



**ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE**

**HEALTH AND SAFETY MANAGEMENT PRACTICES OF
ADDIS ABABA CITY ROAD CONSRUCTION PROJECTS**

BY: WONGEL GEDEON

**A project work submitted to the School of Graduate Studies of AAU School of
Commerce in Partial Fulfillment of the Requirement for the Degree of Master
of Arts in Project Management**

ADVISOR: Dr. MENGISTU B.

March 2020

Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE

***Health and Safety Management Practices of Addis Ababa City Road
Construction Projects***

**A project work Submitted to Addis Ababa University College of Business and
Economics in Partial Fulfillment of Requirement for the Degree of Masters of
Arts in Project Management**

By: Wongel Gedeon

Approval Board Committee

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March 2020
Addis Ababa, Ethiopia

STATEMENT OF DECLARATION

I the undersigned declare that this project work under the title *Health and Safety management practices of Addis Ababa City Road Construction* is my own work, and has not been presented for the award of Degree Program in this or any other institution to the best of my knowledge and belief. All incorporated materials for the study have been acknowledged and this paper is conducted for the partial fulfillment of the Master of Arts Degree in Project Management

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The above candidate has carried out research for the Masters Dissertation under my Supervision

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ABSTRACT

Health and safety management practices on road construction projects of Addis Ababa city face a significant policy implementation and awareness creation gap that result in the occurrence of injuries and accidents. Research has shown that there are different stated policies on construction projects and different Road construction projects keep facing health and safety issues. This study identified health and safety practices in road construction projects and stated the main causes of accident in road construction projects as well proposed a measure to mitigate. Considering the situation in road construction the research asks what is the general look of safety and health management in Addis Ababa City road construction projects. Based on a review of the literature and the existing situation in Addis Ababa City Road Construction the Methodology is designed in a descriptive way that includes both qualitative and quantitative research approach on 18 projects undertaken by foreign and local contractors. A survey question distributed to Clients, Consultants, and Contractors, by using Convenience Sampling. Analysis of the responses demonstrated that on Local contractors all the health and safety management Measuring criteria are below 50% except Health and safety equipment. The result indicates that health and safety management are not given enough attention towards management, supervision, workspace and policy implementation, awareness creation and environmental protection in the road construction industry. Major causes of road construction injuries are stated as dust, excavation, noise, vibration and traffic accidents. On this basis, recommendation is given that Client, Contractors, and Consultant must give enough attention in awareness creation, supervise policy implementation, equipped workers and produce a conducive environment. Further research is needed to identify strategies and implementation procedures on the health and safety of road construction projects.

Key words: health and safety management, road construction, contractors, clients and consultant

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ACRONYMS

AACRA	Addis Ababa City Road Authority
BLS	Bureau of Labour Statics
ERA	Ethiopian Road Authority
GDP	Growth Domestic production
HS	Health and Safety
HSE	Health and Safety Excusive
ILO	International Labor Organization
MOLSA	Ministry of Labor and Social Affair
MOUWD	Ministry of Works and Urban Development
MOH	Ministry of Health
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
TMP	Traffic Management Plan
WHO	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1. Background of the study

The construction industry is one of the most significant in its contribution to GDP especially in developing countries and in terms of impact on the health and safety of the working population. The construction industry provides the homes we live in, the buildings we work in and the transport infrastructure we rely upon to improving our quality of life. However, for many workers in the construction industry leads to the unimaginable pain and suffering associated with accidental death or serious injury. (Helen and Steve, 2005) According to the Bureau of Labor Statistics (BLS), in 2012 alone, the construction industry experienced 856 fatalities and accounted for 19% of all fatalities among all industries (BLS, 2013). There are more than 60,000 fatalities reported every year in the construction industry around the world (Lingard, 2013). In the United States, the number of fatal injuries in construction increased by 16% from 2011 to 2014 (BLS, 2015).

Due to these, the industry continues to kill and injure more of its workers each year than almost any other industry. Have a notice that there is a huge range of incidence rates, varying from country to country that vary also in project types. In a project-based industry, accident rates will vary from project to project. Each project is unique, and each project type (for example, a road or a bridge or a house) has its own characteristics, methods of working, materials employed and techniques for construction.

(Helen and Steve, 2005) these make the health and safety issues raised in road construction is different from the others, Safety and health in construction is considered as doing construction activities with great attention and concern avoiding or minimizing all-hazard possibilities from human resources, material, and environment at every stage of the construction.

The way in which construction work is organized makes the management of health and safety more challenging than in other industries (Ringen et al. 1995).

Construction in Addis Ababa is the major city activity, different constructions are undertaken almost everywhere, different roads are excavated, using different machines that are helpful for construction like dozer, excavator, loader, grader, and other materials are very common to see everywhere in the city. (Vaughan, 2014) Noticing all these construction activities, having several

workforce makes health and safety management crucial for the construction sector. Health and safety issues are important in all occupation branches, most importantly for the construction. As road construction is sensitive towards health, safety, and its vulnerability is high resulting in severe health and safety damages. Road density in Ethiopia is among the lowest in Africa and other developing countries, with an estimated 21 km of road per 1000 square km and 0.43 km per 1000 population. The road network in Ethiopia consists of 23812 km of trunk, major link, and regional roads. Out of 8180 km of the trunk roads, approximately 3478 km are paved and 4702 km have gravel surfaces. The major link roads constitute about 7589 km; mostly gravel surfaced with only 178 km of paved surface. The standard of the approximately 8043 km of regional roads varies considerably, in part because various agencies have been involved in constructing regional roads over the last 15 years or so. In addition, there are some 30,000 km of unclassified, low standard, earth (dry weather) tracks and trails. (ERA, 1995) with this road history, health and safety management was not given the focus on constructing a road. In Addis Ababa, the capital city of Ethiopia road construction is the most significant industry in city construction where 25 – 30 % of city land is used for road circulation according to norms and standards of Addis Ababa. These drives health and safety in road construction should be considered with each road segment planned for construction.

1.2. The problem statement

There existed different regulations and rules regarding construction safety that address the employees the employer, the workers, and others. Having these principles and rules according to world health organization annually, throughout the world, an estimated number of 271 million people suffer work-related injuries, and 2 million die because of these injuries. (WHO, 2003). Moreover, the majority of the world's workforce does not have access to occupational health services. Only 5 to 10 percent of the workforce in developing countries and 20 to 50 percent of the workforce in developed countries have access to some kind of occupational health services (Tetsuya, 1999). According to The National Institute for Occupational Safety and Health (NIOSH) reports that roughly 20,000 construction workers are injured each year in highway and street construction accidents. (NIOSH, 2014). Coming to Ethiopia, the policies on occupational health and safety understated by the federal government include approved national policies that lack a local policy with in an organization. Some of the written policies are not specific to road

construction considering these awareness gaps in regulation provision are neglected. During road construction, a person keeps suffering, injured, slips, affected by chemicals, machineries even death happen.

Beside, Studies revealed that there is a gap in the safety and health rules and the recorded continual incidents that show health and safety management keeps being an issue in road construction industry.

In the road construction industries the workers, the road users, and the environment are highly exposed to hazards and safety issues. There exists poor follow up on the health and safety management stated policies, policies undertaken at an international level with international knowledge and performance, Several injuries, health problems, and different environmental risks are occurring; workers in road construction are exposed to hazards connected to construction equipment and the working environment.

The different stakeholders on the project including the supervisor, the project manager, the contractor, and the client all are interested in the project output or delivery without making the path of the workers safe to accomplish the project and keep the environment healthy. Health and safety management has been resulting different damages that is not limited to the workers, the issue of health and safety passes through the living community and the environment that makes health and safety management practices a problem in road construction.

1.3. Objective of the Study

1.3.1. General Objective

The general objective of the study focus on to identify, health and safety practices in road construction projects, and propose measures to alleviate

1.3.2. Specific Objective

- To assess the contribution of Contractors, Consultant, and Client towards health and safety management practice
- To state the major health and safety issues on Addis Ababa City Road Construction Projects.
- To identify the main causes of road construction accidents and ways to manage them.

1.4. Research Questions

1.4.1. General Research Question

The general research question that the study address is:

What is the look of safety and health management in Addis Ababa City road construction projects?

1.4.2. Specific Research Question

The specific research questions that the study addresses are:

- What are the views of the contractors, consultants, and clients towards health and safety management?
- What are the common causes of accidents on road construction projects?
- What are the major issues concerned with road construction health and safety?
- What are the measures taken to manage health and safety on current projects?

1.5. Significance of the study

This study will state the current practices of the health and safety management on road construction and give a vital well-studied information for higher officials, direct Addis Ababa city road authority to demonstrate different policies regarding city road construction towards health and safety practices, minimize the rate of accidents raised during construction. Road construction will not be a threat for the living area community as well for the road users, this study could give environmental protection awareness and health and safety management awareness and it also used as a review document who want study further the different issues in regards and the scope that is beyond these paper.

1.6. Scope of the research

The concern of this study is about identifying practices of health and safety management on road construction, focusing on different selected road segments governed by Addis Ababa City Road Authority, Consulted by different companies and contracted by both local and foreign contractors. The study considers currently active projects, which are eighteen in number road segments on their construction phase located at different topographic locations in Addis Ababa city.

Therefore, the study is conducted on these active road construction areas focusing on the health and safety practices of contractors, consultants, and clients on the project sites.

1.7. Limitation of the study

This research faces a limitation regarding the information in time of reviewing different literature, little is written on road construction safety especially when it comes specifically to Ethiopia, Addis Ababa. This research paper addresses only Addis Ababa city road projects that are governed by AACRA. Since there is a limited time to complete the project where with this limit to convince and collect data was challenging, however, the researcher stretches to find out possible ways to communicate with the participant and other who put a hand on the research to organize and briefs the current practices of health and safety in road construction. The study is limited to views of clients, contractors, and consultants.

1.8. The Organization of the report

The Research paper will have five chapters containing introductory part consists of Background of the study, statement of the problem, Objective of the study, research question, significance of the study, the scope and limitation of the study then it proceed to literature review which we find in chapter two where relevant document mater reviewed related the study area. Chapter three describe the methodology of the study, whereas the fourth chapter brief the analysis and findings of the project and finally the last chapter will give a conclusion and recommendation of the research paper.

CHAPTER TWO

LITREATURE REVIEW

2.1 Theoretical Review

Occupational health and safety is the prevention and maintenance of the highest degree of physical, mental and social well-being, the prevention of ill-health among workers caused by their working conditions, the protection of workers from factors adverse to their health in their employment, and the placing and maintaining workers in occupational environments adapted to their individual and psychological conditions.” (ILO, 2001)

Health refers to the protection of bodies and minds of people from illness resulting from materials, processes or proceeding used in the work place whereas safety is protection of people from physical injury (Hughes and Ferret,2008). Therefore, the above statement is considerable while undertaking health and safety practices of road construction. Different papers are produced on the health and safety issues of construction some that are specific to road construction are reviewed and stated under the following titles.

2.1.1 Safety policies

Safe and healthy working conditions do not happen by chance. Employers need to have a written safety policy for their enterprise setting out the safety and health standards, which it is their objective to achieve. The policy should name the senior executive who is responsible for seeing that the standards are achieved, and who has authority to allocate responsibilities to management and supervisors at all levels and to see they are carried out. (ILO, 1995)

Types	Safety policies
Transport, earth-moving and materials-handling equipment	1, All vehicles and earth-moving or materials-handling equipment should: be of good design and construction taking into account as far as possible ergonomic principles particularly with reference to the seat; be maintained in good working order; be properly used with due regard to safety and health; be operated by workers who have received appropriate training in

	accordance with national laws and regulations. 2. The drivers and operators of vehicles and earthmoving or materials handling equipment should be medically fit, trained and tested and of a prescribed minimum age as required by national laws and regulations. 3. On all construction, sites on which vehicles, earthmoving or materials handling equipment are used with safe and suitable access ways should be provided for them and traffic should be so organized and controlled as to secure their safe operation. 4. Adequate signaling or other control arrangements or devices should be provided to guard against danger from the movement of vehicles and earth-moving or materials-handling equipment. Special safety precautions should be taken for vehicles and equipment when maneuvering backwards. (ILO,1992)
Traffic Accident	• Provide alternative pedestrian routes where these are interrupted • Provide diversions with suitable and reflecting road signs; provide barricades and delineators and flagmen to guide the construction traffic. For regulation of traffic, the flagmen shall be equipped with red and green flags • Use clear, labeled properly and meaning full traffic signs and speed limits, especially at road crossing of the people and conjunction of animals • Provide traffic awareness specially at schools, religious, public bus station and other risky places, • Delineat or putt appropriate signs on livestock crossing areas(AACRA, 2019)
Mobile asphalt layers and finishers	1, Wooden floors in front of the sprayers should be covered with corrugate sheet metal. The mixer elevator should be within a wooden or sheet-metal enclosure which should have a window for observation, lubrication and maintenance.

	2. Bitumen scoops should have adequate covers. 3. The sprayer should be provided with a fire-resisting shield with an observation window. 4, To avoid fire risks due to foaming: boilers should have a device that prevents foam from reaching the burners; or only non-foaming products should be used. 5, When asphalt plants are working on public roads, an adequate traffic control system should be established and reflective jackets provided for the workers. 6, No naked flame should be used for ascertaining the level of asphalt in the tank. (ILO,1992)
Pavers	Pavers should be equipped with guards that prevent workers from walking under the skip.
Road rollers	1. Before a road roller is used the ground should be examined for bearing capacity and general safety, especially at the edges of slopes such as embankments. 2. Rollers should not move downhill with the engine out of gear. 3. When a roller is not in use: the brakes should be applied; the engine should be put into bottom gear if the roller is facing uphill; the engine should be put into reverse if the roller is facing downhill; the contact should be switched off; the wheels should be blocked. (ILO,1992)

Table 2. 1 Safety Policies

2.1.2 Duties and responsibilities in road construction industry

Contractors

The contractor is responsible for overseeing and ensuring that safe and healthy conditions prevail on the jobsite and that jobsite conditions and work practices meet the required standards for safety and health. The contractor must also:

comply with all applicable requirements of OSHA, that include provide education and training in safety and health for employees, furnish first aid and medical attention for those injured on the jobsite, keep records of accidents and injuries and submit required accident and injury reports. (Reese, and Eidson. 1999)

The contractor is also responsible for keeping unauthorized persons away from hazardous activities on the site. If the contractor allows visitors on the jobsite, they must be supplied with hard hats and other required and appropriate protective equipment to protect them from safety and health hazards on the jobsite.

The movement of visitors around the jobsite must be restricted as necessary to ensure their safety. (OSHA 2005)

Through these they provide a safe work environment provide safe equipment's, consistence maintenance, provide suitable safety signs, notices, personal protective equipment's and assign well trained on site personnel.

Employees

Employees have to take care not to endanger themselves, their colleagues or others affected by their work. Employees have to cooperate with their employer on health and safety matters and not do anything that puts them or others at risk. Employees must be trained and clearly instructed in their duties. Self-employed people must not put themselves in danger or others who may be affected by what they do. (Phil Hughes, Ed Ferrett, 2011)

Workers in Ethiopia management plan

Worker shall: -

- Correctly wear high visibility vests, in addition to other personal protective equipment required at all times whilst on the worksite.
- Comply with the requirements of the TMP and ensure no activity is undertaken that will endanger the safety of other workers or the general public.

