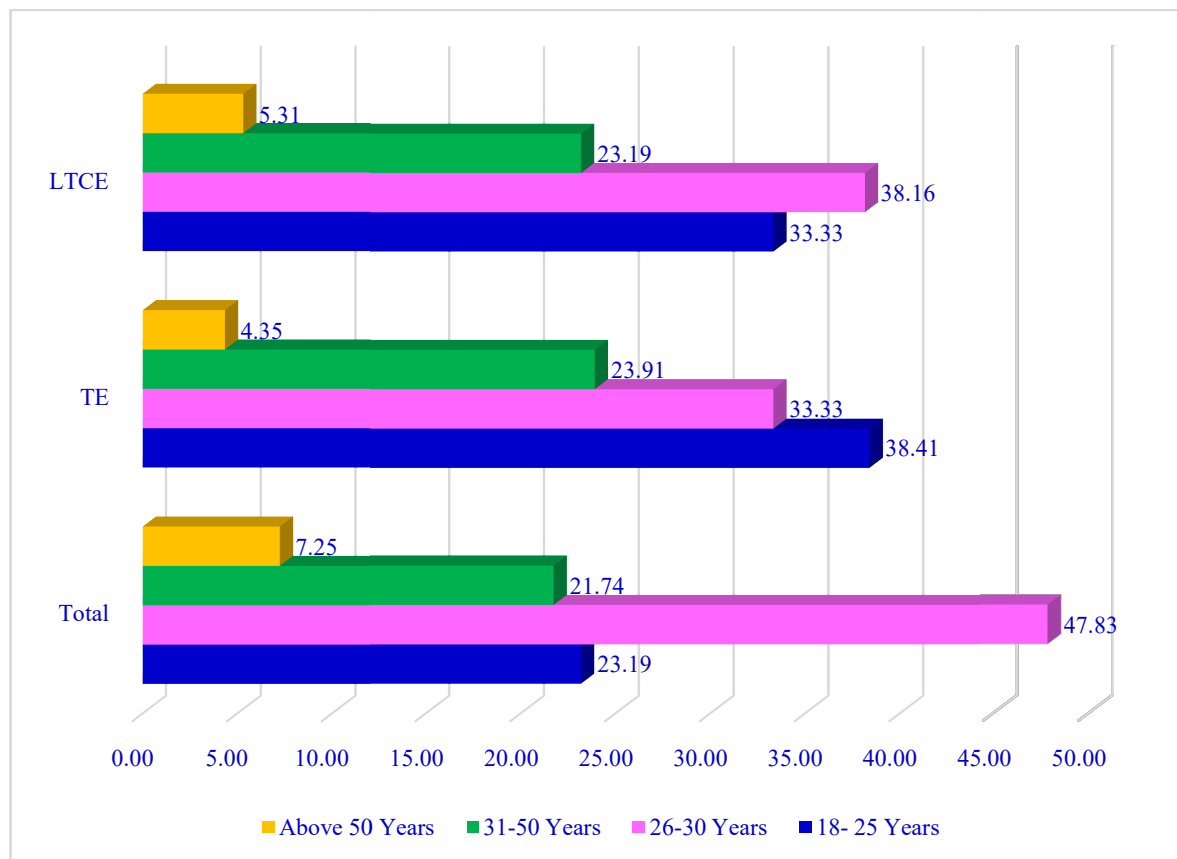
Source: Survey Results (March 2017)

The data illustrated in Figure 4.1 showed the distribution of long term contract employees (LTCE) and temporary employees (TE) based on their gender in the study area. The graph contains the Percentage of each category. As we can see from the graph, 86.96% of long term

contract employees are male; where as 13.04% of them were female. In the same manner, out of temporary employees 72.46% of them are male and that of 27.54% employees are female.

Overall, out of the total respondents, more than three-fourth of them (77.29%) are male; and the remaining 22.71% are female. Generally, the data illustrated in the graph showed that, the Percentage distribution of female employees in both long term contract employees and temporary employees were very less. This indicated that, the participation of female in construction sector was very low when compared to male; particularly among long term contract employees.

Figure 4.2: Age Distribution of the Respondents (%)



Source: Survey Results (March 2017)

With regards to age distribution of the respondents, the data illustrated in figure 4.2 showed that, the numbers of temporary employees were higher in the age category that ranges from 18-25 years (38.41%) than long term contract employees (33.33%). This showed that a very young work-force was employed as temporary employees than those employees employed in the construction industry as long term contract employees.

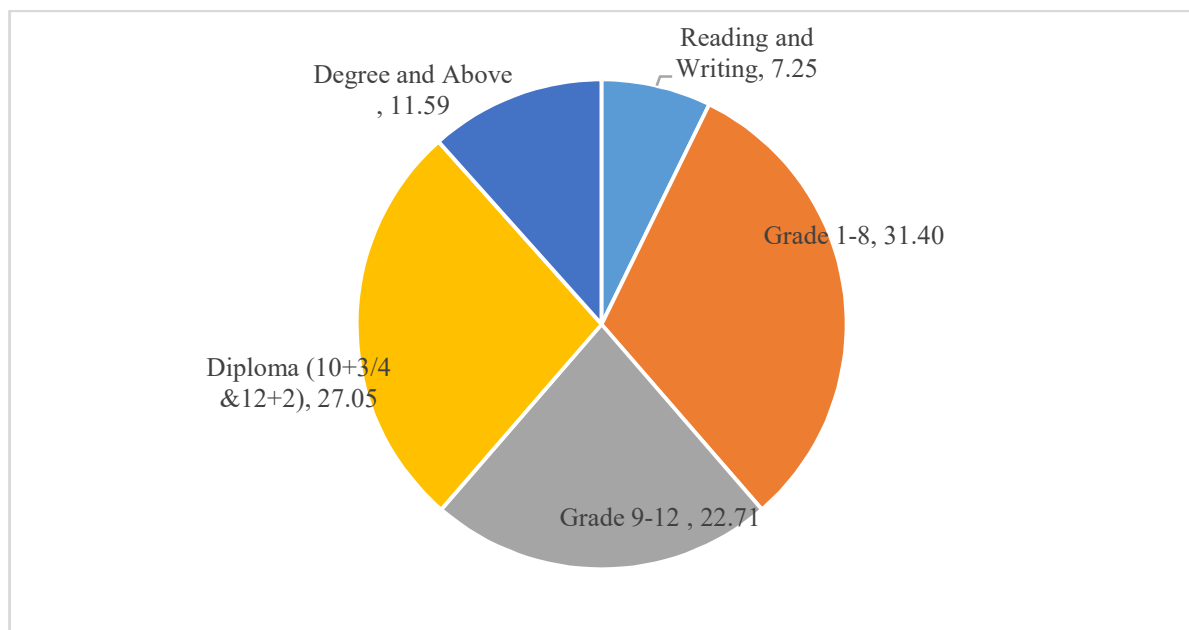
The next category of the age classification ranges from 26-30 years. Under this category the number of long term contract employees showed a little increment in percentage than that of the other category; in that, 38.16% of the respondents were long term contract employees and 33.33% of them were temporary employees.

Summing the above two age categories 71.03% of the respondent were in the age group that ranges 18-30, which implies a total of younger and productive work force are involving in the construction of condominiums in the study area; hence creating safety awareness among all the workers should be an important target of the stakeholders.

