



**DILLA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**COLLEGE OF NATURAL AND COMPUTATIONAL**  
**SCIENCE**  
**DEPARTMENT OF BIOLOGY**  
**KNOWLEDGE, ATTITUDE, PRACTICE AND**  
**OCCUPATIONAL HEALTH RISK OF SMALL AND MEDIUM**  
**SCALE WELDERS AT DILLA TOWN, GEDEO ZONE,**  
**ETHIOPIA**  
**BY: MERSHA BIRU**

**DECEMBER, 2023**  
**DILLA, ETHIOPIA**

**KNOWLEDGE, ATTITUDE, PRACTICE AND  
OCCUPATIONAL HEALTH RISK OF SMALL AND MEDIUM  
SCALE WELDERS AT DILLA TOWN, GEDEO ZONE,  
ETHIOPIA**

**BY: MERSHA BIRU**

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**A RESEARCH SUBMITTED TO THE DEPARTMENT OF  
BIOLOGY COLLEGE OF NATURAL AND  
COMPUTATIONAL SCIENCES SCHOOL OF GRADUATE  
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## **Acknowledgement**

MSc, abbreviated for Master of Science, means a higher academic degree that students can earn after completing their bachelor's degree in a specific field of study. Research and learning are fun and allow you to explore something you like while growing personally and professionally. This trip also has the benefit and joy of meeting and collaborating with incredible individuals who have the same interest.

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## **Declaration**

The researcher, the undersigned, declares that this research work entitled “**knowledge, attitude, practice and occupational health risk of small and medium scale welders at Dilla town, Gedeo zone, Ethiopia**”. The originality of this thesis is to assess knowledge, attitude and practice related to occupational risk of welders found in Dilla town, Is my real original work, and it has not previously formed the basis for the award of any Degree, Diploma of University or other institutions of higher learning, except where due acknowledgement is made in acknowledgements.

Name of the author: **Mersha Biru**

Signature \_\_\_\_\_

Date of submission \_\_\_\_\_

Dilla University, Dilla

This thesis has been submitted for examination with our approval as the university advisors.

### **Major Advisor:**

Dr. Thewodros Bekele (PhD) Signature \_\_\_\_\_ Date \_\_\_\_\_

## **Dedication**

I dedicate this thesis research to my beloved parents and families. As well as the researcher extended his dedication to peoples who contribute even a piece of advice and idea throughout in my life to reach on this stage.

## **List of Abbreviations**

AFSCME:-American Federation of State, County and Municipal Employees

COPD:-Chronic Obstructive Pulmonary Disease (COPD)

DB:-Deci Bell

EBP:-Evidence Based Practice

ILO:-International Labor Organization

PPE:-Personal Protective Equipment (PPE)

REL:-Recommended Exposure Limit (REL)

UV:-Ultraviolet UV

UVR:-Ultraviolet Radiation,

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## **Abstract**

*Welding is critical for Ethiopia's industrial growth, with small and medium scale welders playing an essential role in various industries. However, welding is associated with various occupational risks that can significantly impact the health and safety of welders. This study aimed to investigate the knowledge, attitude, practice, and occupational risk of small and medium scale welders in Dilla Town, Gedeo Zone, Ethiopia. A descriptive survey design was employed, and data were collected using a structured questionnaire and observation. The questionnaire instrument consisted of three parts: attitude level, knowledge level, and practical level. Descriptive statistics and chi-square test were used to analyze the data. The total sample of 120 welders and owners were taken from Dilla town using census or whole sampling technique. The study found that 62.5% welders had a basic level of knowledge of occupational risks associated with welding, but their attitude and practices towards occupational risks were inadequate. The study also found that welders had most prevalence of occupational risks, with eye injuries being the most common. The study recommends the need for interventions to improve the knowledge, attitude, and practice of welders toward occupational safety. These interventions should include training and education programs on occupational hazards associated with welding and the use of personal protective equipment. The study findings may inform policy and practice in promoting safe welding practices and improving the working conditions of welders in Dilla Town, Gedeo Zone, Ethiopia.*

**Keywords:** *Dilla town, welders, attitude, knowledge, occupational, descriptive survey design*

## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1. Background of the study

Welding is a way of joining metals that is used everywhere in the world. It is really common in making things, building, fixing, and maintaining things in different industries. Many people use different ways of welding to do their jobs (Tadesseet *al.* 2016). The welding process is when we put metals together. It is a part of making things from metal, where we cut, bend, join, polish, or coat them (Buhiska, 2014).

According to the International Labor Organization (ILO), constructing activities involve building things like houses and buildings. This includes digging and building, making changes to the structure, fixing things, and tearing down buildings. This means that constructing sites are places where construction work is done, and workers are people who do the construction work (ILO Code of Practice, 1992).

Workers often encounter various types of injuries during their job, such as cuts, wounds, broken bones, dislocated joints, twisted muscles, torn ligaments, lost body parts due to accidents, internal injuries, burns, frostbite, injuries caused by chemicals, severe poisoning, and infections. The study found that there are a few main reasons why accidents happen at work: The working conditions are not safe; there is not enough supervision and training;; the machinery and equipment used is old; there is not enough maintenance being done; the workspace is not kept clean and organized; safety rules are not followed and the production units are overcrowded and cramped (Joshi et al.2011).

These activities make workers breathe in welding fumes, a mixture of tiny particles, gases, and metals. The different materials used in these processes create a risk of exposure and health problems for workers(Cosgrove 2015). Occupational hazard related to welding may come from welding fumes, sharp metal edge as well as hot and flying molten leads to irritation of eyes and other health problems. The PPE that most people are familiar with are goggles, while the ones that fewer people know about are earmuffs or earplugs. This is because eye injuries are more likely to happen and be more serious than hearing problems. So, it's important to wear goggles for protection. The same results have been found in Nigerian welders (Gwomson et al. 2018).

The fast growth of the economy and cities in developing countries like Ethiopia has caused changes in the workplace. The organization responsible for worker health and safety is not strong enough to keep up with the increasing need for health services, particularly for industrial workers like those in welding jobs. (Kumie, 2016). There isn't much information

available concerning welding profession concocted in Ethiopia, but the number of welders is growing, particularly in small businesses..

Most of the evidence published was obtained from the developed world, and very small researched data exist concerning welder's dangers and the risk factors in developing countries (kumie2016). Similarly, limited information is available in Ethiopia in general, southern Ethiopia cluster region Gedeo Zone, Dilla town in particular. Thus, this study aims to explore the knowledge, attitude, practice, and occupational health risk of small and medium scale welders in Dilla Town, Gedeo Zone, Ethiopia, to provide insights into the challenges and opportunities in promoting safe welding practices and improving the working situations of welders in the area. The study intends to contribute to the progress of effective policies and strategies to enhance the occupational health and safety of welders in Ethiopia.

## **1.2. Statement of the problem**

Safety and health issues are big problems in small and medium businesses in places like Ethiopia in Africa. This is because people don't know enough about the dangers of their jobs, and there aren't enough safe work environments available. Safety and health policy, as well as poor safety management, result in significant financial losses.

Welding has risks that can harm workers' health. Some dangers that welders face include eye irritation, vomiting, and long-term health problems such as a higher chance of getting lung cancer, skin disease, and gastritis.

The welding profession in Dilla Town, Gedeo Zone, Ethiopia, is associated with various occupational health risks that can significantly impact the health and safety of small and medium scale welders in the town.. Despite the critical role played by welders in various industries, which is narrow information on their awareness, character, and performs towards occupational risks, and the existing studies lack specificity to the Dilla Town context. Therefore, there is a need to investigate the knowledge, attitude, practice, and occupational risk of small and medium scale welders in Dilla Town, Gedeo Zone, to identify the gaps in their understanding of occupational hazards and promote the safe welding practices. The study aims to provide insights into the occupational safety and health challenges faced on small and medium scale welders at Dilla town and contribute to the development of effective policies and strategies to improve their working conditions and safety of occupational health while welding in their working environment.

### **1.3. Research Question**

Based on the statement of the problem mentioned above, the researcher aims to provide adequate answers for the following basic research questions (research problems). These include:

- What is the level of knowledge of welders related to their welding work while they are in their working environment?
- What is the attitude level of the welders related to their welding work?
- What are the safety levels of welders that they are taking while welding in their working environment in Dilla town?
- What are the practices of welders look like while welding in their in working environment Dilla town?
- What are the major risk factors that are associated with occupational hazards of welders in Dilla town?

### **1.4. Objective of the study**

#### **1.4.1 General objective**

The general objective of the study is to assess the level of knowledge, attitude, and practice related to occupational health risks among small and medium scale welders in Dilla Town, Gedeo Zone, Ethiopia.

#### **1.4.2. Specific objectives**

Based on the research questions given above, the researcher put and achieved the following specific objectives of the research. These include:

- To evaluate the level of knowledge of small and medium scale welders related to occupational hazards associated on welding work.
- To assess the attitude level of the welders related to their welding work in the town.
- To evaluate they actual practice of small and medium scale welders in in implementing safety measures
- To assess the level that the welders are taking for their safety while they are in their working environment

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

The study on the knowledge, attitude, practice, and occupational risk of small and medium scale welders at Dilla town, Gedeo zone, Ethiopia, is significant for several reasons. First, it was provide insights into the level of awareness and preparedness of small and medium scale welders in Dilla town towards occupational safety hazards. The study assessed the level of knowledge of small and medium scale welders in Dilla town regarding the occupational risks

associated with their profession. It was also determine the attitudes of small and medium scale welders in Dilla town towards the utilization of personal protective equipment (PPE) during welding and investigate their adherence to safety guidelines.