- Enter and leave the site by approved routes and in accordance with safe work practices (Traffic, health and safety management, 2019)

Employer

The employer will undertake suitable sufficient written risk assessments and put in place effective arrangements for the planning, organization, monitoring and review of health and safety measures in the workplace (including health surveillance) Such should be recorded. Employ or contract competent persons to help them with health and safety duties; develop suitable emergency procedures. Ensure that employees and others are aware of these procedures and can apply them; provide health safety information to employees and others, such as other employers, the self- employed and their employees who are sharing the same workplace. Employer consider the maturity level of its employees in relation with safety handling of themselves.

They are also responsible for protecting people from harm caused by work activities. This includes the responsibility not to harm contractors and subcontractors on site. (Phil Hughes, Ed Ferrett, 2011)

Employers should provide adequate means and organization that should establish a suitable program on the safety and health of workers consistent with national laws and regulations and should comply with the prescribed safety and health measures at the workplace.

Employers should so provide and maintain workplaces, plant, equipment, tools and machinery and so organize construction work that as far as is reasonably practicable there is no risk of accident or injury to health of workers. (ILO,1992)

Client

co-ordinate or nominate a competent person to co-ordinate all activities relating to safety and health on their construction projects; inform all contractors on the project of special risks to health and safety of which the clients are or should be aware; require those submitting tenders to make provision for the cost of safety and health measures during the construction process. In estimating the periods for completion of work stages and overall completion of the project, clients should take account of safety and health requirements during the construction process. (ILO, 1992)

The Management of Health and Safety at Work Regulations apply to everyone at work and encourage employers to take a more systematic approach to deal with health and safety. These is

done by: small projects, clients should undertake assessing the risks, which affect employees and anyone, might be affected by the Site Occupier's work, including contractors, setting up emergency procedures.

Designers

Considering health and safety in the design through making health and safety layout on drawings that are agreed by all working design team are essential these team will also plan for safety and health in layout and design drawings, with due regard to buildability, future maintenance and repairs. (ILO, 1999) Many safety issues raised due to design problems in road construction that increase the design requirement in road systems through Periodic checks, sort out interface problems with different contractors, certify contractor's claims for safety payment, and conclude the final accounts. (ILO, 2005) It advocates a proactive approach in which human characteristics used as the starting point. These characteristics refer on the one hand to human physical vulnerability and on the other hand to human (cognitive) capabilities and limitations (Wegman and Aarts 2008).

Safety officer/manager

Every company of any size should appoint a properly qualified person whose special and main responsibility is the promotion safety and whoever is appointed should have direct access to an executive director of the company. (ILO,1999)

Their duties include; passing the organization information from management to workers, conduct safety training programs that include induction training for all workers on the site, the investigation and review of the circumstances causes of accidents and occupational diseases to advise on preventive measures, acting; as consultant and technical adviser to the safety committee, participation in pre-site planning.

To be a safety officer one should have experience and should be properly trained, qualified and where such exists should be a member of a recognized professional safety and health body. (ILO,1999)

The Safety Officer shall: -

- Ensure all traffic control measures of the **TMP** are placed and maintained in accordance with this palm

- Ensure suitable communications and consultation with the affected stakeholders shall be maintained at all times
- Ensure inspections of the Traffic Controls are undertaken in accordance with the TMP, and results
- Recorded feedback from field inspections, worksite personnel and members of the public, and take action to amend the traffic control measures as appropriate following approval from the Engineer.
- Arrange and/or undertake any necessary audits and incidents investigations
- Prepare a Traffic Management induction program periodically with HSE adviser.
- Preparing weekly and monthly appropriate traffic safety report for project stakeholders. (Traffic, health and safety management, 2019)

Supervisors

Good planning and organization at each work site and the assignment of clear responsibility, to supervisors are fundamental to safety in construction. Each supervisor requires the direct support of site management and seek to assure within his/her field of competence that working conditions and equipment are safe. workplace safety is regularly inspected, workers have been adequately trained for the job they are expected to do, workplace safety measures are implemented, the best solution are adopted using available resource and skills and necessary personal protective equipment is available used. Making the work Site safe will require regular inspection and of the means for taking remedial measures. The training workers enable them to recognize the risk involved and how they can overcome them. Workers have to see the safe way of getting a job done. (ILO,1999)

Site Supervisor

The Site Supervisor is responsible for overseeing the day-to-day activities, and is therefore responsible for the practical application of the TMP measures and shall;

- Instruct workers on the relevant safety standards, including the correct using of high visibility safety vests.

- Ensure traffic control measures are implemented and maintained in accordance with the TMP.
- Undertake and submit the required inspection and evaluation reports to management.
- Render assistance to road users and stakeholders when incidents arising out of works affect the network performance or the safety of road users and workers.
- Take appropriate action to correct unsafe conditions, including any necessary modifications to the TMP. (Traffic, health and safety management, 2019)

Traffic Controllers

Traffic controllers (flag men & others) will be used to control road users to avoid conflict with workers, traffic and pedestrians and to stop and direct traffic in emergency situations.

Traffic Controllers shall: -

- Operate in accordance with Section of this Traffic Management Plan.
- The flagmen shall be equipped with red and green flags sign to make suitable traffic flow in the corridor. (Traffic, health and safety management, 2019)

2.2 Empirical Review

2.2.1 Road construction hazards

Working close to traffic can be dangerous. Each roadside work zone has its own unique set of hazards associated with roads, traffic, vehicles, and work activities. Employers or supervisors need to identify workplace hazards, put measures in place to protect workers from those hazards, and ensure workers know the hazards and how to protect themselves. (Cone Zone, 2017)

For works which by their very nature expose workers to hazards arising from the use or presence of chemical, physical or biological agents and climatic conditions, appropriate preventive measures should be taken to avoid any danger to the safety and health of workers. (ILO,1992)

Causes of accidents and Hazard

Most road workers are exposed to accidents; these occur when workers are run over or struck by moving vehicles, trucks or equipment. Construction vehicles and equipment in the work area cause over half of the fatalities. The main hazards and risks of accidents in the construction sector can be categorized and described in the following way but not limited to the stated

Slips and falls

Slips, trips and falls may have serious consequences, causing severe injuries such as broken bones or concussion. Slips and trips are caused when materials are scattered everywhere haphazardly, the floor is wet or greasy, inappropriate footwear is worn. (HSE, 2004)

Contractors and others in control of construction sites must therefore manage work so that people can move safely around the site.(Hughes and Ferret, 2011)

Height risk

Road construction deals with surface work but at some points in construction of bridges and high ways with height difference the issue of height risk present. Falls generally occur from unguarded edges or openings at height, bridgework, through fragile materials, into excavations, from ladders, from temporary platforms like tower scaffolds, from places of work on an existing facility and on stairways.

There is a need to assess the risk from work at height and to organize and plan the work so it is carried out safely. Managing work at height follows a hierarchy of controls - avoid, prevent and arrest.(Haslam, R.A., Hide, S.A., Gibb, A.G., Gyi, D.E., Pavitt, T., Atkinson, S., Duff, A.R.,2007)

Scaffolding

These could happen during the assembly, alteration dismantling of the scaffolding and the risks can be present whenever scaffolds are used. Comparable risks arise when systems similar to scaffolding are used in false work (i.e. temporary structures used in construction to support spanning or arched structures in order to hold the component in place until its construction is sufficiently advanced to support itself). (European council, 1992)

The main causes of the incidents are dangerous methods of erection or dismantling, defects in the erected scaffold and misuse of the scaffold.

Instability

Instability can adversely affect existing facilities at or nearby the project, new structures under construction and temporary structures erected as a part of the construction work. Loss of

structural integrity can be due to a number of causes. These include failures in design especially of temporary works, failures in correctly executing the works as designed and failures in properly monitoring the work being undertaken to take account of the unforeseen. Excavation effect in instability is great. (HSE, 2014)

Risks related to traffic circulation

Risks related to working on existing roads with live traffic depend on the type of work to be performed. Collisions can occur between vehicles working inside the site, and between vehicles using detours, or by passing vehicles with site machinery, equipment and workers, (perhaps where the site is not adequately signed and physically protected). Work in existing tunnels can present particular risks from and to moving traffic.(HSE, 2014)

Construction machinery risk

Risks from construction machinery depend upon the type of equipment under consideration e.g. earthmoving equipment, lifting equipment, etc. and the work activities.

- Risks related to earthmoving equipment (Dozers, excavators, loaders, graders, etc, including their accessories) may include roll-over of the equipment, objects falling onto the equipment, and from malfunctioning safety and other warning devices, etc.
- The risks related to lifting equipment (e.g. tower cranes, mobile cranes, etc., including accessories such as slings) may include: workers falling from height during the installation, operation and dismantling of the equipment, collapse of the equipment during use due to overloading or during erection and dismantling, and failures due to poor slinging techniques, etc. Demonstrable operator competence following training specific to the machinery, proper planning and supervision of the work, and effective inspection, maintenance and repair arrangements are some of the measures that can be taken to reduce the likelihood of accidents.(European Council, 2009)

Electricity

The major risks related to electricity are electrocutions and burns. (HSE, 2014) Many deaths and injuries arise from use of poorly maintained electrical equipment, work near overhead power lines, contact with underground power cables, horizontal boring or drilling, mains electricity

supplies, use of unsuitable electrical equipment in explosive areas, fires started by poor electrical installations and faulty electrical appliances and untested worksite distribution boards.

Working near high voltage power lines (including systems in buildings, overhead power lines or underground cables) can cause serious and fatal injuries due to direct contact with live lines or arcing from those lines to nearby equipment. (Janicak, C. 2008)

Fire and explosion

Fire risks on a construction site have many sources such as: the use of flammable liquids, welding or abrasive cutting techniques used in places not specially prepared for such works, liquid gases used with an open flame and flammable materials.

2.2.2 Health and safety Measures in road construction

The preventive measures should give emphasis on the need to eliminate or reduce the hazard at the source and in particular should require the replacement of hazardous substances, equipment or processes with substances, equipment or processes less harmful or hazardous to workers' safety and health. The reduction of noise and vibration caused by equipment, machinery, installations and tools could be made through control of the release of harmful agents or chemicals into the working environment. (ILO,1992)

Have a Plan

Every road construction project should have a transportation management plan. The plan should consist of a temporary traffic control plan to protect workers by safely conducting traffic around or through the work zone. It should also have a traffic control plan for inside the work zone that manages the flow of heavy equipment, construction vehicles, and workers. (Kendall Jones, 2017)

badly planned and untidy site is the underlying cause of many accidents.

Health and Safety Warning Signs

Safety Signs and Signals are one of the main means of communicating health and safety information. This includes the use of illuminated signs, hand and acoustic signals. The work zone should consist of an advanced warning area with warning signs alerting motorists of upcoming changes in driving conditions. A transition area using traffic control devices for lane,

closures and traffic pattern shifts, a buffer area. The work area and a termination area to allow traffic to resume back to normal and a sign indicating that the work zone has ended. All traffic control devices whether its cones, barrels, barriers or signs should comply with the Federal Highway Administration's manual. (Kendall Jones, 2017) Care must be taken to avoid using too many signboards in close proximity, signboards are only effective if they can be seen and understood. If too many signs are placed together, there is a danger of confusion or of important information, being overlooked (HSE 2009).

Create Separate Work Areas

Road construction work zones are busy areas usually with several work activities taking place at the same time. To avoid accidents, use cones, barrels, and barriers to clearly delineate specific areas of the work zone such as material storage, areas where heavy equipment is being used, vehicle parking and safe areas for workers on foot to move about in. (Kendall Jones, 2017)

Wear Proper personal protective Equipment

All personnel inside the work zone should wear proper safety equipment. Personal protective equipment (PPE) refers to protective clothing, helmets, hard hats, steel-toed boots, highly visible clothing and, depending on the noise levels, hearing protection. Or other garment or equipment designed to protect the wearer's body from injury by blunt impacts, electrical hazards, heat, chemicals, and infection, for job-related occupational health and safety purposes. (OSHA,2007)

Personal protective equipment and protective clothing should comply with standards set by the competent authority, taking into account as far as possible ergonomic principles. (ILO1992) some are;

- **Head protection**

Falling objects, overhead loads and sharp projections are to be found everywhere on construction sites. Head injuries often occur when moving and working in a bent position, or when arising from such a position. Safety helmets protect the head effectively against most of the hazards, and one should wear a helmet whenever you are on site and particularly when you are in an area where overhead work is going on.(ILO,1997)

- **Foot protection**

Foot injuries fall into two broad types: those due to penetration of the sole by nails, which have not been knocked down or removed, and those due to crushing by falling materials, which can be minimized by wearing protective footwear. The type of safety shoes or boots to be used will depend on the nature of the work, but all safety footwear should have an impenetrable sole and uppers with a steel toe-cap. (ILO1997)

- **Hand and skin protection**

Hands are extremely vulnerable to accidental injury, and in construction more injuries are caused to hands and wrists than to any other part of the body. Open wounds, abrasions, fractures, dislocations, strains, amputations and burns occur. They are largely preventable by better manual handling techniques and equipment, and by wearing suitable hand protection such as protective gloves and gauntlets. (ILO1997)

- **Eye protection**

In construction industry, many eye injuries occur because of flying material, dust or radiation so while undertaking a task that have an effect on the eye, one have to wear a PPE as per the standard.

First aid kit

When there is an accident on site and someone is hurt, one can help by: calling for help from someone on site trained in first aid, or in cases of severe injury by calling an ambulance and reporting the accident at once to your supervisor. (ILO,1997) the size of the site and number of people employed will determine what is needed in the first aid considering there should be a blanket and a stretcher. On large sites with more than 200 people are employed, there should be a properly equipped first aid room. On any construction site of that size, at least one person on every shift should have been trained in first aid to a nationally recognized standard.

Be Aware of the Surroundings

Regardless of what your job duties entail in the work zone, workers should always be mindful of what's going on around. Avoid walking behind any vehicles that may be backing up or into the swing radius of heavy equipment. Whenever possible, face traffic while inside the work zone or have a spotter available when your back is turned. Spotters should also be used to monitor the

movement of vehicles and heavy equipment inside the work zone in addition to monitoring traffic to alert workers to any potential dangers.((Kendall Jones, 2017)

Avoid Blind Spots

Vehicles and heavy equipment are constantly moving about inside the work zone including dump trucks, compactors, pavement planers, excavators, pavers, and rollers. Operators should ensure that all mirrors and visual aid devices are attached and operating properly including backup alarms and lights.