Besides, the data of the figure showed that, the highest Percentage (47.83%) of employees out of the total respondent were found in the age classification ranges from 26-30 years. Furthermore, almost a balanced %ages distribution were observed between long term contract employees and temporary employees in the age categories that ranges from 31-50 years (21.74%) and 18-25 years old (23.19%).

That is, under the category 31-50 it is 23.19% and 23.91% long term contract employees and temporary employees respectively and took a total contribution of 21.74 percent. The last category of age group (above 50 years) accounts only 7.25% of the total respondent. This indicated that, in terms of age the number of matured employees in the construction sector was insignificant.

Figure 4.3: Educational Status of the Respondents



Source: Survey Results (March 2017)

Education background and construction site safety awareness has a direct relationship. Construction site workers awareness and understanding to safety and health issue can be enhanced by regular education, training, workshops and other means of addressing the importance of the situation. In relation to this the data illustrated in Figure 4.3 showed that, there were 11.59% of employees with education background of degree and above; and those respondent expected to have some level of construction safety awareness which they acquired through regular education, training and work shop through their course of school life.

The next expectation in terms of having construction safety awareness set on those employees that can have an educational background of diploma (10+3/4). According to the results demonstrated in Figure 4.3, the share of diploma (10+3/4) holders from the total respondents was 27.05% and this category of employees expected to have some level of awareness and understanding about construction site safety.

The other categories of employees in terms of educational background were those who have educational background from grade 9-12 and 1-8 grades. Their educational background and their exposure to construction site safety training and workshops effects to grant less expectation from this two category of employees. However, their share from the total respondent was slightly higher than other categories. These are 22.71% and 31.40%for those having education status from grade 9-12 and 1-8 grads respectively.

The other category of employees with educational skill of reading and writing takes a share of 7.25% only. Even though their number was small, this category of employees considered to have none construction safety awareness and expected to face construction safety problems.

Table 4.1: Experiences of the Respondents in the Construction Industry

Items	LTCE		TE		Total	
	Count	%	Count	%	Count	%
Below 2 Years	2	2.90	31	22.46	33	15.94
2-5 Years	43	62.32	65	47.10	108	52.17
6-10 Years	19	27.54	19	13.77	38	18.36
Above 10 Years	5	7.25	23	16.67	28	13.53
Total	69	100	138	100	207	100

Source: Survey Results (March 2017)

The construction work experience can be enhanced when the number of years worked and exposure to specific task or activity increased. Increased in work experience in any specialty further makes the person better in his/her judgment regarding the activities in work environments. So, it is believed by many construction participants' having an increased construction work experience can open the gates to be aware of the hazards in the construction industry.

Considering the above facts, respondents were asked to indicate their work experiences in the construction sector. As respondents responses illustrated in Table 4.1, from the total 207 respondents more than half 108(52.17%) of them were worked in the construction industry for 2-5 years. However, with regards to this year of experiences, the number of long term contract employees (62.32%) was somewhat better than temporary employees (47.10%). This implies that the indicated %ages of workers are expected to have a few attitudes of construction site safety hazard and methods to tackle them.

Furthermore, according to the data of this Table, those workers who had a work experiences of 6-10 years accounts 18.36% of all respondents participated in this study. Nevertheless, the Percentage share of long term contract employees (27.54%) was somewhat better than temporary employees (13.77%).

Moreover, as can be seen from the data of the table, employees with work experience of above 10 years (13.53%) and below two years (15.94%) have nearly the same Percentage shares.

Generally, in terms of their experience the results illustrated Table 4.1 showed that, majority of long term contract employees and temporary employees were found above two years of service in the construction sector.

4.2. Constriction Safety Awareness

Under this part of the chapter data collected from the respondents regarding the extent of safety awareness among Addis Ababa housing construction project office construction workers at Koye Feche III project site were organized in Tables and graph for analysis. The analyses were made following each Tables and graphs.

4.2.1. Perception and understanding about construction safety among workers

In this part, respondents' responses related to the perception, understanding about and attitude towards construction safety among employees related to their employment pattern in the study

area were presented and analyzed. It focuses on understanding of the general safety conditions, safety information, and safety rules implementation at the construction site.

It is argued that, having proper understanding about basic concepts of construction safety, the regulations, and information on safe work place will facilitate the success of construction industry and the development of the sector in the country. Considering these facts, respondents were asked to rate their understanding about construction safety concepts, the regulations, and essential information on construction safety at Koye Feche III construction site; and their response were illustrated in Table 4.2.

Table 4.2: Understanding and Perception of the respondents

No	Items	Res.	Responses (%)					Total	Mean Score	SD	t-test	P-Value
			5	4	3	2	1					
1	Heard about construction safety before	LTCE	1.45	14.49	13.04	2.90	68.12	100	1.78	1.22	0.77	0.444
		TE	1.45	10.87	16.67	19.57	51.45	100	1.91	1.12		
		All	1.45	12.08	15.46	14.01	57.00	100	1.87	1.15		
2	Know safety information that can be described by picture, sign, labels or other else.	LTCE	5.80	7.25	8.70	59.42	18.84	100	2.22	1.03	1.28	0.201
		TE	2.90	16.67	28.99	23.19	28.26	100	2.43	1.15		
		All	3.86	13.53	22.22	35.27	25.12	100	2.36	1.11		
3	Understand safety rule in my work place	LTCE	5.80	15.94	8.70	63.77	5.80	100	2.52	1.02	3.86	0.000
		TE	4.35	42.75	15.94	33.33	3.62	100	3.11	1.04		
		All	4.83	33.82	13.53	43.48	4.35	100	2.91	1.07		
4	Can deal with safety problems in the work place	LTCE	10.14	2.90	33.33	46.38	7.25	100	2.62	1.03	-2.31	0.022
		TE	6.52	11.59	3.62	57.25	21.01	100	2.25	1.11		
		All	7.73	8.70	13.53	53.62	16.43	100	2.38	1.10		
5	Series construction site safety problem could be acquired during construction work	LTCE	1.45	5.80	13.04	60.87	18.84	100	2.10	0.83	-3.36	0.001
		TE	2.17	5.80	10.14	15.94	65.94	100	1.62	1.03		
		All	1.93	5.80	11.11	30.92	50.24	100	1.78	0.99		
6	Had safety awareness needed for the hazards face on this job	LTCE	4.35	4.35	7.25	60.87	23.19	100	2.06	0.94	-0.70	0.486
		TE	1.45	13.04	10.87	28.26	46.38	100	1.95	1.11		
		All	2.42	10.14	9.66	39.13	38.65	100	1.99	1.05		
7	Taking safety training will increase safety awareness	LTCE	10.14	5.80	68.12	11.59	4.35	100	3.06	0.87	-0.10	0.922
		TE	10.14	21.01	39.13	22.46	7.25	100	3.04	1.07		
		All	10.14	15.94	48.79	18.84	6.28	100	3.05	1.00		
Overall Results		LTCE	5.59	8.07	21.74	43.69	20.91	100	2.34	1.07	-0.10	0.922
		TE	4.14	17.39	17.91	28.57	31.99	100	2.33	1.21		
		All	4.62	14.29	19.19	33.61	28.30	100	2.33	1.16		

Source: Survey Results (March 2017)

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

As can be seen from the table, 51.45% of temporary employees and 68.12% of long term contract employees plus 57% of the total sample responds' strongly disagree that they have heard about construction safety so far. Only 1.45% of long term contract employees and exactly equal percentage of temporary employees had strongly agree that they had ever heard about construction safety before. This indicated that, they are working in the construction site without the required information exposing them to different risks and possible accidents of construction sites.