Second, the study was help to identify areas where small and medium scale welders in Dilla town may be lacking in knowledge, attitude, or practice regarding occupational safety. The findings of the study provides recommendations for improving these areas. For instance, if the study reveals that small and medium scale welders in Dilla town have inadequate knowledge of occupational safety hazards, policymakers and stakeholders can use the findings to develop interventions that promote safety awareness among welders in the town. Similarly, if the study finds that People who do small and medium scale welding jobs have a bad opinion about using protective gear. The results can be helpful in creating strategies to encourage welders to use protective gear.

Third, the results of the study was useful for policymakers and stakeholders in the welding industry. The results of the study can help make rules and actions that enable safer working situations for small and medium scale welders in Dilla town and beyond. Policymakers can use the findings to develop regulations that promote the use of PPE and adherence to safety guidelines among welders. Similarly, stakeholders in the welding industry can use the findings to develop training programs that promote safety awareness among welders.

Finally, The findings of this research contribute to our existing knowledge in regards to workplace safety and health in Ethiopia, with a specific focus on small and medium-sized enterprises. Small and medium businesses play a big role in the country's economy. This study's results can help create programs that improve safety and health at these enterprises. The study can also be used as a reference for future research on occupational safety and health in Ethiopia.

### **1.6. Scope of the Study**

To make the research more clear and easier to handle, it is recommended to narrow down the study and focus only on specific parts of the problem or areas of interest. This study focuses only on assessing knowledge, attitude, practice and associated factors among welders in Dilla town. The study was conducted from 1<sup>st</sup> March 2023 up to 29<sup>th</sup> August 2023. During this period, each task was done according to the planned schedule.

### **1.7. Limitation of the study**

During this study, the researcher encountered various difficulties. Such limitations like the unwillingness of some welder respondents to fill out the questionnaire due to their fear of

secreting, the Load of work in this job, welders' social life, welders' back history, and family state where may the limitation of the study.

### **1.8. Operational definition as applied in the Study**

**Acute Health Effects:** Health problems that happen because of being around dangerous things while working or right after working, or within two weeks afterwards.

**Occupational Hazard:** Any action, procedure, or substances involved in welding that could harm or negatively impact the health of the people who do it..

**Personal Protective Equipment:** Devices such as goggles, masks, and helmets are worn by welders to protect them from dangers they may encounter at work. These dangers might include heat, sparks, chemicals, and flying debris. In addition, safety boots, special aprons, and gloves made with insulating material are also used for protection. The purpose of using these devices is to prevent or minimize any harm that could be caused by these hazards.

**Risk:** The chance of getting hurt or having a negative health effect from being around something dangerous.

**Small Scale Enterprise:** A small company that has fewer than 10 employees.

**Welding:** Joining metal pieces together by using hot melted metal that is created at the joint through heat, pressure, or both heat and pressure.

**Welder :**is anyone, amateur or professional, who uses welding equipment, perhaps especially one who uses such equipment fairly often.

### **1.9. Organization of the study**

This study was organized and presented in to five chapters. Chapter one consists of background of the study, statement of the problem, Research question, objectives of the study, significance of the study, delimitation and limitation of the study, operational definitions and organization of the study. Chapter two presents review of related literature. Chapter three deals with methods and materials such as: Description of study area, Design of the study, Sources of data, Sample and sampling technique, Data collection instrument, Method of data analysis and Ethical consideration. Chapter four deals with result and discussion such as: result, discussion and major finding. Chapter five deals with conclusion and recommendation was presented.

## **CHAPTER TWO**

### **2. REVIEW OF RELATED LITERATURE**

#### **2.1. What is welding?**

Welding is when you use really hot heat to join two metal parts together. The heat makes the parts melt and mix together. Welding is commonly used in shipyards, construction sites, mines, vehicles, petrochemical plants, and metalworking (Pankaj 2015).

Welders have been told to reduce their risk of breathing in too much welding smoke by making sure there is good airflow and by keeping their heads away from the smoke. However, welding involves closely watching the work and many workers tend to position their head wherever needed in order to see it (Harris et al, 005). A specialized helmet with a fresh air tube is recommended as a means to ensure the safety of welders by preventing them from breathing in welding fumes and gases. Another option is to wear a mask over the mouth and nose and use a machine that sucks in the fumes nearby (Satyanarayana et al.2016).

#### **2.2. Mechanisms of welding and Welding process**

When the electrical power between two separate electrodes gets stronger, the insulation of air eventually breaks and electricity flows between them. This causes a bright light and intense heat to be produced. Welding workshop entails various activities such as cutting of metals with gas flame (oxyacetylene fuel), grinders, or lathe machines, and fusing of metals with the aid of arc (stick) welding also called Shielded Metal Arc Welding (SMAW) or Gas, Metal Arc Welding (GMAW) (as MIG - metal inert gas welding, or MAG - metal active gas welding). Different composition of gas can be used-pure carbon (IV) oxide (CO<sub>2</sub>) or gas mixture of argon and CO<sub>2</sub> (Bonow et al. 2014). Welding is a process where an electric arc is created between a wire and the metal being worked on. This causes the metal to melt and join together. The GMAW uses a gas to protect the welding process from harmful substances in the air (Bonow et al. 2014).

#### **2.3. Knowledge and attitude of welders**

Welding workers need to know about the dangers at work and how to protect themselves with safety gear. Safety and health training is important for learning more about how to stay safe and healthy. It also helps in developing the habit of using personal protective gear. Employers and other responsible entities should promote training and provide regular supervision specifically focused on the safety and well-being of workers (Chepkener2013).

#### **2.4. Risk exposure, learning and motivational campaigns**

The researchers found that welders didn't understand the risks in their work environment. They believe that having a nurse to educate and provide healthcare to workers can help prevent accidents and improve the overall health and quality of life for welders (Chauhan et al., 2014). . In simpler terms, it means that there should be a focus on teaching the importance of health and safety at work in schools and learning centers. The professionals in this field have the knowledge and experience to teach students about potential risks in the environment and how to prevent them, especially for future welders. This will help students be more prepared and successful in their future jobs. It says that there is a problem with not putting into action and regularly telling people at work about the dangers of smoking.

This is important because smokers who also work with metal fumes may have test results that don't show the true damage to their lungs. This could lead to their lungs getting worse faster (Hicks 2009).

#### **2.5. Knowledge Level and Safe Practices of welders**

In this part, we found that the level of education, job experience, safety training, and following work regulations were connected to the use of personal protective equipment (PPE). Workers with a higher level of education are over 13 times more likely to use personal protective equipment compared to workers who only completed primary school (Chepkener 2013).

Workers who had received safety training were almost twice as likely to use personal protective equipment compared to workers who had not received safety training. The study wanted to find out how aware workers in Axum and Adwa were of workplace dangers and how well they followed safety measures (Beyene et al. , 2019) This study found that the respondents' understanding of workplace dangers was only 44.2%, which is less than a previous study conducted in Addis Ababa, where 69.5% of respondents knew about different types of occupational health and safety information. Another study in Adwa also found that 68.7% of respondents knew about occupational health and safety information. (Tadesse et al, 2016) This could be because most workers were professionals who did not work with welding. Most workers knew a lot about electrical hazards 202 (777%), and accident prevention 220 (846%), compared to other things they were asked about (Chepkener, 2013).

The study found that 67. 7% of the people surveyed knew about personal protective equipment. A similar result was seen in a study conducted in India among welders. As part of being safe, 86.5% of the people in the study used protective clothing and gear. Compared to other safety practices, a higher percentage, 56.1%, of people washed their hands before

eating, 75.6% used gloves, and 850% covered container lids after use. This may be because we didn't ask how often people use personal protective equipment while interviewing them. Out of the people surveyed, the majority (80. 8%) used eye goggles for protection. The next most common item used was an apron (76. 9%). The least used item was ear plugs (34. 2%) (Anita et al. 2019).

This study showed that having work experience is important for knowledge. Workers with more than five years of experience are 56% more likely to be knowledgeable compared to those with less than one year of experience. This finding is similar to other studies done in Addis Ababa and Adwa town(Tadesse et al, 2016; Beyene et al, 2019).

This research found that health and safety training is linked to what respondents know. A study in China showed that big companies and small companies had differences in safety training, and this affected how safe the workplace felt. A study found that training workers in occupational safety and health is beneficial. The study showed that training helps workers understand job hazards and encourages safer work practices in many different places (Chepkener, 2013).

Information from specific surveys and studies about workers getting hurt or dying on the job was also looked at. These reports often showed that a major reason for these accidents was that the workers did not have enough training. Other studies have found that workplace training on first aid can help to lower the number of injuries among workers. This means that even this type of training can make jobs safer. Using training and supervision during dangerous tasks has also improved knowledge about safety. (Beyene et al, 2019) Another study conducted in Addis Ababa found that there was no important connection between health and safety training and how much people knew about safety information. (Tadesse et al, 2016). Even though there were no other studies to compare it to, having rules at work was linked to having a better understanding of the dangers that come with the job. In our meeting, we found that education level was strongly related to the use of safety gear. Workers who had a certificate or higher education were ten times more likely to use personal protective equipment.