If workers are on foot and working near these machines while in operation remember that the driver has a limited line of sight. Always stay in visual contact with the driver. A good rule of thumb to follow is that if you can't see them then they probably don't see you. (Kendall Jones, 2017)

Have a Competent Person on Hand

A competent person should be onsite whenever work is being performed. Per OSHA, a competent person is someone “capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.” A competent person is needed to conduct hazard assessments and regular inspections of the worksite. Workers should report any unsafe hazards or equipment to the competent person assigned to the work zone so they can be corrected immediately. (Kendall Jones, 2017)

Start Each Workday with a Safety Meeting

In addition to ensuring that all personnel at the jobsite have the proper training required it is also a good idea to have a quick safety meeting before work begins. Since conditions can change greatly from day to day in the work zone workers should be briefed on the work activity scheduled each day and notified of all potential hazards. This is also a good time to ensure that

all workers have and are wearing the proper PPE required for the work being done that day. (Kendall Jones, 2017)

Have a Site Specific Safety Program

Every road construction project is different, each work zone has its own unique hazards, and challenges so creating a safety program geared specifically for the site can go a long way in preventing accidents. The site specific safety program include identifying all hazards and plans to control and mitigate them, schedules to routinely inspect all equipment and material, a plan for first aid and emergency medical care in the event of an accident and safety training schedules for all employees. (Kendall Jones, 2017)

Positive Separation - Separate workers from traffic using "positive separation," such as barriers, road closures, shadow vehicles, and buffer space. Remember, this separation is important for both roadway traffic and construction vehicles.

Be alert - Do not become complacent with your work environment. Stay alert at all times and in all places. Stop, look, and listen for possible hazards.

Stay Hydrated

Workers performing road construction are susceptible to overexertion and heat-related illnesses. Asphalt absorbs 95% of the sun's rays and asphalt temperatures can easily be 30° F or higher than the surrounding air temperature. Workers should drink plenty of water or liquids high in electrolytes like sports drinks or coconut water. Workers should also get out of the heat and sun as much as possible especially on extremely hot days to avoid heatstroke, dehydration and heat exhaustion. (Kendall Jones, 2017)

Health and Safety Warning Signs

Safety Signs and Signals are one of the main means of communicating health and safety information. This includes the use of illuminated signs, hand and acoustic signals (e.g. fire

alarms), spoken communication and the marking of pipework containing dangerous substances. Traditional signboards, such as prohibition and warning signs, signs for fire exits, fire action plan notices (fire drills) and fire-fighting equipment are also considered to be Safety Signs. It is critical that all Safety Signs and Signals can be easily understood. Where signboards are used in a workplace they should be sufficiently large and clear so that they can be easily seen and understood. Signboards also need to be durable, securely fastened and properly maintained to ensure they remain visible. Care must be taken to avoid using too many signboards in close proximity, signboards are only effective if they can be seen and understood. If too many signs are placed together there is a danger of confusion or of important information being overlooked (HSE 2009).

2.2.3 Environmental impact on road construction

Road construction has an effect on the people and environment both positively and negatively. Positively roads provide the opportunity of mobility and transport for people and goods. On the negative side, roads occupy land resources and cause adverse impacts on natural water resources and discharge areas.

According to ROADEX The three most damaging effects of road construction and management are noise, dust and vibrations. Which mainly occur during the process of road construction. Noise mainly occurs during road construction phases but it can also occur to a lesser degree during maintenance operations. Dust is created during the construction of gravel roads and unbound aggregate layers.. Excess dust production can be treated by means such as watering and use of alternative materials.

Noise - Noise is a sound that is undesirable to the listener. The level of the disturbance caused by sound will depend on its extent and intensity, and on the sensitivity of the persons affected. Noise is majorly considered as a problem in areas where living areas and many settlers occupy. The condition of roads also have an effect on noise level, as a road in poor condition cause more noise than road in a better condition during car mobility. Greater consideration must therefore be given if roadworks are likely to create noise. Noise disturbances may cause irritation as well as agitation and stress to livestock. Neitzel *et al.* (1999) report that noise exposure levels vary

according to the type of construction and activities being undertaken. Among construction classifications, road construction, installation of machines or equipment and clearing, grading or excavating are reported to account for the largest number of compensation claims (Daniell *et al.* 2002).

Construction sites are noisy places. Excessive exposure to loud noise can cause permanent damage to your hearing. Noise at work can cause stress, making it difficult to sleep. Very high levels of noise caused, for example, by using cartridge tools can cause instantaneous hearing damage.

The levels of noise produced in operations such as piling, tunneling and cleaning operations may be such that unprotected persons will exceed their maximum recommended daily dose in a matter of seconds. (ILO, 1995)

Vibrations - Vibrations disturb people close to roads but they may also cause damage to buildings and sensitive equipment. Vibrations, and noise, can cause damage to geological and archaeological objects. A major source of vibrations to surrounding households are uneven roads with potholes where vibrations caused by poor road conditions can be also a risk to the health of drivers.

Many noisy machines or hand-operated tools also transmit vibrations to the body – pneumatic rock drills or concrete breakers are common examples. In this way they can injure muscles and joints, and affect blood circulation causing what is known as “white finger disease”. When using these tools you should wear gloves, which help to cushion the vibrations. (ILO 1995)

Dust- Dust is an almost inevitable consequence of roadwork. Gravel and crushed gravel and hard rock aggregates always contain a proportion of fines, and if the material is dry, a heavy dust cloud can be raised when it is mobilized. The resulting dust can disturb both the population and the local environment.

Waste - Waste is any substance or object which the holder discards, intends to discard, or is required to discard. In construction, it includes unexpected materials, such as excavated soil that

cannot be re-used. Waste may arise in different ways: Packaging material, Residual road structure material, Dangerous waste, oil from machines, etc. (RoadexIV)

Based on its effect on the environment waste is classified as Active (materials that will modify due to reaction), Inactive (material that will not be modified by any physical, chemical or biological reaction in a normal landfill site) and Dangerous (characterized as Flammable, Caustic, Oxidable, Explosive, Poisonous, Harmful and irritating)

Examples of dangerous wastes in roads operations are fuel, accumulators and accumulator acids, brake fluids, transmission oils, shock dampers, different acids, etc. The main sources of these dangerous goods are vehicles (both road users and maintenance). In addition Program Project 25-09 and reported in 2001 in National Cooperation Highway Research Program (NCHRP) Report 448 (Nelson et al. 2001) concluded that most materials, including asphalt concrete and hydraulic cement concrete, used in the construction and repair of highways “behave in a benign fashion in the environment. On the highway surface, leaching is slow, transport is rapid, and dilution is great....”

2.2.4 Overview road construction in Ethiopia, Addis Ababa

History shows the road construction in Ethiopia have different grades and range in the 17th and 18th centuries containing a number of small roads trails and footpaths. It was prior to the second Italian occupation i.e. between the years 1896 and 1936 that a great success was made in road construction. Emperor Menilik was said to be a successful road builder participating himself in the construction. In 1903 the road from Eritrea to Addis Ababa and the road from Addis to Addis Alem were built. In addition, it was during that time, that the first Asphalt roads appeared in Addis Ababa. Through different difficulties road construction keeps proceeding.

As stated on the news on 2014 Addis Ababa city road construction the road sector continues to enjoy the largest share of the budget from the Addis Ababa City Administration. For almost five years the sector has been allotted a large amount of money, surpassing investments in other sectors. As stated on Fortune newspaper the road sector is among the top priorities of the budget that shows its consideration on the city government.

2.2.5 Occupational safety and health in Ethiopia

There are international labor conventions on occupational safety and health that are required to be adopted and ratified for the maintenance of workers' health through policy, regulatory framework and provisions of enforcement by UN member countries. Ethiopia has ratified about 20 ILO conventions, including core conventions such as - Occupational Safety and Health Convention, 1981 (No. 155). (MOLSA,2006) These conventions are the basis for developing laws in the area of workplace protection. 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 (Negarit Gazeta, 2004) and Labor Proclamation No. 515/2007 on public civil servants. (Negarit Gazeta, 2007) The national level policy on Occupational Safety and Health (OSH) has recently been developed and approved (July 2014) by the Central government. Ethiopia is moving fast towards industrialization and civil reform to advance productivity (GTP). (MOFED, 2010)

The Ethiopian Constitution (Constitution 1994) is the foundation for the governance of OSH. It has numerous articles that ensure the protection of citizens and workers from environmental and work related hazards. The Ethiopian Labor proclamation has established the provisions of OSH in work places. The proclamation clearly indicates the duties and responsibilities of the three parties: employer, employee and the government inspectors as stakeholders. (Negarit Gazeta,2004) There are OSH directives and guidelines used by OSH inspectors and safety officers to ensure the protection of workers. (MOLSA, 2008) Collective agreement made between an employer and a Trade Union is mandatory for a factory that operates under the Labour Proclamation. The agreement document is a cornerstone that explicitly indicates the provision of OSH at respective workplaces. OSH related agreements include responsibilities of partners, safety measures, leave (annual, sick, study, etc.), working duration and hours, fire safety, provisions of personal protective devices, sanitary facilities, and health services. Ethiopia has committed herself to exercising ILO Conventions. Twenty conventions are ratified and

addressed in the labor proclamation. (MOLSA, 2006) that includes Occupational safety and health, convention 155/1981.

2.2.6 Different Environmental policies In Ethiopia

Policies and acts promulgated on areas of environmental protection and sustainable utilization include the Constitution of the Federal Democratic Republic of Ethiopia (Proclamation No. 1/1995), Environmental Protection Policy (FDRE, 1997); the Environmental Protection Authority Establishment Proclamation (Proc. No .9/95), Proclamation for the establishment of Environmental Protection Organs (Proclamation No. 295/2002, Environmental Pollution Control Proclamation (Proclamation No. 300/2002, Forestry Proclamation No.94/02 and Water Utilization Policy (Proclamation No. 92/1994), Biodiversity Strategy and Action Plan (BSAP), the respective Regional.

The Constitution of the FDRE (1995)

The Constitution provides the following basic policies pertaining to natural resources management and the environment.

- Government and all Ethiopian citizens shall have the duty to protect the country's environment and natural resources; Design and implementation of programs and projects of development shall not damage or destroy the environment; and Peoples have the right to full consultation and expression of views in the planning and implementation of environment policies and projects that affect them directly.

Environmental policies are stated in Conservation Strategy of Ethiopia. Environment Policy (Approved 1997), Biodiversity Policy (Approved 1998) and Investment Policy (Proclamation No. 37/1996) that are functional at federal level.

Environmental protection in Ethiopia road construction

Environmental protection and mitigation measures cover all works necessary for the protection of the environment. The main areas, which could have adverse impacts on the environment during the course of the project, are the camp, liquid and solid waste tipping areas, detour

construction, borrow pit and quarry exploitation, widening of the existing road, plant sites, and workshop. Indeed, construction operations, movement of labor and equipment on the aforementioned work areas will induce landscape destruction, soil erosion, damage to trees and shrubbery, water, air and noise pollution on the existing environment.

Aiming at above-mentioned adverse impacts and pollution sources, we shall take relevant measures to minimize unfavourable effect to surrounding environment caused by construction activities. (Traffic, health and safety management, 2019)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The purpose of the study is to overview the health and safety management on Addis Ababa City Road construction projects. Specifically the study required to answer, how the current state of health and safety management in road construction looks like, consideration of the road development on health and safety, the duties of different stakeholders and causes of accidents of the construction process. In order to assess and analyze the problem different kinds of data are collected from different stakeholders who involve on the city road construction industry.

This chapter leads us in detail on the procedures that the method used to compile. The paper divided into several sub sections addressing the choice of research design, data collection procedures including questionnaire theme, techniques to consider sample, data representation and others.

3.2 Research design

The research study is designed in survey and descriptive designs, where the survey is used to quantify the data. The descriptive design is a way to answer questions of the existing situation of who, what, when, where, and associated with the health and safety managements on Addis Ababa city road construction. The study also considers explanatory format to answer the why question to get concrete information and help to answer the research question and address the research problem. The strength of the method used is because it allows for examining the situation in depth and ensures the evidence obtained avoiding ambiguity as possible.

3.3 Research approach

The research followed a mixed approach that encompasses qualitative and quantitative approaches in order to reach a solution of what been studied. qualitatively it deal with quality of a kind that aims at discovering the underlying motives and desire using in depth interviews for the purpose and quantitatively it is helpful in quantifying variables which is gathered through closed ended Questions and interpreting statistical data. It relate a collected data and observation

in different ways, where it study why the particular thing exists along with what respondent have to say about it.

3.4 Target Population

The study is defined in Addis Ababa City Road construction projects, which are constructed by foreign and local contractors. Hence, the acquired data determine the target population. The target population of this study includes key staffs of contractors, consultants and client of every active projects.

3.5 Sampling Method

The sampling methods the study use is convenience sampling in order to gain initial primary data regarding specific issues.

Sample size

In this study eighteen segments of Addis Ababa City Roads, which are currently under construction are considered for gathering the required data. From these active projects, the respective staffs are taken as a source of information, which are believed to have the required knowledge on the subject matter. Accordingly, staffs of each projects' contractors, consultants and the client itself are involved. The Eighteen currently active projects and road segments that this paper focuses are stated in Appendix B

According to the described road segments in Appendix B, assigned for local and foreign contractors are described on the table below.

Projects	Road segment	Sample size	Distributed Questionnaire	Collected Questionnaire
By local contractor	14	32	32	32
By Foreign contractor	4	10	10	9
Employer's Planners and Safety Officers		4	4	4
Total	18	46	46	45

Table 3. 1 Sample size

The sample is taken from:

- The Fourteen projects by local contractor; Twenty-Eight questioners were distributed for each contractor's and consultant's representative of the projects. One questionnaire for contractor side and one for consultant side. Besides, four questioners for counterpart engineers of the project from the employer side were also distributed.
- Similarly, In the foreign contractors of Four projects; Eight questioners were distributed for each contractor's and consultant's staffs. One from the contractor and one from the consultant side is taken and the remaining two questioners were distributed to the counterpart engineers from the employer side.
- Finally, the Employer's planners and safety officers are also incorporated in the study because they are the law enforcers of many road projects in Addis Ababa. Hence, to engage their idea, four questionnaires were distributed for staffs from the employer side at head office level.

3.6 Data collection techniques

The data is collected using different techniques. This paper follows observation techniques through viewing different on site visit of the situation and as well informal communication with different workers on the area. This study undergoes on site as well office interview and questionnaires are distributed for different stakeholders on the project; Employer, Planner, Contractor, and Consultant. As a primary data source the distributed questionnaires address different questions that guide to address the research question and allow the participants to express their idea freely in a way they were comfortable. Secondary data collection is also used through different document reviewed on health and safety management on road construction in Ethiopia, particularly in Addis Ababa.

Questionnaire

In order to collect the required data, the questionnaire is designed and given to different professionals that undertake the construction projects. Through the questionnaire, the mind of professionals about issues are developed and analyzed. The responses are not instantaneous; respondents could answer freely when they have time and are not afraid to express their honest views.

- **Questionnaire design**

The flow of the Questionnaire starts from the researcher explains to the respondent the topic and objective of the research project from the outset, including their confidentiality. The questionnaire is designed according to, Creative Research System (CRS, 2015) pointed out that designing a survey should include the following steps: Establish the aims and objectives of the project, Determine the sample, Choose survey methodology, Create the questionnaire, Pre-test the questionnaire, if practical.

Conduct the survey and analyze the data.

