



**SAINT MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**DEPARTMENT OF PROJECT MANAGEMENT**

**ASSESSMENT ON HEALTH AND SAFETY PRACTICES IN ETHIOPIA**  
**ELECTRIC POWER CONSTRUCTION PROJECTS**

**BY**

**KASAHUN TSEHAY JEMANEH**

**JUNE 2022**

**ADDIS ABABA**

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**St. Mary's University  
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**Assessment on Health and Safety Practices in Ethiopian Electric  
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## **DECLARATION**

I therefore certify that the study described in this thesis, "Assessment of Health and Safety Practices in Ethiopian Electric Power Construction Projects," is my own original work. It had not been submitted as partial fulfillment for any educational qualification at this university or any other, and it had not been used in any projects in any way, and all of the resources materials used for this thesis had been appropriately recognized.

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Kasahun Tsehay

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Date

## **LETTER OF CERTIFICATION**

This is to certify that Mr. Kasahun Tsehay Jemaneh prepared the thesis "Assessment of Health and Safety Practices in Ethiopian Electric Power Construction Projects," which was submitted to St. Mary's University in partial fulfillment of the requirements for the award of the degree of Master in project management, under my guidance and supervision.

As a result, I hereby declare that no part of this thesis has been submitted to any other university or institution for the purpose of awarding a degree or diploma, and that all matters contained in the thesis have been properly recognized.

\_\_\_\_\_

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\_\_\_\_\_

Signature

\_\_\_\_\_

Date

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## **ABSTRACT**

*The construction business has long been regarded as one of the most dangerous. This is due to the industry's low performance in terms of health and safety when compared to other industries around the world. Every country's labor law states that it is the employer's responsibility to ensure that every employee is working in a satisfactory, safe, and healthy environment. The construction industry in Ethiopia is characterized by high incidents rate of accidents. The objective of this research is Assessment of Health and Safety Practices in Ethiopian Electric Power Construction Projects. Accordingly, survey research design was used to accomplish the objectives of the study. Mainly a five point Likert scale questionnaire was distributed to engineers and professionals who are working in Ethiopian Electric Power construction projects as a project manager, site engineer and office engineer to may help collect the data for knowing the levels of health and safety conditions in Ethiopian Electric Power Construction Projects. Activities used SPSS (Statically Package For Social Science) software, Microsoft Excel spreadsheets tools, and descriptive statics were used to identify the importance and relative significance of the health and safety factors that were ultimately utilized to develop the proposed health and safety framework or health and safety model. The results show that the health and safety practices in Ethiopian Electric Power Construction Projects are classified as unsafe practice and required high improvement that is due to a major five causes factors of accidents on the response failure to use Personal Protective Equipment's (PPE), Lack of health and safety training, lack of top management commitment in health and safety programs,, Lack of education, Negligence & carelessness, Inadequate management of work environment, and ineffectiveness of current health and safety policies. And Most of construction projects don't have continues health and safety training, safety meeting, safety policies, safety officer, medical and first aid facilities and reporting system. Moreover, the roles of government towards health and safety are almost minimal under implementation of Occupational Health and Safety rules.*

**KEY WORDS:** Health and Safety management, Construction project, Employee/Worker, Accident,

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## ACRONYMS

EELPA:	Ethiopian Electric light and power Authority
EEPCO:	Ethiopian Electric Power Corporation
EEP:	Ethiopian Electric Power
HS	Health and safety
HSC	Health and Safety Commission
HSE	Health and Safety Executive
U.K	United Kingdom
U.S.A	United States of America
WHO	World Health Organization
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Administration
HSMS	Health and safety Management System
SPSS	Statistical Package for Social Sciences
PMBOK	Project Management Body of Knowledge
PM	Project Manager
HRM	Human Resource Manager

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## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1. Background of the Study

The Guide to the Project Management Body of Knowledge recognizes Health and Safety management as necessary knowledge in the project management field (PMBOK Guide, cited by Cretu et al., 2011). All hazards and accidents that could potentially put project employees at risk are expected to be taken into account by safety management. Any workplace's health and safety is critical to reducing such dangers, both legally and ethically, but in particularly risky environments, such as the construction industry, health and safety takes on a life-threatening relevance since the business's daily tasks are extremely dangerous. As a result, it's critical to develop appropriate safety activities and strategies that account for the possibility of major health and safety issues.

Past studies in the areas (Lucy Fekete, Prof. Emer T. Quezon, Yolente C. Macarubbo, 2016) clearly shows that different types of construction projects pose a significant risk to employees' lives, and serious injuries and fatalities are common in the construction business. As a result, safety considerations and management, as well as basic health and safety considerations, are unquestionably essential to every construction project. Many of the numerous health and safety dangers in construction can be avoided with good health and safety planning.

As a result, dangerous human behavior (i.e. individual variables) and/or a hazardous working environment are the leading causes of construction site accidents (i.e. system factors). Furthermore, it is clear that there is a significant problem with falls, and construction-related injuries continue to be a huge problem around the world.

Safety management is the process of identifying health and safety hazards and taking steps to reduce the likelihood of a risk materializing as well as to mitigate or eliminate the potential effects of such risks. SAEED (2017, SAEED). This proposal focused on the most common type of risk in Ethiopian electric power construction projects: the impact of construction on staff health and safety (H&S).

The goal of this proposal is to offer findings on health and safety management techniques in Ethiopian electric power (EEP) construction projects. The project's main goals are to: benchmark the existing state of construction health and safety procedures in Ethiopian electric power (EEP) construction projects. First determine the data requirements for continuous performance measurement; second, to produce health and safety recommendations; third, to develop appropriate educational and training materials; and, lastly, to improve current practice and control construction worker health and safety.

## **1.2. Brief history of the company**

The Ethiopian Electric Power (EEP) is public owned vertically integrated power utility company responsible for the construction and operation of power generation plants, Substation and High Voltage transmission systems. Previously, the mother company was established in 1956 EC named as the Ethiopian Electric light and power Authority (EELPA). In 1997 it was re-structured as a Corporation and renamed as Ethiopian Electric Power Corporation, under the Public Enterprise Act of 1992.

EPP as public enterprise mandated by the Ministry of Water, Irrigation and Energy. The decree proclaimed under the Regulation 203/2013 adopted by the Council of Ministers on December 27, 2013EC, having the following main objectives.

Undertake feasibility studies, design and survey of electricity generation, transmission and substations; to contract out such activities to consultant as required;

Undertake electricity generation, transmission and substations; construction and upgrading to contract out such works to contractors as required;

Handle electricity generation, transmission and substations operation and maintenance activities;

Bulk power sell and leasing power transmission lines.

As of today, EEP's installed capacity has reached to 4,515 MW, of which more than 90% shares are from hydropower and the remaining is wind and thermal. Operating grid voltage levels ranges from 132 to 500kV with a total transmission length of 19,746km. Currently, EEP interconnected with Sudan and Djibouti through 230kV double circuit interconnector exporting more than 200MW and 1,000GWh energy annually.

On the construction and expansion wing, EEP has started the commissioning and finalization of the construction of interconnector with Kenya through 500kV HVDC system, which is one of the most critical infrastructures highways in Eastern African power pool. When it became operational, there will eminent power exchange not only between Ethiopia and Kenya but it will also have the opportunities for energy trade between Tanzania, Zambia, and Egypt through power wheeling mechanism with the help of existing infrastructure in the power pool.

The Grand Ethiopian Renaissance Dam (GERD) is one of the most critical hydro power generation plants having a capacity of 5,150MW; the first phase of the project is expected to be operational by 2021 GC. The project will help achieve the national electrification access program, which has a target to increase from existing 33% to 96% on grid energy access by 2030. At the same time export of clean energy to eastern African countries will make a difference.

### **1.3. Statement of the Problem**

Construction is a major and active sector that is a backbone of the global economy in general and Ethiopia's economy in particular, mobilizing immense amounts of varied resources and budgets and embracing massive people by creating large job opportunities. Dadzie (Dadzie, 2013). An estimated 271 million individuals worldwide suffer from work-related injuries each year, with 2 million dying as a result of these injuries. Work-related injuries and diseases were expected to cost the global economy 4% of its gross domestic product. Eijkemans (Eijkemans, 2003).

The construction industry, which employs the greatest workforce, has been responsible for around 11% of all occupational injuries and 20% of all occupational deaths. Every year, the International Labor Organization estimates that at least 60,000 people die on Construction projects around the world. This indicates that in the industry, one fatal accident occurs every ten minutes. The majority of these collisions are caused by risky behavior and unsafe conditions.

The various levels of health and safety awareness in a site necessitate distinct training and communication methods. The enhancement of a healthy and safe working environment on construction sites is hampered by a lack of knowledge of the area, exposure to technology, information, and experience.