## **2.6. Major Occupational risks factors for welders.**

Major occupational risk factors for welders are: lung cancer risk Vs welding, the effect of metal, the interference of welding fumes, shortage of financial motivations and expenditure on disease, risk of noise exposure level for hearing loss, welders job has hazard effect of dermatological and hypersensitivity, welders on construction site has potential hazards of eye and face (Andreassi 2011).

### **2.6.1.Lung cancer Versus Welding**

This research studied how exposure to certain metals can cause primary cancers in the lungs, and secondary ones in the bladder and kidneys. They did not find significant results for cancers in the stomach and brain, except for melanoma, burns, and cataracts caused by exposure to UV radiation. They also found only a few cases of nasal cancer. The metal fumes that are produced when welding can be made up of different things. This depends on the type of metal being welded, the electrode being used, and the shielding gas. It is hard to know exactly what is in the welding fumes because there can be a lot of variation. However, some of the components in the fumes are known to contribute to the development of lung cancer (Andreassi, 2011).

Welding in North America and Europe is becoming safer, but in developing countries, there are many different ways of welding which can make diseases more noticeable and harder to control because there aren't as many rules. Other exposure that can affect welders' health are how they position themselves while welding, not having enough fresh air, working in small spaces, and not wearing safety gear. These factors make it difficult to assess and prevent work-related accidents and illnesses for welders. This study looked at many articles from different countries. These articles conducted experiments and research on the topic, and found important results that benefit the health of welders (Budhathoki 2014).

### **2.6.2.Toxicity**

Metal oxides are made up of manganese (Mn), iron (Fe), zinc (Zn), nickel (Ni), chromium (Cr), cadmium (Cd), cobalt (Co), and lead (Pb), titanium, vanadium (V), , and other similar substances. These substances can be found in things like fillings, mixtures of metals, metal parts, and protective coatings. Research on short-term and medium-term exposures to carbon nanotubes in mice and rats found that it can cause serious health problems like lung inflammation, genetic damage, fibrosis, mesothelioma (a type of cancer), granulomas, and glioma (a type of brain tumor) if inhaled or put directly into the body. Also, the way the substance spreads in the air, the size and shape of its particles, and other chemical properties can greatly impact how harmful it is to our lungs. (Ajayi 2011).

The skin can easily take in ultraviolet radiation from the welding light. Welders often get burns from hot metal and ultraviolet radiation(Anthony & Brain, 2014). The seriousness of radiation injury depends on different things like the clothes you wear, the type of welding you do, how long you are exposed to the radiation, how strong the radiation is, how far away you are from the source of radiation, the color of the radiation, how sensitive you are to radiation, and if there are any chemicals in your body that can be affected by radiation. Some

substances produced during welding can make your skin sensitive or irritated. These substances include different types of chromium, nickel, zinc, cobalt, cadmium, molybdenum, and tungsten. When people who are allergic to chromate are exposed to fumes from welding chromium steel, they can develop a skin rash called allergic dermatitis (Lombardi et al., 2005).

Researchers found that welders who did not protect themselves from nickel during their work developed contact eczema (Holly et al, 2006). Out of all the injuries, the most common ones were surface burns and deep burns, which were found in 41% of the welders. The welders had a skin condition called ultraviolet radiation-induced dermatitis on their face, hands, and forearms. A welder who rarely wore a protective face mask had a skin condition on his face that kept coming back and was very bad. A doctor named Merryman(2009) wrote about this case . The doctor found out that the condition was caused by the welder being exposed to ultraviolet rays from welding without protection. The welder was exposed to a lot of ultraviolet light, which was 128 times more than what is considered safe for an 8-hour day. A research was done on 77 welders. Out of these, 75 workers were regularly exposed to welding operations, while 58 workers were not exposed. The study found that skin redness was common among welders and less frequent in other workers who were exposed to welding( Lyon, 2002). Redness of the skin was mostly found in areas that were not covered by clothing and was common on the neck of welders. Also, the different groups did not have any major differences in the number of skin conditions like dermatoses, skin tumors, or premalignant lesions. The light from welding has been suggested as a possible cause of skin cancer. But we don't know for sure how much this light actually contributes to skin cancer in welders (Emmett et al., 2001).

### **2.6.3.The interference of welding fumes**

The main cause of chronic obstructive pulmonary disease (COPD) is breathing in welding fumes. However, people who have jobs where they are exposed to vapors, gases, dust, and fumes have an increased risk of getting COPD. This especially applies to workers in cement and masonry professions who have been exposed to asbestos, welding and cutting metals, silica, cement dust, and other tasks that involve using solvents and paint (Lombardi et al., 2005).

Workers who have been doing their job for less than five years have a lower chance of experiencing blockages in their breathing passages. Currently, there is no cure for these health conditions. However, strategies to manage the risks can greatly improve the quality of life and prevent the decline of workers. We still need to make more efforts in recognizing and

controlling hazards with aroids persuades. In this situation, taking action can help to prevent diseases in two ways. First, by encouraging employers in developing countries to run campaigns urging their employees to quit smoking. Second, by implementing policies to ensure workers receive regular medical check-ups to protect them from occupational diseases as required by law (Bakri et al., 2019).

#### **2.6.4. Economical problems**

The government did not provide financial incentives to the industries that make everyday items. This means that they did not give money or help to these industries. Because of this, new ways to make certain things were not developed. These new ways would be able to join things together like before, but without being as harmful to people's bodies. This would help keep skilled workers from leaving their jobs and prevent the government from spending money on medical treatment for lung diseases that cannot be cured (Hicks 2009).

#### **2.6.5. Risk of Noise exposure level for hearing loss**

Many industries are quickly growing and using machinery a lot in production. This could cause high noise levels that can lead to hearing loss. Dangers from the machinery system have been known for a long time. Noise-induced hearing loss is a common problem in car part factories. It happens because of the machines and how people work there (Megbele et al, 2012).

Welding creates loud sounds that can cause hearing problems for workers who are exposed to the noise for at least 8 hours a day. Workers in car parts factories work for a minimum of 8 hours every day, and they work for 6 days each week. Sometimes, die casting makes a lot of loud noise for a long time, while pressing usually makes loud noise in short bursts. So, most workers who do these three tasks usually wear something in their ears to protect their hearing. Welding makes a lot of loud noise from the machines and the metal being crushed. But, many workers don't wear something to protect their ears (Tetteh et al. 2020).

The noise levels that workers were exposed to in the past might have been high because the methods used to control noise were not good enough, the rules and policies about noise were not managed properly, the workers did not know enough about how noise can damage their hearing, and the companies did not focus enough on keeping their workers safe (Chauhan et al, 2014).

Hearing loud sounds for a long time can make you feel dizzy and have ringing in your ears even before you notice any problems with your hearing. Permanent hearing loss can happen

when someone is exposed to loud noises every day for 8 hours or if they are exposed to sudden really loud noises. Loss of hearing can happen slowly over several years, but it usually happens faster during the first 6-10 years. It often begins with difficulty hearing high-frequency sounds. Moreover, people who are regularly around loud noises for 40 years are more likely to experience hearing loss. Additionally, being exposed to loud noises for 8 hours every day for 5 years can lead to a permanent decrease in hearing ability (Cezar et al., 2012).

A hearing conservation program is a set of rules made by the employer to protect employees from losing their hearing due to loud noises at work. It includes policies that are announced to the employees, monitoring of noise levels in the workplace, and measures taken to preserve workers' hearing. Loud sounds can cause problems with hearing (Megbele et al, 2012).

So, the study wanted to measure how much noise people were exposed to at work, that caused them to lose their hearing. We also wanted to find out what things made people more likely to lose their hearing. We studied workers in a car part factory who did welding.

## **2.7. Welders on Construction Sites has health hazards of physical damage**

Eye and face hazards in welding and grinding applications on a construction site are also a critical concern. Electric arc welding can cause special dangers for workers' eyes, faces, and breathing systems. Certain welding and cutting tasks produce harmful ultraviolet/infrared radiation and super bright visible light that can cause lasting damage to the eyes. Additionally, sparks from welding and grinding can harm your eyes. The source of these hazards can be ultraviolet, visible, and infrared radiation from the welding arc, contact with solid, liquid, or gaseous materials and foreign bodies, and mechanical impact from high-velocity particles to the eyes and face ( Lombardi et al. 2005).

One of the most common eye injuries caused by welding work are burns on the retina or cornea. Moreover, 'arc-eye' can happen when a worker's eyes are exposed to UV rays. These injuries usually happen when a worker doesn't wear the right eye protection, or when they mistakenly hit an electric arc because their welding helmet is not covering their face. Long-term exposure to these dangers for many years can cause damage to the eyes, such as retinal degeneration and cataracts, as well as skin cancer. These injuries caused by harmful light can be avoided if you wear the right protection and use it correctly. It is important to choose the right protection for your eyes when welding because the amount of light can change depending on the job (Emmett et al. 2001).

According to the Chauhan et al. (2014) potential short-term symptoms from intense visible radiation are spot blindness, bloodshot eyes, and headaches. Red eyes or bloodshot eyes

occur when the blood vessels on the surface of the eye expand. Sometimes a blood vessel can leak and cause bleeding on the surface of the eye and leave a red patch. These health effects from visible light overexposure take some time to happen – normally seconds to hours, and damage can be immediate and accumulative. Long-term over exposure may lead to problems with the macula, impaired vision at night, and permanent retina damage (Anita et al. 2019).