The questionnaire should be short, simple and unambiguous as possible to get highest rate of response. To allow wider range of responses the survey format was designed to be simple to complete, it uses from 1 to 5 Likert scale. Likert scale were commonly used in attitudinal measurements. This type of scale uses a five-point scale ranging from strongly disagree, disagree, neutral, agree, strongly agree where noted by 1 to 5 respectively to rate respondent's agreement level on health and safety issues on road construction projects. Where the other part left is simple multiple choice. The survey completely comprised of seventy-three questions divided in four sections. The first Eight questions is about the background of respondent, the second Forty seven questions are about health and safety management different issues sub classified as health and safety policy, training, management, supervision, safety resource and environmental in relation with public body aspect are addressed. The third part relates with Frequency of causes of Injuries in road construction sites. Finally, the last seven questions focus on measures and approach to health and safety management issues.

Research process

The research process is an organized guide for obtaining different data through the above listed techniques and methods then developing data analysis to reach to the findings. The research process is structured to flow one after the other to reach the finding and formulate a conclusion in a realistic way ensuring the objectives are achieved.

3.7 Ethical Considerations

Ethical consideration is mandatory in a research in order to develop confidentiality between the researcher and the participant. This research builds confidentiality about what can and cannot be

done with the collected data where the result depends on the provided data by the respondents and data from interviews as well reviews of documentations. The researcher informs consent where participants are told everything that might or will occur during the study in a way they can understand. Meanwhile the issues of fairness, and getting an accurate information where protecting privacy is well handled under the study.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter explains and shows the results of the collected data from the Questionnaires, Interviews and literature review. The data gathered from the questionnaire is presented and analyzed in four sub topics for both Foreign and local contractors. The first category local contractors having 14 projects and the second category is for foreign contractors having 4 projects. It also incorporate the ideas of the employer towards to fill the gap. Totally, there exist 18 active road projects in Addis Ababa city. The Employer of the projects is Addis Ababa City Roads Authority and in each projects there exist different contractors and consultants. During site visit, detail observation was made and ten interviews have been made; three from the consultant side, three from the client, two from the local contractor and the remaining two from the foreign contractor side on site and at office. These interviews help to observe the health and safety practices on road construction, identify the responsibility of different stakeholders on health and safety and identify the major causes on health and safety in road construction projects. The data analysis has three major parts that discusses first about the personal information of the respondent, and then states different issues of health and safety management with respect to health and safety rules and policies, training, management, supervision, resources, and safety environment and the third part of analysis will consider the frequency of causes of injuries in construction sites. The method of analyzing is by using averages and percentages where described in tables and charts in order to easily present a data, which is understandable without many more description.

4.2 Personal information of the respondent

This section gives an information of the respondent who participated on the study, regarding organization type, origin of the organization level of grades, number of employees, educational level and work experience on road construction. From the result of collected data, a total of 45 participants that completed the questionnaire making a rate of 20% client based, 40 %

contractors and 40% from the consultant. All of the consultants and 80% of the contractors are local and the remaining 20% are foreign contractors since the selection of the projects raise from 14 local contractors projects and 4 foreign contractor projects. All the projects are undertaken by 100% Grade 1 contractors. The respondent have variety of educational background, who are 24% of Master's Degree, 69% of Bachelor's Degree and 7% of certificate or Diploma. Considering on their work experience towards road construction; 29% of the respondents have below 5 years' experience, 22% have 6-10 years' work experience and the remaining 49% have work experiences more than 10 years. These result shows that most of the respondents are well experienced on road construction projects. Besides to the workers' experience the company's experience matters in attaining a project goal; in this study there is only one company with experience of 5-10 the rest have more than ten years' experience and among them 67% have been stayed in the road construction for more than 15 years. The number of employees within the organization ranges from 100-250 for 29 % the companies and the rest 71% have more than 250 employees. These shows the size of the organizations handling the projects are large. The table below shows the summarized listed points as follows.

Variable	Characteristics	Number/ Frequency	Percent
Organization type	Client	9	20%
	Contractor	18	40%
	Consultant	18	40%
origin of the organization	Local	36	80%
	Foreign	9	20%
Organization Grade/level	Level/Grade 1	45	100%
	Level/Grade 2	0	
	Level/Grade 3	0	
Average Employee No.	<50	0	
	50-100	0	
	100-250	13	29%
	>250	32	71%
Company experience	1-5		
	5-10	1	2%
	10 - 15	14	31%
	>15	30	67%
Position	Project Manager & Resident Engineer	21	47%
	Inspector, Project and Office Engineer	21	47%

	Safety Officers and Experts	3	6%
Education Level	Doctorate Degree	0	
	Master's Degree	11	24%
	Bachelor's Degree	31	69%
	Certificate/Diploma	3	7%
Work Expeiance	1-5Yrs	13	29%
	6-10Yrs	10	22%
	11-15Yrs	11	24%
	>15Yrs	11	24%

Table 4. 1 Respondent Personal Information

4.3 Health and safety management concerns

This section describes about health and safety management issues to be considered in road construction specific to the project sites where having direct or indirect effects on the workers as well the working environment. These are sub classified as health and safety rules and policies, health and safety trainings, health and safety management, health and safety supervision, health and safety resources or equipment and environmental and public body safety.

4.3.1 Health and Safety Rules and Policies

On the table below questions on health and safety, rules and their result are described.

Item no.	Description	Local contractors					Foreign Contractors					Employer				
		SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
1	The company has a designated health and Safety Officer	6%	9%	9%	41%	34%	33%	33%	22%	0%	11%	50%	0%	0%	25%	25%
2	Project have a site-specific Health & Safety plan	19%	6%	9%	25%	41%	56%	33%	11%	0%	0%	0%	50%	0%	25%	25%
3	Projects are reviewed periodically or frequently in Health & Safety aspect	16%	19%	0%	34%	31%	33%	56%	0%	11%	0%	0%	0%	25%	50%	25%
4	Construction firm have Health & Safety policy	16%	34%	6%	25%	19%	22%	56%	11%	0%	11%	25%	0%	0%	25%	50%
5	Safety and health records are kept at the site	13%	6%	9%	44%	28%	0%	67%	33%	0%	0%	0%	0%	25%	25%	50%
6	The policy is communicated to all concerned parties in the company	6%	3%	0%	59%	31%	22%	44%	22%	11%	0%	0%	0%	25%	25%	50%
7	Construction firm have a written Health & Safety rules & regulations and implementation for all workers reflecting management concerns for safety and health	9%	6%	9%	50%	25%	22%	78%	0%	0%	0%	0%	0%	0%	50%	50%
8	Safety and health duties are specifically assigned on site	6%	9%	13%	44%	28%	33%	56%	11%	0%	0%	0%	0%	25%	75%	0%
9	The company will take disciplinary measures on workers who do not follow safety procedure	9%	6%	0%	31%	53%	11%	44%	44%	0%	0%	0%	0%	25%	50%	25%

Table 4. 2 Describe Health and Safety Rules ad Policy of respondent

The figure below summarizes the above table

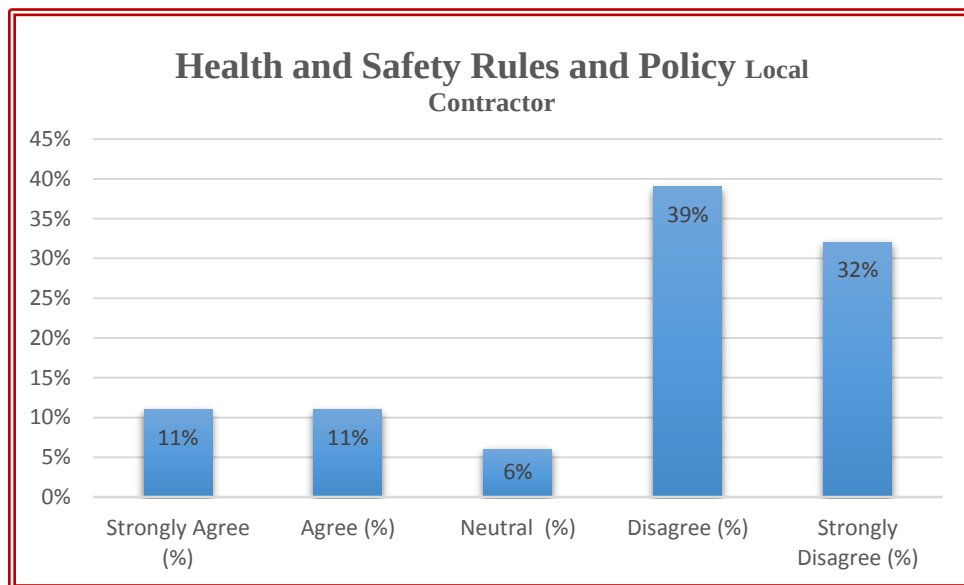


Figure 4. 1 Health and safety rules and policy of Local contractors

The above figure shows 11% of the road construction health and safety rules and policy that focus on having health and safety officer, site specific health and safety plans existence of safety and health policy, keeping records of safety and health, understanding all policies by all work force are health and safety policies are functional and strongly agree. 11% as well agrees on the above terms 6% have ticked Neutral From these where 39% shows that it is not agreeable and 32% strongly disagree so these explains in local contractors the safety rules and different policies are not well set as well project lack safety plans and records

For the foreign contractor the findings varies, that 26% of the respondent strongly agrees and on the other end only 3% strongly disagree. on the medium the one that agrees are 50% where as again there exist 3% of disagree, the left 18% is Neutral so the Foreign contractors are good in implementation of policies, communicating safety issues and having safety plans.

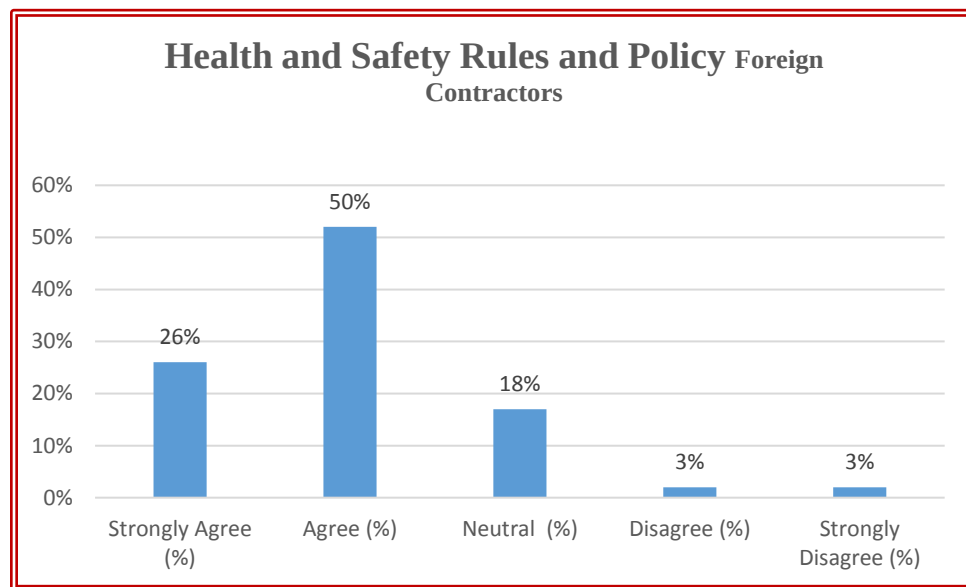


Figure 4. 2 health and safety rules and policy of foreign contractors

We can relate both contractors as the following figure that states there is a reverse figure on Foreign and local contractors.

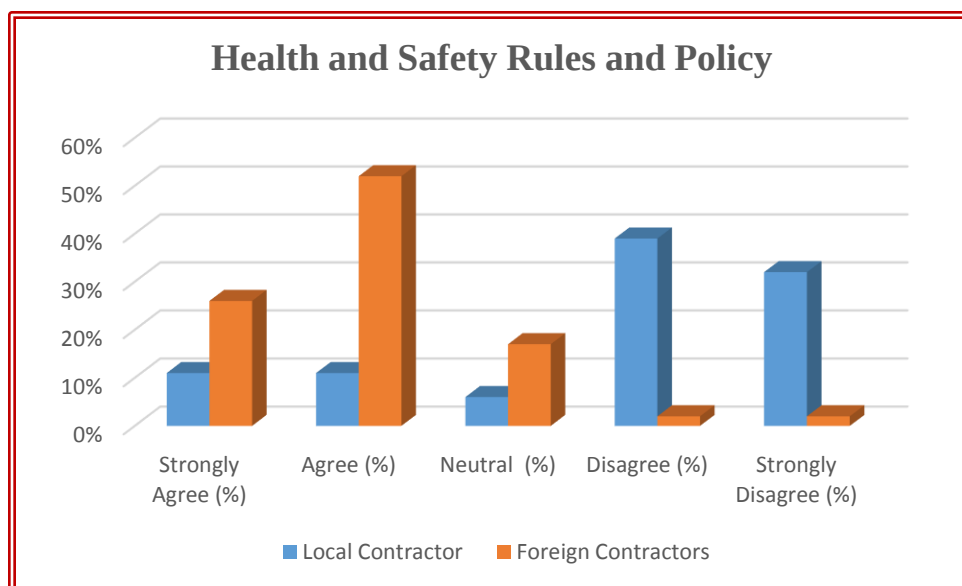


Figure 4. 3 Relation of local and foreign contractors

Health and safety policies as described from the table 4.2 on the employer side 8% strongly agrees 6% agrees and 14% kept neutral where as 39% disagrees and 33% strongly disagrees these state that the policies are not well implemented as stated by local contractors. In addition, the employer knows the matter without taking action.

4.3.2 Health and safety training

These states the concept of health and safety management that equip workers to follow what it should be done and ask for what is desired. These is made through training. Safety training is a crucial factor to decrease the level of accidents early before occurrence as a preventive strategies. Health and safety training include receiving instruction towards health and safety before commencing work, having regular training, prepare instruction manual on different health and safety procedure, use of equipment's and preventive actions. The following table shows the descriptive statistics of the respondent on training.