The majority of developed countries have notoriously weak health and safety standards. As a result, despite various efforts over the years to improve the practice, there appears to be a huge health and safety hazard that persists in developing countries, particularly in the construction industry Samuel, H.et al. (Samuel, H.et al. 2012). As a result, many countries appear to scarcely recognize the construction industry's practice of health and safety as a major contributor to their national growth Michael Fosu (Michael Fosu, 2018) According to Ethiopia electric power generation power plant construction, high voltage transmission line construction and including small, medium, and large substation building construction project.

Construction sites engineers, supervisors, and project managers are mostly seen with helmets on their heads and high visibility vests, standing at a safe distance, while daily laborers with no helmets or PPEs do the actual work on site, using construction tools and materials, holding equipment, and walking on old wood scaffoldings. People may break the law, but what is most amazing is seeing people lose their morality and sense of self-awareness.

This study looked at the current state of safety considerations and methods for reaching a zero-injury and zero-accident in the construction environment. More precisely, in Ethiopia Electric Power (EEP), office report during 2020/21 as examined Ethiopia electric power construction projects were lost more than 4 workers were died due to unsafe practice of construction Consequently, the organization has been mentioned the construction disaster that is more than 5 construction professionals were disabled and passed away because of involving unsafe practice during the year of 2020/21. there are a number of projects underway, including the development of a generation power plant construction, high-voltage transmission line construction and substation construction. Performing this following research questions need to be addressed:

#### **1.4. Research Question**

- ❖ What policies and regulations apply to Ethiopian Electric Power's (EEP) construction projects in terms of health and safety?
- ❖ What are the health and safety management frameworks employed by Ethiopian Electric Power (EEP) during construction?
- ❖ Are staffs in Ethiopian Electric Power's (EEP) provided adequate health and safety training during various sorts of construction projects?



- ❖ Are Ethiopian Electric Power's (EEP) health and safety infrastructure, equipment, and evaluation procedures suitable during various sorts of construction projects?

## **1.5. Objective**

### **1.5.1. General Objective**

The general objective of this research is to assess health and safety practice in Ethiopian Electric Power's (EEP) construction projects.

### **1.5.2. Specific Objective**

- ❖ To investigate the Ethiopian Electric Power (EEP) construction projects' current health and safety rules and regulations?
- ❖ To identify the health and safety management structures employed throughout the construction projects of Ethiopian Electric Power (EEP)?
- ❖ To determine whether enough health and safety training is provided throughout the construction phase of Ethiopian Electric Power's (EEP) construction projects.
- ❖ To assess the health and safety facilities, equipment, and evaluation procedures employed during Ethiopian Electric Power's (EEP) construction projects?

## **1.6. Significance of the Study**

The Significance of this Research is that Addressing health and safety issues to be considered as a regulatory burden because it offers significant possibilities and rewards to construction companies. Some of the benefits are To Ascertain that everyone in the organization understands their responsibilities. Assist in the establishment of a safe and healthy workplace. To ensure that all employees have the opportunity to discuss health, safety, and environmental issues. Reduce the dangers on the jobsite and keep note of all found hazards. Reduce the number of occurrences and establish a workplace free of accidents and injuries, resulting in lower project costs. And it provides a best practice guide to health and safety for other construction enterprises in Ethiopia, and solutions to health and safety concerns in one country may easily be copied to other countries to generate further improvements, which will definitely have a beneficial impact on the globe. Finally, it contributes significant knowledge for future research in the domain of safety

and health management practice in many types of construction projects, where there is a scarcity of information.

### **1.7. Scope and Limitation of the Study**

The study's goal is to evaluate safety and health management practices in Ethiopian electric power generation, transmission, and substation construction projects (EEP) The necessity to limit the study stems mostly from the following fundamental factors:

The focus of the paper is in the construction site's safety and health policies, Factors that contribute to the occurrence of safety and health incidents and Methods that have been used to reduce the number of accidents on construction sites.

The study employed a descriptive methodology to identify Ethiopian Electric Power's (EEP) existing health and safety practices in construction projects. During the implementation phase, the researchers tried to examine the core problem areas in accordance with the research questions, because identifying the problem is only half the battle. Primary data was gathered through interviews and questionnaires, and secondary data was gathered from previous studies, books, journals, and other sources. SPSS and a Microsoft Excel spreadsheet were used to evaluate the quantitative data.

Due to the little time allotted for research preparation, the research focus on force projects. And the local contractor and foreign contractor are not included because gathering the essential information and analyzing the data is difficult.

The research attempted to uncover the reality practices of health and safety management inside the scope region, however the lack of transparency among the people made fact-finding more difficult than all the other difficult aspects of doing a study.

### **1.8. Organization of the Research Report**

There are five chapters in this research report. The first chapter covers the introduction, study background, problem statement, study objectives, and other pertinent introductory topics. The literature review is the topic of the second chapter. The study strategy and methodologies employed throughout the data gathering and analysis process are covered in the third chapter.

The study's general findings are presented in the fourth chapter, and the study's summary of findings, conclusion, and recommendations are presented in the fifth chapter.

## CHAPTER TWO

### 2. LITRATURE REVIEW

#### 2.1. Introduction

The primary goal of doing literature reviews is to obtain data on the study issue. The study begins with a thorough analysis of the literature on construction health and safety, concentrating first on the breadth of the business and the majority of activities that involve perilous and dangerous procedures.

#### 2.2. Theoretical Review

##### 2.2.1. Health and Safety Definitions

Some basic occupational health and safety definitions, as well as the legal framework for health and safety, are required before a detailed discussion of health and safety issues can take place, because it appears important to have a clear understanding of the nature and working conditions in the construction industry and safety organizations in order to develop an efficient tool for health and safety issues.

**Health:** - is the state of a person's mind, body, and spirit, typically implying that they are free of illness, injury, or discomfort. In 1946, the World Health Organization (WHO) defined health as "a state of complete physical, mental, and social well-being, rather than only the absence of sickness or infirmity" (WHO, 2006).

is the safeguarding of persons against physical harm. It has something to do with external threats and the impression of being safe from them. According to the Business Dictionary, safety is described as a state of relative freedom from danger, risk, or threat of harm, injury, or loss of employees and/or property, whether intentionally or accidentally created. The distinction between health and safety is hazy, and the two terms are frequently used interchangeably to express care for an employee's physical and mental well-being at work.

**Construction projects:** are coordinated efforts to create a structure or a building.

**Employee/Worker:** An employee is a person who works for a company under a contract of **employment:** A worker under a contract in which the individual “undertakes to execute or perform any labor or services for another party individually.”

**Accident:** a terrible incident that occurs unintentionally and without warning, usually resulting in damage or injury.

### **2.2.2. Health and Safety Management**

Health and Safety Management is a set of procedures and efforts aimed at identifying workplace dangers and reducing accidents as well as exposure to hazardous circumstances and chemicals. (2019 Business Dictionary)

An employer's health and safety management system is a system in place to reduce the risk of injury and disease. (Alberta Government, 2020) Health and Safety Management is a tried-and-true strategy for lowering risk, keeping a safe culture, and increasing productivity. (National Quality Assurance Agency, 2020)

The management of health and safety is critical to the effective completion of projects. To be able to work, an individual must be healthy, and the working environment must be safe so that activities may be carried out properly.

### **2.2.3. Importance of Health and Safety**

White and Benjamin (2003) noted how implementing the guidelines would contribute to increased profitability within the organization and boost worker productivity because there would be a decreased percentage of absences due to injuries and illness. This would raise the organization's profile and contribute to increased profit and turnover. Because of the lower costs associated with workplace accidents, a better connection with builders and contractors also reduces the risk of prosecution and the resulting penalties.

### **2.2.4. Scope and Components of Health and Safety Management**

More than merely a health and safety program is included in health and safety management. It encompasses policies, systems, standards, and records related to health and safety, as well as integrating health and safety activities and programs into other corporate operations. (British Columbia Workplace Safety, 2020)

Programs, rules, and processes that protect the safety, welfare, and health of anyone involved in labor or employment are referred to as occupational health and safety. Any health and safety program's overarching purpose is to establish the safest working environment possible and to reduce the risk of workplace accidents, injuries, and fatalities. Drew Mitchell (Drew Mitchell, 2013)

### **The Following Elements Make up Effective Health and Safety Management:**

**Policy:-**The workplace should develop a health and safety policy that meets the standard of the labor law in the country. Responsibilities to people and the working environment will be met in a way that fulfills the spirit and letter of the law. (HSA, 2020)

#### **Management and commitment**

Effective leadership and commitment enables consistent application of the health and safety policy through planning and setting goal towards achieving the policy. The management should be committed to implementing the rules looking forward to improve the health and safety culture in the workplace. The management should assure the availability and adequacy of resources (good facilities, right tools and PPEs) provided to the workers.

#### **Health and Safety Training and Instruction**

In order to have a healthy and safe working environment, everyone in the work place must play their role. Senior manager should know their role in establishing HS policies and continually plan and provide resources for HS practices. Employers must make sure all workers are trained and can perform their tasks in a healthy and safe manner. Workers should work in a healthy and safe manner as per their training.