Moreover, the data of the table further showed, only one-fourth of the employees (25.12%) from the total respondents strongly disagree that they know safety information that can be described by pictures, sign, label or other methods.

Further, the table showed that, 65.94%of temporary workers were strongly disagreed that, during construction work a safety problem that can be extended to permanent disability or death could be acquired; whereas 18.84% of long term contract employees had the same response. This implies that, the construction site workers in the study area are not aware that their day to day work activities can create a danger on their lives unless proper percussion is taken.

Besides the data of the table in item number six showed, only 10.14% of the total respondent agree that they have the require safety awareness to protect themselves during construction activities in the site. On the contrary, 39.13% and 38.65% of the respondents were disagree and strongly disagree about having safety awareness needed for the hazards they faced on their job at the study area respectively.

Furthermore, the data illustrated in row seven of the Table further showed that, out-of the total 207 respondents, only 10.14%and 15.94% of the workers strongly agree and agree that, taking safety training will increase their safety awareness. On the other hand, 18.84% and 6.28% of them were respectively did not agree and strongly disagree that taking safety training will increase their safety awareness.

Overall results of the table illustrated in the last rows clearly showed that, only 14.29% and 4.62% of the respondents respectively agreed and strongly agreed to the sequence of positively stated questions related to their perception, understanding and attitude of construction safety. Whereas, 33.61% and 28.30% of the respondents sequentially disagreed and strongly disagreed to the same questions related to their perception, understanding and attitude of construction safety. The results of mean score ($M=2.33$, $SD=1.16$) further indicated that overall perception,

and understanding of both groups of the respondents: long term contract employees and temporary employees; about construction safety in the study site was found at lower level.

Moreover, the mean score calculated for each items of the Table showed that, relatively moderate level of understanding regarding an item that describe about construction safety rules in work place ($M=2.91$, $SD=1.07$). On the contrary, the mean score results for an items that describe about Series construction site safety problem that can be extended to permanent disability or death could be acquired during construction work ($M=1.78$, $SD=.99$); getting proper information about construction safety before ($M=1.87$, $SD=1.15$); and having safety awareness needed for the hazards they faced on the job ($M=1.99$, $SD=1.05$) were rated lower mean score than the remaining items of the Table.

In general, all the above statements showed that, understanding of long term contract employees and temporary employees participated in this study about construction safety at the study in the project site was not good enough. This means, employees' were engaged on construction activities without having sufficient information, and understanding about construction safety in the study area. This may lead to infer that the workers are not able to protect themselves and their workmates from construction accidents if it happens.

4.2.2. Use of Personal Protective Equipment (PPE) and First-Aid

In literature part of this paper it was shown that the Federal Ministry of Labor and Social Affairs states that initiator (client) of any construction activity is responsible for the supply and delivery of all the necessary personal protective devices and preparation of first aid kits before the beginning of any construction activities. In this part the data were organized in table shows respondents response concerning their knowledge of the use of personal protective devices and the availability of first aid kits at Koye Feche III construction site.

The data illustrated in Table 4.3 showed that, out of the total responds' 14.49% and 2.90% of the respondents were respectively agreed and strongly agreed that they always remember to use personal protective equipment. On the other hands, majority of the respondents, that is, 51.21% and 20.29% of them were disagreed and strongly disagreed to same statement. Moreover a mean score calculated for this item ($M=2.285$, $SD=1.04$) also indicated lower level of respondents agreement to always remember to use personal protective equipment (PPE) when they enter in to the construction site in the study area. This clearly revealed that, even though personal protective equipments are available adequately in a given construction sites, many of construction workers aren't adapted to use the devices in the construction industry.

Table 4.3: Use of PPE and First-Aid

No	Items	Res.	Responses (%)					Total	Mean Score	SD	t-test	P-Value
			5	4	3	2	1					
1	I always remember to use personal protective equipment when I enter in to site.	LTCE	5.80	5.80	10.14	68.12	10.14	100	2.290	0.94	-0.05	0.962
		TE	1.45	18.84	11.59	42.75	25.36	100	2.283	1.09		
		All	2.90	14.49	11.11	51.21	20.29	100	2.285	1.04		
2	Use of PPE is comfortable for construction work	LTCE	8.70	5.80	1.45	8.70	75.36	100	1.638	1.29	1.72	0.086
		TE	5.07	8.70	11.59	25.36	49.28	100	1.949	1.19		
		All	6.28	7.73	8.21	19.81	57.97	100	1.845	1.23		
3	I know about first aid to protect someone during emergency	LTCE	7.25	13.04	7.25	8.70	63.77	100	1.913	1.38	1.14	0.257
		TE	3.62	16.67	13.77	21.01	44.93	100	2.130	1.25		
		All	4.83	15.46	11.59	16.91	51.21	100	2.058	1.30		
4	First aid kit is effectively available in our site	LTCE	5.80	10.14	63.77	5.80	14.49	100	2.870	0.98	-1.89	0.060
		TE	12.32	11.59	22.46	23.19	30.43	100	2.522	1.36		
		All	10.14	11.11	36.23	17.39	25.12	100	2.638	1.25		
Overall Responses		LTCE	6.88	8.70	20.65	22.83	40.94	100	2.178	1.25	0.47	0.628
		TE	5.62	13.95	14.86	28.08	37.50	100	2.221	1.24		
		All	6.04	12.20	16.79	26.33	38.65	100	2.207	1.24		

Source: Survey Results (March 2017)

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

With regards to the use of PPE at construction work, the data illustrated in item number two of the Table showed that, 49.28% and 75.26% of temporary employee and long term contract employees respectively strongly disagree to the statement that use of personal protective equipment is comfortable for construction work, at the study site. Contrary to these, 5.07% of temporary employees and 8.70% of long term contract employees strongly agree that use of personal protective equipment is comfortable for construction work. In this regard the mean score 1.845 (SD=1.23) also shown almost strong disagreement of the respondents regarding the comfortably of PPE to use at construction work site in the study area.

With regards to the third item of the Table, that is "I know about first aid to protect someone during emergency"; the results indicated disagreement of the respondents (M=2.058, SD=1.30). Moreover, the data indicated that more than half (51.21%) of the respondents were "Strongly Disagreed" regarding having knowledge about first aid to protect themselves during emergency at construction site of the study area. Additionally, 16.91% of the respondents also reflected their disagreement for the same item.

The use of personal protective equipment to protect oneself from injuries, the availability and knowledge of how to use of first aid kit during injury is an important task to be considered.

Concerning these points, the study result indicated that very small number of respondents, that is, 11.11% and 10.14% of the total responds' respectively agreed and strongly agreed that first aid kit is effectively available at koye Feche III construction site; whereas 17.39% and 25.12% of the responds' sequentially disagreed and strongly disagreed on the same statement. Moreover the data of the Table regarding this item also showed that, 36.23% the respondents were not clearly indicated their level of agreements. The calculated mean result ($M=2.638$, $SD=1.25$) also showed almost moderate level of their agreement regarding availability of First aid kits effectively in the study construction site.