	Description	Local contractors					Foreign Contractors					Employer				
		SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
1	Workers undergo instruction on Health & Safety before commencing work on a particular site	6%	6%	0%	38%	50%	11%	56%	22%	11%	0%	0%	25%	50%	0%	25%
2	Provide awareness with written information about Health & Safety procedures	13%	6%	9%	44%	28%	22%	56%	22%	0%	0%	0%	0%	0%	75%	25%
3	Workers are regularly trained in Health & Safety	6%	6%	9%	44%	34%	0%	56%	22%	22%	0%	0%	0%	0%	50%	50%
4	Workers trained in proper care & use of personal protective equipment	16%	13%	0%	34%	38%	0%	56%	33%	11%	0%	0%	0%	25%	50%	25%
5	Training is conducted at all levels, including for managers, supervisors, workers, subcontractors and contract workers.	6%	6%	3%	47%	38%	11%	44%	44%	0%	0%	0%	0%	25%	25%	50%
6	Instruction manuals or safe work procedures are used to aid in preventive action	9%	19%	0%	34%	38%	11%	56%	22%	11%	0%	0%	0%	25%	50%	25%

Table 4. 3 Describe Training Data of the respondent

From the above table the training part is summarized in the following figure

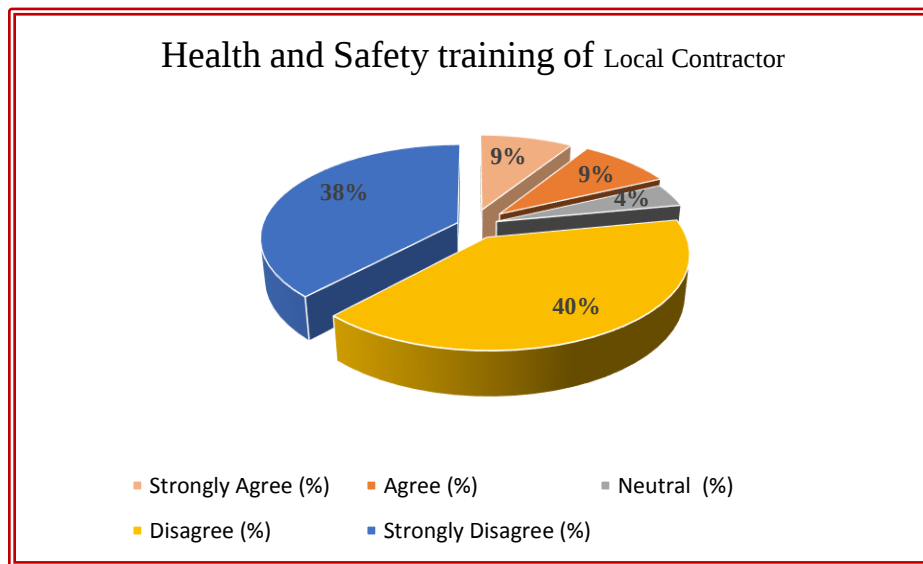


Figure 4. 4 Health and safety training of local contractors

From fig 4.4 we can understand that only 9% of the respondent strongly agree as well agree on, employees has well understood and have equipped knowledge towards health and safety through taking regular training, care and use of PPE, have a written awareness procedures by workers.

Beside the neutral 4% the other 38% and 40 % strongly dis agree and dis agree respectively that these training experiences are not exercised at their company. These implies there exist a poor training habit and awareness creation on health and safety management. The employer takes the same culture as local contractor, majorly they disagree that training is taken place rating 42% as well strongly disagree 33% and none strongly agrees and 4% agrees and 21% are neutral.

The above figure varies when it comes to Foreign contractor that more than 50 percent agrees that training is provided towards PPE, Health and safety management, different instruction manual are set on procedures and preventive actions. Described in the following figure.

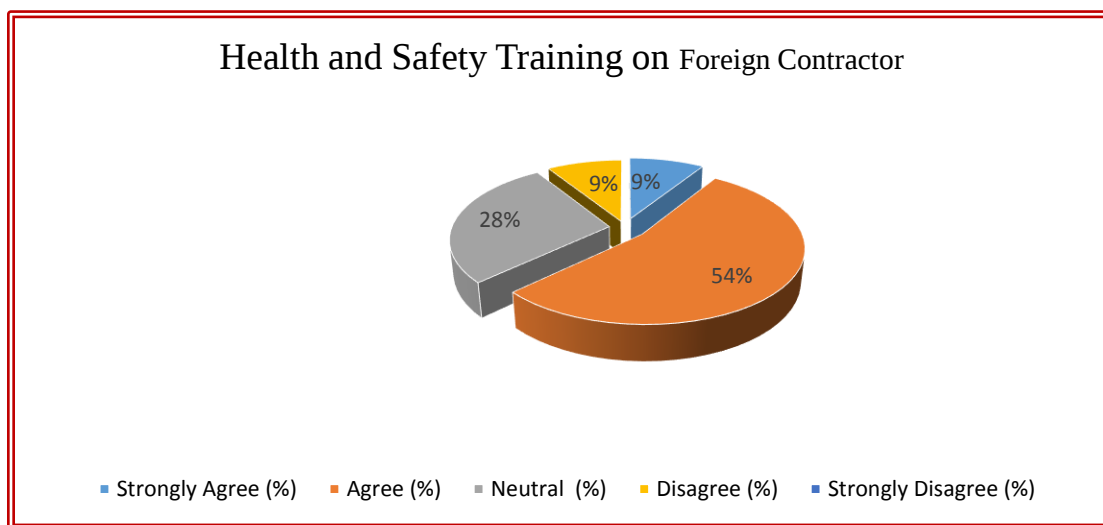


Figure 4. 5 Health and Safety training on foreign contractors

4.3.3 Health and safety resource or equipment

The availability and usage of this resource simply rescue the worker from variety of accidents which decreases the number of injury and hazard in work areas. Under these there are company provision of good welfare facilities, adequate first aid, PPE, repaired site machine and safety kits.

The following table briefs the respondent views on the specific raised questions in percentage

Description	Local contractors					Foreign Contractors					Employer				
	SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
The company Provided good welfare facilities such as showers, canteens, toilets	9%	38%	22%	19%	13%	11%	56%	33%	0%	0%	0%	50%	25%	25%	0%
Material schedule data sheets provided for all hazardous materials on site	9%	25%	31%	28%	6%	44%	33%	22%	0%	0%	0%	0%	50%	50%	0%
Adequate first aid and first aider(s) on your construction projects/sites	16%	28%	25%	19%	13%	22%	67%	0%	11%	0%	0%	25%	25%	50%	0%
Safety helmets, safety goggles and safety shoes are worn by the operator and other within the locality	13%	28%	19%	28%	13%	33%	56%	0%	0%	11%	0%	50%	50%	0%	0%
The company Provided personal protective equipment (PPE)	9%	31%	22%	25%	13%	33%	67%	0%	0%	0%	0%	100%	0%	0%	0%
Where this is not practicable, all excavations and opening are covered or fenced off at the end of the working day	6%	56%	19%	16%	3%	11%	78%	11%	0%	0%	0%	0%	50%	50%	0%
The firm Provided right tools, equipment and plant to execute construction	22%	59%	13%	6%	0%	22%	67%	11%	0%	0%	0%	25%	50%	25%	0%
All site vehicles and machines are in a good repair having checked all brake of in use	16%	59%	13%	9%	3%	33%	67%	0%	0%	0%	0%	50%	50%	0%	0%

Table 4. 4Description of health and safety resources

From the collected data majority of the respondent 41% agrees and 13% strongly agrees on the provision of health and safety equipment's where as 19% disagrees and 8% strongly disagrees that health and safety resources and equipment's not provided 20% is kept neutral.

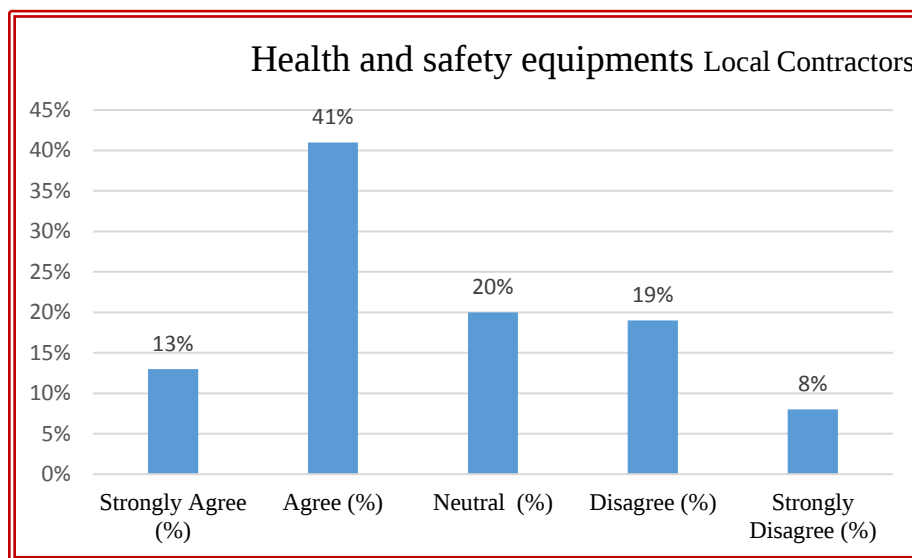


Figure 4. 6 Health and safety equipment of local contractors

On the local contractor the provision of safety equipment is stated as per the collected data 26% strongly agrees and 61% agrees on equipment availability only 1% disagrees as well strongly disagrees and 10% are stated as neutral.

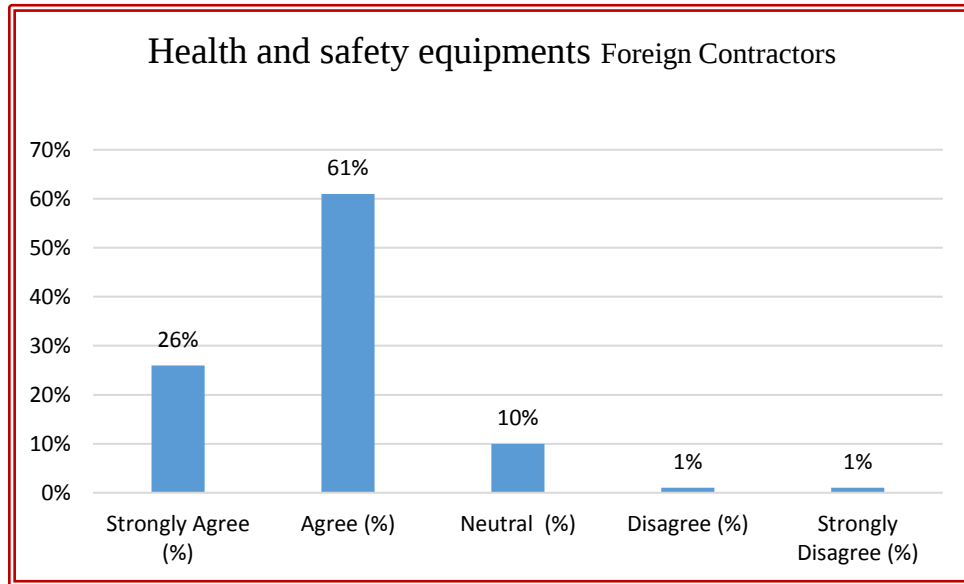


Figure 4. 7 Health and safety equipment foreign contractors

As data from the interview, provision of health and safety equipment is directly related with financial stand that result usually the foreign company gives PPE that contain safety shoes, helmet and other safety equipment's once a year and repair if some damages occur.

When we relate the above figures of local and foreign contractors there exist good provision of health and safety equipment's

4.3.4 Health and safety management

The management should encourage the enforcement of health and safety as well assure the workers safety through undertaking the measures, request and implement adequate budget and undertake regular medical examination to have a sustain health status of workers. Especially in construction industry through variable dust, chemicals and hazards the regular check up is important factor.

Description	Local contractors					Foreign Contractors					Employer				
Management	SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
Managers encourage and support worker participation, commitment and Involvement in Health & Safety activities	6%	13%	0%	47%	34%	11%	78%	11%	0%	0%	0%	0%	75%	25%	0%
Managers actively monitor the Health & Safety performance of their projects and workers through reports	13%	6%	6%	38%	38%	22%	78%	0%	0%	0%	0%	0%	50%	0%	50%
Managers ensure that the Health & Safety budget is adequate	3%	3%	16%	44%	34%	22%	56%	22%	0%	0%	0%	0%	25%	50%	25%
Managers involve workers on safety management measures	6%	9%	3%	44%	38%	11%	67%	11%	11%	0%	0%	0%	0%	75%	25%
Managers set a specific budget for health and safety measures	3%	6%	19%	44%	28%	33%	44%	22%	0%	0%	0%	0%	0%	25%	50%
Managers have regular medical examination to monitor health of the employees	3%	6%	0%	50%	41%	11%	56%	11%	22%	0%	0%	0%	25%	50%	25%

Table 4. 5 Description of health and safety management

When the collected data summarized about health and safety management on points to encourage and support worker participation, actively monitor health and safety performance only 6% strongly agrees and 7% agrees by saying the management fulfill the stated terms, the rest having 44% Disagrees and 35% strongly disagrees the left 7% is Neutral on local contractors. These data and from the interview it describes as the managers usually focus on the produced output and producing within the provided time. In the employment side from the interview they totally agree they do not consider safety as first issue while site visit. The management as well disagrees with 38% and strongly disagrees with 29% and only 4% agrees on the fulfilment of the management whereas 29% are neutral that bide with local contractors.

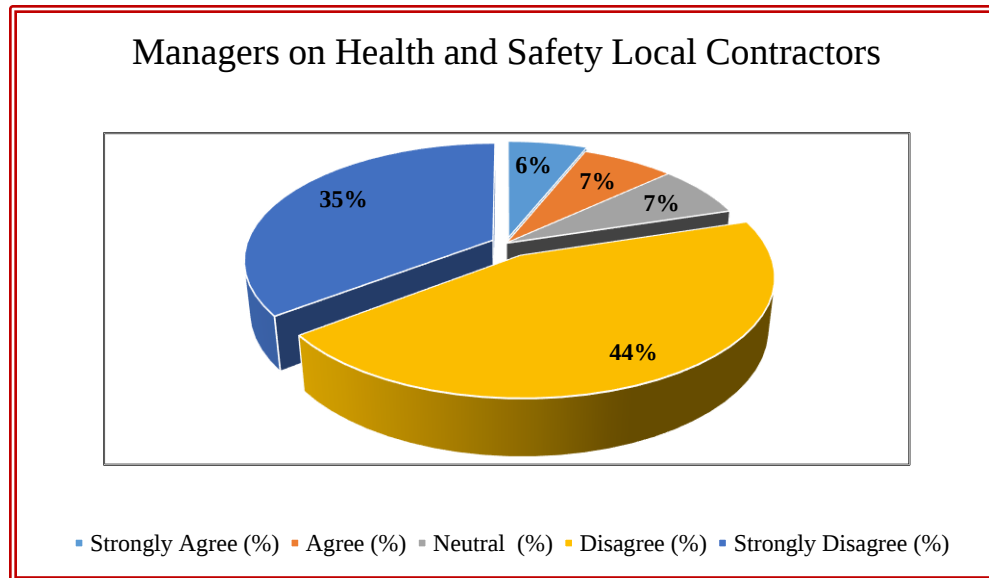


Figure 4. 8 Manager on Health and Safety of Local Contractors

Where the above pie chart explains that the managers are poor in communicating towards health and safety as my interview describes with Client side project manager and team leader they explain that they are more concerned on accomplishment of the project timely and not consider health and safety as such.

On the four projects taken by Foreign contractors these is not an issue from my interview with the RE they have a health slip at a known Hospital in the city to be checked for their health check as well not pre examination but safety is well considered relatively. 63% and 19% strongly agrees and agrees respectively of the respondent agrees on getting good managing service towards health and safety and only 6% disagrees where 13%are neutral.