#### **Inspection of Premises, Equipment, Workplaces and Work practices**

Reviewing general health and safety practices in the workplace can help you understand how things are going, pinpoint the source of a problem, and avoid accidents and unhealthy and unsafe working habits from emerging. Monitoring and evaluation are critical aspects of health and safety. The PDCA (Plan, Do, Check, Act) system is used in health and safety management.



**Figure 2.2.4-1: Health and Safety Monitoring and Reviewing**

**Source: (Victoria Hughes, 2018)**

### **Identifying Hazards and Managing Risk**

Risks must be assessed, identified and risk control method should be developed as to minimize workplace hazards as much as possible and ensure the well-being of workers.

### **Joint Health and Safety Committee and Representatives**

Joint health and safety committee and representatives help in coordinating all workers to jointly talk over about health and safety issues, bring ideas, identify problems causing injuries and accidents and bring on solutions. They also assist in developing and implementing HS management system.

### **2.2.5. Health and Safety in Construction**

Health and safety at construction sites deals with both physical and psychological well-being of workers on construction sites and other persons whose health is likely to be adversely affected by construction activities. It is of primary concern to employers, employees, governments and project participants. (Muiruri and Mulinge, 2014)

In the researcher’s opinion Health and Safety of workers must be given number one priority in construction sites. The lives of the people engaged in construction activities must be valued than the construction of buildings, which is very far from the current situation. The value given to

them and the workplace being safe and healthy brings them peace and stability of mind which in turn increases productivity and success of the project.

Construction sites are dangerous places to work. Employees are expected to operate at considerable heights with potentially risky building materials and heavy machinery. To limit the risk of injury and protect workers' lives, it is critical that health and safety rules are strictly observed. (2016, Monica Sikora)

## **2.3. Empirical Review**

### **2.3.1. Health and Safety Management in Construction**

Over the last few decades, the construction industry's activities have prompted serious health and safety concerns among governments, stakeholders, health and safety professionals, and researchers (Enshassi and Mayer 2002, Gibb 2005, International Labor Organization (ILO) 2005, Kaplinski 2002, Leopold and Leonard 1987, Rowlinson 2004). As a result, health and safety legislation has been devised to ensure that construction managers, as well as many other project participants, are responsible for controlling the hazards connected with building projects. In the construction sector, health and safety management has progressed from accident-prevention methods to more systematic and proactive approaches to reducing the risk of hazards.

### **2.3.2. Health and Safety Management in Ethiopia Construction**

Across the country, 85 percent of workers do not have access to occupational health care. Only approximately 5% of workers in developing nations have access to occupational safety and health services. Ethiopia is in the process of transitioning from an agriculture-based to an industrial-led economy. As a result, the country must focus on developing infrastructure that meets acceptable standards to protect employees and the environment, with an emphasis on the industrial sector.

By 2017, the United Nations Assembly has called for Universal Access for all employees, including those in the informal sector. Ethiopia is likely to keep its end of the bargain. Developing countries are burdened with the loss of up to 10% of their GDP due to work-related injuries and disorders. Ethiopia appears to be in a good position in terms of enacting OSH legislation based on the aforementioned convention. However, the application of the regulations' requirements is still a mystery.



This is largely due to employers' or investors' misunderstanding of the legislation, as they are more concerned with profits than with the costs of providing OSH Services. A source of concern is OSH inspectors' limited training capacity in terms of measurement-based hazard evaluation, access to hazard measuring equipment, knowledge and skill in utilizing the equipment, exposure to measurement technology, and the lack of qualified human resource. (2016, Kumie et al.)

### **2.3.3. Integration of Health and Safety with Project Management**

Many construction-related accidents may be avoided, according to studies, if proper precautions were taken at all stages of the project's existence. As a result, project participants have a stake in enhancing the health and safety of construction sites and completed projects.

This approach to integrating health and safety management into building processes assumes that responsibility for health and safety is shared evenly among the project's major participants. As a result, project participants must "think health and safety" throughout the project's phases. As Hinze (1998) points out, addressing construction worker safety throughout the design phase necessitates acknowledging the potential impact of designers' decisions on the health and safety of building site employees. Similarly, if owners are involved in construction safety, the expense of safety can be kept to a minimum.

### **Factors Affecting Health and Safety Performance in Construction**

Previous literatures have identified a number of elements that influence construction safety and health performance. These elements include:

**Weather Condition:**-Extreme weather has a direct impact on performance in terms of safety and health. Nausea, headaches, weariness, extreme thirst, intense sweating, confusion, excruciating big muscle cramps, and loss of consciousness are all symptoms of heat stress. Heat cramps, heat exhaustion, or heatstroke can occur as a result of these indicators of heat stress, and if left untreated or severe enough, can result in mortality (Brake & Bates, 2002). (Neitzel, et al., 2001).

### **Complexity of the Design**

When designers are more aware of the safety ramifications of their design decisions, such as fewer injuries and lower redesign and operating costs for special procedures and protective

equipment, safety and health performance improves (Hinze & Wiegand, 1992). (Kartam, et al., 2000).

### **Type of Owners**

Owners can implement procedures to improve safety and health performance, such as providing safety and health rules for contractors to follow; implementing work permit systems for potentially hazardous tasks; and so on. Oblige the contractor to appoint a competent supervisor to oversee workplace safety; At owner-contractor meetings, talk about safety. Conduct safety checks during construction; ensure that accidents are reported promptly and thoroughly (Hinze & Gambatese, 2003). (Report-A-3, 1982).

### **Project Duration**

Tight project schedule had high rank on safety performance of the project (Zou, et al., 2007), (Report-A-3, 1982)

### **Safety and Health Policy**

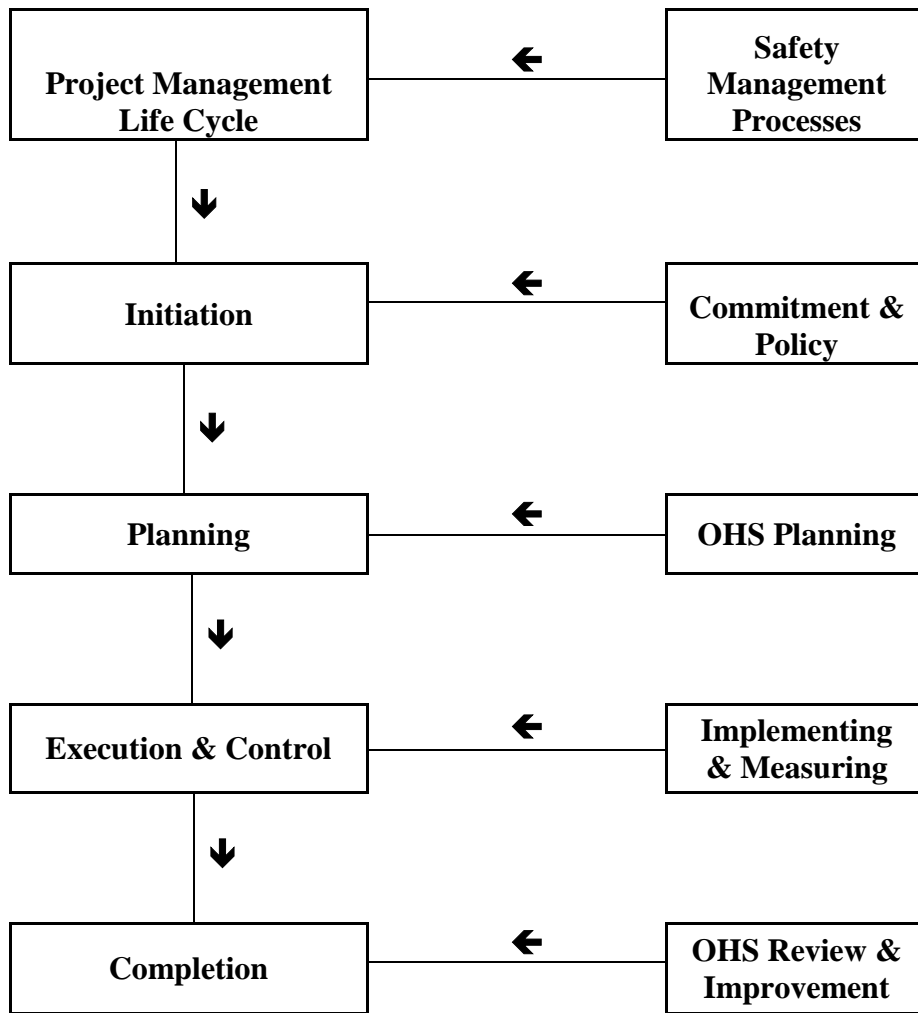
Top management's dynamic attention and dedication to safety and health improvement, as well as maintaining good safety and health policy will result in a reduction in accidents (Sawacha, et al., 1999). (Shibani, et al., 2012).

### **Safety Signals, Signs and Barricades**

Warnings in the form of signs and symbols have been identified as one of the most effective methods for influencing behavior and increasing stakeholder risk awareness (Chapanis, 1994). (Edworthy & Adams, 1996).