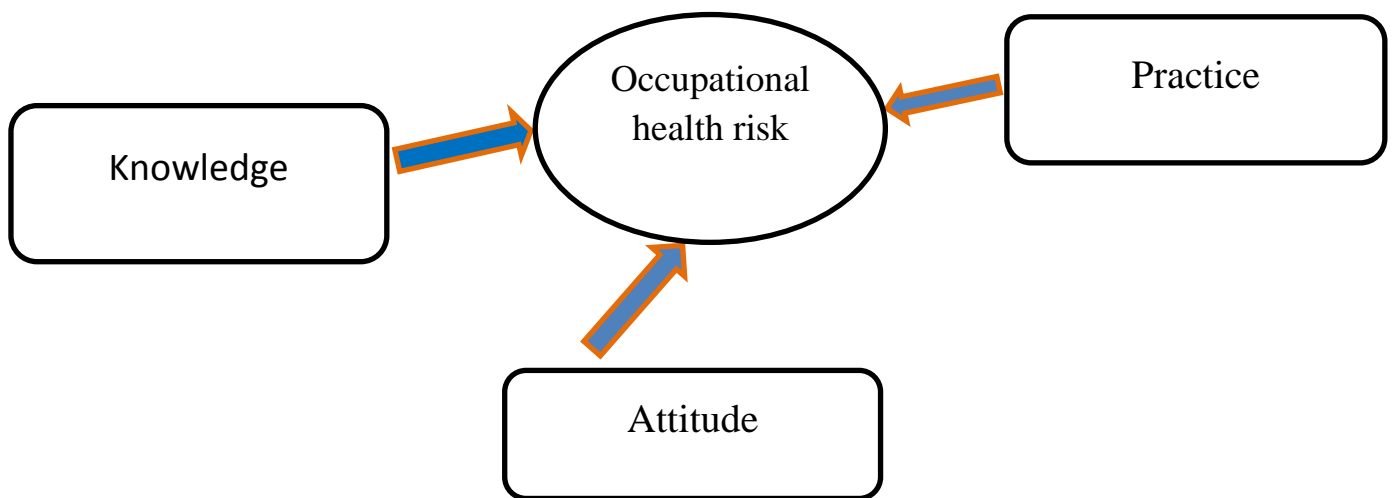
Over exposure to infrared radiation can also cause problems. Adverse health effects can include dry eyes, tearing eyes, and headaches. Prolonged exposure to infrared radiation can heat the lens of the eye and produce cataracts over the long term. Health effects from infrared radiation can take a long time to happen – usually years. Damage is accumulative and can lead to retinal damage and cataracts (Beaumont & Weiss 2001).

A foreign object getting in your eye is something to worry about when you are doing welding or grinding. Imagine you have been working really hard for an hour in a very hot place. You remove your face protection and use your shirt's sleeve to wipe the sweat off your forehead. Unfortunately, your shirt is dirty and has small pieces of metal and rough materials on it. By mistake, these particles get in touch with your eye. Small pieces of dust or dirt can enter the eyes from hair, clothes, or protective gear. Gases and tiny floating dust particles in the air can make you feel uncomfortable, cause redness and swelling, and harm your body (Ajayi 2011).

There is a wide variety of eye and face protection PPE available. Options include safety glasses and goggles, safety glasses with foam gasket, clear and tinted face shields, and grinding and welding head tops with powered and supplied air respirator systems. It is necessary to choose safety equipment from a trusted manufacturer that is suitable for the danger and working conditions and meets the right performance criteria. It is important to remember that personal protective equipment does not do any good if it is not being worn. The time wearing the equipment, and wearing the equipment correctly, is imperative. PPE needs to be worn 100% of the time when exposed to hazards to be effective (Tetteh et al. 2020).

## 2.8. CONCEPTUAL FRAMEWORK OF THE STUDY

In accordance to the presented theoretical and empirical literature review, the researcher has set three basic variables for the knowledge, attitude, practice and occupational risk of small and medium scale welders at Dilla town, Gedeo zone, Ethiopia. It is presented as follow in a diagrammatic form: These three basic component that affects the small and medium scale welders are: knowledge, attitude and practice.



**Figure 1 The Conceptual framework of the study**

## CHAPTER THREE

### 3. METHODOLOGY OF THE STUDY

#### 3.1 Study area

The study was done in Dilla town, Gedeo zone, Ethiopia. Dilla town is the capital city of Gedeo zone, located in the Southern Ethiopia cluster Region of Ethiopia. It is situated approximately 360 kilometers south of the capital city, Addis Ababa. The study area is surrounded in west by Abaya Woreda (oromia); in the south by Wonago woreda; in the north by Sidama Region and in the east by DillaZuria woreda. The town is located with a longitude and latitude of  $06^{\circ}24'30''\text{N}$   $38^{\circ}18'30''\text{E}$ , with the elevations of 1570 meters above sea level. Dilla town is a rapidly growing urban center with a population of over 158,795 (CSA, 2007). The town is known for its economy, with small and medium enterprises playing a significant role in its growth.

Welding is a prevalent profession in Dilla town, with many small and medium scale welders operating in the area.

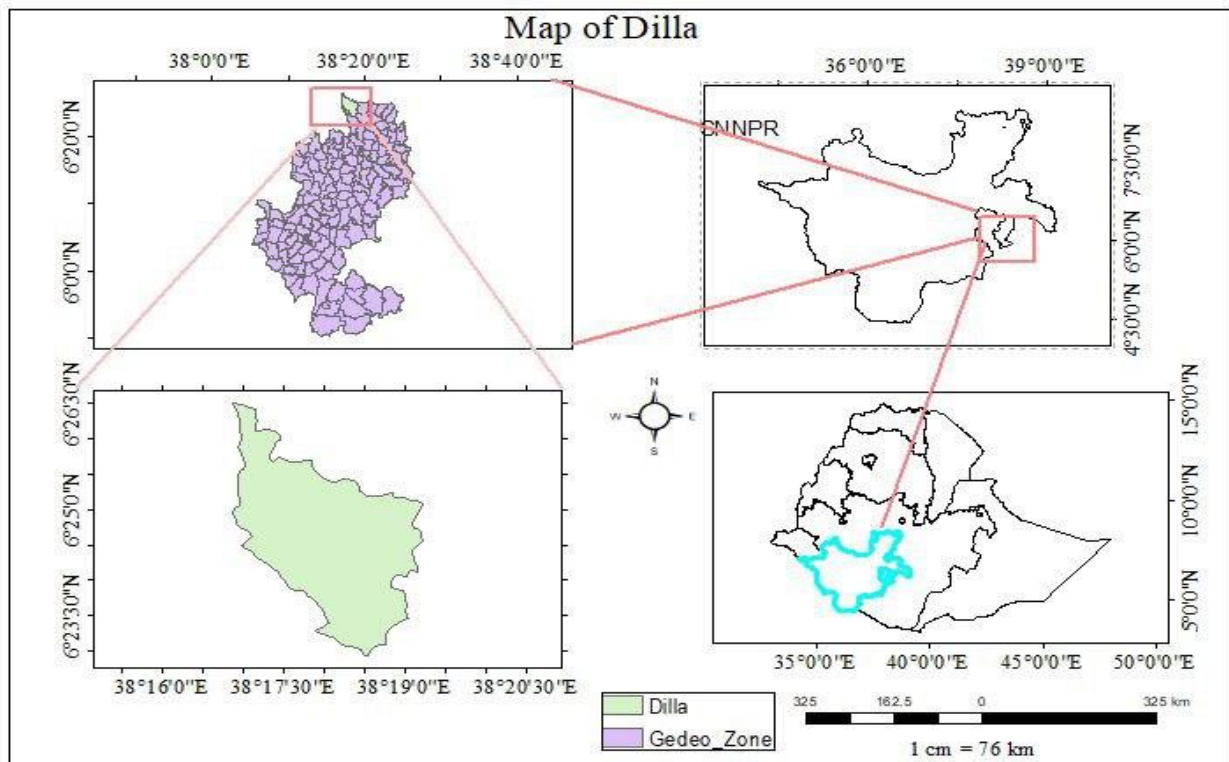


Figure 2:-Map of the study area

### **3.2 Research Design**

For this study, descriptive research design was employed with the assumption that will be helpful to obtain relevant information from concerned respondents. It was recommended that Descriptive research design will give a better and deeper understanding of a phenomenon which helps as a fact-finding method with adequate and accurate interpretation of the findings. It is believed to be more important to briefly assess the knowledge, attitude, and practice related to the occupational risk of welders found in Dilla town. Moreover, it helps to gather data at particular points in terms of the intensions of describing the nature of existing condition, or identifying standards against which existing condition can be compared or determine the relationship that exist between specific event (Jose and Gonzales , 2002). Mixed research method was employed because Mixed method is an approach to inquiry that combines or associates both qualitative and quantitative forms. It also involves the use of both approaches in tandem, so that the overall strength of a study is greater than either qualitative or quantitative research, Creswell & Plano Clark, (2007). Therefore, mixed research method has advantages to obtain in-depth information and provides varied, diverse and thorough data which develops the hypothesis of study. Furthermore qualitative data is used to triangulate quantitative data. Gay, et al. (2009) also indicated that using mixed research method neutralizes or cancels the biases of any single method. Concurrent mixed design the data was collected at the same time. This has the advantage of reducing the duration of the data collection.