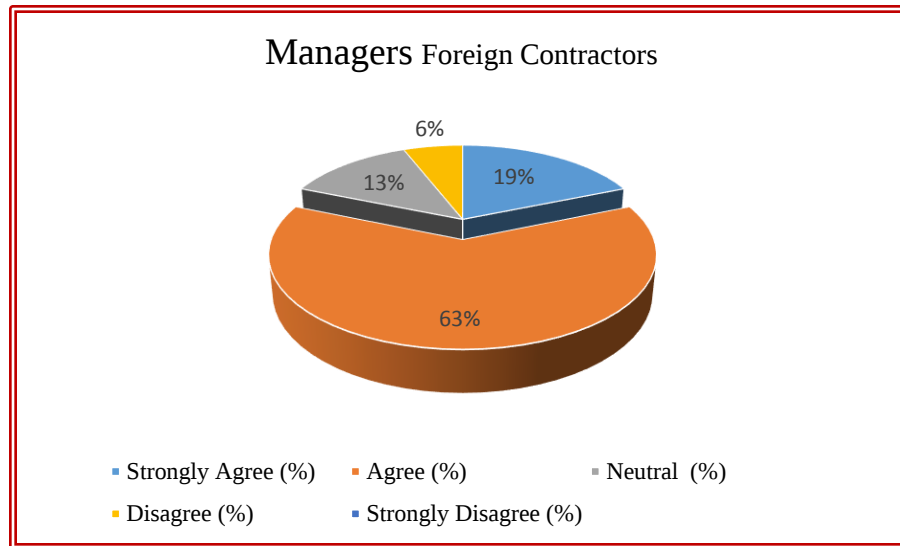


Figure 4. 9 Managers health and safety on foreign contractors

4.3.5 Health and safety supervision

Supervision comes after considering health and safety management; it is a crucial factor in an organization to undertake intensive follow ups and inspections by local authorities and others. So it is directly related with the value given to it when major value is given to health and safety an authorized persons inspect regular basis and when not being considered as valuable, list is given towards.

Item no.	Description	Local contractors					Foreign Contractors					Employer				
	Supervision	SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
1	Proper supervision by staff trained in Health & Safety carried out on the project	6%	3%	6%	47%	38%	11%	44%	44%	0%	0%	0%	0%	25%	50%	25%
2	Local authorities and Health & Safety enforcement agencies visit sites for inspection	6%	3%	22%	38%	31%	22%	44%	22%	0%	11%	0%	0%	25%	25%	50%
3	The company conducts regular site safety inspections	6%	3%	0%	47%	44%	0%	67%	22%	11%	0%	0%	0%	50%	25%	25%
4	Hazardous jobs are clearly identified and special attention is given by the company	13%	38%	19%	19%	13%	22%	56%	22%	0%	0%	0%	25%	25%	25%	25%
5	The safety inspection results are documented and communicated	6%	6%	13%	44%	31%	0%	67%	33%	0%	0%	0%	0%	25%	50%	25%

Table 4. 6 Description of health and safety supervision

Under health and safety supervision there exist having professional supervisor, site visit by responsible authorities, avoidance of hazardous task as well having documented safety inspection. From the data collected in local contractors 8% and 11% agrees on the supervision part, 12% neutral and majority percent disagree stated as 39% disagrees and 31% strongly disagrees as stated above the graph is directly proportion with the management. The figure below explains the supervision ratio.

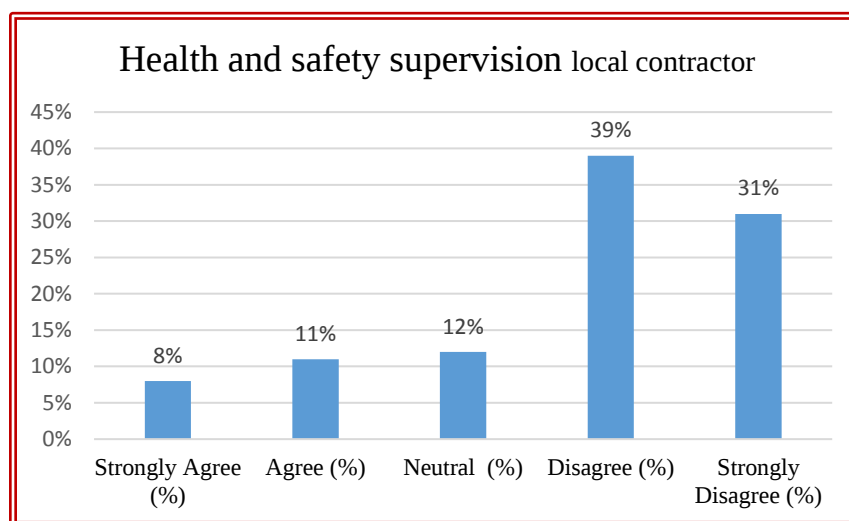


Figure 4. 10 Health and safety supervision of local contractors

The Foreign contractor have again the reverse of these data as the management implies, majority percent agrees on the level of supervision giving 56% agrees and 11% strongly agrees the one that disagrees and strongly disagrees are only 2% where as 29% are stated as neutral.

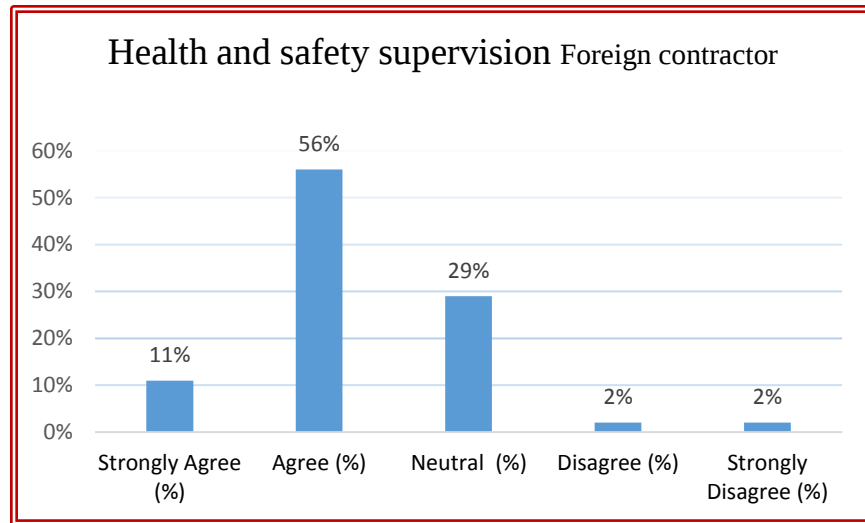


Figure 4. 11 Health and safety supervision foreign contractors
Employers on supervision they are the one who are suppose to inspect but the collected data states as 30% strongly disagrees, 35% disagree, and only 5% agrees with 30 % kept neutral.

4.3.6 Environmental and public body safety

Any construction made in the environment has a direct or indirect effect on the public body as well as on the surrounding and in construction projects the surrounding is medium of working ground that require persistent sustainable protection these attaches towards recycling, waste removal, reinstating quarry sites and preparing signs and others in order to keep safe the public body.

Item no.	Description	Local contractors					Foreign Contractors					Employer				
	Environmental and Public Body Safety	SA	A	N	D	SD	SA	A	N	D	SD	SA	A	N	D	SD
1	Project office uses public roads to store material like sand or gravel.	13%	41%	0%	31%	16%	11%	33%	0%	22%	33%	0%	50%	0%	25%	25%
2	There is adequate artificial light that does not throw deep shadow, while working at night time	3%	19%	6%	47%	25%	33%	56%	11%	0%	0%	0%	75%	0%	25%	0%
3	There is a traffic control system on the site to control the movement of vehicles in order to avoid danger to pedestrians	13%	50%	3%	9%	25%	33%	56%	11%	0%	0%	0%	25%	25%	50%	0%
4	Proper arrangements have been made for collecting and disposing of waste and scrap at frequent intervals	22%	6%	0%	50%	22%	11%	89%	0%	0%	0%	0%	0%	25%	75%	0%
5	Recycling and reusing construction wastes.	0%	19%	13%	47%	22%	22%	44%	11%	22%	0%	0%	0%	25%	50%	25%
6	Bury or burn construction wastes.	0%	22%	13%	50%	16%	0%	33%	11%	44%	11%	0%	0%	25%	50%	25%
7	Dispose excavated soil & construction wastes to open land.	9%	22%	0%	38%	31%	22%	56%	11%	0%	11%	0%	100%	0%	0%	0%
8	Reinstating quarry sites for rock and selected soil after use.	3%	3%	13%	44%	38%	22%	56%	11%	0%	11%	0%	25%	25%	25%	25%
9	Covering manholes and excavated holes to prevent harm.	48%	6%	0%	28%	18%	0%	67%	22%	11%	0%	0%	0%	25%	75%	0%
10	Planting trees and greenery for environmental protection.	3%	6%	13%	41%	38%	11%	33%	22%	0%	33%	0%	25%	75%	0%	0%
11	Safety signs are appropriately positioned in the site	9%	6%	0%	38%	47%	22%	67%	11%	0%	0%	0%	0%	25%	75%	0%
12	All harmful materials have been identified and suitable precautions taken	9%	19%	16%	50%	6%	11%	67%	22%	0%	0%	0%	0%	0%	100%	0%
13	All containers of hazardous chemicals in use on site are properly labelled	13%	22%	16%	47%	3%	11%	67%	22%	0%	0%	0%	25%	0%	50%	25%

Table 4. 7 Description of environmental and public body safety of respondent

Regarding environmental and public body safety it consider traffic control system proper waste disposal system, reinstating quarry sites, greenery and planting, placing safety signs to protect the public body. Regarding these from the collected data environmental consideration of safety 9% strongly agrees and 19% agrees whereas the majority respondent disagrees standing 41% disagrees and 24% strongly disagrees. These states the elements to protect the environment in road construction are not well considered and the public bodies are not very safe during construction.

These is summarized in the following figure

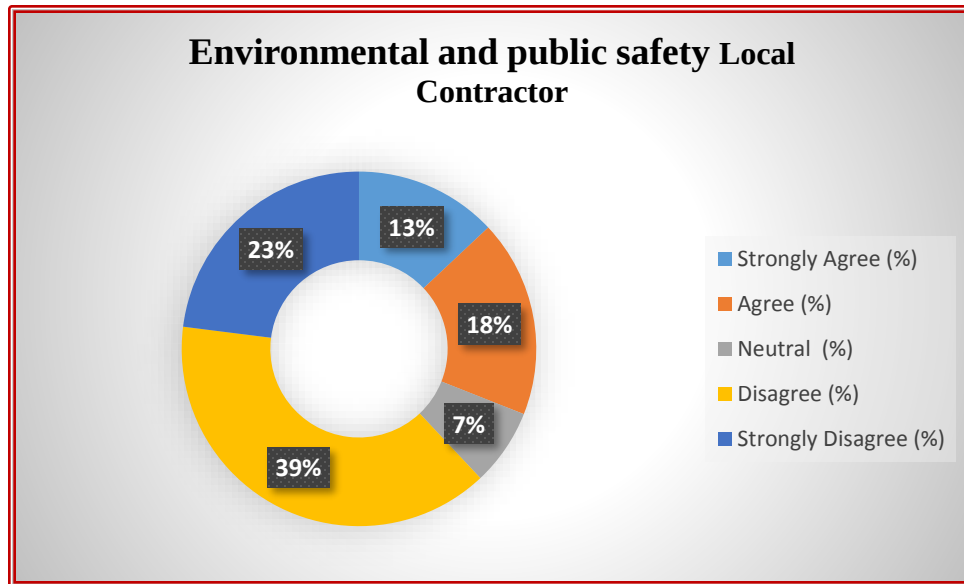


Figure 4. 12 Environmental and public safety local contractor

These varies in Foreign contractor that the terms in environmental and public safety are agreeable by 55% and strongly agree 16% disagree and strongly disagree have 8% and 13% of it is neutral.

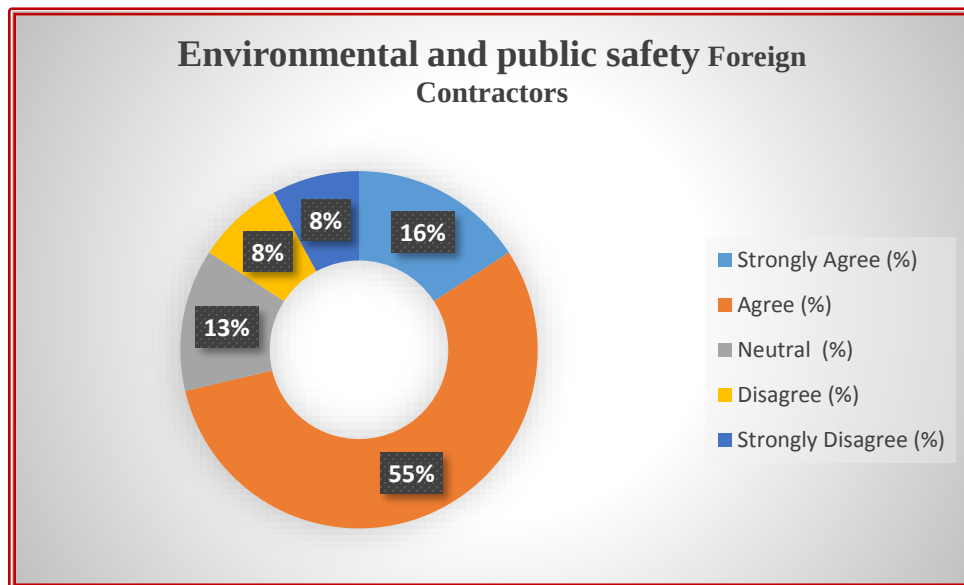


Figure 4. 13 Environmental and public safety of Foreign Contractors

The employer does not consider environmental and public body as a major road construction activity that 10% strongly disagree, and 46% disagrees whereas 25% agrees and 19% are neutral

4.4 The Major Health & Safety areas to be considered during road construction projects

The project states that 4 foreign and 14 local grade one contractors projects on road construction is seen. from the data collected, respondents believed dust has a great part in causes of accidents having 78% summing high and very high then Excavation follows with 69% and vibration comes having 67% slips and falls are also causes of accident having 64% of the total. The least in frequency of occurrence are electricity, fire and explosion and hazardous substances are less frequent to occur.

The interview as well agrees with the above data that dust is a major health and environmental problem that could not be avoided in road construction but have a chance to minimize it through frequent watering. foreign contractors will water their project sites four times a day to prevent the dust and the local contractors once a day which is conditional and away far from the foreign contractors. As it is collected from the interview traffic accidents as well frequently occur especially at nighttime due to substandard safety signs which is difficult to see in a night, uncovered borehole, negligent flag persons are stated as a reason of traffic accidents.