### **Role of Government and Engineering Societies**

Engineering societies will aid in the expansion of engineering knowledge by raising engineer awareness of safety and health issues. There are no powerful labor unions in developing nations like there are in industrial countries, which have the capacity to defend their workers and compel contractors to provide safe working conditions and safety equipment (Fang, et al., 2004).



**Figure 2.3.3-1: A Proposal Model to integrate Health and Safety Management into Project Management**

Source: (I.T.Althaqafi and Dr. Barry Elssy, 2015)

## **2.4. Conceptual framework of the Study**

Health and safety management is critical to any organization's overall performance.

Employees and those who are directly or indirectly affected by the workplace are protected by an in-house HS policy.

The success of the project is dependent on well-structured HS management, which is in charge of enforcing the policy, monitoring, and evaluating HS performance.

Evaluation approaches are useful for inspecting the workplace's safety and health practices. To enable employees to carry out their activities in a healthy and safe manner, health and safety training should be tailored to their specific levels of knowledge and attitude

## **CHAPTER THREE**

### **3. RESEARCH METHODOLOGY**

#### **3.1. Introduction**

This chapter discusses research design, population and sampling methods, data collection sources and tools/instruments, data analysis methods, and ethical considerations in general. It also discusses the study procedures and method used to conduct the study in relation to its objective, which was discussed in Chapter 1.

#### **3.2. Research Design**

The study employed a descriptive research approach to attain the research aims and answer the given research questions. Descriptive design is utilized because it is a scientific process that involves monitoring and describing a subject's behavior without changing it in any manner and it provides a lot of information about a specific case. The researcher is use this design to evaluate and report the safety and health practices used in Ethiopian Electric Power's (EEP) generation, transmission, and substation construction projects,

#### **3.3. Population and Sampling Method**

This research focused on Ethiopian Electric Power's generation, high-voltage transmission line, and substation development projects that are currently under construction (EEP). The population surveyed was based on data obtained from the Ethiopia Electric Power (EEP) office. These are generation power plant construction projects by Ethiopia Electric Power (EEP), Own Force Contractor (the client acts as both client and contractor) and high voltage transmission line and substation construction projects by Ethiopia Electric Power (EEP), Own Force Contractor (the client acts as both client and contractor) The researcher narrowed the scope due to the following justifications: the project is currently in the construction stage, the data availability factor, and the time constraint to complete the project work limited the researcher to focusing only on the case study of these projects, namely the assessment of Ethiopian Electric Power Construction Projects Safety and Health Practices.

### **3.3.1. Sample Size**

The responders for the representative Generation, High voltage Transmission line, and Substation construction projects were chosen using a convenience sample technique. The questionnaire was issued to all project staff members, as well as representatives of skilled and unskilled laborers who are currently working on the Ethiopia Electric Power Construction project. As a result, the questionnaire was issued to a total of 80 respondents, 30 of whom work in Generation Power Plant construction, 25 in high-voltage transmission line construction, and 25 in general substation construction. The questionnaire response rate has been excellent. Each representative group returned the questionnaire in full, revealing their opinions on safety and health practices Of the Ethiopia Electric Power Generation power plant construction, high voltage transmission line and substation constructions projects understudied.

### **3.4. Sources and Tools/Instruments of Data Collection**

Primary data was gathered from selected Ethiopian Electric Power construction projects that are currently under construction. Questionnaires and interviews were used to obtain the primary data. There were both open-ended and closed-ended questions in the survey. The research questions were adopted from a research done by Sipara Alemu Assessment of Health and Safety in Constructing High-rise Buildings in Addis Ababa: The case of Ayat Share Company (June2020) After Editing the questioner based on my advisor comment the questionnaires were distributed for each Ethiopian Electric Power construction projects, and gathered.

### **3.5. Data Analysis Methods**

The data acquired from the primary sources was analyzed using SPSS and Microsoft Excel spreadsheets, and descriptive statics of frequency and percentage of the respondents were used to interpret the results. The questionnaires gathered from the different construction projects in the company were analyzed the health and safety policies and regulations used in the Ethiopian Electric Power construction projects, the health and safety management used during the Ethiopian Electric Power construction projects, whether sufficient health and safety management trainings are given to the employees during the Ethiopian Electric Power construction projects or not and whether there are adequate facilities, tools and evaluation techniques of health and safety during the construction of Ethiopian Electric Power construction projects.

The data from questioner and interview comments were analyzed using qualitative data analysis techniques separately but presented in combination with the quantitative information.

### **3.6. Ethical Consideration**

After obtaining the stated organizations' consent, the research work began. Before being invited to respond, respondents were informed about the research's goal. This project's quality and integrity are ensured by the researcher. The voluntary respondents' confidentiality and privacy were likewise ensured. This objective and unbiased project effort was determined not to damage responders in any manner. As a result, the researcher best considers all ethical perspectives.

## CHAPTER FOUR

### 4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter explains how the data obtained through questionnaires and interviews was triangulated. It comprises data analysis and interpretation that aids in reaching conclusions and forwarding recommendations for Ethiopian Electric Power Construction projects' health and safety policies. Reorganize the data in a methodological way so that it was clear and unambiguous to understand and, thus, to analyze. Tables and charts are employed. because this way of data presentation is chosen over others since it allows for simpler comprehension and a clearer image of the information being provided.

#### 4.1. General Information of the respondents

This section contains information about the people who took part in the study. The following are the characteristics of respondents for Ethiopia Electric Power Construction projects who took part in this survey. The questionnaire had a large number of questions in order to obtain comprehensive information on current health and safety measures, but they were simple to respond. The response rate of the questionnaire was so far so good. 100% of each representative group returned the questionnaire by disclosing their view about the safety and health practices of Ethiopia Electric Power constructions projects.

**Table 4.1-1: General information of respondents**

<b>Gender of Respondent</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Male	66	82.5	82.5	82.5
	Female	14	17.5	17.5	100.0
	Total	80	100.0	100.0	
<b>Education status of respondent</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Master (2nd Degree)	25	31.3	31.3	31.3
	First Degree	47	58.8	58.8	90.0
	Advanced Diploma	3	3.8	3.8	93.8
	Diploma	5	6.3	6.3	100.0



Total		80	100.0	100.0	
Job title of the respondent					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Electrical Engineer	21	26.3	26.3	26.3
	Civil Engineer	20	25.0	25.0	51.3
	Project Manager	4	5.0	5.0	56.3
	Architect	2	2.5	2.5	58.8
	Site Engineer	8	10.0	10.0	68.8
	Office Engineer	11	13.8	13.8	82.5
	Supervisor	8	10.0	10.0	92.5
	Other please specify	6	7.5	7.5	100.0
	Total	80	100.0	100.0	
Experience of respondent					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	0-5 Years	11	13.8	13.8	13.8
	6-10 Years	25	31.3	31.3	45.0
	11-15 Years	21	26.3	26.3	71.3
	Above 15 Years	23	28.8	28.8	100.0
	Total	80	100.0	100.0	

**Source: Own survey (2022).**

As shown in the table above there was 82.5% Male and 17.5% Female respondents it is clear that there is unequal participation between Male and Female in the study of Ethiopia Electric Power (EEP) construction firm.

According to the table above, 31.3 percent of respondents working in Ethiopian Electric Power Generation, High Voltage Transmission Line, and Substation Construction projects have a Master's degree, 58.8% have a First degree, 3.8 percent have an Advanced Diploma, and 6.3 percent have a Diploma.

The table above depicts Electrical Engineers made up 26.3 percent of the responders, followed by Civil Engineers at 25%, Project Managers at 5%, Architects at 2.5 percent, Cite Engineers at 10%, and Office Engineers at 13.8 percent. Supervisors accounted for 10% of the total, while

others accounted for 7.5 percent. The researcher feels that health and safety is the duty of all professions involved in the study in some way, and has attempted to include as many as feasible. According to the table above, the respondents' employment experience and time with the company. The majority of them had 6–10 years of experience, but there were others with 11–15 years or more. Those with 10 years or more experience helped explain the situations in the construction industry, but 5 years or less is sufficient to understand the current practices in the company, which can represent all Ethiopia Electric Power construction projects because the practices are similar. As a result, the respondents' experiences indicate that they can provide valuable information as required by the study.

## **4.2. Current Health and Safety Practices in Ethiopia Electric Power Construction Projects**

### **4.2.1 Health and Safety Policy**

Companies should have documented health and safety policies and regulations that conform to the country's OHS policies and guidelines. Employees must be supplied with a healthy and safe working environment, and the organization must be dedicated to sustaining it while striving for continuous improvement. All employees and visitors must conduct themselves and their jobs in a safe and healthy manner, and they are responsible for their own and their coworkers' health and safety. Those who do not follow the company's health and safety policy should face disciplinary action if necessary. During the interview, a senior employee of the Ethiopia Electric Power Construction Project stated that most construction projects lack a well-organized written OHS policy, and if they do, the implementation is poor; however, they do have a written policy here in this organization, but no budget has been allocated for implementation, and they are working on it. In the survey, respondents were asked if they had an in-house OHS policy and implementation, and if they didn't, why not. Because most employees do not perceive HS practices being implemented in their workplaces, the majority of respondents replied no and indicated their reasons from a list offered.