### **3.3. Study population**

The participants of this study were selected from all welding houses in Dilla town. Dilla town administration welding house workers and owners are a source of population, and 120 welders and owners are study population, and also 120 welders and owners are a sample population. Meanwhile the study is expected to explore the research topic; the study is believed that it was a good idea to get the necessary information directly from the welders who were also the group we were focused on.

### **3.4. Sample size and sampling techniques**

All small and medium scale welding workshops found in Dilla town were involved as the study participants. Since the total study population of the study is small in number, the researcher decided to use all of them as the study sample size. Therefore, a total 120 employees who are currently working in the welding activities in the town were taken as a sample members to conduct the study. as a sample size for the study.

### **3.5. Source of data**

The information for the study was gathered from original sources. The primary data was gathered through 120 respondents by questionnaire and observation method. Observation of welding were conducted using an observation checklist. The researcher observed if the workplace is well lit and well arranged.

### **3.6. Method and procedure of data collection**

#### **3.6.1. Data collection instruments**

The source of collected data for this study was structured questionnaires and observation. Structured questionnaires were developed to collect data on the knowledge, attitude, and practices of the welders towards occupational safety and the risks associated with welding. The questionnaires were translated into Amharic and translated back in to English to check for consistency. The asked items in the questionnaire were carefully put together and adjusted after being thoroughly checked. It gathered numbers using a questionnaire that was tested beforehand. In addition to the questionnaires, individual observation were conducted with a sample of welders who obtain more detailed information about their familiarities and perceptions of work-related hazards and safety actions.

#### **3.6.2. Data Collection Procedures**

The researcher took ethical clearance from the Department of Biology in Dilla University. The researcher explained to the respondents the purpose of the study, assured them of confidentiality, and requested them to sign consent forms. Each respondent was given the adjusted questionnaire to fill out. The researcher translated each item in the questionnaire from English to Amharic before the welder respondents, or welders were allowed to fill it. Owners were given a questionnaire and observation were left to respond at their convenience and return them upon completion by a given data.

### **3.7. Method of data analysis**

Quantitative data was presented by using tables (using mean, standard deviation, frequency and percentages) and graphs). The data analysis involved data cleaning, descriptive statistics, inferential statistics, interpretation of findings. The collected data were checked for completeness, accuracy, and consistency. Any errors or inconsistencies were corrected before analysis using EpI 6.04 and then exported into SPSS (version 25 IBM) statistical package for coding and analyzing. For generating the required output from the collected data, an SPSS version 25 was used. These enabled the researcher to summarize the results to assess the level of knowledge, attitude, and practice related to occupational health risks among small and medium scale welders in the town. The items of the questionnaires were organized and

presented in tables based upon basic research questions and specific objectives of the study. Furthermore, description and analysis of them were made following the data illustrated in each tables. In addition to this, a chi-square test of association was applied to test whether there is an association between the knowledge, attitude and practice of welders with the occupational health risk of welders in Dilla town. Thus, associations between independent and dependent variables were analyzed by calculating the odds ratio with a 95% confidence interval. Chi-square analysis was done to control confounders and to test the association of variables (items) of attitude, knowledge and practice of welding while welding in the working area. The findings of the study were interpreted and presented in tables, graphs, and charts and by using the significance value (p-value). The results were discussed in light of the study objectives and the existing literature on the subject.

### **3.8. Ethical Consideration**

The researcher obtained an ethical clearance from the Department of Biology at Dilla University. Participants were briefed on the aims and objectives of the study. What needs to be known, why and how they have been selected, and how their opinions and observations are important to the study. The researcher informed the participants of the purpose of the research and notified them of their freedom of choice whether to participate in the research or not. Participation was purely voluntary, so the participants were given a consent form to sign. All the information was confidential, and the participants were asked not to indicate their names in the questionnaires and observation.

### **3.9. Pilot Study**

A pilot test was conducted on the questionnaire on other town welding workers who were not part of the study. Twenty welders participated twice in the pilot study. According to Marshall and Rossman (1999), the survey should be tested in a small sample to ensure that the survey is reliable and serves the purpose of the research.

The welders were informed that their participation was voluntary and that the information received in the pilot phase of the research would not be included in the final results of the study. The objective of the pre-testing was to determine the reliability and validity of the questionnaires by ironing out any ambiguities that were found in the questionnaire. The pre-testing also helped the researcher familiarize himself with the data collection process.

#### **3.9.1. Reliability and Validity**

#### **3.9.2. Validity**

In this study the researcher judged validity of the items on their appropriateness of content and to determine all the possible areas that needs modification, so as to achieve the objectives

of the study. The researcher also was take caution by reading and referring more to have valid procedure. In the process the researcher properly revised data gathering tools so as to make it valid. In addition to this, the collected data were checked for completeness, accuracy, and consistency. Any errors or inconsistencies were corrected before analysis using

### 3.9.3. Reliability

The reliability of the questionnaire instrument was assessed by using Alpha Method Using SPSS Version 20 (Cronbach's Alpha). It was found that the overall reliability coefficient value was 0.923. This value indicates that the instrument was reliable and would achieve the purposes of the study. Wiersma(2009) recommended that the general rule is reliability coefficient values greater than 0.7 are high or more acceptable to consider adequate for the study. The values of Cronbach's Alpha for the three piloted scales and the whole instrument were measured in the table below.

Table 1: Summary of Reliability Analysis

<b>Occupational risk</b>	<b>Cronbach's Alpha</b>	<b><u>No</u> of items</b>
Attitude level	<b>0.729</b>	<b>10</b>
Knowledge level	<b>0.748</b>	<b>11</b>
Practical level	<b>0.771</b>	<b>10</b>
<b>Total</b>	<b>0.923</b>	<b>31</b>

The Cronbach's Alpha result for the three variables of occupational health and safety was found to be more than the 70% or 0.7. As a rule of thumb, a Cronbach's Alpha result of more than 0.7 is said to be reliable variable for the study to be conducted. Therefore this result revealed that the three variables of level of attitude, level of knowledge and level of practice were found reliable for the study.

## CHAPTER FOUR

### 4. RESULTS OF THE STUDY AND INTERPRETATIONS

#### 4. Introduction

This chapter presents analysis, results, and discussions of the study. The first section deals with description of demographic information of the participants. The second section deals with three occupational risk factors of participation in welding workers on attitude, knowledge and practical level about welding workers were presented. Furthermore, the main findings of the study were presented with the help of tables followed by descriptive statement for analysis to give answers to basic questions set in the study.

#### 4.1. Results and interpretations

##### 4.1.1. Response Return Rate

From the total number of the sample respondents, 120 participants full filled and returned questionnaires while 24 participants did not return the questionnaires. Thus, the response rate of the study is 83.33% . This means that about 16.67% of the selected welders in the town don't returned the questionnaire to the researcher. According to Creswell (2003) a response rate of at least 75% is good enough for generalization of the findings when questionnaires are used. Therefore, this response rate is considered a good enough to make generalization of the findings.

##### 4.1.2. Demographic Information of the welders

The following section presents the demographical information of the one hundred and twenty (n=120) participants the study. The demographics information includes the participants' age, educational level and gender.

Table 2: demographic information of the welders

No.	Socio-demographic variables	Categories of the variables	Frequency	Percentage
1	Gender	Male	110	91.7%
		Female	10	8.3%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
2	Age	<20 years	8	6.7%
		21-25 years	22	18.3%
		26-30 years	43	35.8%
		31-35 years	32	26.7%
		>36 years	15	12.5%

		<b>Total</b>	<b>120</b>	<b>100.0%</b>
3	Educational level	Primary school	9	7.5%
		Secondary school	60	50.0%
		Collage	33	27.5%
		University and above	18	15.0%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>

The result of the above table revealed that 10 (8.3%) of the respondents were female welders, whereas 110 (91.7%) of the respondents were male welders. The aforementioned table indicates that 8 (6.7%) participants were under the age of 20, 22 (18.3%) participants were between the ages of 21 and 25, and 43 (35.8%) respondents were between the ages of 26 and 30. It was found that 15 (12.5%) of the respondents were over the age of 36, while 32 (26.7%) of respondents were between the ages of 31 and 35. According to the aforementioned table, 9 (7.5%) of the respondents were in elementary school, 60 (50.0%) were in high school, 33 (27.5%) were in college, and 18 (15.0%) were graduates of a four-year institution or above

#### **4.1.3 Knowledge, Attitude and practice measurements criteria**

**Knowledge:** The knowledge level was measured by using the number 1 for correct answers and 0 for incorrect answers. This included questions that could be answered with "YES" or "NO" or with short answers. Participants that score greater 50% were categorized as having ‘Good’ knowledge and while those who scored less than 50% were categorized as having poor knowledge (MukhtiarBaig 2020).

**Attitude:** To measure the attitude of the study participants, questions were prepared with the Likert scale. Attitude was assessed by seven questions; the result was evaluated by scoring favorable responses as 1(one) and 0(zero) for unfavorable responses. Attitudes of the respondents who scored greater than 50% were categorized as having a “favorable attitude,” and those who scored less than 50% were considered as having an “unfavorable attitude (MukhtiarBaig 2020).