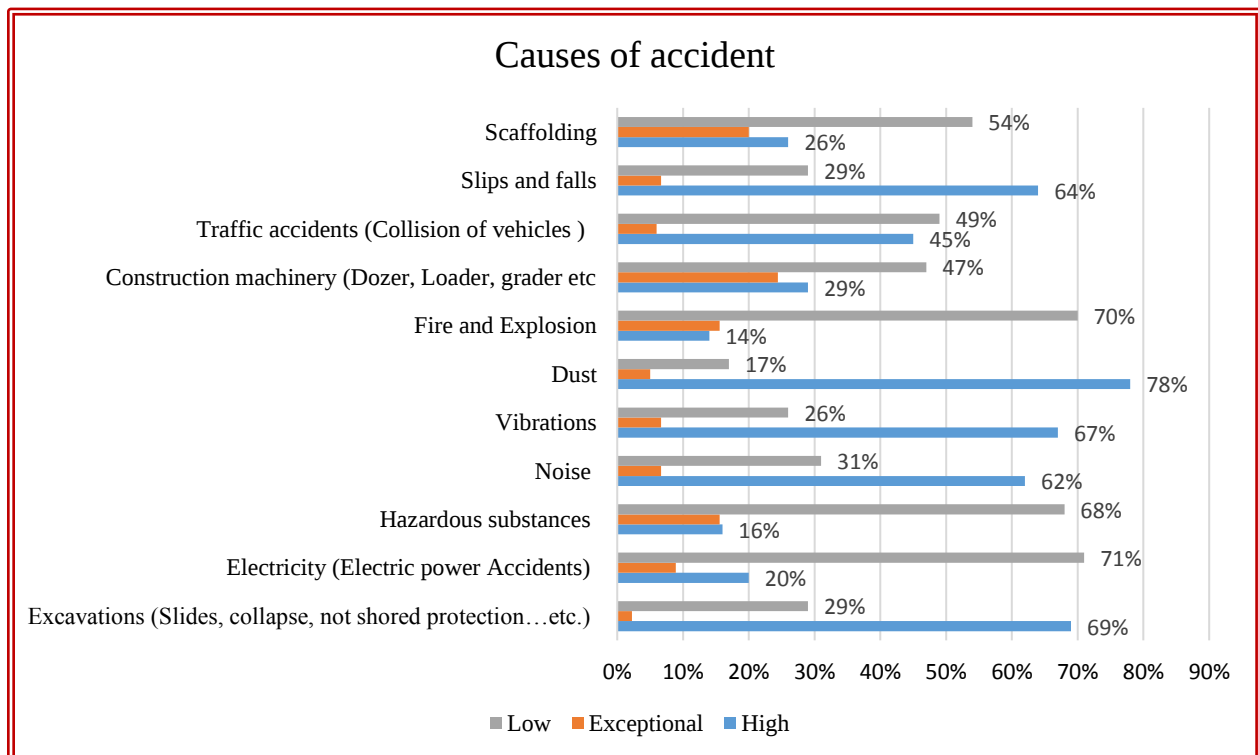


Figure 4. 14 causes of accident

According to health and safety management practices some general questions are given to respondent which gives different figure.

On the following table based on the description, safety and health policy as well safety and health training highly affect safety and health performance, considered as a major reason of accident that management and workers are in short of. Others also have significant effect at some degree but not as policy, safety culture and training. Contractors took the leading position in being responsible for different health and safety gaps due to; it is the platform for production followed by government and consultant. The main hindrance is negligence, different stakeholders, the consultant, the client and the contractor know the importance of health and safety in construction but due to negligence, they simply not consider as a major part of construction. From the table below one can generalize as implementing policies, creating awareness and creating safety culture is a basic concept that require intensive follow-ups.

Description	Characteristics	Contractors		Employer
		Local	Foreign	
Factors Highly affect safety and health performance	Complexity of the Design	2%	0%	17%
	Weather Condition	7%	13%	0%
	Safety and Health Policy	33%	33%	33%
	Safety and Health Training	19%	33%	17%
	Safety Signals, Signs and Barricades	26%	7%	17%
	Risk Assessment	14%	13%	17%
Major reason of accident management is short of	Lack employs of safety officer	17%	19%	0%
	Lack of safety policy	19%	13%	57%
	Lack of safety training	23%	38%	29%
	Safety signals, signs and barricades	26%	13%	14%
	cost of safety	15%	19%	0%
Major reason of accident workers are short of	Lack of training	33%	23%	14%
	Lack of experience in using equipment	10%	15%	29%
	Lack of safety culture	40%	46%	43%
	Lack of safety Motivation	18%	15%	14%
Responsible for the accidents	Workers	8%	22%	14%
	Government	23%	22%	29%
	Contractors	54%	39%	43%
	Owners Consultant	15%	17%	14%
Main hindrance of	Lack of awareness	25%	36%	17%

safety implementation	Negligence	59%	36%	67%
	Inappropriateness	3%	7%	0%
	Incurring unnecessary cost	13%	21%	17%
What measures are frequently undertaken	Risk assessment	15%	27%	17%
	Give adequate training	17%	27%	13%
	Follow the safety policy	14%	18%	13%
	Safety signs	33%	27%	17%

Table 4. 8 General view of respondent

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Summary of the finding

As empirical reviews revealed that the road construction industry has poor health and safety practice record compared to other industries. The study identified health and safety management practices on road construction in Addis Ababa city road construction projects. All the companies included in the study are Grade 1 contractor where 67% of all have greater than 15 years' experience on road construction, which make the companies not new for health and safety issues. Local contractors undertake 80% of the projects that represent different projects in Addis Ababa are given to local contractors that show 80% of construction projects are exposed to poor health and safety performance. where based on the stated health and safety criteria to undertake the study named; safety and health policy, safety and health training, safety and health management, safety and health supervision, safety and health equipment provision, and safety and health environment and public body. All the local contractors score below 50 % except on health and safety resource provision, which is, 54% and foreign contractors are greater than 50%. These show the local contractors have poor health and safety practice and the foreign contractors have relatively good practices on health and safety management. The major causes of road construction accidents are occurred due to dust taking 78% followed by excavation, vibration, slips and falls, noise, and traffic accidents. With a percentage of 69%, 67%, 64%, 62%, and 45% respectively. The majority of the respondent agrees on factors that highly affect health and safety performance is a policy followed by safety and health training, the same finding occurs on the major reason of the accident is management short of safety policy and safety training. These shows safety and health policy and safety and health training both have a great effect on health and safety management practices of road construction. Respondents agree that measure reason of accidents workers lack safety culture followed by training and the contractors are the ones that are responsible for causes of accident further negligence is the basic hindrance of safety implementation followed by lack of awareness and budget.

Findings from the interview - different workers at management level proclaim lack of workspace has a big impact on the cause of an accident, the master plan force the project to be undertaken on a limited space only which results in a construction sector to be bound with that given space.

The person assigned as a safety officer is from other professions that miss either the construction concept or the medical concept with another profession. These make hard to find professional staff. Risk of electricity is a major cause of accident in one of the sites and become a threat for the workers as well the public body during construction, negligence on different stakeholders especially (client, Consultant, and Contractor), and lack of accountability on enforcement. Foreign contractors also need intensive follow-ups towards health and safety that require soft skill management to feel the workers. Health and safety management practices are useful in road construction to keep the workers safe, the living as well the surrounding environment so it is an area that requires special focus.

Findings from observation - Personal protective equipment is not properly worn by all staff, in local contractors no or lose covers made on the construction site to separate the public from harm. The foreign usually use corrugate iron to avoid traffic accident and produce a closed work zone. Avoidance of safety signs is observed in some projects, the safety signs are improvised written by hand and have no light at nighttime that causes accidents.

Generally the survey data as well interviews lead to safety and health should not be a written principle stated as “safety first” it should be injected in all workers sewed as a culture which cannot be untied these are done through engaging the government the clients, the consultant and the contractor that has a major part in road construction sector.

5.2 Conclusion

Road construction in Addis Ababa has poor performance in health and safety management practices the study revealed that construction workers' safety and health are still in question that prone them to injuries and accidents. There exist untrained staff on health and safety; workers are exposed to dust, excavation, vibration, noise, slips, and falls, traffic accident and others.

The study identified that not all the staff are well equipped with health and safety knowledge on health and safety policies, these will lead to conclude there is a huge gap which shows there exist a procedural problems at almost all levels of the project. Causes of accidents in road construction are poor working conditions due to lack of working space, lack of safety awareness, substandard PPE products, and lack of policy implementation.

From health and safety management issues there are inadequate safety plans, poorly organized safety policies, have a trained staff, poor work for awareness creation and exposed environment to hazards. These show the problem is at all level starting from the plan to the worker's safety issues are a concern.

As stated in the literature review as well from the interview, there exist different health and safety legislation from the government on the construction industry but it lacks regular supervision on the implementation process.

The local contractors has poor performance on following the health and safety rules and policies, having a trained workers, management, supervision and keeping the environment and public body safe and healthy. This is not the issue recorded on the local contractor the same is true on the consultant and client-side.

The client is concerned about receiving the output based on the scheduled time rather than following the health and safety of the workers. That makes the health and safety management practices are at an initial stage in most of the projects that require many incubation and enhancement.

5.3 Recommendations

Generally, the literature review, interviews and survey data collected reveal there exists poor practice of health and safety management in road construction as well different construction sectors which lead to recommend the following points to be considered by the government, contractor, client consultant, and workers.

The contractor is recommended to submit a practical health and safety procedure to be undertaken, that always make safety and health a top priority on the work environment. Uplift all the workers to the same understanding of safety and health rules and procedure, though different follow-ups make safety part of a daily communication tone. Provide training and awareness on how to identify and control hazards, and other health and safety matters to know their responsibilities as well their right in working safely, regular awareness creation session have to be developed for every staff.

The supervisor must inspect the worksite to make it a safe work zone for the workers and take action on those who do not follow the stated safety rules on the site.

Managers demonstrate and work to change the work habit of the organization towards health and safety management giving it a core organizational value; provide adequate support and resource to set a good work safety environment.

Create a network where all workers and employers cooperate to control workplace hazards through communication and coordination for multiemployer at work site prior to work, getting general brief.

Appreciate and award who works towards health and safety and penalize who is against health and safety procedures.

The health and safety management discipline has to be added in an educational curriculum in order to produce an equipped safety engineer, safety officer, and safety supervisor and replace the unprofessional ones.

A workspace has to be provided for every construction sector besides the working zone by the government.

Consider health and safety at all stages of construction starting from the feasibility stage, at the design stage, construction stage and operation stage.

Consultants usually report the monthly or weekly progress report of the project production but it must also incorporate monthly progress of safety issues on the construction site.

Taking action on the contractors until termination due to its health and safety consideration and supervise every activity assigning an accountable person.

Control chemicals use in the construction process to undertake different construction work production in order to protect the environment also the public bodies.

Safety signs, barriers, safety tape, and other materials have to be stationed as per the road construction standard.

All the person on-site should wear a safety kit in order to influence the workers positively as managers supervisors and team leaders should wear

Consider the budget separately starting on the bid document, generally, safety measures should be included the contract as a pay item, work program, and high attention should be given by the employer.

The client of the projects, which is Addis Ababa City Road Authority, different contractors which are local and foreign contractors as well different consultants, visit the site not only for its completion time but for its health and safety practices.

5.4 Further works in the future

Using this study as a ground further research can be conducted on different construction streams regarding health and safety practices as ;

- Impact of health and safety management practices of road construction on the public body, victims of accidents, pedestrians and policy experts.
- Policy implementation procedure of health and safety management in road construction
- Environmental response to health and safety road construction

Further research on Health and Safety Management in road construction projects will improve the understanding of different workers on health and safety practices of road construction projects.

REFERENCE

- BLS (Bureau of Labor Statistics). (Mar. 15, 2015). "2003–2014 *census of fatal occupational injuries*." Retrieved from <http://www.bls.gov/>
- BLS (Bureau of Labor Statistics), 2013. *National Census of Fatal Occupational Injuries in 2012*.
- Cone Zone,(April 13,2017), *keeping road side workers safe*, Retrieved from conezonebc.com/roadside-worker-safety-respues/for-employers-and-supervisors/what-employers-need-to-know/
- Daniell, W.E., Fulton-Kehoe, D., Cohen, M., Swan, S.S. and Franklin, G.M. (2002) Increased reporting of occupational hearing loss: Workers' compensation in Washington State 1984–1998,*American journal of Industrial Medicine*,(45), 502–510.
- Ellis, M. V. (2001). Harmful supervision, a cause for alarm: Comment on Gray et al.and Nelson and Friedlander *Journal of Counseling Psychology*, 48(4), 401–406 .
- European Council, 'Council Directive 92/58/EEC of (24 June 1992) on the minimum requirements for the *provision of safety and/or health signs at work*', Official Journal L 245,
- EC - European Council, 'Council Directive 2009/104/EC of (16 September 2009) concerning the minimum safety and health requirements for the use of work equipment by workers at work', Official Journal.
- Federal Democartic Republic of Ethiopia. Proclamation No. 377/2003: (2004) Labour Proclamation. 10th Year No 12, Federal Negarit Gazeta. Addis Ababa, Ethiopia:
- Federal Republic of Ethiopia. (2007) The Federal Civil Servants Proclamation No 515/2006. 13th year No. 15, Federal Negarit Gazeta. Addis Ababa, Ethiopia.
- Federal Democratic Republic of Ethiopia.(2010) *Ministry of Finance and Economic Development. Growth and Transformation Plan-2010/11-2014/15*.
- Fred Wegman and Letty Aarts (2008), Advancing sustainable safety: National road safety outlook for The Netherlands for 2005-2020, safety science, Volume 46, pp 323-343
- Giang D.T & Pheng S.L. (2011). Role of construction in economic development; *Review of key concepts in the past 40 years. Habitat International* 35(1), 118–125.