**Table 4.2.1-1: Respondents’ Opinion about the Ethiopia Electric Power construction project HS Policy and Implementation**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>
<b>Lack of Awareness by upper level management and government body</b>	14	17.5	17.5
<b>No Control By Government Body</b>	22	27.5	27.5
<b>ignorance towards health and safety implementation practices</b>	44	55	55

**Source: Own survey (2022).**

Some respondents selected more than one option, and 55% of respondents agreed that ignorance is the primary reason for the lack of HS policy and implementation. Top managers who are aware of the importance of HS practices but are unaware are responsible for enacting HS policy. Unless it is out of ignorance that one does not observe the HS standards, one can naturally prefer and understand the value of a healthy and safe working environment. HS procedures are not practiced, according to 27.5 percent of respondents, due to a lack of government regulation.

Of course the government should inspect and enforce health and safety practices in every company and use punishment for disobedience and reward system for obedience of the law. Only 17.5 percent of the respondents said it is lack of awareness by all parties. As a result, it is reasonable to conclude that the lack of HS policy and implementation is primarily due to ignorance. One of the components of effective health and safety management, according to the conceptual review, is a health and safety policy and a commitment to consistently look forward to it. In the absence of a health and safety policy and implementation, particularly during the construction phase of a structure, there is a high likelihood of higher accident costs, time overruns, productivity losses, and, most importantly, loss of life.

### **4.2.2 Health and Safety Management Structure**

A Health and Safety Manager should be appointed in order to have an effective Health and Safety Management System. Managers should organize a combined health and safety committee to work together to decrease workplace dangers as much as practicable. Managers and supervisors are jointly accountable for the health and safety of all employees under their control.

During the interview, all interviewees stated that there is no HS Manager, implying that there is no specific appointed individual (manager) in charge of the aforementioned management responsibilities. According to the senior project manager, general oversight of each project site occurs twice a week, but not specifically for HS performance. Only if a major issue is discovered during the supervision do they attempt to resolve it. In terms of assuring the appropriateness of the HS budget, there isn't one in the first place. Respondents were requested to explain why they believe this is the case and to submit their proposed HS expense as a percentage of the total development cost.

**Table 4.2.2-1: Respondents' Opinion towards the company's HS Management Structure**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>
<b>Lack of Awareness by upper level management of the EEP and the country's government body</b>	25	31.25	31.25
<b>No Control by Government Body</b>	42	52.5	52.5
<b>Ignorance towards health and safety practices.</b>	37	46.25	46.25
<b>Budget Constraint</b>	34	42.5	42.5
<b>Absence of Obligation in the construction project Agreement</b>	28	35	35
<b>Upper level Management and Commitment Problem</b>	53	66.25	66.25

**Source: Own survey (2022).**

The respondents were asked to select their reasons from a list of options in the questionnaire, with 66.25 percent selecting "upper level management and commitment problem," 52.5 percent selecting "no control by the government body," 46.25 percent selecting "Ignorance," 42.5 percent selecting "Budget Constraint," 31.25 percent selecting "Lack of Awareness," and 45 percent selecting "Absence of Obligation in Contract Agreements." The key cause for the lack of an HS manager has been identified as a difficulty with upper-level management and dedication. The organization and its top executives must appoint a Human Resources Manager to oversee all

human resources issues. The lack of government control was the second most popular explanation; the government should require the appointment of an HS Manager because this will help to prevent many workplace injuries and damages. Ignorance and financial constraints were the third and fourth most popular causes. Ignorance must be eradicated, and morality and consciousness must pervade everyone's minds, as health and safety are everyone's responsibility. Whether or not there is an enforcing and punishing body, it is critical to follow the law and keep oneself and others safe.

**Table 4.2.2-2: Respondents' Suggested HS Expense**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>
<b>Less than 0.5%</b>	26	32.5	32.5
<b>0.5-1%</b>	34	42.5	42.5
<b>1-2%</b>	13	16.3	16.3
<b>2-3%</b>	4	5	5
<b>More than 3%</b>	3	3.8	3.8
<b>Total</b>	80	100	100

**Source: Own survey (2022).**

There are different types of costs or budgets for occupational health and safety from the total costs of the construction based on the type of construction like mega project, medium and small projects for occupational health and safety (OHS) cost to undertake the construction.

42.5 percent of the respondents chose from 0.5-1%, 32.5 percent chose less than 0.5%, 16.3 percent chose 1-2% and so on. Even though many experts propose varying OHS costs to underdeveloped nations like Ethiopia, the findings of this study and the researcher's own experience suggested 1.1 – 2% of the total construction cost.

### **4.2.3. Health and Safety Training**

New employees must be trained prior to starting work, and workers must get ongoing training and guidance to ensure that good work practices are followed and promoted. These trainings must not only serve to demonstrate that the organization has training or to comply with numerous policies and regulations, but also to encourage health and safety practices and serve as an outstanding model for the construction industry. HS meetings, written pamphlets, and orientations should all be used to raise awareness.

During the interview, the PM informed the researcher that every project has a training session once a year. According to the study, this once-a-year training is irrelevant because people forget and need be reminded frequently, and new employees can join at any moment during the year. When asked if there are trainings for new employees, workers, or written pamphlets to inform them about HS procedures, all respondents said no and explained why.

**Table 1.2.3-1: Respondents’ Opinion towards the Company’s HS Training**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>
<b>Lack of Awareness for HS training by companies and governments Parties</b>	25	31.25	31.25
<b>No Control By Government Body for the company’s HS training</b>	40	50	50
<b>Ignorance against the company’s HS training</b>	48	60	60
<b>Budget Constraint for HS training</b>	62	77.5	77.5
<b>Upper level Management and Commitment Problem</b>	32	40	40

**Source: Own survey (2022).**

77.5 percent cited "budget constraints," 60 percent cited "ignorance," 50 percent cited "government control," 40 percent cited "high level management and commitment issues," and 31.25 percent cited "lack of awareness by all stakeholders." Because the researcher discovered that there is no budget allocated for HS during the interview with the management, the most frequently stated reason by the respondents is budget constraints. Even if one of the managers, such as the HRM, wishes to schedule HS trainings, it will be impossible to do so without a budget. The lack of awareness among business owners workers HS is a major issue that the government should address through regular inspections and penalties for violating Ethiopian OHS policies. The findings of this study confirmed the previously mentioned limitations in OSH inspectors' training capacity in terms of measurement-based hazard evaluation, access to hazard measuring equipment, knowledge and skill in using the equipment, exposure to measurement technology, and the lack of trained human resource.

#### **4.2.4. Health and Safety Resources: Facilities, Tools and Evaluation technique**

Employers are required to provide their employees with a healthy and safe working environment. Workers also have the freedom to refuse to work in an unhealthy or dangerous setting. However,

this is not the situation in impoverished nations like Ethiopia, where finding work is extremely difficult, and landing a job may be the ultimate ambition of many people, even construction experts. Good welfare facilities such as showers, canteens, and rest rooms, provision of PPEs, the necessary tools, equipment, and plants to execute activities and frequent examination of applications of those offered facilities, tools, equipment, and PPE are all part of a healthy and safe working environment. PPE is the worker's last line of defense against the occupational hazard; failure to utilize it results in harm and injury.

During the interview, the project manager stated that the site layout considers HS aspects when constructing temporary structures such as site offices and access roads, and that PPEs are provided for some of their employees such as PMs, supervisors, site engineers, and foremen, but that those who are provided are not seen using them on a daily basis due to ignorance and a lack of strict evaluation because everyone is focused on the job at hand. He stated that the sites are supervised, but not the HS components.

In Ethiopia, the construction industry in general needs a lot of work on industrial hygiene. The science of anticipating, recognizing, evaluating, controlling, and preventing health and safety problems in the workplace is known as industrial hygiene.

**Table 4.2.4-1: Respondents’ Opinion towards the Company’s HS Facilities, Tools and Evaluation Technique**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>
<b>Lack of Awareness by the companies and governments for HS facilities</b>	18	22.5	22.5
<b>No Control By Government Body</b>	58	72.5	72.5
<b>Ignorance for HS facilities, tools and Evaluation technique</b>	52	65	65
<b>Budget Constraint for HS facilities</b>	49	61.25	61.25
<b>Absence of Obligation in the Contract Agreement for HS facilities</b>	27	33.75	33.75
<b>Upper level Management and Commitment Problem</b>	8	10	10
<b>No Skilled Person</b>	38	47.5	47.5
<b>No Standard Practice</b>	40	50	50

Source: Own survey (2022).