**Practice:** The responses of the respondents’ practice was also dichotomized into “Good” and “Poor” practice rate. Respondents who scored greater than 75% were categorized as having good practice, whereas those who scored less than 75% were classified as having poor practice (MukhtiarBaig 2020).

#### 4.1.4. Analysis on knowledge, attitude and practice effect on the occupational health risk of welders in Dilla town

##### 4.1.4.1. Analysis on the impact of knowledge on the occupational health risk of welders in Dilla town

**Table 3:**Analysis on the impact of knowledge on the occupational health risk of welders in Dilla town:

No.	Items related with knowledge of welders	Categories of the items	Number of welders (Frequency)	Percent of welders(%)
1	Did you know about welding?	Yes	75	62.5%
		No	45	37.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
2	From where did you know about welding	relative and experience	39	32.5%
		workshop training	21	17.5%
		technical training	54	45.0%
		no answer	6	5.0%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
3	Which type of personal protective equipment did you use most?	welding helmet	18	15.0%
		safety materials	33	27.5%
		Goggles	39	32.5%
		work suit	24	20.0%
		did not any materials	6	5.0%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
4	Knowledge to Protect injuries while welding	Yes	39	32.5%
		No	81	67.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
5	What health problems might face while you work welding activities	problem on sense organs	36	30.0%
		respiratory problems	24	20.0%

		burning and cuts	36	30.0%
		Cancer	15	12.5%
		no answer	9	7.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
6	Identifying health problems related to welding	running eyes and nose	31	25.8%
		Sneezing	30	25.0%
		Cough	45	37.5%
		did not recognize	14	11.7%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
7	Did you know you work my lead you to serious health problems	no i didn't	51	42.5%
		Yes	69	57.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
8	Which materials of welding do you know can cause serious injuries	Electricity	21	17.5%
		hear fire	24	20.0%
		flying sparks	30	25.0%
		welding fumes	24	20.0%
		noise and vibration	21	17.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
9	Do you know anyone who experienced a serious health problem or died as a result of injuries at work	Yes	51	42.5%
		No	69	57.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
10	Did you know the owners have responsibility to deliver protective equipment's of welding	no i didn't	33	27.5%
		Yes	87	72.5%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>
11	Have you ever got any sort of training by the owners while you work hear	Never	15	12.5%
		Sometimes	75	62.5%
		Frequently	30	25.0%
		<b>Total</b>	<b>120</b>	<b>100.0%</b>

The above tables describes the knowledge level of welders while they are welding in their working environment. A total of 11 items were presented which are supposed to measure the knowledge level of welders while they are welding. Most of the welders know about welding from the technical training. While welding respondents most of the times use Goggle protective materials. The result also revealed that most of the welders did not protect themselves from injuries while they are welding. From this output, it is concluded that welders lacks proper understanding on how to protect them from any possible injuries in their working environment. Regarding to health problem, the majority of welders replies that they face a problem of sense organ and burning and cuts wounds. This result clearly revealed that the welders have faced a problem of health problems while welding. This also indicated that welders did not take care of themselves to protect themselves from serious health injuries. In addition to this, the result shows that most of the welders in the town di not any know how that anyone who experienced a serious health problem may lead to death or other problem. The overall implications of the result clearly reveals that most of the welders in the town do not have adequate and proper knowledge on how to protect themselves from serious health injuries related to welding activates in their working areas. So, the knowledge level of the welders in the townies so weak not adequate and are being faced different health injuries.

#### **4.1.4.2. Analysis on the impact of attitude on the occupational health risk of welders in Dilla town**

**Table 4:**Analysis on the impact of attitude on the occupational health risk of welders in Dilla town:

No.	Items related with attitude of welders	Categories of the items	Number of welders (Frequency)	Percent of welders(%)
1	I am comfortable with my occupation	strongly disagree and disagree	74	61.7
		Neutral	12	10.0
		strongly agree and agree	34	28.3
		<b>Total</b>	<b>120</b>	<b>100.0</b>
2	We are respected by our works	strongly disagree and disagree	75	62.5
		Neutral	9	7.5
		strongly agree and	36	30.0

		agree		
		<b>Total</b>	<b>120</b>	<b>100.0</b>
3	I feel welding is most valuable work than others.	strongly disagree and disagree	75	62.5
		Neutral	9	7.5
		strongly agree and agree	36	30.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
4	I do welding only on my free time	strongly disagree and disagree	66	55.0
		Neutral	3	2.5
		strongly agree and agree	51	42.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
5	The owners respects our work and aperiates us	strongly disagree and disagree	27	22.5
		Neutral	6	5.0
		strongly agree and agree	87	72.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
6	We are discriminated by the community by our occupation	strongly disagree and disagree	87	72.5
		Neutral	6	5.0
		strongly agree and agree	27	22.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
7	We have the right to get protective materials while at work	strongly disagree and disagree	66	55.0
		Neutral	12	10.0
		strongly agree and agree	42	35.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>

8	We feel our relations with others are affected by our profession	strongly disagree and disagree	33	27.5
		Neutral	12	10.0%
		strongly agree and agree	75	62.5%
		<b>Total</b>	<b>120</b>	<b>100.0</b>
9	The owners always criticize and disrespects our work	strongly disagree and disagree	60	50.0
		Neutral	12	10.0
		strongly agree and agree	48	40.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
10	We feel welding work is enough to fulfills ours and our family needs	strongly disagree and disagree	90	75.0
		Neutral	12	10.0
		strongly agree and agree	18	15.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>

The result given above describes the attitude level of welders while they are welding in their working environment. The researcher used a total of 10 items to measure the attitude of welders while they are welding in their working areas. The result indicated that they are not comfortable enough with their occupation and are not respected by their work in their working environment. The result indicated that welders do not have the right to get protective materials while they are at work. This again reveals that welders in the town do have a good attitude to ask about their right that to be protected from any possible injuries while working welding activities. Moreover, welders feel that their relationships with others are negatively affected by their profession. The descriptive result mentioned above reveals that welders in the town do not have a good attitude on welding and on how to respect their rights with relation with welding activities. Since welders lack adequate and proper knowledge on welding activities in relation with occupational safety, this also negatively affects their attitude on welding on their working environment.

#### 4.1.4.3. Analysis on the impact of safe practice on the occupational health risk of welders in Dilla town

**Table 5:** Analysis on the impact of safe practice on the occupational health risk of welders in Dilla town:

No.	Items related with practice of welders	Categories of the items	Number of welders (Frequency)	Percent of welders(%)
1	How much time do you spend in welding per day	<3 hours	36	30.0
		3-6 hours	56	46.7
		7-10 hours	24	20.0
		>10 hours	4	3.3
		<b>Total</b>	<b>120</b>	<b>100.0</b>
2	Apart from welding, what other activities do you perform in your work	grinding	21	17.5
		painting	26	21.7
		Cutting	31	25.8
		hammering	24	20.0
		cleaning	18	15.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
3	What protective material do you use to your eye while welding	safety goggle	33	27.5
		welding shies	42	35.0
		welding helmet	36	30.0
		i didn't use	9	7.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
4	What protective mechanism do you use to protect your ear.	ear muffs	36	30.0
		ear plugs	42	35.0
		Others	36	30.0
		i didn't use	6	5.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
5	What protective materials do you use for your legs and hands	safety boots	36	30.0
		ordinal shoes	39	32.5
		insulted safety	36	30.0
		i didn't use	9	7.5

		<b>Total</b>	<b>120</b>	<b>100.0</b>
6	How can you protect your body while welding.	leather apron	21	17.5
		work suit	69	57.5
		ordinal clothes	18	15.0
		i didn't use	12	10.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
7	How often do you use the above protective materials in your work.	every day while at work	87	72.5
		sometimes	33	27.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
8	Did you ever stay away from work due to health problems	Yes	60	50.0
		No	60	50.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>
9	How can you get treatment for injuries or health problems	safety aid in work	24	20.0
		medication for other center	63	52.5
		traditional medicine	24	20.0
		i didn't go to hospital	9	7.5
		<b>Total</b>	<b>120</b>	<b>100.0</b>
10	When did you go to health center for medication or checkup	time of incident only	84	70.0
		sometimes for checkup	24	20.0
		Never	12	10.0
		<b>Total</b>	<b>120</b>	<b>100.0</b>

The output of welders practice on welding related activities was presented on the table given above. A total of 10 items that are supposed to measure the practice of welders on the welding related activities in the town. As the result indicated, most of them spend from 3 to 6 hours per day doing their welding- related activities. in welding per day. Apart from welding activities , welders are also performing cutting works in their working area and most of them

use welding shies as a protective material for their eyes while welding. Welders have also a practice of wearing ear plugs as a protective mechanism for their ear while welding and most of them have a practice of using other mechanisms, too. The result also revealed that most of welders use welding suits while welding to protect their body from any possible injuries and they ever stay away from work due to health problems and injuries. This revealed that they have a poor practice of keeping themselves from injuries and possible risks while performing welding practices. It was also found that most of welders got to health center for medication or check up only when they faced incidents related to welding activities which again clearly indicates that they have poor practice in relation to welding activities. Generally, from the descriptive result, it was found that welders have a weak practice in welding related activities. Since they lack adequate knowledge and have no good attitude , they also have weak welding practice in relation to occupational safety and health in their working environment.