- Haslam, R.A., Hide, S.A., Gibb, A.G., Gyi, D.E., Pavitt, T., Atkinson, S., Duff, A.R., '(2007) *Contributing factors in construction accidents*', *Applied Ergonomics*, 36,(4), 401-415.
- Health and Safety Executive (HSE). (2004). *Improving Health and Safety in the Construction Industry. The Stationery Office, London .*
- Health and Safety Executive, (HSE), (2014) *Structural stability during excavations*. Retrieved, from: <https://www.hse.gov.uk/construction/safetytopics/stability.htm>
- Health and Safety Executive,(HSE), (2014) *Traffic management on site*. Retrieved from: <https://www.hse.gov.uk/construction/safetytopics/vehicletrafficmanagement.htm>
- Helen Lingard and Steve Rowlinson,(2005) *Occupational Health and Safety in Construction Project Management*, (1st Ed), USA and Canada : Spon press
- ILO, & International Labour office. (1992). *Safety and Health in Construction Code of Practice*. Geneva.
- ILO, I. L. (1995). *Safety, Health and Welfare on Construction Sites: A Training Manual* .International Labour office.
- International Labour Office (ILO). (1999). *Safety, health and welfare on construction sites: A training manual*. Geneva: ILO.
- ILO, I. L. (2001). *The Construction Industry in the Twenty First Century: Its Image, Employment* International Labour Office
- ILO (2005). *Global estimates of fatal work related diseases and occupational accidents*, World Bank Regions. Geneva: ILO.
- Janicak, C. (2008) 'Occupational fatalities due to electrocutions in the construction industry', *Journal of Safety Research*, 39, pp. 617-621.
- Johan Granlund, Vehicle and human vibration due to road condition – ROAD EX IV, implementing accessibility project lead partner, the Swedish transport administration northern region,

- Kendall Jones (April 12,2017) Road construction work zone safety tips, Retrieved from [https:// www.constructconnect.com/blog/10-road-construction-work-zone-safety-tips](https://www.constructconnect.com/blog/10-road-construction-work-zone-safety-tips)
- K.Ringen and J. Seegal (1995), safety and health in the construction industry, *Annu Rev. Public Health* (16), 165-88
- Lingard, H. (2013). "Occupational health and safety in the construction industry." *Construction management and economics* 31(6): 505-514.
- Ministry of Labour and Social Affairs (October 2006) Occupational Safety and Health profile for Ethiopia, Addis Ababa.
- Ministry of Labour and Social Affairs, (May 2008) of the Federal Republic of Ethiopia. Occupational Safety and Health Directive, Addis Ababa.
- Ministry of Labour and Social Affairs (October 2006) Occupational Safety and Health profile for Ethiopia. Addsi Ababa.
- Mizoue, T., Huuskonen M. S., Muto, T., Koskinen, K., Husman, K., & Bergstrom, M (1999) Analysis of Japanese Occupational Health Services for Small- and Medium- scale Enterprises in Comparison with the Finnish System, *Journal of Occupational Health* 41(2), 115-120
- Neitzel, R., Seixas, N.S., Camp, J. and Yost, M. (1999) An Assessment of Occupational Noise Exposures in Four Construction Trades, *American Industrial Hygiene Association Journal*, Aihaj, 60(6), 807–817.
- NIOSH [2014]. NIOSH bibliography of communication and research products 2013. Cincinnati, OH: U.S. Department of Health and Human Services, DHHS (NIOSH) Publication No. 2014–119.
- Phil Hughes, Ed Ferrett, (2011) *Introduction to health and safety in construction* (5th ed.). USA and Canada: Routledge
- Reese, C.D., and J.V. Eidson. (1999). *Handbook of OSHA Construction Safety and Health*. CRC Press, LLC.Boca Raton, FL.
- The Federal Democratic Republic of Ethiopia,(1996) Ethiopian Road Authority, Road Sector Development Program 1997- 2007 second draft final report, Addis Ababa

The Federal Government of Ethiopia.(1994) The Constitution of the Federal Democratic Republic of Ethiopia,

Traffic, Safety and health management plan (2019), Addis Ababa city construction work Companies, Addis Ababa, Ethiopia

U.S. Department of Labor, (2005) *Occupational Safety and Health Administration..* Retrieved from <http://www.osha.gov/>.

Vaughan, J. (2014). *Ethiopia construction boom lays foundation for growth*. Addis Ababa: Agence France Press.

WHO, (2003) Occupational health program of WHO Headquarters, Geneva, Switzerland. *The Global Occupational Health Network*; .1-2

APPENDIX A
ADDIS ABABA UNIVERSITY

School of Commerce

Department of Project Management

Questionnaire survey for research

Dear Respondents,

I am undertaking a research under the title “Health and safety management practices on Addis Ababa city Road construction projects, as a partial fulfilment of Master of Arts in project management at Addis Ababa University School of Commerce. The main objective of the research is to identify, health and safety practices predominant in road construction projects, and propose measures to alleviate.

To successfully conduct this research it is mandatory to look into the issue from different perspectives and to collect views of professionals who have vast experience in road construction in Ethiopia in general and in Addis Ababa City, in particular. In this respect, your participation is highly valuable for the result of the research.

I am grateful for your time and I thank you in advance for your valuable cooperation. All the information you provided will be kept in strict confidentiality and will be used for this academic purpose only.

If you have any questions or comments, please don't hesitate to contact me. You can reach me at

Email: wongelgedeon@gmail.com

Thank you for your time and cooperation.

Regards,

Wongel Gedeon,

Graduate Student at Addis Ababa University, School of Commerce

MSc. in Project Management

Advisor: Dr Mengistu B.

Part I: Personal information of the respondent

Please answer the following general questions by filling the blanks and marking (✓) on the spaces provided as appropriate.

1. Name _____ of _____ your _____ Organization
(Optional):_____

2. Organisation type: ☐ Client/owner ☐ Contractor ☐ Consultant

3. Specific to Contractors/Consultants:

3.1. Origin of the organization:

☐ Local ☐ Foreign

3.2. Level/ Grade of the Organization:

☐ Level/Grade 1 ☐ Level/Grade 2 ☐ Level/Grade 3 ☐ Below
Level/Grade 3

3.3. Average Number of Employees:

☐ <50 ☐ 50-100 ☐ 100-250 ☐ >250

3.4. Years of Experience in road construction:

☐ <5 ☐ 5-10 ☐ 10-15 ☐ >15

4. Name of the Person filling the questionnaire
(Optional):_____

E-mail address/Contact info. (for possible follow-up
communication):_____

5. Position in the Company you
represent:_____

6. What is the highest level of education you have received?

☐ Doctorate Degree ☐ Master's Degree ☐ Bachelor's

Degree

☐ Certificate/Diploma ☐ Others Please

Specify:_____

7. Relevant work experience in road construction?

☐ 1-5Yrs ☐ 6-10Yrs ☐ 11-15Yrs ☐ >15Yrs

Part II Health and safety management issues

Please tick the extent to which you believe that the following **statements can** contribute to health and safety in road construction projects at Addis Ababa

S/N	Health and Safety rules and policies (1=strongly agree, 2=agree, 3= neutral, 4=disagree 5=strongly disagree)	1	2	3	4	5
1	The company has a designated health and Safety Officer	☐	☐	☐	☐	☐
2	Project have a site-specific Health &Safety plan	☐	☐	☐	☐	☐
3	Projects are reviewed periodically or frequently in Health &Safety aspect	☐	☐	☐	☐	☐
4	Construction firm have Health & Safety policy	☐	☐	☐	☐	☐
5	Safety and health records are kept at the site	☐	☐	☐	☐	☐
6	The policy is communicated to all concerned parties in the company	☐	☐	☐	☐	☐
7	Construction firm have a written Health & Safety rules ®ulations and implementation for all workers reflecting management concerns for safety and health	☐	☐	☐	☐	☐
8	Safety and health duties are specifically assigned on site	☐	☐	☐	☐	☐
9	The company will take disciplinary measures on workers who do not follow safety procedure	☐	☐	☐	☐	☐
Training						
1	Workers undergo instruction on Health &Safety before commencing work on a particular site	☐	☐	☐	☐	☐
2	Provide awareness with written information about Health & Safety procedures	☐	☐	☐	☐	☐
3	Workers are regularly trained in Health & Safety	☐	☐	☐	☐	☐
4	Workers trained in proper care & use of personal protective equipment	☐	☐	☐	☐	☐
5	Training is conducted at all levels, including for managers, supervisors, workers, subcontractors and contract workers.	☐	☐	☐	☐	☐
6	Instruction manuals or safe work procedures are used to aid in preventive action	☐	☐	☐	☐	☐
Management						
1	Managers encourage and support worker participation, commitment and Involvement in Health &Safety activities	☐	☐	☐	☐	☐
2	Managers actively monitor the Health &Safety performance of their projects and workers through reports	☐	☐	☐	☐	☐

3	Managers ensure that the Health & Safety budget is adequate	☐	☐	☐	☐	☐
4	Managers involve workers on safety management measures	☐	☐	☐	☐	☐
5	Managers set a specific budget for health and safety measures	☐	☐	☐	☐	☐
6	Managers have regular medical examination to monitor health of the employees	☐	☐	☐	☐	☐
Supervision						
1	Proper supervision by staff trained in Health & Safety carried out on the project	☐	☐	☐	☐	☐
2	Local authorities and Health & Safety enforcement agencies visit sites for inspection	☐	☐	☐	☐	☐
3	The company conducts regular site safety inspections	☐	☐	☐	☐	☐
4	Hazardous jobs are clearly identified and special attention is given by the company	☐	☐	☐	☐	☐
5	The safety inspection results are documented and communicated	☐	☐	☐	☐	☐
Health and Safety Resources						
1	The company Provided good welfare facilities such as showers, canteens, toilets	☐	☐	☐	☐	☐
2	Material schedule data sheets provided for all hazardous materials on site	☐	☐	☐	☐	☐
3	Adequate first aid and first aider(s) on your construction projects/sites	☐	☐	☐	☐	☐
4	Safety helmets, safety goggles and safety shoes are worn by the operator and other within the locality	☐	☐	☐	☐	☐
5	The company Provided personal protective equipment (PPE)	☐	☐	☐	☐	☐
6	Where this is not practicable, all excavations and opening are covered or fenced off at the end of the working day	☐	☐	☐	☐	☐
7	The firm Provided right tools, equipment and plant to execute construction	☐	☐	☐	☐	☐
8	All site vehicles and machines are in a good repair having checked all brake of in use	☐	☐	☐	☐	☐
Environmental and Public Body Safety						
1	Project office uses public roads to store material like sand or gravel.	☐	☐	☐	☐	☐
2	There is adequate artificial light that does not throw deep shadow, while working at night time	☐	☐	☐	☐	☐
3	There is a traffic control system on the site to control the movement of vehicles in order to avoid danger to pedestrians	☐	☐	☐	☐	☐

4	Proper arrangements have been made for collecting and disposing of waste and scrap at frequent intervals	☐	☐	☐	☐	☐
5	Recycling and reusing construction wastes.	☐	☐	☐	☐	☐
6	Bury or burn construction wastes.	☐	☐	☐	☐	☐
7	Dispose excavated soil & construction wastes to open land.	☐	☐	☐	☐	☐
8	Reinstating quarry sites for rock and selected soil after use.	☐	☐	☐	☐	☐
9	Covering manholes and excavated holes to prevent harm.	☐	☐	☐	☐	☐
10	Planting trees and greenery for environmental protection.	☐	☐	☐	☐	☐
11	Safety signs are appropriately positioned in the site	☐	☐	☐	☐	☐
12	All harmful materials have been identified and suitable precautions taken	☐	☐	☐	☐	☐
13	All containers of hazardous chemicals in use on site are properly labelled	☐	☐	☐	☐	☐

Part III

The Major Health & Safety areas to be considered during road construction projects

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

Item no.	Description (1=very high, 2=high, 3=exceptional, 4=low 5=very low)	Frequency of occurrence				
		1	2	3	4	5
1	Excavations (Slides, collapse, not shored protection...etc.)	☐	☐	☐	☐	☐
2	Electricity (Electric power Accidents)	☐	☐	☐	☐	☐
3	Hazardous substances	☐	☐	☐	☐	☐
4	Noise	☐	☐	☐	☐	☐
5	Vibrations	☐	☐	☐	☐	☐
6	Dust	☐	☐	☐	☐	☐
7	Fire and Explosion	☐	☐	☐	☐	☐
8	Construction machinery (Dozer, Loader, grader etc	☐	☐	☐	☐	☐
9	Traffic accidents (Collision of vehicles)	☐	☐	☐	☐	☐

10	Slips and falls	☐	☐	☐	☐	☐
11	Scaffolding	☐	☐	☐	☐	☐

Part IV Choose your best

1, Which Factors highly affect safety and health performance in the construction industry?

- ☐ Complexity of the Design
- ☐ Weather Condition
- ☐ Safety and Health Policy
- ☐ Safety and Health Training
- ☐ Safety Signals, Signs and Barricades
- ☐ Risk Assessment

Others specify _____

2, The major reasons of accident on site are that the management is short of:

- ☐ Lack employs of safety officer
- ☐ Lack of safety policy
- ☐ Lack of safety training
- ☐ Safety signals, signs and barricades
- ☐ cost of safety

Others specify _____

3, The major reasons of accident on the site are that the workers are short of:

- ☐ Lack of training
- ☐ Lack of experience in using equipment

☐ Lack of safety culture

☐ Lack of safety Motivation

☐ Others specify _____

4, In your opinion, who should be responsible for road construction accident during on site?

☐ Workers

☐ Government

☐ Contractors

☐ Owners Consultant

☐ Others.....

5. What is the main problem of companies on the implementation of the health and safety at the work place?

☐ Lack of awareness

☐ Negligence

☐ Inappropriateness

☐ Incurring unnecessary cost

Others specify-----

6, What are the main causes of accidents at construction sites?

☐ Negligence

☐ Poor working conditions/environment

☐ Lack of knowledge on H&S

☐ Lack of personal protective equipment

Others specify-----

7, what possible measures are frequently undertaken on road construction

☐ Risk assessment

☐ Give adequate training

☐ Follow the safety policy

☐ Safety signs

Others specify-----

If you have any comments regarding the health and safety management, please specify here: _

Interview Questions

1. What are the benefit of health and safety management practices on road construction projects?
2. Who is in control of health and safety issues in the site as well in organization and who is responsible for the cause of accidents?
3. How much is the knowledge and workers towards health and safety?
4. What is the reason behind not implementation of stated policies in projects?
5. What have been done to equip workers on health and safety practices
6. What are the main causes of accidents during road construction?
7. What majors are taken to avoid or minimize accidents?
8. What are the responsibilities of different stakeholders towards health and safety management
9. What are the environmental implication during road construction
10. What method are used to protect the environment during road construction
11. What is planned in the future regards health and safety management on road construction?

Observation Checklist

Site details

Site name	
Site Manager's name	
Principal Contractor	

Instructions

Every section of the audit should have a check :

Yes = Observed and in compliance

No = Observed and not in compliance Not Needed = Not present on jobsite

Personal Protective Equipment				
Item	Yes	No	Brief description of the situation	Further Comments
Helmets				
Safety shoes				
Eye protection				
Respiratory Protection				
Ladder				
Scaffolds				
Fall protection				
Machine Hazards				
Electrical Hazards				
Excavation				
Vibration				
Dust				
Noise				
Road side features and passive safety installations				
Traffic signing, marking, and lighting observation				
Needs of vulnerable road users				
Readability by drivers				
Sign legibility				
Traffic signals				
Watering				
Flag men				
Others				

Comments

APPENDIX B

Active Project Site

1. Kality Ring Road - Bulbula - Kilinto Roundabout Road Projects
2. Kality Raundabout - Tuludimtu Roundabout
3. Package 34 Road Project, Lot1: Bole Bulbula Quarry Entrance - Woreda 12 Intersection - Bulbula 40/60 Condominium
4. Bole Bulbula Woreda 12 Intersetion - BulbulaRound about Bulbula 40/60 Condominium and End of Nova Real Estate, Including Link Road Project
5. Ararat - Kara
6. Ararat Hotel - Kotebe College
7. CMC AYAT Road Junction-Gurad shola Summit Road and CMC Summit –Meri
8. Kera Kebet Beret - Gofa Mebrat Hail Condominium Junction Road Project
9. Alemtsehay bridge-Shegole Road junction
10. Package 36; Haile garment RA - Jemo RA
11. Shiromeda- Kidanemiret
12. Shiromeda- Kuskum
13. Ras Desta - Kechene Medhanialem
14. Fafa Food Factory - Dama Hotel - Bihere Tsege - Sene Zetgne School - Debrezeit Road Project
15. Klinto condominium AC road project
16. Megenagna Wuhalimat Woreda 17 Health Center Road Project
17. Keraniyo Medhanialem - Ambo Road Asphalt Concrete road Project
18. Pushkin square sarebet - Gotera Road Project

Project Site Location