72.5 percent said "no government oversight," 65 percent said "ignorance," 61.25 percent said "budget restriction," 50 percent said "no standard practice," 47.5 percent said "no skilled individual," and so on. As indicated in the table. The fundamental reason is that there is no tight government oversight. People would perform better in that situation because they are terrified of penalty. Ignorance is the second most commonly cited cause, which is cited not only by employers, but also by employees, according to the PM, who stated during the interview that employees are equally dumb in not utilizing PPEs after being provided with them. Budget constraints are the third most popular cause; naturally, the senior PM informed the researcher that there is no budget allotted for HS. It is difficult to put into effect because there is no standard practice. Other causes included a lack of HS professionals and an HS responsibility in the contract agreement when hiring outside contractors.

#### **4.2.5. Responsibility of Accidents during Construction**

All stakeholders in the building of Ethiopia electric power construction projects are responsible for health and safety. Although each of them has a duty to perform each individual is accountable for his or her own health and safety.

#### **4.2.6. Accident and Fatal Reporting**

During the interview, the researcher noted that when an accident occurs on the job, the foreman reports the incident to the nearest engineer in the office, who then contacts management. It will be reported to insurance within 72 hours (two days), and insurance will manage the costs. If the worker dies, compensation money will be provided to the worker's injured family, and the body will be sent to the relatives.

The interview revealed that there is a First Aid Kit on site but no First Aider; there used to be a nurse, but now the foremen manage first aid. Two deaths (one from scaffolding and the other while attempting to swim in an excavated hole that had become filled with water) and one paralysis (falling from height while carelessly assisting a coworker on the ground) were among the worst accidents in the previous three years, according to the researcher's findings. Accident and fatality reporting is a key issue that requires the attention of a health officer. It aids in risk assessment, risk prevention and control, hazard identification, safety plans, and research. Future works.



### 4.3. Opinions of Respondents in Construction Related Disciplines on the Construction Health and Safety Program

All construction professionals are responsible for construction health and safety. Every construction discipline must include a construction health and safety program.

**Table 4.3-1: the frequency and percentage of respondents who believe that HS should be included in construction-related disciplines.**

Likert Scale												
	Very Important		Important		Neutral		Not really Important		Unimportant		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
<b>Project Manager</b>	52	65	27	33.8	0	0	0	0	1	1.3	80	100
<b>Architect</b>	14	17.5	47	58.8	17	21	1	1.3	1	1.3	80	100
<b>Civil Eng.</b>	44	55	35	43.8	1	1.3	0	0	0	0	80	100
<b>Structural Eng.</b>	43	53.8	33	41.3	4	5	0	0	0	0	80	100
<b>Quantity Survey</b>	23	28.8	50	62.5	7	8.8	0	0	0	0	80	100
<b>Building Survey</b>	32	40	38	47.5	9	11	1	1.3	0	0	80	100
<b>Safety Officer</b>	59	73.8	21	26.3	0	0	0	0	0	0	80	100

Source: Own survey (2022).

**Table 4.3-2: Mean and Standard Deviation of Table 4.3-1**

	<b>PM</b>	<b>Architect</b>	<b>Civil Engineer</b>	<b>Structural Eng.</b>	<b>Quantity survey</b>	<b>Building Survey</b>	<b>Safety Officer</b>
<b>Mean</b>	1.3875	2.1000	1.4625	1.5125	1.8000	1.7375	1.2625
<b>Std. Deviation</b>	.62630	.73948	.52636	.59521	.58244	.70699	.44277

Source: Own survey (2022).

The mean and standard deviations are organized in the above table according to the disciplines specified.

The construction/construction management program covers the following topic areas. Respondents were asked if they were included in the study.

**Table 4.3-3: Frequency and Percentage of Respondents' Answer in whether the listed Subject areas are addressed in the Construction/ Construction Management Program**

	Likert Scale											
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
<b>Legal Requirement</b>	35	43.8	36	45	7	8.8	2	2.5	0	0	80	100
<b>Responsibility HS</b>	39	48.8	38	47.5	1	1.3	1	1.3	1	1.3	80	100
<b>HS Policy</b>	41	51.3	37	46.3	2	2.5	0	0	0	0	80	100
<b>Safety Plan</b>	38	47.5	35	43.8	5	6.3	2	2.5	0	0	80	100
<b>Risk Analysis</b>	29	36.3	44	55	3	3.8	4	5	0	0	80	100
<b>HS Program</b>	37	46.3	35	43.8	5	6.3	2	2.5	1	1.3	80	100
<b>HS Inspection</b>	40	50	36	45	4	5	0	0	0	0	80	100
<b>HS Training</b>	37	46.3	35	43.8	6	7.5	1	1.3	1	1.3	80	100
<b>Constructability</b>	24	30	47	58.8	8	10	1	1.3	0	0	80	100
<b>Personal Protection</b>	39	48.8	38	47.5	2	2.5	1	1.3	0	0	80	100
<b>Injury Report</b>	33	41.3	38	47.5	5	6.3	4	5	0	0	80	100
<b>HS Promotion</b>	32	40	39	48.8	5	6.3	4	5	0	0	80	100

<b>Procurement system Influence</b>	29	36.3	39	48.8	10	13	2	2.5	0	0	80	100
<b>In-house HS rules</b>	19	23.8	45	56.3	13	16	3	3.8	0	0	80	100
<b>House Keeping</b>	15	18.8	43	53.8	18	23	4	5	0	0	80	100

Source: Own survey (2022).

**Table 4.3-4: Mean and Standard Deviation of Table 4.3-3**

	1	2	3	4	5	6	7	8
Mean	1.7	1.5875	1.5125	1.6375	1.775	1.6875	1.6	1.675
SD	0.73605	0.7061	0.55103	0.71589	0.74587	0.805	0.73948	0.77582
	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	
Mean	1.825	1.6	1.75	1.7625	1.8125	2	2.1375	
SD	0.65168	0.73948	0.78756	0.78343	0.74789	0.7463	0.77531	

Source: Own survey (2022).

The mean and standard deviations are organized in the above table according to the disciplines specified.

#### 4.4. Major health and safety concerns should be considered during Ethiopian Electric Power Project development

Injuries on Construction Sites: How Common Are They?

In general, the construction sector is a dangerous one. Every action must be carried out in a healthy and safe manner; failure to do so results in deadly and non-fatal accidents, as well as health issues.

During the interview, all of the interviewees agreed that every action on the construction site must be done carefully and safely.

**Table 4.4-1: the frequency of injuries and the percentage of respondents' opinions on the frequency of injuries**

	<b>Likert Scale</b>				
	High	Medium	Low	Exceptional	Total

	F	%	F	%	F	%	F	%	F	%
<b>Falling of Object</b>			44	55	16	20	1	1.3	80	100
	19	23.8								
<b>Stairways and ladders</b>	21	26.3	47	58.8	11	13.8	1	1.3	80	100
<b>Scaffolding</b>	29	36.3	37	46.3	13	16.3	1	1.3	80	100
<b>Excavation</b>	23	28.8	37	46.3	18	22.5	2	2.5	80	100
<b>Electricity</b>	24	30	28	35	26	32.5	2	2.5	80	100
<b>Construction Hoists, Cranes</b>	7	8.8	42	52.5	29	36.3	2	2.5	80	100
<b>Hazardous Substance</b>	21	26.3	30	37.5	27	33.8	2	2.5	80	100
<b>Noise</b>	23	28.8	34	42.5	20	25	3	3.8	80	100
<b>Tools &amp; Machinery</b>	20	25	44	55	15	18.8	1	1.3	80	100
<b>Fire</b>	23	28.8	32	40	16	20	9	11.3	80	100

Source: Own survey (2022).

**Table 4.4-2: Mean and Standard Deviation of Table 4.4-1**

	1	2	3	4	5
<b>Mean</b>	1.9875	1.9000	1.8250	1.9875	2.0750
<b>SD</b>	.70250	.66751	.74247	.78746	.85351
	6	7	8	9	10
<b>Mean</b>	2.3250	2.1250	2.0375	1.9625	2.1375
<b>SD</b>	.67082	.83249	.83353	.70160	.96448

Source: Own survey (2022).

The mean and standard deviations are organized in the above table according to the causes given.

Falling from heights, stairways, and ladders, as well as dug areas the most dangerous regions were construction hoists and cranes, but construction sites are the riskiest places to work, requiring the most careful, healthy, and safe methods.

Factors affecting Ethiopia Electric Power's (EEP) construction projects' health and safety performance

There are a variety of elements that have varying degrees of impact on the health and safety performance of Ethiopian Electric Power Projects. Respondents were asked to rate the severity of the various factors' effects.