#### **4.2. Analysis of association result of knowledge, attitude and practice with the occupational health risk of welding activities (a chi-sqaure test of association result)**

**Table 6:**association analysis of knowledge, attitude and practice on the occupational health risk of welding in Dilla tonm welders

<b>Variables</b>	<b>Pearson Chi-sqaure Value (<math>\chi^2</math>)</b>	<b>df</b>	<b>Significance p-value</b>
Knowledge	38.54	10	0.001
Attitude	64.56	9	0.000
Practice	45.75	9	0.001

The result given above describes association analysis of knowledge, attitude and practice on the occupational health risk of welding in in the study area, Dilla town. The result includes the chi-sqaure test value , the degrees of freedom and the p-value of significance. The  $H_0$  (null hypothesis) and alternative hypothesis( $H_1$ ) for the chi-sqaure test of association are stated as follows:

$H_0$ : There is no significant association between knowledge, attitude and practice with the occupational health risk of welding (they are independent) versus.

$H_1$ : There is a significant association between knowledge, attitude and practice with the occupational health risk of welding (they are dependent or related).

The value used for testing the hypotheses is the p-value of significant and the rule of testing is that if the p-value of the result is less than the alpha value of 5% ( $\alpha =0.05$ ), then the null

hypothesis will be rejected, and accept otherwise. The p-value for Knowledge level is found to be 0.001, which is quite less than alpha value of 0.05. Thus, the conclusion is to reject the null hypothesis and accept the alternative one. Therefore, the result revealed that there is a significant association between knowledge, and occupational health risk of welding (they are dependent or related). In addition to this, the p-value for the attitude level of welders and the occupational health risk of welders is found to be 0.000, which is less than alpha value. The result leads to the rejection of the null hypothesis and acceptance of the alternative. Therefore, it is revealed that attitude level of welders and the occupational health risk of welders are associated or related to each other and this association is significant(  $p < 0.05$ ). From the result it was also indicated that the p-value for the practice level is  $0.001 < 0.05$  and hence the null hypothesis is rejected. It was found that practice level of welders and their occupational health risk is also related or associated to each other. This revealed that when the practice level of welders is enhanced and improved, then their occupational health becomes improved and vice versa. The result indicated that there is a significant association (relationship) between knowledge, attitude and practice on the occupational health risk of welders in the study area.

#### 4.1.3. Descriptive Analysis of personal protective equipment use in the working environment

Table 9: Descriptive Analysis of personal protective equipment Use in the area of work

Observation checklist	Yes		No	
	Number of welders	percentage	Number of welders	percentage
Does the worker have any personal protective equipment?	20	83.3	4	16.7
Is the PPE suitable for the task he/she is performing?	6	25	18	75
Is area of work well arranged?	1	4.3	23	95.7
Are electrodes removed from the holder when not in use?	5	20.83	19	79.17
Is suitable certified fire extinguishing equipment available?	0	0	24	100

The above descriptive result clearly explains the of personal protective equipment use in the area of work. There were a total of 24 working area of welders observed in the study area.

Each working area of welders were closely observed by the researcher and got the above result. The result revealed that worker in each working area have at least one personal protective equipment while they are working. Therefore, in this regard , the researcher has observed that at least one worker have their own protect equipment to keep themselves from any possible risks during working time of welding. It was also found that the majority of the welder's PPE was not suitable for the task they are performing (75%). The result revealed that the area of work was not totally arranged while they are working. In addition to this, the result revealed that 79.17% observed electrodes are not removed from the holder when not in use. It was found that 95.7% of welders in the working area were not properly arranged. So, there was a poor management of properly arrangement in the working areas. In case of the availability of certified fire extinguishing equipment, it was observed that no welders in the study area (0%) has certified fire extinguishing equipment available and thus they are found to have a poor performance in this case.

## CHAPTER FIVE

### 5. DISCUSSION OF THE RESULT

various issues which were obtained from the analysis of the data and the findings of the study observed in earlier sections and discussions made accordingly.

The level of welder-related knowledge, attitudes, and practices in Dilla town were determined by this study. The work-related health and safety of welders in Dilla town is lacking, as seen by this. The study found that the great majority of respondents received their education through apparent ship. Many welders may not have had the academic credentials necessary to enroll in a formal vocational institution at the beginning of their careers in order to pursue the welding and fabrication course. In the recent study, researchers found a variety of problems related to welding in the workplaces of welders in Dilla Town. These could cause harm: vibrations, noise, bright light, fumes and gases, electricity, work postures, dust, unsecured gas cylinders, heat, and fast machinery.

According to the current study, 62.5% of welders had a negative attitude regarding using welding. This may be due to the infrequent instruction in welding techniques and support monitoring in small metal workshops. The welders may be injured as a result of the poor practices that could result from the negative attitude, for instance non-utilization and the application of improper welding procedures. Particularly, when working in a metal workshop, the majority prioritized income over safety. Our results suggest that a sizable number of the welders in the research had low risk perceptions of work dangers and did not comprehend the necessity of using welding. Only the majority of respondents indicated that they would be open to attending free training, and greater than two-thirds of participants said they would not be prepared to wage for a welding-related exercise time. This might be the case since most welders assumed they knew enough about welding thanks to the internet.

This attitude suggests that some welders are unwilling to expand their expertise in welding training workshops, so ongoing health education is required to alter this perception for the research area. A favorable attitude toward using PPE was linked to completing tertiary education. A better understanding of safety precautions is fostered by higher education, which also creates a positive outlook (Nasab et al. 2009). Similarly, a rise in experience years was linked to a favorable attitude regarding PPE use. The status of knowledge and attitude toward the usage of PPE ultimately improves with more exposure to occupational dangers and more training opportunities. In past research, similar results have been observed (ILO 2015; Itiakorit et al. 2021). When compared to welders with lower levels of knowledge, individuals with higher status of knowledge were further probable in acquiring a positive

outlook. A higher status of knowledge translates into a more positive approach toward the usage of PPE and a better grasp of the occupational dangers that go along with it (Mary et al. 2020).

The results of the study indicate that 57.5% of respondents had no knowledge of welding, (participants scored less than 50% were categorized as having poor knowledge, 45.0% had knowledge (because that participants scored greater than 50% and categorized as having a good knowledge) gained through technical trainings, 32.5% had protective gear on while welding, such as goggles, ear muffs, gloves, and face masks, and the majority believed that there were health issues associated with welding that mostly affected cuts and burns as well as problems with sense organs (eye, ear, skin). In order to understand more about the risk of working as a welder and its causes, welders answered. In this study of occupational welders in Dilla Town, numerous occupational risks were identified in the work environments of the welders. Most welders were familiar with at least one type of welding effect and welding technique. Others, however, were unaware of anything detrimental related to their line of work or of any individual protective tools they may employ. For wounds and burns on the arms and hands as well as metal fume fever-related symptoms, the self-reported incidence of acute health impacts was high.

A study conducted in India by Chauhan et al (2014) found that most welders (59%) had problems with their eyes, while a smaller percentage (26%) experienced irritation on their skin. The experts suggested providing training on staying healthy and safe for this group. Another research conducted in India by Kumar and Dharanipriya (2014) found that the most common type of eye injury was abrasion, which means scratches on the surface of the eye.

This was followed by lacerations, which are cuts, and foreign particles getting into the eye. According to this study, flash burns and contusion were the least frequent types of injuries. This study found that most of the people who do welding are between 20 and 40 years old. The research suggests that we should do more studies to find better ways to train young people, so they are less likely to get hurt. Employing this approach may contribute to a decline in the occurrence of injuries. According to the cross-sectional study conducted in Sri Lanka by Arnold et al. (2019), in comparison to the control group, Welders are more likely to get chronic bronchitis even if their lung function is not affected. In Africa, there haven't been many studies about work-related injuries among welders. According to a research conducted by Sabitu et al. (2009), the most usual injuries among welders in Kaduna, Nigeria, were cuts to the hands and fingers. The next common injury was pain in the muscles and bones (such as back or waist pain). Injuries to the eyes only made up 17% of all the injuries. This study

showed that people knew a lot about the dangers of their work, but they did not use enough safety measures to protect themselves from those dangers. Mokaba et al (2013) found that in a study conducted in South Africa, welders had a higher rate of burns (46%) because they did not use protective gloves.

Many studies have looked at the health risks faced by Jua Kali workers, but few have focused on the health risks faced by Jua Kali welders. There are many research studies looking at the dangers that people in certain jobs face. One group that has been studied a lot is Jua Kali workers, who are skilled craftsmen. Welders are a specific type of Jua Kali worker that has been focused on in some of these studies. According to a study by Ashraph et al. (2012), workers in Mombasa who repair radiators were the most affected by lead exposure, with 83.3% having high levels of lead in their blood. Painters were the next most affected group, with 16.67% having high blood lead levels, followed by metal fabricators, with 11.76% having high blood lead levels. According to a study by Chepkener (2013), accidents involving the eyes were more common among metal workers (33.3%) compared to other job activities in the Jua Kali industry in Nairobi. Despite the numerous studies conducted worldwide to understand the connection between welding work and injuries at the workplace, there is still a lack of research on the role of welders' awareness of physical dangers and their use of safety precautions.