In general, overall results of the Table confirmed weakest level of usage of PPE and First-Aid kits in the study area. Majority of the respondents were not agreed (38.65% strongly disagreed and 26.33% disagreed) the practices of Using of Personal Protective Equipment (PPE) and First-Aid at koye Feche III construction site. Out of the total 207 respondents, only 18.24% responds (6.04% = Strongly Agree and 12.20% = Agree) have reflected their understanding about PPE, its usage and availability of first aid kits in the study area. In addition the mean score 2.2.7 ($SD=1.24$) also indicated disagreement of the respondents on usage of PPE and First-Aid kits in the study construction project site. In this regards, the results of t-test did not indicated statistically significant differences between two groups of respondents (long term contract employees and temporary employees) in responding all items of using Personal Protective Equipment (PPE) and First-Aid.

4.2.3 Understanding of Basic Accident Causing Construction Activities

In this part of the section respondents' responses collected regarding understanding of basic accident causing construction activities at the project area; were presented and analyzed. Understanding and identifying some of the basic accident causing construction activities and work processes are as important as using PPE and having first aid devices in construction work cause prevention is the best way to get protected from injury.

The data in Table 4.4 contains respondents' responses regarding their understanding about basic accident causing construction activities in the study site (for more information please refers to Appendix D).

Table 4.4: Respondents Understanding about accidents causing construction activities

No	Items	Res.	Responses (%)					Total	Mean Score	SD	t-test	P-Value
			5	4	3	2	1					
1	Working on an old scaffolding can cause safety problem	LTCE	14.49	13.04	62.32	7.25	2.90	100	3.290	0.91	0.67	0.506
		TE	18.12	29.71	27.54	22.46	2.17	100	3.391	1.09		
		All	16.91	24.15	39.13	17.39	2.42	100	3.357	1.03		
2	Using a ladder shorter than 1 meter above the landing can lead for falling	LTCE	30.43	15.94	46.38	4.35	2.90	100	3.667	1.05	-1.61	0.110
		TE	23.19	21.74	27.54	27.54	0.00	100	3.406	1.12		
		All	25.60	19.81	33.82	19.81	0.97	100	3.493	1.11		
3	When working on floors above the ground level; edge protection is important	LTCE	10.14	59.42	21.74	8.70	0.00	100	3.710	0.77	-4.39	0.000
		TE	10.87	13.77	57.97	15.22	2.17	100	3.159	0.89		
		All	10.63	28.99	45.89	13.04	1.45	100	3.343	0.89		
Overall Results		LTCE	18.36	29.47	43.48	6.76	1.93	100	3.556	0.93	-2.76	0.002
		TE	17.39	21.74	37.68	21.74	1.45	100	3.319	1.04		
		All	17.71	24.32	39.61	16.75	1.61	100	3.398	1.01		

Source: Survey Results (March 2017)

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

As shown in the table above 24.15% and 16.91% of the respondents were agreed and strongly agreed that working on old scaffolding can cause safety problem. Only 17.39% of the same categories of employees disagreed to similar statement. Furthermore, the mean score results (M=3.357, SD=1.05) also showed moderate level of understanding of the respondents on the issue of working on an old scaffolding can cause safety problem at construction site under study.

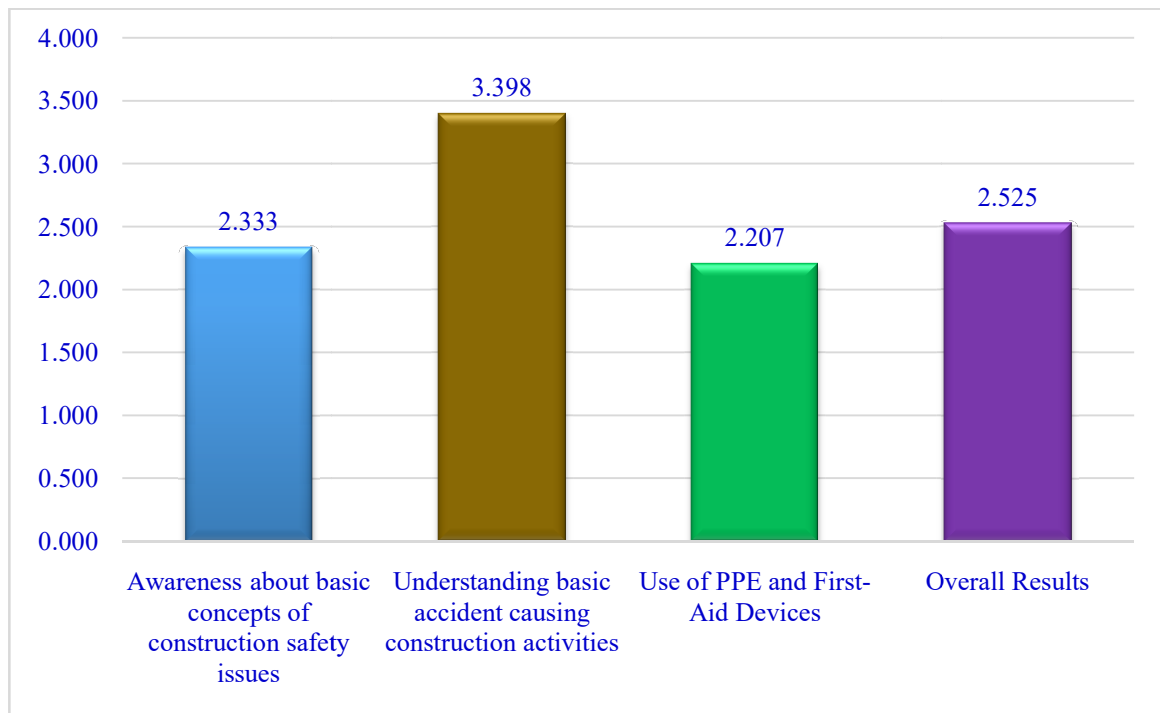
Furthermore, regarding the second item of the Table, out of the total respondents 25.15% of the total employees strongly agree and 19.81% of them with a mean score of 3.493 (SD=1.11) were agreed to the statement that using a ladder shorter than one meter above the landing can lead for falling. This indicated above moderate level of agreement among the two groups of respondents' for item synonymously.

However, with regards to the third items of the Table (When working on floors above the ground level; edge protection is important), statistically significant differences was observed between the two groups of respondents (long term contract employees and temporary employees) in responding the item. According to the data of the Table, long term contract

employees (with 3.710 mean score and $SD=0.77$) were more agreed about item than that of temporary employees ($M=3.159$, $SD=0.89$). This indicated that, those employees employed on long term bases had better understanding about the consequences of working on floors above the ground level as accident causing construction activities than temporary employees of the construction site of this study area.

Such differences were also observed on overall understanding of the respondents about basic accident causing construction activities in the study site. Particularly their differences was reflected on their disagreement in responding the item; in that the number of temporary employees who disagreed the item (21.74%) were much high than that of long term contract employees (6.76%). However, overall mean score results showed that, their understudying was found almost at moderate level ($M=3.398$, $SD=1.01$).

Figure 4.4: Construction Safety Awareness Summary Results (Mean Scores)



Source: Survey Results (March 2017)

The illustrated in Figures 4.4 demonstrated summary results of respondents' responses on construction safety awareness items. As can be seen from the figure, both long term contract employees and temporary employees were relatively responded better agreements for items associated with understanding of basic accident causing issues of construction activities (3.389 mean score) in the study site. However, they lacks proper aware regarding issues related to Use

of PPE and First-Aid devices (2.207 mean score) and awareness about basic concepts of construction safety issues in the study area.