**Table 4.4-3: the frequency and percentage of respondents' opinions on the degree of impact of several elements impacting HS performance in the construction industry**

	Likert Scale											
	Very High		High		Average		Low		Very Low		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
<b>Design Complexity</b>	34	42.5	34	42.5	10	12.5	2	2.5	0	0	80	100
<b>Type of Owner</b>	37	46.3	39	48.8	4	5	0	0	0	0	80	100
<b>Weather Condition</b>	39	48.8	28	35	10	12.5	2	2.5	1	1.3	80	100
<b>Project Cost</b>	37	46.3	31	38.8	7	8.8	5	6.3	0	0	80	100
<b>Project Duration</b>	33	41.3	32	40	9	11.3	6	7.5	0	0	80	100
<b>HS in Contracts</b>	40	50	33	41.3	6	7.5	1	1.3	0	0	80	100
<b>HS</b>	38	47.5	36	45	4	5	2	2.5	0	0	80	100
<b>Policy</b>	34	42.5	38	47.5	4	5	4	5	0	0	80	100
<b>Accident Report</b>	29	36.3	38	47.5	6	7.5	5	6.3	2	2.5	80	100
<b>Fire Control</b>	34	42.5	32	40	12	15	1	1.3	1	1.3	80	100
<b>Risk Assessment</b>	34	42.5	32	40	12	15	1	1.3	1	1.3	80	100

<b>HS Training</b>	34	42.5	37	46.3	5	6.3	3	3.8	1	1.3	80	100
<b>PPEs</b>	31	38.8	40	50	5	6.3	3	3.8	1	1.3	80	100
<b>Emergency Planning</b>	35	43.8	28	35	12	15	3	3.8	2	2.5	80	100
<b>HS Inspection</b>	24	30	41	51.3	12	15	2	2.5	1	1.3	80	100
<b>HS Meeting</b>	29	36.3	32	40	16	20	1	1.3	2	2.5	80	100
<b>First Aid Provision</b>	31	38.8	36	45	9	11.3	2	2.5	2	2.5	80	100
<b>Safety Signs</b>	33	41.3	33	41.3	9	11.3	3	3.8	2	2.5	80	100
<b>Work Environment</b>	32	40	37	46.3	8	10	1	1.3	2	2.5	80	100
<b>Reward &amp; Punishment</b>	28	35	31	38.8	15	18.8	5	6.3	1	1.3	80	100
<b>Role of Gov't &amp; Engineering Societies</b>	39	48.8	29	36.3	9	11.3	2	2.5	1	1.3	80	100

Source: Own survey (2022).

**Table 4.4-4: Mean and Standard deviation of Table 4.4-3**

	1	2	3	4	5	6	7	8	9	10
Mean	1.75	1.5875	1.725	1.75	1.85	1.6	1.625	1.725	1.9125	1.7875
Std. Deviation	0.77132	0.58879	0.87113	0.8642	0.90148	0.68621	0.70036	0.77908	0.95723	0.83732
	11	12	13	14	15	16	17	18	19	20
Mean	1.75	1.7875	1.8625	1.9375	1.9375	1.85	1.85	1.8	2	1.7125
Std. Deviation	0.83439	0.82207	0.97752	0.81666	0.91877	0.90148	0.94266	0.86273	0.95467	0.8597

Source: Own survey (2022).

The mean and standard deviations are sorted based on the factors stated in the preceding table.

The role of government and engineering societies, work environment, HS policy, HS inspection, HS training, contractual HS specification, risk assessment, emergency plan, provision of PPEs,

accident report, first aid and aider, and owner's attitude were identified as major factors affecting construction site health and safety performance.

The four main factors that the four research questions were based on were identified. The literature reviews and poll findings make it evident how the many causes—ignorance, a lack of government oversight, a budgetary limitation, and issues with upper-level management and commitment—are interconnected.

Thus, it is clear that the issues with upper-level management's commitment and budgetary restrictions are two of the main causes. Poor health and safety practices that result in workplace dangers can be caused by upper management failing to budget for health and safety management in a corporation. Therefore, it may be argued that there is a relationship between government control and ignorance, as discussed in the literature review and the data interpretation section. Even if there is ignorance of health and safety procedures in a corporation, robust government regulation may undoubtedly prevent it.

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSION AND RECOMMENDATION

#### 5.1. Summary of Major Findings

This study has analyzed the Health and Safety practice on Ethiopia Electric Power (EEP) construction projects. The finding revealed that;

Ethiopian Electric Power Construction projects lack health and safety practices. The absence of a health and safety management system, the implementation of health and safety policies, the appointment of health and safety personnel, the creation of a health and safety awareness mechanism, good welfare facilities, the provision of PPEs, and evaluation techniques in the organization were all mentioned as major issues.

Ethiopian Electric Power has created internal regulations that are in compliance with Ethiopian labor legislation. However, the policy is not followed. The majority of respondents felt that the biggest reason for the lack of HS policy and execution is ignorance, followed by a lack of government oversight.

There was no particular health and safety manager in place. The biggest issue, according to almost all respondents, is a problem with upper-level management and dedication. The lack of control by the government entity was also mentioned as a reason. Ignorance and financial constraints were also mentioned as factors.

According to the results of the interview, there is no funding for HS management. Every project receives health and safety training once a year. It meets the company's annual HS training requirement, but it does not contribute to the development of a healthy and safe culture. The majority of responders claimed that it was due to financial constraints. Some respondents agreed that ignorance was the reason, while others cited lack of government control, upper-level management and commitment issues, and a lack of awareness by all stakeholders as factors.

The company has the necessary tools and equipment to execute high-quality construction work, but the workers on the jobsite lack adequate welfare and personal protective equipment. The results of the polls revealed that the biggest cause for this is the government's lack of control;



second, ignorance; and third, budget constraints. The lack of standard practice and experienced personnel were significant factors.

Total site supervision is conducted once a week, with the emphasis on the work being done rather than the workers. This is said to be due to the top managers' singular focus on their work.

In addition, the significance of incorporating a health and safety program into construction-related industries was investigated. The most common causes of accidents were scaffolding and excavated holes, followed by falls from height and stairways and ladders, noise, construction equipment, tools and machinery, electricity, and finally fire.

Furthermore, elements affecting the health and safety performance of Ethiopia Electric Power Construction Projects structures were discovered. The findings suggested that the implementation of all components of a health and safety management system, the engagement of government and engineering societies, and the kind of owner all had a significant impact on project HS practices.

## **5.2. Conclusion**

According to the findings of the study, health and safety procedures in Ethiopia Electric Power Construction Projects are distant from those of health and safety management systems. It is possible to say that health and safety practices are only found in the country's written conventions. Occupational health and safety policies and standards may have been established decades ago, but the sad reality is that they have yet to be implemented.

Construction employees are on the front lines of the industry. They have firsthand experience with unsafe health and safety practices. These construction personnel are in charge of the day-to-day construction activity. Nonetheless, attention is paid to the work, and only the work, unless serious accidents occur, in which case insurance companies handle the matter.

Construction professionals, such as site and office engineers, project managers, supervisors, and others, devote at least five years of their lives to studying construction. And it took them at least three years to get a solid job.

Although proper tools and equipment may be visible on project sites, a person wearing PPEs is not commonly seen. Surprisingly, the Organization' primary concern is whether the project is on budget and on time.

The issue affects not just the workers, but many others, both directly and indirectly. Construction health and safety ignorance affects workers' families, the owner, the client, the contractor, the construction firm, the construction industry, the city, and the country. The task of creating a healthy and safe culture does not fall to one person, but rather to everyone participating in the sector.

In general, it is difficult to assert that a standard practice of health and safety is followed in Ethiopia Electric Power Construction Projects structures. There is no single way to understand and apply health and safety regulations.

Inspections of construction sites by the government are low-key. And the consequences of failing to follow health and safety regulations are minor. It is very good, vital, and valued that the country has health and safety regulations and standards that correspond with the ILO; yet, it is extremely bad, useless, and depreciated that those laws are not strictly enforced by the regulatory agencies.

### **5.3. Recommendation**

In light of the findings of this research, suggestions on construction health and safety practices have been forwarded.

To the Ethiopia Electric Power:

To reduce workplace dangers, construction organizations should have established internal health and safety policies and regulations that conform to local labor laws.

For proper implementation of health and safety practices, there should be an organized HS management structure.

Because other managers may be preoccupied supervising construction operations, an appointed HS officer must be responsible for the implementation and monitoring of HS procedures.

Periodic HS trainings should be held to remind personnel to work in a safe and healthy manner and to remind them of the penalties of not doing so

Workers should be supplied with good HS amenities to create a positive working atmosphere and promote their morale, which will increase the company's production.

All workers should be provided with personal protective equipment (PPE) which is comfortable according to the weather condition of Ethiopia to assist protects them from injury.

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**St. Mary's University**  
**Graduate Program in Project Management**  
**MA Thesis Questionnaire**

**A Survey on Assessment of Health and Safety Practices in Ethiopian Electric Power Construction Projects**

My name is Kasahun Tsehay. I am a Master's of Project Management Student at St. Mary's University. The goal of this Questionnaire is to Gather Information for An Assessment on Health and Safety Practices in Ethiopian Electric Power Construction Projects. Please help me by completing the Questionnaire because your Honest, Complete, and Timely Responses are Critical to the Success of my Research. Furthermore, I would like to reassure you that the Information Gathered through this Questionnaire will be used just for Academic Purposes, and your Responses will be kept private and Anonymous. As a result, the Researcher Respectfully Requests that you carefully respond to each item.