The present study show that level of practice for welders and owners in welding house were 46.7% of the respondents were 3-6 hours spend in welding time per day, 25.8 % of the respondents were deferent from welding, other activities they perform while working for cutting, 32.5% of the respondents were protective materials do you use for your legs and hands in ordinary shoes, most of the respondents were protect your body while welding work suit, every day at work use the above protective materials in your work, can you get treatment for injuries or health problems in Medication from health center. In this study, many welders were not well-prepared for practical tasks. This might be because the non-traditional welder's attitude and knowledge are cheaper, easier to find, and more comfortable compared to the traditional ones. Therefore, most of the welders in this study did not use the right materials that protect them from dangerous situations. This put them at a high risk of getting hurt/burn. These results are similar to what other studies have found in poorer countries. In those studies, most of the welders did not use the right safety PPE equipment (Alexander et al. 2016; Budhathoki et al. 2014; Hassan et al. 2017; Zgambo, 2015). The research found that most of the welders (62.9%) didn't follow good safety practices when it came to using protective equipment. This might be because most of the welders had a negative attitude. This

could also be because the welders in Nansana municipality haven't had many chances to learn and improve their skills. They also don't get regular training or support from their supervisors at work. Welders who had a happy and optimistic outlook were more likely to follow proper procedures and do a good job compared to those who were unhappy or pessimistic. It is important to improve both the knowledge and attitude of welders towards protective equipment to improve their practices.

The recent study found that many welders know a lot about PPE. This might be because all the welders in this study had some kind of training (either formal or informal) on PPE. Additionally, welders who received formal training had more knowledge and followed better safety practices related to personal protective equipment (PPE) compared to those who were trained through apprenticeship. Formal training schools include OSH in their courses, which teach workers about staying safe and understanding risks at work. The current study found that people have a lot of knowledge about PPE, which is similar to what was reported among welders in Ethiopia (Beyene et al. 2019). Another study in Nigeria found that the type of training people receive affects how aware they are of hazards related to their occupation (Sabituet al. 2009b). The results of our research show that it is important to provide proper training for welders to improve their knowledge, attitude, and safety practices regarding personal protective equipment. It was found that welders know a lot about different ways to welding methods. Goggles were the most often used welding technique, whereas earmuffs and earplugs were less popular. This might be explained by the fact that eye-related injuries are more likely to occur and be severe than hearing impairments, necessitating the use of goggles as protection. The majority of welders were not discovered or interested in welder attitudes using various techniques. Practically speaking, welding occupations resulted in more significant injuries than chronic or serious injuries.

## CHAPTER SIX

### 6. CONCLUSION AND RECOMMENDATION

The major objective of this study was to explore knowledge, attitude and practice related to occupational risk of welders found in Dilla town. To achieve the goals, the researcher used a method called descriptive survey. This method involved gathering information through questionnaires and observation. It included both qualitative (descriptions and explanations) and quantitative (numbers and statistics) approaches. The sample populations were welders and owners of welding house. The data gathered from questionnaires was analyzed applying frequency, percentage, chi square and data gathered from observation was analyzed using narrative approach.

The sample consists of welders in dilla town welding workers. This sample was taken from each welding house. Therefore, from the total population of 144(100%) welders and owners the sampled of 144(100%) welders were taken as a sample of the study was selected by available sampling techniques.

#### 6.1. Conclusions

Based on the major findings of the study and discussions of the study described in each section about the risk level of welding occupations in the following possible conclusions were made: The overall implications of the result clearly reveals that most of the welders in the town do not have adequate and proper knowledge on how to protect themselves from serious health injuries related to welding activities in their working areas. So, the knowledge level of the welders in the town is so weak not adequate and are being faced different health injuries. In addition to this, the result revealed that welders in the town do not have a good attitude on welding and on how to respect their rights with relation with welding activities. They do have a negative attitude towards the welding work and they often experience different health-related risks while welding in their working environment. It was also concluded that welders have a weak practice in welding related activities. Since they lack adequate knowledge and have no good attitude, they also have weak welding practice in relation to occupational safety and health in their working environment.

## 6.2. Recommendation

Based on what the study found and the conclusion made, the following suggestions were given:

- ✓ The Ministry of Health, along with the media and other groups who support causes, should organize programs to promote work safety. These programs will focus on educating people about the dangers of welding in the workplace. They will be advertised on social media, radio, and television.
- ✓ More research is needed to understand how to keep welders in small businesses in Dilla town safe and healthy while welding. It's important to find ways to prevent or reduce the risks that come with welding.
- ✓ As can be understood from the result of the study, the knowledge, attitude level and practice level of welders in the town was found to be weak and not promising. Thus, the researcher would like to recommend that the concerned body (the zonal enterprise organizer) must work hard in order to create awareness creation campaign to enhance their understanding ,attitude and practice related to their welding profession They need to getting information about the health risks of welding on how to wok being safe in their work.
- ✓ The result indicated that welders in the town are expose to different serious health risk related to their welding profession. Therefore, it is recommended that the concerned bodies(welding owners, the welders themselves) need to take care of protecting the safety level of welders while they are welding. To be productive in their work, welders' occupational safety needs to be well protected.

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## Appendix-1

### Questionnaire

#### Dear respondents

First of all I would like to thank you for your cooperation and willingness to be a case for my study. The purpose of this observation is to investigate issues related to knowledge, attitude, practice and associated factors of welders in Dilla town. Therefore, considering this purpose, you are kindly requested to answer honestly and carefully after you feel questions. The information that you give will kept strictly confidentially.

**Thank you for your time and effort!**

#### I. Socio-demographic information

[Please tick  and fill in where appropriate]

1) Sex Male  Female

2) Age(years) \_\_\_\_\_

3) Marital status? Single  Married

4) Educational level?

None  Primary  Secondary  Collage and above

5) How did you train to become a welder?

Apprenticeship training  Technical training  Other (Specify) \_\_\_\_\_

#### II. Knowledge of welders and owners about welding

Variables	Categories
Did you know about welding	No
	Yes
From where did you know about welding	From relatives and experience
	Workshop trainings
	Technical training
	No answer
Knowledge to Protect injuries while welding	Welding helmet
	Hand shield and safety shoes
	Goggles, ear muffs, gloves , face mask etc
	Work suit, leather apron
	Didn't know any protective material
What health problems might face while you	Problem on sense organs ( eye, ear, skin..

work welding activities	Respiratory problem
	Burnings and cuts
	Cancer
	No answer
Did you think there is a health problem related to welding works	Yes
	No
Identifying health problems related to welding	Running eyes and nose
	Sneezing
	Cough
	Didn't recognize weather its related to welding or not
Did you know you work my lead you to serious health problems	No I didn't
	YES
Which materials of welding do you know can cause serious injuries	Electricity
	Heat , fire or explosions
	Flaying sparks and failing objects
	Welding fumes and gases
	Noise and vibrations
	No answer
Do you know anyone who experienced a serious health problem or died as a result of injuries at work	Yes
	No
Did you know the owners have responsibility to deliver protective equipments of welding	NO I didn't
	YES
Have you ever got any sort of training by the owners while you work hear	Never
	Some times
	Frequently

### III. Attitude of welders and owners about welding

<b>Variables</b>	<b>Strongly disagree (1)</b>	<b>Disagree(2)</b>	<b>Neutr al(3)</b>	<b>Agree (4)</b>	<b>Strongly agree(5)</b>
I am comfortable with my occupation					
We are respected by our works					
I feel welding is most valuable work than others					
I do welding only on my free time					
The owners respects our work and aperitates us					
We are discriminated by the community by our occupation					
We have the right to get protective materials while at work					
We feel our relations with others are affected by our profession					
The owners always criticize and disrespects our work					
We feel welding work is enough to fulfills ours and our family needs					

#### IV. Practice of welders while welding

Variables	Categories
How much time do you spend in welding per day	Less than three hours
	Three to six hours
	Seven to ten hours
	More than ten hours
Apart from welding, what other activities do you perform in your work	Grinding
	Painting
	Cutting
	Hammering
	Cleaning
What protective material do you use to your eye while welding	Safety goggles
	Welding shields
	Welding helmet
	I didn't use any protective material
What protective mechanism do you use to protect your ear	Ear muffs
	Ear plugs
	Others
	I didn't use any material
What protective materials do you use for your legs and hands	Safety boots
	Ordinary shoes
	Insulated safety gloves
	I didn't use any protective material
How can you protect your body while welding	Leather apron
	Work suit
	Ordinary clothes
	I didn't use any protective material
How often do you use the above protective materials in your work	Every day while at work
	Sometimes
Did you ever stay away from work due to health problems	YES
	NO
How can you get treatment for injuries or	Safety aid on work place

health problems	Medication from health center
	Traditional medicine
	I didn't go to hospital due to lack of money
When did you go to health center for medication or checkup	Only at the time of incidence or symptoms of disease
	Sometimes for checkup
	Never

### Appendix-2

#### Observation checklist

	Observation checklist	Yes	No	Comment
1	Does the worker have any personal protective equipment?			
2	Is the PPE suitable for the task he/she is performing?			
3	Is area of work well arranged?			
4	Are electrodes removed from the holder when not in use?			
5	Is suitable certified fire extinguishing equipment available?			



I. Worker have any personal protective equipment



II. Area of work not well arranged



III. Area's which are not suitable certified fire extinguishing equipment