Besides, overall results illustrated in figure clearly showed, lower level of construction safety awareness among respondents (2.525 mean score). This means majority of long term contract employees and temporary employees were engaged on construction activities of the study site without having proper awareness and understanding of construction safety issues; which possibility lead them to accidents and injuries in the construction site of the study area. Generally based on the overall result of the respondents' one can infer that the construction safety awareness among workers at Koye Feche III construction site is very low. This implies that the perception, understanding and attitude towards construction safety is very low, hence the project initiators has to take the initiation to arrange and prepare trainings and workshops to close the gap regarding the workers perception, understanding and attitude of construction safety.

4.3. Frequently Occurring Injuries

Regarding the types of injuries most frequently experienced in the housing construction sites and that result the housing construction participants for an expected damage of body parts and for the loss of the life of innocents; respondents were asked to answer and rank ten most common construction site accidents that are extracted from related studies. Their responses were illustrated in Table 4.5 (the detailed data were illustrated in Appendix C).

Accordingly, the overall results of this Table, Foot and hand injury (M=4.546, SD=0.94), Falling from height (M=4.319, SD=1.14), Collapse during excavation (M=4.164, SD=1.03), and Collapse during concrete casting (M=3.821, SD=1.09), Back pain (M=3.614, SD=1.41) were synonymously identified by the two group of respondents as the top-five most frequently occurring injuries in Koye Feche III housing construction site.

Besides, Puncture (M=3.473, SD=1.11), and Hit on the head (M=3.401, SD=0.94), were identified by the respondents next to the above top-five accidents as the sixth and seventh injuries repeatedly occurred in the construction industry especially in the housing construction understudy.

Table 4.5: Most Frequently Occurring Injuries

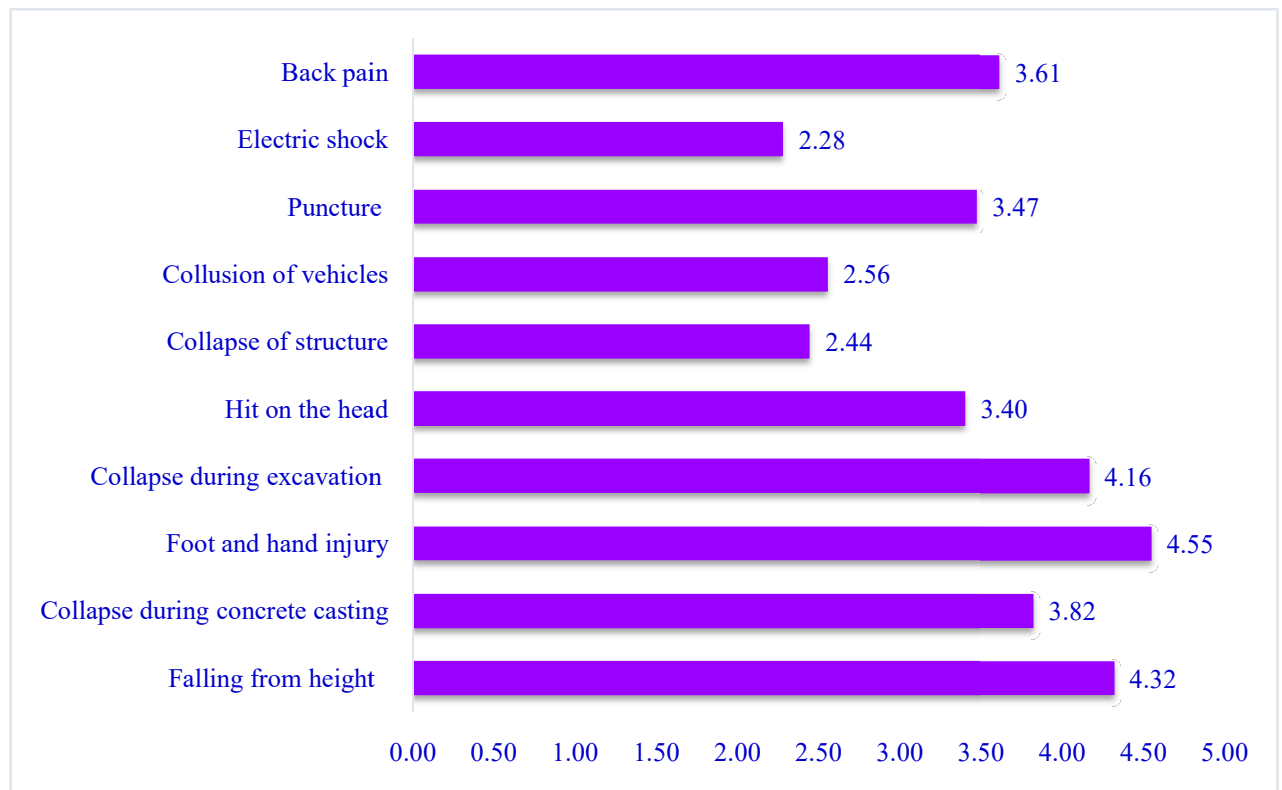
N ^o	Items	Res.	Responses (%)					Mean	SD	t-test	P-Value	Ranks
			5	4	3	2	1					
1	Falling from height	LTCE	79.71	8.70	4.35	2.90	4.35	4.565	1.02	-2.22	0.027	2
		TE	58.70	18.12	13.04	4.35	5.80	4.196	1.18			
		All	65.70	14.98	10.14	3.86	5.31	4.319	1.14			
2	Collapse during concrete casting	LTCE	18.84	18.84	57.97	2.90	1.45	3.507	0.88	2.99	0.003	4
		TE	44.20	25.36	18.84	7.25	4.35	3.978	1.15			
		All	35.75	23.19	31.88	5.80	3.38	3.821	1.09			
3	Foot and hand injury	LTCE	66.67	26.09	1.45	4.35	1.45	4.522	0.85	0.26	0.794	1
		TE	81.16	2.17	9.42	5.80	1.45	4.558	0.98			
		All	76.33	10.14	6.76	5.31	1.45	4.546	0.94			
4	Collapse during excavation	LTCE	66.67	15.94	11.59	4.35	1.45	4.420	0.96	-2.56	0.011	3
		TE	42.75	31.16	13.04	13.04	0.00	4.036	1.04			
		All	50.72	26.09	12.56	10.14	0.48	4.164	1.03			
5	Hit on the head	LTCE	5.80	17.39	63.77	7.25	5.80	3.101	0.84	3.32	0.001	7
		TE	13.04	44.20	31.88	6.52	4.35	3.551	0.95			
		All	10.63	35.27	42.51	6.76	4.83	3.401	0.94			
6	Collapse of structure	LTCE	1.45	1.45	39.13	21.74	36.23	2.101	0.97	3.44	0.001	9
		TE	5.80	4.35	55.07	15.22	19.57	2.616	1.03			
		All	4.35	3.38	49.76	17.39	25.12	2.444	1.04			
7	Collusion of vehicles	LTCE	4.35	8.70	14.49	63.77	8.70	2.362	0.92	1.78	0.077	8
		TE	6.52	17.39	32.61	21.74	21.74	2.652	1.19			
		All	5.80	14.49	26.57	35.75	17.39	2.556	1.11			
8	Puncture	LTCE	5.80	78.26	8.70	4.35	2.90	3.797	0.74	-3.03	0.003	6
		TE	10.87	47.83	17.39	9.42	14.49	3.312	1.23			
		All	9.18	57.97	14.49	7.73	10.63	3.473	1.11			
9	Electric shock	LTCE	2.90	8.70	11.59	65.22	11.59	2.261	0.89	0.19	0.850	10
		TE	2.90	8.70	36.23	18.84	33.33	2.290	1.11			
		All	2.90	8.70	28.02	34.30	26.09	2.280	1.04			
10	Back pain	LTCE	27.54	50.72	10.14	8.70	2.90	3.913	1.00	-2.19	0.030	5
		TE	38.41	16.67	19.57	3.62	21.74	3.464	1.55			
		All	34.78	28.02	16.43	5.31	15.46	3.614	1.41			

Source: Survey Results (March 2017)

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

Furthermore, as one can see from the data of the Table and summary results illustrated in Figure 4.5, Collusion of vehicles (M=2.556, SD=1.11), Collapse of structure (M=2.444, SD=1.04), and Electric shock (M=2.20, SD=1.04), were the three items identified by long term contract employee and temporary employees as the least frequently occurring injuries in the study area.