Yours Sincerely

Thank you for your cooperation

By: Kasahun Tsehay Jemaneh

Mobile: +251-911936486

E-mail: kasukoffee@gmail.com

*Note:*

- No need of writing your name
- Please fill the answer by putting “√” mark
- Kindly provide your response attentively and return the completed questionnaire as soon as possible

**PART I: Background Information of Respondents**

No.	Items	Option/Dimension	Put (√)
1	Gender:	Male	
		Female	
2	Age:	20-30 Years	
		31-40 Years	
		41-50 Years	
		51 Years & Above	
3	Educational Qualification:	PhD	
		Masters (2nd Degree)	
		First Degree	
		Advanced Diploma	
		Diploma	
		Certificate	
4	Job Title	Other: please specify	
		Electrical Engineer	
		Civil Engineer	
		Project Manager	
		Architect	
		Site Engineer	
		Office Engineer	
		Supervisor	
Other: please specify			

5	Work Experience (Overall):	0-5 Years	
		6-10 Years	
		11-15 Years	
		Above 15 Years	

**Part 2 (Health and Safety System in the Project)**

2.1. Do your construction projects/sites have a Health and Safety Manager?  
(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Lack of awareness by all parties in the industries
- B. Absence of obligation in the contract agreement
- C. Ignorance
- D. There is no controlling and enforcement by the government
- E. Other: Please Specify\_\_\_\_\_

2.2. Do Managers actively monitor the Health & Safety performance of their projects and workers through reports? (Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Lack of awareness by all parties in the industries
- B. Budget constraints
- C. Upper level management and commitment problem
- D. Other: Please Specify \_\_\_\_\_

2.3. Do Managers ensure that the Health & Safety Budget is adequate?  
(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?



A. Lack of awareness by all parties in the industries

B. Budget constraints

C. Upper level management and commitment problem

D. Other: Please Specify\_\_\_\_\_

2.4. Do your construction firm have a written in house Health & Safety rules & regulations and implementation for all workers reflecting management concerns for safety and health?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. No control and enforcement by the government

C. Ignorance

D. Other: Please Specify

2.5. Do your project have a site-specific Health & Safety plan? (Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. Absence of obligation in the contract agreement

C. Ignorance

D. There is no controlling and enforcement by the government

E. Other: Please Specify\_\_\_\_\_

2.6. Are there any safety orientation and training provided to new employees in your company?

A. Yes B. No

If yes please describe the training materials used?\_\_\_\_\_

2.7. Is there a regular health and safety training program for workers?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. No budget for Health & Safety

C. Upper level management and involvement problem

D. There is no enforcement law

E. Other: Please Specify\_\_\_\_\_

2.8. Does the Layout of the site consider Health & Safety aspects? (During constructing site offices, access roads, temporary structures while constructing the project)

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industry

B. There is no controlling and enforcement law in the contract agreement

C. No skilled person

D. Ignorance by all parties

E. Other: Please Specify\_\_\_\_\_

2.9. Do Constructability of project is reviewed periodically or frequently in Health & Safety aspect? (Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. No contractual obligation in the contract

C. There is no controlling and enforcement law in the contract agreement

D. Not standard practice

E. No skilled person

2.10. Does your firm prepare written brochure or orientation those aware workers about the preventive measures to reduce risk? (Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. Budget constraint

C. No company Health & Safety policy in the firm

D. Ignorance

2.11. Is there adequate first aid and first aider(s) on your construction projects/sites?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. Ignorance

2.12. Do your firm provide personal protective equipment (PPE)? (Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. Other: Please Specify

2.13. Do your firm provide right tools, equipment and plant to execute construction?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Lack of awareness by all parties in the industries
- B. Budget constraints
- C. There is no enforcement law
- D. Other: Please Specify

2.14. Do your firm provide good welfare facilities such as showers, canteens, toilets?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Lack of awareness by all parties in the industries
- B. Budget constraints
- C. There is no enforcement law
- D. Ignorance

2.15. Do Proper supervision by staff trained in Health & Safety carried out on your project?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Lack of awareness by all parties in the industries
- B. Budget constraint
- C. There is no enforcement law
- D. No trained person

2.16. Are all injuries, fatalities filled & reported to the concerned body?

(Yes/No)\_\_\_\_\_

If your answer is no, what do you think is the reason?

- A. Rarely done by the consultant
- B. Lack of awareness by all parties in the industries
- C. Upper level management and involvement problem
- D. There is no regulatory body enforce to report
- E. Other: Please Specify

2.17. In your opinion, who should be responsible for industrial accident during construction on site?

- A. Workers
- B. Government
- C. Contractors
- D. Owners' Consultant
- E. The Company

2.18. Is there a governmental organization follow up and contribute in improving safety in the Construction projects?

- A. Yes
- B. No
- C. If yes, who is it and how does it work?

2.19. What is your suggested expense in safety management in the terms of contract cost in construction projects?

- A. Less than 0.5%
- B. 0.5-1%

C. 1-2%

D. 2-3%

E. More than 3%

**Part 3 (Respondent's opinion towards construction health and safety program in Construction)**

**3.1. Please tick (✓) in the box that best reflects your answer where: degree of importance of the inclusion of construction health and safety program in the construction/construction management program to various construction related disciplines.**

No	Discipline	Very Important	Important	Neutrall	Not really Important	Unimportant
1	Project manager					
2	Architects					
3	Civil engineers					
4	Structural engineers.					
5	Quantity surveyors					
6	Building surveyors					
7	Safety Officers					

**3.2. Do you think the following subject areas are addressed in the construction/construction management program? Please tick (✓) in the box that best reflects your answer where:**

No	Subject area	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Legal requirements And liabilities					
2	Health and Safety Responsibility					
3	Health and Safety Policy					
4	Hazard identification /Safety plan					
5	Risk analysis and Method					

	Statements					
6	HS programs (health And safety meetings, permits to work)					
7	Health and Safety inspection					
8	Health and Safety Education and training					
9	Constructability					
10	Personal Protection					
11	Injury/damage report And Investigation					
12	Health and Safety Promotion					
13	Influence of Procurement System					
14	In-house safety rules					
15	Housekeeping					

**Part 4 (The Major Health and Safety areas to be considered during construction of high Ethiopia Electric Power construction projects)**

**4.1. Frequency of causes of Injuries in construction sites Please Mark (√) on the space provided**

No	Description	Frequency of injuries and fatalities			
		High	Medium	Low	Exceptional
1	Falling (Objects falling from a height)				
2	Stairways and ladders				
3	Scaffolding (Falling from scaffolding during construction)				
4	Excavations (Slides, collapse, not shored protection...etc.)				
5	Electricity (Electric power Accidents)				

6	Construction Hoists & Elevators and Cranes & Derrick				
7	Hazardous substances				
8	Noise				
9	Tools and Machinery (Drilling, Grinding, Bending machine...etc.)				
10	Fire (from electric, fuel, chemical etc.)				

#### 4.2. Factors that affect safety and health performance in the construction industry

Please Mark (√) on the space provided

No	Description	Degree of impact				
		Very high	high	average	Low	Very low
1	Complexity of the Design					
2	Type of Owner/attitude of owner/					
3	Weather Condition					
4	Project Cost					
5	Project Duration					
6	Contractual Specification of Safety health					
7	Safety and Health Policy					
8	Accidents / Incidents / Near Miss Report					
9	Fire prevention and control					



10	Risk Assessment					
11	Safety and Health Training					
12	Personal Protective Equipment (PPE)					
13	Emergency Planning and Procedures					
14	Safety and Health Inspection					
15	Safety and Health Management Meeting					
16	First-Aid Provision					
17	Safety Signals, Signs and Barricades (Incentives)					
18	Work environment					
19	Reward and Punishment System					
20	Role of Government and Engineering Societies					

**Annex 3: Interview (The first seven questions will be only for top managers)**

1. Current Status of the project
2. What is the total experience of your company in construction?
3. What is the total number of employees?
4. What is the total Project Construction Cost (in ETB Millions)?
5. How much is the Health and safety prevention expenditure in % from the total cost?
6. How much is the Health and safety accident expenditure in % from the total cost?
7. How much is the number of accidents in the previous two years?
8. What are the health and safety practices you use on this site?
9. Have you ever take a health and safety training in this site? How Often?
10. What kind of illness and injury has happened in this site during your stay? What were the main causes?
11. In which area of the work do usually health and safety problem arose?
12. What was the worst accident you remember on this site?
13. What kind of tools and facilities are there for health and safety management system?
14. How often does the supervisor or site manager check your health and safety practices on your daily activities?
15. What are the health and safety tools and practices you personally use on site?
16. Can you mention some of the Ethiopian Construction Health and Safety Rules, Regulations and Standards that you know?