Figure 4.5: Injuries most frequently Occurred at Construction Site



Source: Survey Results (March 2017)

4.4. Main Causes of Construction Site Injuries (Accidents)

The causes of construction injuries are numerous and varied. While some of these causes are easy to spot, others are less obvious. In order to protect oneself and others from injuries usually occurred at construction sites; the primary criteria are to know the cause of the problem. Once the primary causes are identified it can easily lead all concerned bodies to seek solution and take appropriate actions.

Considering, numerous causes that are identified by different researchers that can be reasons for construction site injury or hazard; in this study the research takes eight causes that are identified by previous researchers as the major factors that are possibly sources of a construction site problems or injuries. These eight questions are presented to the respondents to identify the extent of those items as the core causes of the construction site injuries using likert-scale chart and the results of respondents' responses were presented in Table 4.6.

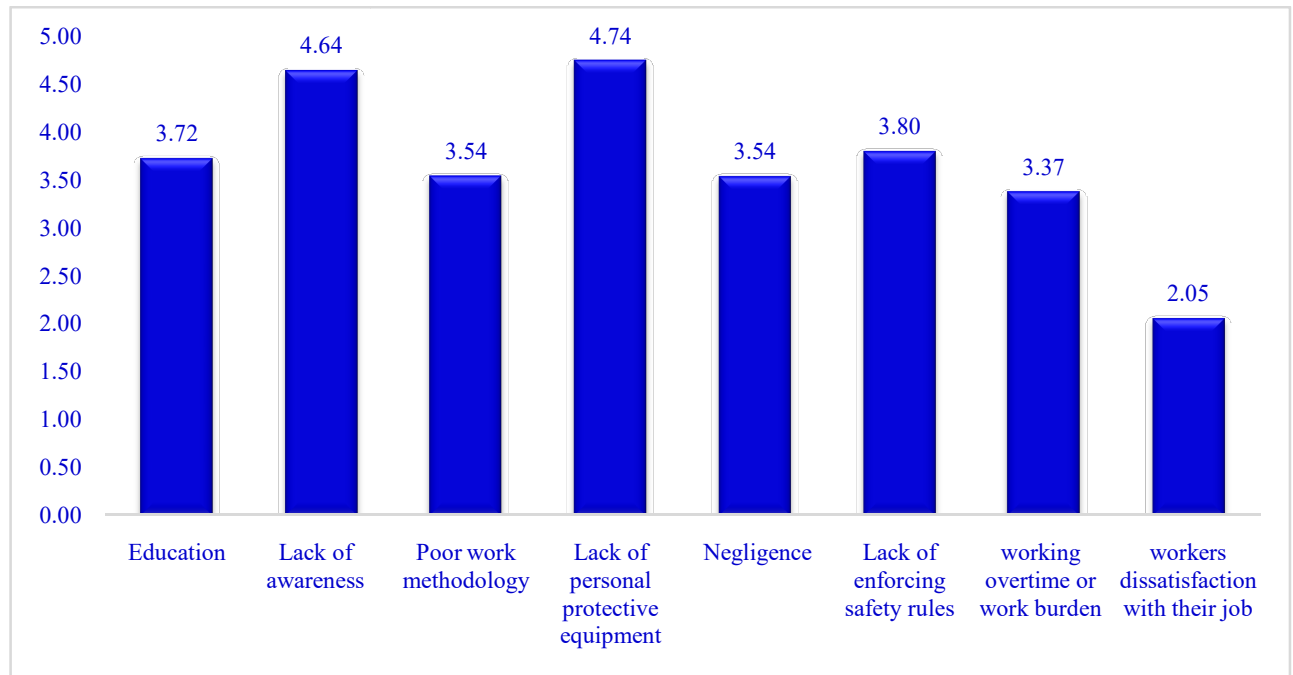
Table 4.6: Main Causes of Construction Safety Injuries

N ^o	Items	LTCE		TE		Total		t-test	P-Value	Ranks
		Mean	SD	Mean	SD	Mean	SD			
1	Education	3.96	0.88	3.61	1.09	3.72	1.04	-2.30	0.02	4
2	Lack of awareness	4.71	0.81	4.61	0.88	4.64	0.86	-0.80	0.42	2
3	Poor work methodology	3.35	0.82	3.64	1.05	3.54	0.99	2.00	0.05	5
4	Lack of personal protective equipment	4.75	0.67	4.74	0.77	4.74	0.74	-0.13	0.894	1
5	Negligence	3.39	0.83	3.61	1.05	3.54	0.98	1.50	0.134	6
6	Lack of enforcing safety rules	3.90	0.75	3.75	1.00	3.80	0.93	-1.11	0.267	3
7	working overtime or work burden	3.26	0.76	3.43	0.89	3.37	0.85	1.33	0.184	7
8	workers dissatisfaction with their job	1.90	1.21	2.13	1.29	2.05	1.27	1.24	0.217	8

Source: Survey Results (March 2017)

Lack of the availability of personal protective equipment at the project site was considered by the respondents as the core cause of the construction site problems and injuries with a mean value of 4.74(SD=0.74). Next to this, lack of construction site safety awareness (M=4.64, SD=0.86) was the second major cause of the injuries associated with construction work; and lack of enforcing construction site rules and regulation (M= 3.80, SD= 0.93) was followed the above two causes and rated by respondents at third level.

Figure 4.6: Summary of Main Causes of Construction Safety Injuries



Source: Survey Results (March 2017)

Moreover, respondents responses illustrated in the Table and summary data demonstrated in Figure 4.6 also shows, Lack of basic education ($M=3.72$, $SD=1.04$), Negligence ($M=3.54$, $SD=0.98$), Poor work methodologies ($M=3.54$, $SD=0.99$), and work burden ($M =3.37$, $SD=0.85$) as other additional causes of construction site problems and injuries in the study area.

However, workers dissatisfaction with their work ($M=2.05$, $SD=1.27$) was identified by both group of the respondents as the least causes of construction site injuries. This means construction site employees were not usually exposed to different accidents and injuries because of their dissatisfaction with their job and work environments.

4.5. Major Findings

The Ethiopian Labor proclamation No. 377/06 (in Article 92) clearly spells out the fundamental obligations of an employer with regard to putting in place all the necessary measures in order to ensure, work places are safe, healthy and free of any danger to the well-being of workers. Moreover, the proclamation ensure that, workers are properly instructed and notified concerning the hazards of their respective occupations and the pre cautions necessary to avoid accident and injury to health. Ensure that directive are given and also assign safety officer, establishes an occupational, safety and health committee, provides workers with protective

equipment, clothing and other materials and instruct them of its use, obliged to register and notify to the nearest labor inspection services occupational accident and diseases (Negart Gazeta, 2004). In addition to that, Ministry of Construction and Urban Development mention the importance of on job training and it includes the specific topics to be incorporated in the training module.

However the findings of this study confirmed that, there is no safety inspector at all and no enforcing rules to push the contractors and consultants to keep the construction workers health and safety. Above all, noting has been done to enforce the contractors to provide the basic types of PPE like heal mate and safety shoe to the workers. As of the response obtained from interview of the managements, practically nothing has been done related to construction safety training in the last three years. In addition, all the management's responded that the construction safety awareness of the workers is low but theses managements believe the problem really exist.

In relation to this, it is mention in the literature review in a study conducted in 2014 to assess Construction Site Workers' Awareness on Using Safety Equipment suggested that the construction safety awareness of workers in Malaysia was medium; they don't have all the applicable knowledge to protect themselves from construction site accidents but they have sufficient knowledge on the risk of accidents at construction sites [16].But in this study we found that, the construction safety awareness among Addis Ababa housing construction workers was low. Moreover, Sebsibe and Dagnachew (2016) found that lack of construction safety awareness is the primary cause of workers injury at construction sites followed by poor working conditions and lack of use of personal protective equipment in Addis Ababa.However, in this study it is found that lack of personal protective equipment is the primary cause of workers injury at the study area; followed by lack of construction safety awareness and lack of enforcing rules and regulations.

Furthermore, occupational hazards in construction industry: case studies from housing and construction workers at Addis Ababa by Tewodros (2016), discussed that, the three leading occupational injuries in the study site were puncture, followed by hand injury, and back pain. Whereas, this study result showed that the frequently happening types of construction site injuries are foot and hand injuries, followed by falling from height and Collapse during excavation.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter deals with conclusions drawn from the findings and recommendations forwarded in order to improve construction safety awareness among Addis Ababa Housing construction project office construction workers in the study area.

5.1 Conclusions

Construction site accident reduction or total avoidance involves initially creating awareness concerning construction site safety and the primary cause of accidents pulse the types and extent of injuries. So, the results of this study have important implications for keeping construction site safe and injury free, especially in mass construction projects sites like construction of condominiums and for policy makers.

The study results revealed that out of the total participants' majority of the workers never heard about construction site safety before this study. The study also exposed that greater than half of the participant fail to agree that construction site accident could cause permanent disability that could be extended to death.

So based on the responses from the above specific questions related to construction safety awareness and responses of other sequence of questions related to safety awareness such as their exposure to construction safety related information and their understanding of work place safety rules, there is low level of construction safety awareness among Addis Ababa housing construction project office construction workers.

The study also found out that the most common injuries were foot and hand injury, followed by falling from height, and Collapse during excavation. Moreover, the highly rated causes of the injuries are lack of personal protective equipment (PPE), lack of safety awareness, and lack of enforcing rules at Addis Ababa housing construction project office construction site. From these it is possible to conclude that, unless an immediate action is taken on time, the mentioned accidents and their causes can strongly affect the life of construction workers and the development of the sector. So, it calls the action of Addis Ababa Housing construction project office and other stakeholders to take their parts in order to improve construction safety awareness among construction workers in the study area.

5.2. Recommendations

Based on the findings of this study, the following recommendations were forwarded:

- To improve the level of construction safety awareness in the construction industry, the intensive effort of stakeholders of the construction industry including owners, management and employees of construction companies, consultants as well as government is important. Addis Ababa housing construction project office and other construction participants should be heavily responsible to enhance the employees' knowledge and attitude towards construction safety and the causes and upshot of construction activities.
- The study indicated that lack of personal protective equipment was the primary cause injuries around the study area hence provision of sufficient number and kind of personal protective equipment will result in the reduction of the problem. Therefore, Addis Ababa housing construction project office as client should try to fulfill the required type and number of devices equivalent with the other basic materials of construction works.
- Moreover, regular safety training and orientation should be given to employees by construction companies and consultants. Addis Ababa housing project office should also give training to representatives and safety officers of the housing construction branch offices and certify them. The Safety Officers intern will train workers in their respective project sites and inspect the site regularly
- Addis Ababa housing construction project office in collaboration with the Ministry of Labor and Social Affairs and other concerned governmental and non-governmental bodies should prepare clear and effective safety rules and regulation that can be efficiently implemented around the housing construction project office construction sites, because that is one of the most common cause of injury around the construction sites as responded by the participants.
- Construction safety education should be given at colleges or universities level in more detail than the current practices to students who could assigned in the construction sector when they graduate. This will help them to focus on construction safety while they engaged on construction sites.

- Construction workers should be encouraged and coordinated to participate on issues related to construction safety and health at their company.

Finally, though the findings of this study attempted to identify extent of construction safety awareness, frequently occurring injuries and major causes of safety problem among construction workers at construction project site of Addis Ababa housing construction project office, there may be other specific factors not assessed through this study. So, to identify such factors and to take proper actions on time; it is advisable if further research is conducted by the city on issues related to factors affecting construction safety awareness in the city.

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APPENDICES

APPENDIX- A: The Questionnaires



ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

GRADUATE STUDY PROGRAM

Questionnaire to Koye Feche III construction site workers

Research Topic “An Assessment of safety awareness among Addis Ababa housing development construction workers the case of Koye Feche III project site”

This research survey is designed to fulfill an academic requirement for MSc program in Construction Management at the Addis Ababa science and Technology University. I can assure you that the research data will only be used solely for the academic purpose and will be treated with strict confidentiality. Particular mentioning of names will not be required anywhere.

Your open and prompt response is highly appreciated.

Objective of the study

The general objective of the study is to assess the awareness of safety among Addis Ababa housing development construction workers.

To mention the specific objectives

- To assess safety awareness among Addis Ababa housing construction workers at Koye Feche III project site.
- To investigate safety problems among Addis Ababa housing construction workers at Koye Feche III project site.
- To identify the major causes of safety and health problems among Addis Ababa housing construction workers at Koye Feche III project site.

Thank you in advance for your time!

For Further Information

Name; Ephrem H/Michael

Phone; +251-0911394445

E-mail; ephrem0673@gmail.com

Advisor; Girmay kahasy (PhD)

Part I: General Information

1. Sex

Male Female

2. Age

18-25 31-50
26-30 above 50

3. Marital Status

Married Divorced
Single Widowed

4. Educational level

Illiterate 9-12 Diploma (10+3/4 And 12+2
Can Read And Write Degree
1-8 Above Degree

5. Employment pattenren

Permanent Temporary /contract

6. What is your position in the organization? _____

7. Working hours

8 hours greater than 8 hours

8. Your years of experience in the construction industry:

Below 2 years 2-5 years
6-10 years above 10 years

9. How many years did you work in your current company?

Below 2 years 2-5 years

6-10 ears above 10 years

Part II: Perception

The following statements are related to your experiences in the construction industry. The questions are prepared to evaluate your awareness of construction safety, to identify the most hazardous construction problems and to identify the possible causes of the problems. Please show the extent to which you agree that the construction industry safety in your site has the feature described in each statement. The study is interested to know the level of your agreement or disagreement to each factor using the scales: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5)

Nº	Statement	1	2	3	4	5
10	I have heard about construction safety before.					
11	I know safety information that can be described by picture, sign, labels or other else.					
12	I understand safety rule in my work place					
13	I can deal with safety problems in my work place.					
14	I always remember to use personal protective equipment (PPE) when I enter in to site.					
15	Series construction site safety problem that can be extended to permanent disability or death could be acquired during construction work?					
16	I have the safety awareness needed for the hazards we face on this job.					
17	Working on an old scaffolding can cause safety problem					
18	Using a ladder shorter than 1 meter above the landing can lead for falling					
19	When working on floors above the ground level; edge protection is important					
20	Taking safety training will increase safety awareness					
21	Use of PPE is comfortable for construction work					
22	I know about first aid to protect someone during emergency					
23	First aid kit is effectively available in our site					

Part III: Most commonly occurring accidents in the construction site

Nº	Statement	1	2	3	4	5
24	Falling from height					
25	Collapse during concrete casting /dismantling of formwork					
26	Foot and hand injury					
27	Collapse during excavation					
28	Hit on the head					
29	Collapse of structure					
30	Collusion of vehicles					
31	Puncture					
32	Electric shock					
33	Back pain					

Part IV: Main causes of construction safety problems in your work area

Nº	Statement	1	2	3	4	5
34	Education					
35	Lack of awareness					
36	Poor work methodology					
37	Lack of personal protective equipment					
38	Negligence					
39	Lack of enforcing safety rules					
40	working overtime or work burden					
41	workers dissatisfaction with their job					

APPENDIX- B: Interview Questions for Top Management Official

Interview Questions

- 1) How do you describe the construction safety awareness of the workers in your work area?
- 2) How many times did you prepare safety training in your construction company/site so far?
- 3) Do you think the construction workers in your site are safe from construction hazarded? If yes how/ what are the reasons for being safe?
- 4) What efforts as a contractor, consultant or client did you take to improve construction safety awareness of your employees?

APPENDIX- C: Most Frequently Occurring Injuries-Respondents responses (%)

No	Items	Res.	5	4	3	2	1	Mean	SD	t-test	P-Value	Ranks
1	Falling from height	LTCE	79.71	8.70	4.35	2.90	4.35	4.565	1.02	-2.22	0.001	2
		TE	58.70	18.12	13.04	4.35	5.80	4.196	1.18			
		All	65.70	14.98	10.14	3.86	5.31	4.319	1.14			
2	Collapse during concrete casting	LTCE	18.84	18.84	57.97	2.90	1.45	3.507	0.88	2.99	0.024	4
		TE	44.20	25.36	18.84	7.25	4.35	3.978	1.15			
		All	35.75	23.19	31.88	5.80	3.38	3.821	1.09			
3	Foot and hand injury	LTCE	66.67	26.09	1.45	4.35	1.45	4.522	0.85	0.26	0.105	1
		TE	81.16	2.17	9.42	5.80	1.45	4.558	0.98			
		All	76.33	10.14	6.76	5.31	1.45	4.546	0.94			
4	Collapse during excavation	LTCE	66.67	15.94	11.59	4.35	1.45	4.420	0.96	-2.56	0.002	3
		TE	42.75	31.16	13.04	13.04	0.00	4.036	1.04			
		All	50.72	26.09	12.56	10.14	0.48	4.164	1.03			
5	Hit on the head	LTCE	5.80	17.39	63.77	7.25	5.80	3.101	0.84	3.32	0.174	7
		TE	13.04	44.20	31.88	6.52	4.35	3.551	0.95			
		All	10.63	35.27	42.51	6.76	4.83	3.401	0.94			
6	Collapse of structure	LTCE	1.45	1.45	39.13	21.74	36.23	2.101	0.97	3.44	0.026	9
		TE	5.80	4.35	55.07	15.22	19.57	2.616	1.03			
		All	4.35	3.38	49.76	17.39	25.12	2.444	1.04			
7	Collusion of vehicles	LTCE	4.35	8.70	14.49	63.77	8.70	2.362	0.92	1.78	0.102	8
		TE	6.52	17.39	32.61	21.74	21.74	2.652	1.19			
		All	5.80	14.49	26.57	35.75	17.39	2.556	1.11			
8	Puncture	LTCE	5.80	78.26	8.70	4.35	2.90	3.797	0.74	-3.03	0.002	6
		TE	10.87	47.83	17.39	9.42	14.49	3.312	1.23			
		All	9.18	57.97	14.49	7.73	10.63	3.473	1.11			
9	Electric shock	LTCE	2.90	8.70	11.59	65.22	11.59	2.261	0.89	0.19	0.298	10
		TE	2.90	8.70	36.23	18.84	33.33	2.290	1.11			
		All	2.90	8.70	28.02	34.30	26.09	2.280	1.04			
10	Back pain	LTCE	27.54	50.72	10.14	8.70	2.90	3.913	1.00	-2.19	0.007	5
		TE	38.41	16.67	19.57	3.62	21.74	3.464	1.55			
		All	34.78	28.02	16.43	5.31	15.46	3.614	1.41			

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

APPENDIX- D: Responses on Main Causes of Construction Safety Injuries (%)

No	Items	Res.	5	4	3	2	1	Mean	SD	t-test	P-Value
1	Education	LTCE	18.84	71.01	1.45	4.35	4.35	3.957	0.88	-2.300	0.033
		TE	15.22	52.90	18.84	3.62	9.42	3.609	1.09		
		All	16.43	58.94	13.04	3.86	7.73	3.725	1.04		
2	Lack of awareness	LTCE	84.06	8.70	4.35	0.00	2.90	4.710	0.81	-0.802	0.018
		TE	78.99	9.42	7.25	2.17	2.17	4.609	0.88		
		All	80.68	9.18	6.28	1.45	2.42	4.643	0.86		
3	Poor work methodology	LTCE	14.49	13.04	65.22	7.25	0.00	3.348	0.82	2.003	0.047
		TE	21.01	39.13	27.54	7.25	5.07	3.638	1.05		
		All	18.84	30.43	40.10	7.25	3.38	3.541	0.99		
4	Lack of personal protective equipment	LTCE	84.06	10.14	4.35	0.00	1.45	4.754	0.67	-0.133	0.125
		TE	86.96	5.07	4.35	2.17	1.45	4.739	0.77		
		All	85.99	6.76	4.35	1.45	1.45	4.744	0.74		
5	Negligence	LTCE	13.04	18.84	65.22	0.00	2.90	3.391	0.83	1.503	0.024
		TE	21.74	35.51	27.54	12.32	2.90	3.609	1.05		
		All	18.84	29.95	40.10	8.21	2.90	3.536	0.98		
6	Lack of enforcing safety rules	LTCE	13.04	71.01	11.59	1.45	2.90	3.899	0.75	-1.113	0.081
		TE	16.67	60.14	9.42	8.70	5.07	3.746	1.00		
		All	15.46	63.77	10.14	6.28	4.35	3.797	0.93		
7	working overtime or work burden	LTCE	11.59	10.14	71.01	7.25	0.00	3.261	0.76	1.335	0.184
		TE	9.42	39.13	38.41	10.87	2.17	3.428	0.89		
		All	10.14	29.47	49.28	9.66	1.45	3.372	0.85		
8	workers dissatisfaction with their job	LTCE	4.35	4.35	28.99	1.45	60.87	1.899	1.21	1.240	0.030
		TE	2.17	18.84	21.01	5.80	52.17	2.130	1.29		
		All	2.90	14.01	23.67	4.35	55.07	2.053	1.27		

NB: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree