

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE

SCHOOL OF PUBLIC HEALTH

ASSESSING THE PREVALENCE OF OCCUPATIONAL INJURY AND ITS ASSOCIATION WITH UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AMONG WORKERS IN LARGE SCALE METAL MANUFACTURING FACTORIES, ADDIS ABABA, ETHIOPIA

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Abbreviations/Acronyms

BOLSA ……Bureaue of Labour and Social Affaires

CI …… Confidence Interval

CSA …… Central Statistics Agency

FGD …… Focus Group Discussion

FDRE ……Federal Democratic Republic of Ethiopia

GNP …… Growth National Products

GTP …… Growth and Transformation Plan

GDP ……Gross Domestic Product

GNP …… Gross National Product

ILO …… International Labour Organization

KAP …… Knowledge, Attitude and Practice

METEC ……Metal and Engineering Corporation

NORHED …… Norwegian Program for Capacity Development in Higher Education and Research for Development

OR……Oddis Ratio

OSH …… Occupational Health and Safety

PPE …….. Personal Protective Equipment

SPSS ……Statistical Package for Social Sciences

USA……..United Sataes of America

MOLSA …… Ministry of Labour and Social Affaires

Abstract

Background: The risk of occupational diseases and injury is increasing from time to time that has become the most prevalent and major public health problem in the world. Globally, there are 271 million work related injuries, and 2 million work-related deaths per year. Metal and engineering industries are identified as one of the five priorities sector by the government of Ethiopia, which is expanding in diversity and number. Work related injuries have become public health importance among industrial workers in Ethiopia. Personal protective equipment are belived to prevent the occurance of injuries. Studies on the prevalence of injury and its association with PPE utilization among metal workers in Ethiopia is limited.

Objectives: The aim of this study was to assess the prevalence of injury and its association with the personal protective equipment among workers in large scale metal manufacturing factories in Addis Ababa, Ethiopia from Auguest to October, 2016.

Methods: Institution based cross sectional study was carried out among 588 metal workers engaged in metal manufacturing factories in Addis Ababa. Five metal manufacturing factories were selected based on their long year service and existing total number of workers. Data was collected by trained data collectors using pretested Amharic version questionnaire through face to face interview. Observation and FGD was done by using Observation check list and FGD guide. The raw data was entered using Epi Info version7 then exported to SPSS version 20 for descriptive statsitcs, bivariate & multivariate analysis. Statistical signficance of 0.05 was considered.

Results: The prevalence of occupational injury in one year was 49.9% [95%CI:45.8-53.9]. There were 18 reports with disability from one factory in one year. Respondents age range of 18 to 30 years [AOR=0.42; 95%CI:0.186-0.950], attending primary school [AOR=5.64; 95%CI: 3.049-10.430] and secondary school [AOR=4.20; 95%CI: 2.567-6.883], work experience of less than 11 years [AOR=3.62; 95%CI: 1.214-10.824], those who had 11 to 20 years work experience [AOR=7.878; 95%CI: 2.596-23.904], workers with no job stress [AOR=0.38; 95%CI: 0.219-0.668] and workers who didn't use PPE were [AOR=4.84; 95%CI: 2.929-8.012] found to have a statistically significant association with work related injury as compared to their reference categories.

Conclusion and recommendation: This study concludes that the prevalence of occupational injury among metal workers was high as compared with the studies done in Addis Ababa metal factories and Mekele small scale industries. The study also showed that respondent's age, educational status, work experience, job stress and PPE use were the significant variables associated with work related injury. There should be quality and adequate supply of PPE for all metal workers. Safety education for metal workers and program based supervision in metal factories is essential.

1. Introduction

1.1 Background

Work related injury is any personal disease, or death resulting from an occupational accident (1). Usually work related injuries causes body damage like cut, fracture, sprain, or amputation on the body. Working in metal fabrication exposes workers usually for high risk of injury. Working with heavy materials and machinery results for crushing and dropping injuries. All over the world there is insufficient data on occupational injury and is known as a "silent" epidemic. Occupational diseases and injuries risk is increasing from time to time and now a days it is the most prevalent and major public health problem (2).

Globally, there are 271 million work related injuries, and 2 million work-related deaths per year (2). Due to weak occupational health and safety services 160 million work-related diseases occurred each year. The introduction of new technologies, chemical substances and materials contributed more for the increasement of burden of occupational injuries in Africa. In Sub-Saharan Africa loss of about 4% of Gross National Product (GNP) was resulted due to more than 257,000 total work-related fatalities, and 55,000 injuries (3).

There are well organized occupational safety and health management systems in many developed countries (4), the workers health is improved by these organized systems. To the contrary, in developing countries from 80% employed in heavy and dangerous work places only 5–15% have access to occupational health service (5). Worldwide work related injuries are the main causes of death, disability and disease and continue to cause serious public health problems (6). So, occupational hazard prevention and control program should be strengthened to control occupational health and safety issues in Africa.

The contribution of safer and healthier work condition is high for poverty reduction and sustainable development (7). Socio-demographic, economic, personal work behavior and the working environment are found to be contributory factors to the injuries. The type, magnitude and depth of injury are likely to bring significant changes in productivity and affect expenses through medical and compensation costs (8). Compensation, work time loss, production interruption, medical expenses and social assistance accounts for 5% of the global gross national product (GNP) (9). Thus more attention should be given by the owners of both small and large-scale industries to improve occupational safety measures and safe working environment through training, routine use of protective equipments and promoting health and safety for their workers (8).

1.2 Statement of Problem

The industry sector is one of the envisioned sectors expected to play a great role in Gross Domestic Product (GDP) growth, job creation, foreign exchange earnings in the Growth and Transformation Plan (GTP) period in Etiopia. In this regard metal and engineering industries are identified as one of the five priorities sectors by the government for existing industry investment (10).

The risk of having work-related injury is higher in developing countries than that of developed counties (11). Different studies conducted in Ethiopia showed that occupational injuries at manufacturing industries were highly significant (12). Astudy done in Addis Ababa indicated that among textile factory workers the frequent causes of injury were machinery 42 (29.4%), and being hit by or against objects 29 (20.3%). Similarly falling (12.8%), striking (25.5%), and flying objects from machines (8.5%) were reported as the major causes of occupational injury by the Department of Environmental Health of Ministry of Health (12). A study done in Ethiopia indicated that 60% of workers who did not use Personal Protective Equipment (PPE) were more likely to be injuried than workers who use Personal Protective Equipment (PPE) (13). A study conducted in Hawassa town showed that from the total respondents more than 17.0% of the workers did not use all the necessary Personal Protective Equipment (PPE) during work. The reasons for not using Personal Protective Equipment (PPE) were lack of Personal Protective Equipment (PPE), lack of practice, uncomfortable to use, and lack of safety education (14). Due focus is not given for injuries prevention and had low commitment level along with occupational health in developing countries, including Ethiopia (8, 15).

Different industries are increasing in Ethiopia. Occupational Safety and Health issue is indirectly addressed by the Government policy in a positive way (16). Currently, the Occupational Safety and Health system in relation to policy, implementation of legistation, infrastructure skills and capacity in Ethiopia is limited (17).

Hence, Ministry of Labour, and Social Afaires (MOLSA) of Ethiopia did not addresse well the prevention of occupational health and safety issues of workers in metal factories and others. There is no clear strategy developed to prevent metal workers from injuries. The association of prevalence of work place injury with personal protective equipment utilization among metal production workers is not determined (11), as a result work place related injuries are more and more likely to arise among metal manufacturing factory workers in Ethiopia (18).

The utilization of personal protective equipment by all metal production workers is belived to rerduce the prevalence of injury among metal workers. This assessment is designed to fill the gap by identifying prevalence of work related injuries and its association with personal protective equipment utilization among workers in metal manufacturing factories in Addis Ababa, Ethiopia.

1.3 Rationale and Significance of the study

Morbidity, mortality, and disability related with occupational hazards are becoming a big public health problem in developing countries including Ethiopia which cause a challenge to meet occupational health and safety program goals. Evidence based occupational health and safety services are essential in Ethiopia. The severity of occupational injury in most risky work places such as in metal manufacturing factories in Ethiopia are indicated by some studies done in Ethiopia. Work related injuries which associated with low utilization of personal protective equipment are more and more likely to arise among factory workers in Ethiopia. This study aims to contribute in filling information gaps on existing occupational health and safety services practice in the Ethiopian metal industry sector. Therefore, this study will provide base line information for occupational health and safety program implementers in metal manufacturing factories and policy makers to design strategies needed for prevention and control of occupational injuries in Ethiopian metal industry sector.

2. LITERATURE REVIEW

2.1 Occupational health and safety services

International Labour Office (ILO) defines occupational injury as any personal injury, disease, or death resulting from an occupational accident (1).
One third of industry workers pass their life on industy work, hence there is high health and safety effects due to work and work related injuries (19). Occupational injuries caused by major public health and developmental problems and which results a serious health, economic , and social consequences on workers and their employers (20). Metal production related works are stress full and physically damaging. The characteristic of metal work exposes the workers for prolonged hammering and cutting activities in excessive noise and uncomfortable body posture. Moreover, heat and humidity, welding fumes and metal dusts stressors causes excessive strain and deterioration of physical work performance of the workers (21). As a result ache or pain in the musculoskeletal system is common in metal workers (22). At metal work places accidental exposure to electric city and magnetic field are another factors that are affecting human body (23) and occupational accidents are an issue in metal industrial plants (24). Under labour proclamation No 377/ 06 Article 92 clearly stated that the fundamental obligations of an employer with regard to putting in place of all the necessary measures in order to ensure work places are safe, halthy and free from any danger to well being of workers (25).

2.2 Burden of occupational injuries

The International Labour Organization (ILO) estimates that occupational accidents and work-related diseases cause over 2.3 million fatalities annually, of which over 350,000 are caused by occupational accidents, and close to 2 million by work-related diseases. Long-standing work place hazards and new occupational risks are emerging as a result of technical innovation and social changes. Emerging risks also include poor ergonomic conditions at work, electro-magnetic radiation, high psychological and mental demands and constraints (26).

Globally, the International Labour Organization (ILO) estimates that around 4 per cent of the world's Gross Domestic Product (GDP), or about US $2.8 trillion is lost annually in direct and indirect costs owing to occupational accidents and work-related diseases (26).

Worldwide, Weak occupational health and safety services every year results 271 million work related injuries, 2 million work-related deaths (2), and 160 million work-related diseases (11). Like in other developing countries different industries are growing up very fast in Ethiopia. However, due to low accident and disease recognition, poor record keeping and reporting

mechanisms the country is relatively unclear about work related injuries and hazards. Because of this reason, the work related injuries are more and more likely to arise among industrial workers (18). Globally work related injuries are leading causes of death, disability and disease and continue to cause serious public health problems (6). To solve this sever public health problem the field of occupational hazard prevention and control should be strengthened in Ethiopia. Safer and healthier work conditions are the most important things for poverty reduction and sustainable development (7). Socio-demographic, socio-economic, personal work behavior and the working environment are found to be contributory to the injuries. The type, magnitude and depth of injury are likely to bring significant changes in productivity and affect expenses through medical and compensation costs (5). Compensation, work time loss, production interruption, training, medical expenses and social assistance accounts for 5% of the global Gross National Product (GNP) (9, 27). Therefore, more attention should be given by the owners of both small and large-scale industries for improving occupational safety measures and safe working environment through training, routine use of protective devices and promoting healthy and safety for their workers (28). Use of out-dated machinery, poor maintenance and little safety guarding of machinery, inadequate training of workers; poor design of equipment and work stations; and lack of personal protective equipment are some of the factors for the poor occupational safety situations in developing countries (29). A Study done in Addis Ababa showed that there was an injury rate of 200 per 1000 workers per year (30). In general metal processing industries are dangerous, due to more complex nature of production processes, material handling and other related functions of iron and steel making and workers in these industries are at a great risk for non-fatal and illness (24). It is suggested that, health at work and healthy work environment are most important to insure workers health and to contribute positively to the national economies through improved productivity, product quality, work motivation, job satisfaction, and overall quality of the worker's life and society (4). Studies in Ethiopia showed that occupational injuries at manufacturing industries were significant (25, 28, 31, 32). The Amahara Regional State Bureau of Labor and Social Affairs 2007/8 report indicated that from 32 enterprises the incidence rate of occupational injury was significantly higher in textile factories as compared with other enterprises. This report also showed that from the total reported injuries 34.45% of the cases were from Bahir Dar and Kombolcha textile factories (33).

2.3 Body part affected, sources and types of injury

In some study data laceration, cuts, punctures, eye injury, crushing and heat strain were indicated as common injury types (8). A study done in Addis Ababa, showed that being hit by or against objects and falling were the commonest causes of work-related injuries (32). A study conducted among textile factory workers in Addis Ababa revealed that the most common causes of occupational injury were machinery 42 (29.4%), and being hit by or against objects 29 (20.3%). Historical data from Department of Environmental Health of Ministry of Health report showed striking (25.5%), falling (12.8%), and flying objects from machines (8.5%) were the major causes of occupational injury (31). The Department of Environmental Health of Ministry of Health of Ethiopia has also indicated on its report that eyes, hands and fingers are the most commonly affected parts of the body (31). Similarly the Amahara regional Bureau of Labor and Social Affaire report showed that machinery (36.7%), mishandling (15.3%), falling (14.5%), and hand tools (6.2%) were the common occupational injury causes among manufacturing industrial workers (33). As indicated in most studies abrasions, cuts, burns, puncture, and fracture were the common injury types among manufacturing industrial workers (28). A study conducted in Ethiopia showed that the common affected body parts among industrial workers were fingers (37.3%) and hands (11.6%) (20). The study done among textile factory workers in Ethiopia indicated that the most common affected body parts due to work-related injuries were fingers (42%), lower leg (18.95%), and hands (13.3%) (34). Another study conducted in one of the regions in Ethiopia revealed that hands were with the highest frequently affected body parts (30%) followed by fingers (24%) and eyes (19%) (19).

2.4 Determinants of occupational injury

Unsafe working environment and human factors such as age, sex, lack of experience, job dissatisfaction, sleep disorders, smoking habit, excess alcohol intake are some of the inherent factors which causes work place injuries (32, 35, 36). Studies conducted in USA, France and China showed that men had a higher risk of occupational injury than women (35, 37). A study done in Ethiopia among small and medium-scale factory workers showed that occupational injury has no significant statistical association with gender of the worker (11). A study conducted at different places showed that younger workers suffer more occupational injuries than older workers (32, 37). Again, a study conducted in different places indicated that the prevalence of work and work-related injury increased with young age people (11). Also some occupational health and safety studies done in the developing countries indicated that the association between increased educational levels in the factory with decreased work-related injuries (11, 37-39). Low awareness on working conditions and safety environment had its own effect on injury

occurrence. Some researchers revealed that work place injuries are caused by poor work environment which leads to increased job stress and which again results increased risk of occupational injury (35). A study conducted among small and medium scale factory workers in one of the regions in Ethiopia showed that hours worked per week, work place supervision, health and safety training has a significant association with work and work related injuries (11). Association of work accidents with alcohol has been showed by the study done in India (40). Similar study done in Ethiopia indicated that there was no significant association between chat chewing and cigarette smoking with occurrence of occupational injuries (11). Sleeping disorder, job stress and job dissatisfaction are identified by some of studies done in different countries as the major risk factors for the occurrence of occupational injuries among industrial workers (38). A case control study done in India among coal mining factory workers revealed that workers who were highly satisfied with the existing jobs have lower risk of occupational injury. This study also indicated that workers who did not injured have awareness about the physical environment and always take necessary safety precautions. The same study also revealed that poor work environment causes work related injuries and leads to increased job stress. Occupational injury risks can be increased by stresses, and stressed individuals were more likely to have involved in occupational injuries (39). A study done among railway workers in France showed that workers with sleeping disorder problem sustained more occupational injury compared with their counterparts (41).

2.5 Personal protective equipment accessibility and utilization

The development of health, safety and environment lead to increase recognition of hazard control measures. Some of the known hazard control methods are appropriate design of the shop floors, better construction, standard maintenance. It is believed that, absolute hazard control is difficult. Hence, implementation of supplementary measures such as the use of personal protective equipment is unavoidable. Hence, usage of personal protective equipment is very important and is also the last line of protection after engineering controls work practice and administrative controls. Personal protective equipments designed to protect head, eyes, face, hands and arms, feet and hole body from injury (42). Personal protective equipment such as ear plugs for hearing protection, masks for respiratory protection, goggles for eye protection, boots for foot protection, gloves for hand protection, helmets for head protection, apron for body protection, and safety belts for fall protection are recommended for work settings.“Protective equipment like goggles and screens are very effective and simple means of preventing injuries from flying objects among welders’’ (43).

A study done on Knowledge, Attitude and Practice (KAP) of personal protective equipment in Visakhapatnam steel plant in India showed that positive response to Knowledge, Attitude and Practice survey is an indication of the employees having highest degree of awareness about personal protective equipments. Negative responses indicate the future probability of occurrence of accidents or occupational diseases. The same study suggested that in-depth studies should be conducted to identify the key factors responsible for negative response (39). A study done among iron and steel industries workers in capital city of Ethiopia revealed that workers consuming alcohol during working days, without spouse, perceiving their work highly stressful and not using personal protective equipment were more likely to be injured than their counterpart. This study also showed that work related injuries were decreased significantly by using personal protective equipment, and workers who did not use personal protective equipment were 3.61 times more likely (AOR = 3.57; 95CI: 2.20,5.77) to be injured than workers who use personal protective equipment. Similar study indicated that work stress, non use of personal protective equipment, consuming alcohol during working days, and excessive noise were observed as modifiable risk factors for work related injuries.

Therefore, risk of work place injuries can be reduced and prevented by creating awareness, providing training, providing personal protective equipment and establishing of safety programs in industries (13). In general, the socio demographic, behavioral, and work related environment factors are the determining factors which are associated with the prevalence of injury and personal protective equipment utilization.

2.6 Conceptual frame work

This frame work was developed based on the existing literature review on injury and related factors. The frame work was used to develop study tools and designing the methods. The study out come is injury, while the exposure variable in concern is the utilization of Personal Protective Equipment (PPE), given the presence of other exposure factors.

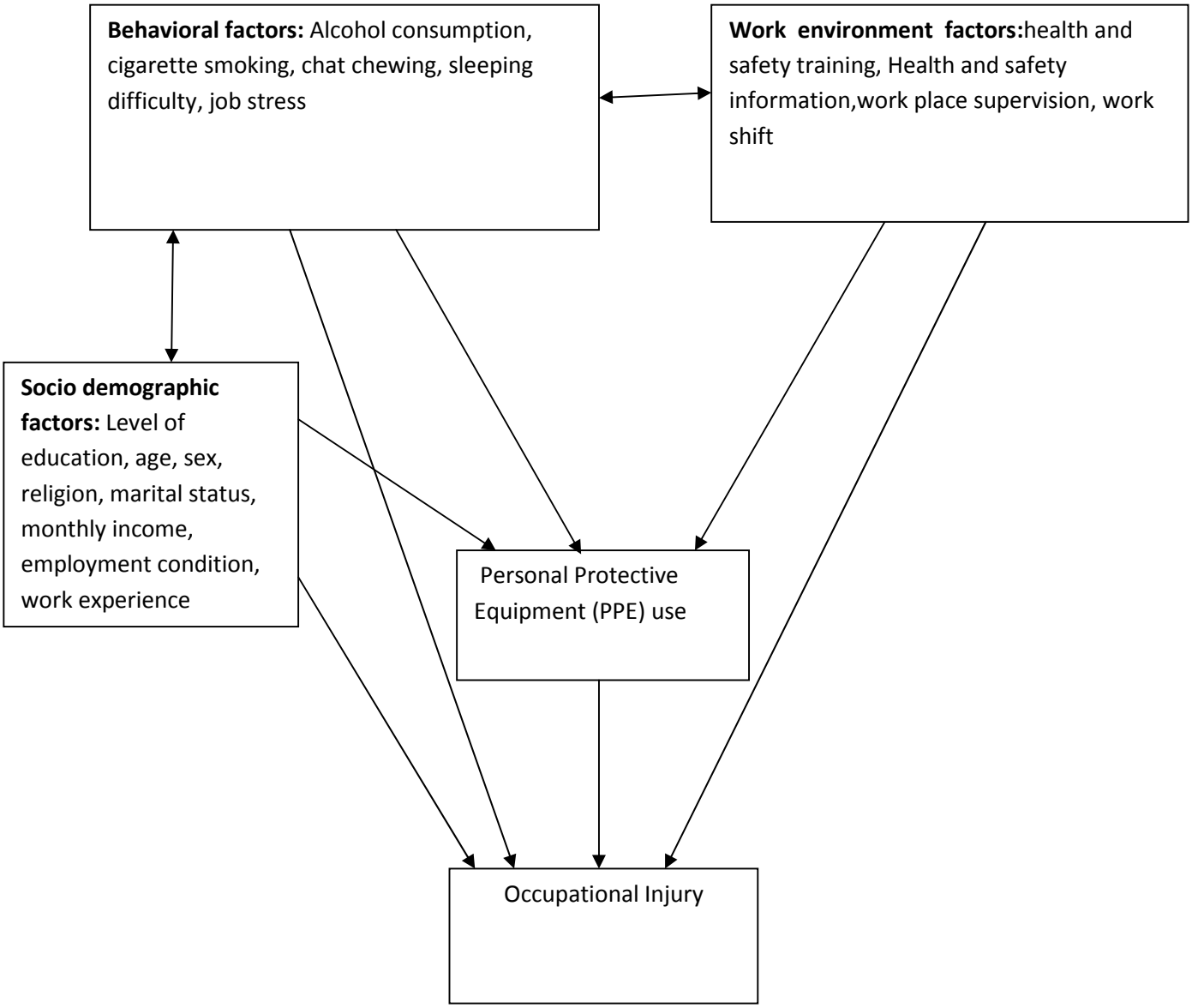


Figure 1:A conceptual frame work adapted from literature review (44)

3. Objectives

3.1 General objective

- To assess prevalence of occupational injury and its association with personal protective equipment among workers in large scale metal manufacturing factories in Addis Ababa, Ethiopia.

3.2 Specific objectives

- To determine the prevalence of occupational injury among metal workers.
- To describe the association of personal protective equipment with injury among metal workers in selected metal manufacturing factories.

4. Methods

4.1. Study setting

This study was conducted in the capital city of Ethiopia Addis Ababa. The geographical location of Addis Ababa is $9^0$1'48'N latitude and 38^0 44'24'E longitudes. Its elevation is 2355 meter above sea level. According to the master plan of the city, total land area of the town is 52700 hectar or 527 Km^2. The city has three administrative structures, these are city administration at the top, 10 sub city administrations at the middle, and 116 woreda administrations at the bottom (45).

This study was conducted in five metal manufacturing factories in Addis Ababa. Some of these factories did not allow us to state their names and characterstics in detail. In this case for purpose of confidentiality the factories named as Factory "A", Factory "B", Factory "C", Factory "D", and Factory "E".

Factory A established in 1970 with a total of 100 production site metal workers, Factory "B" established in 1965 with a total of 89 production site metal workers, Factory "C" established in 1972 with a total of 83 production site metal workers, Factory "D"established in 1968 with a total of 144 production site metal workers, and Factory "E" established in 1964 with a total of 172 production site metal workers.

4.2 Study design and period

Institution based cross-sectional study was carried out from August to October, 2016.

4.3 Source population

All workers directly engaged in metal production in large scale metal manufacturing factories were source population.

4.4 Study population

Workers who directly engaged in metal production and selected for data collection were study population.

4.5 Inclusion and exclusion criteria

4.5.1 Inclusion criteria

Workers in the metal production sites who were directly engaged in metal production work with in the study period (44).

4.5.2 Exclusive criteria

Workers who were ill and unable to communicate were excluded

4.6 Sample size determination

Sample size for this study was determined by using single population proportion formula for prevalence of injury and double population proportion formula and EPIINFO version7 for Personal Protective Equipment (PPE) utilization. The prevalence of injury was 33.3% (13), prevalence of injury among personal protective equipments users 26.5% (13), and prevalence of injury among non users of personal protective equipments 53.6% were used from literature of previous study which conducted among iron and steel industries workers in Addis Ababa, Ethiopia (13). By using single population proportion formula and double population proportion formula total sample size was determined and the larger sample size wase accepted for this study. Therefore, by considering non response rate (10%) a total of 562 production site workers who were directly engaged on metal processing in the selected metal manufacturing factories were included in this study. Sample size was calculated by using the following formulas:

Sample size for the first specific objective

Sample size was calculated by using single population proportion formula for prevalence of injury

$$n = \frac{1.5*((Z\alpha/2)^2 \times p\,(1-p))}{d^2}$$

The single population proportion formula used by considering the following assumptions:

Confidence level (CI) = 95%

Critical value (Zα/2) = 1.96

Degree of precision (d) = 0.05

Design effect=1.5

Expected true proportion of the injury among workers (P), 33.3% (13)

$n = 1.5*((1.96)^2 \times (33.3\%)\ (1-33.3\%))/\ (0.05)^2$

n= 1.5*341

n= 511

10% non response rate = 51

n= 511 +51 =562

Sample size for the second specific objective

Double population proportion formula for PPE utilization

$$n=1.5* \frac{(Z\alpha/^2 + Z\beta)^2 * (P_1(1-P_1)+P_2(1-P_2))}{(P_1-P_2)^2}$$

Where:

P_1= prevalence of injury among PPE users (unexposed groups), 26.5% (13)

P_2=prevalence of injury among non PPE users (exposed groups) 53.6% (13)

Zβ= corresponds to power (the probability of detecting a significant difference in the two groups)

$Z\alpha/^2$ - confidence level

Sample size for the second specific objective was calculated by using EPIINFO version7with the following assumptions:

Confidence interval = 95%

Power of test = 80%

Ratio (Exposed: unexposed) = 1:1

Outcome in unexposed group = 26.5%

Desgin effect = 1.5

Oddis Ratio (OR) = 2

10% non response rate

Therefore, the sample size will be:

Exposed group 161 + unexposed group 161 = 322

1.5*322 = 483

With 10% of non response rate 483+ 48 = 531

The decision made by comparing the sample size in the first objective and second objective. The first objective yields the largest sample size which is 562, so, it is representative for both objectives. Therefore, by taking into consideration time and other resources sample size 562 in the first objective is considered as appropriate sample size for this study.

Sample size for FGD

A total of five focus group discussions (FGDs) were conducted in the selected metal manufacturing factories to address the circumstances of Personal Protective Equipment (PPE) utilization among metal workers and work place safety information. Six discussants were participated on each focus group discussion, and a total of 30 discussants were participated on discussion in five metal factories.

4.7 Sampling techniques

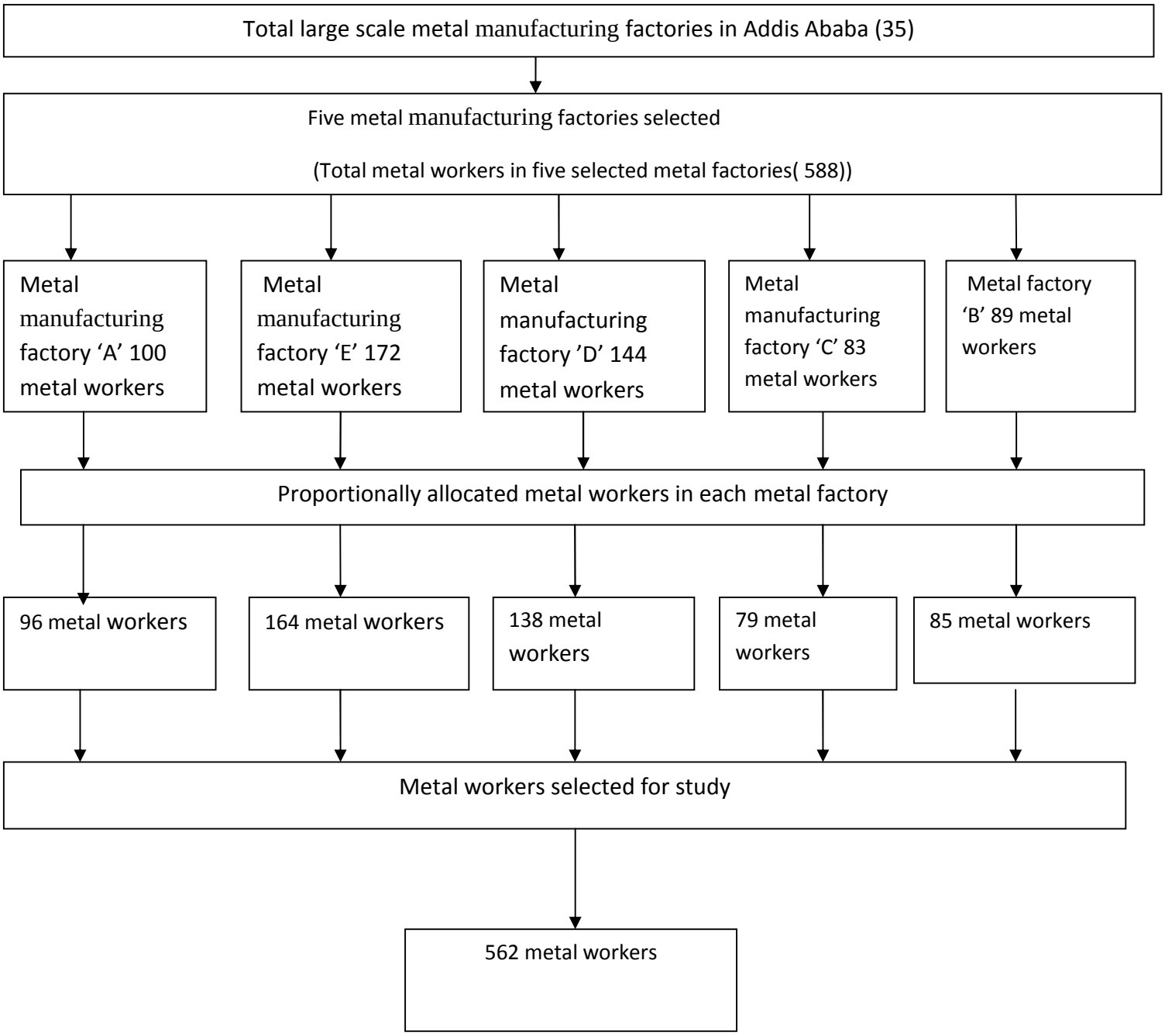
4.7.1 Quantitative

The list of existing functional large scale metal manufacturing factories in Addis Ababa was obtained from Addis Ababa Bureau of Labour and Social Affaires and Metal Industry Development Istitute of Ministry of Industry (46). Five metal manufacturing factories were selected from the whole large scale metal manufacturing factories in the city of Addis Ababa based on their year of establishment / service and total number of workers they have. The sample size of metal workers determined by using single population proportion formula for the first specific objective and double population proportion formula and EPIINFO version7 for the second specific objective with the consideration of 10% non response rate. All 588 metal workers in selected metal factories were included in this study since the sample size is almost equal to the calculated total number of employes in the five metal factories.

4.7.2 Qualitative Focus Group Discussion (FGD)

Workers who were directly engaged on metal production work and who were more exposed for injury were identified as respondents for Focus Group Discussion (FGD), and the data regarding personal protective equipment utilization and work environment were collectd from metal workers by using Focus Group Discussion (FGD) guide.

Figure 2: Schematic presentation of sampling in procedure



4.8 Data collection Tools and procedures

The standard qutionaire adopted from previous research (44) was used for assessing occupational injury and associated factors which include socio-demographic, behavioural, working environment, and Personal Protective Equipment (PPE) utilization. The questionnaire was prepared in English and translated to Amharic and then translated back to English by independent translator to insure the consistency

Data was collected using pretested and structured Amharic version questionnaire via face to face interview of the study participants after getting ethical clearance from responsible bodies and informed verbal consent from study participants (12). Before the actual data collection the questionnaire, observation checklist and Focus Group Discussion (FGD) guide were pretested in 5% of the total sample size in one of the metal factories in Addis Ababa and based on the pretest result necessary modifications were done.

Observation checklist for assessment of work place environment, and focus group discussion guide for Focus Group Discussion (FGD) were used to evaluate personal protective equipment utilization and work place environment.

Injury related data was reviewed from the factories clinics to assure status of occupational injuries within one year period (from August 2015 to July 2016) (12)). Affected body parts and type of injuries were cheeked by observation (12), and the availability of occupational health and safety plans and programs were observed (12). Data collection was administered by two data collectors and one supervisor after two days training. The data collectors and supervisor were first degree holders in environmental health.

4.9 Study variables

1. Dependent
    - Self reported occupational injury
2. Independent

    2.1 Utilization of PPE
3. Other exposure/controlled factors :

    3.1 Socio demographic factors: Age, sex, religion, marital status, level of education, monthly income, employment condition, work experience (12).

    3.2 Work environmental factors: Health and safety training, workplace supervision, work shift (12).

3.3 Workers behavioral factors: Alcohol consumption, chat chewing, cigarette smoking, sleeping disorder, job stress (12).

4.10 Operational Definition

- **Large scale metal manufacturing factory :**
  - Factory that employe 250 or more workers and uses power driven machines (44)

- **Health and Safety Information:**
  - A worker who have got any kind of information in-one-year period through any kind of media about health and safety of factory workers (30).
- **Health and Safety Training:**
  - Short term trainings given on health and safety to factory workers (12).
- **Work Place Supervision:**
  - Regular supervisions done by health and safety professionals / supervisors who received short term training on health and safety (12).
- **Chat Chewing:**
  - It is the practice of chewing chat leaves by the worker at least once per week for different purposes(12).
- **Cigarette Smoking:**
  - Is the practice of smoking cigarette by the worker regularly (12).
- **Sleeping Disturbance Problem:**
  - The presence of sleeping problems when the worker is at work in the factory (12).
- **Alcohol consumption**
  - It is a consumption of any kind of alcohol by metal workers at least two times per week (47).
- **Occupational Injury**
  - Any physical injury which had medical attention sustained on worker in connection with the performance of with his/ her work in the metal manufacturing factory in the last one year and in the last 2 weeks (12).
- **Personal protective equipment utilization**
  - Specialized clothing or device (such as goggles, gloves, ear plug, masks, helement, face shield, boots, protective clothes) worn by employees for protection against work related health and safety hazards at the time of

interview (12). Personal protective equipment is designed to protect many parts of the body, that is, eyes, head, face, hands, feet, and ears.

4.11 Data Management

4.11.1 Quantitative

The filled questionnaire was cheked and reviewed by the investigator to ensure the completeness and consistence of the information collected. To assure completeness of the data 5% of the collected data checked and reinterviewed daily in the field and the collected data kept in safe place. Each questionnaire was coded, stored in appropriate area and checked for completeness by principal investigator during and after data collection. Data was entered in prepared EPI info 7 templates and exported to SPSS.V.20 for cleaning and analysis.

Data was edited and cleaned by running simple frequency and cross tabulation to check for inconsistencies and completeness, and sorting to identify outliers. And also we checked missing values and outliers for accuracy, those which causes of outliers and missed values were determined and no data was dropped from analysis.

4.11.2 Qualitative

Qualitative data generated and scribbles taken during data collection were put in to field notes at the end of every day. Recorded information was transcribed while in the field and afterwards. Notes taken in the field and transcripts were summarized following the themes and made ready for further analysis.

4.12 Data Analysis

4.12.1 Quantitative data

Initially, descriptive statistics was done to determine work related injury prevalence in metal factories and to characterize the variables frequency and percentages. Results were presented using tables, graphs and charts.

Bivariate and multivariate analyses were done to identify factors which were statistically significant with work realted injury and results were presented using COR and AOR with their 95% confidence intervals. Variables which were statsically significant in the bivarate analysis at a significant level of 0.05 were included for the multivariate analysis.

4.12.2 Qualitative data

First the qualitative data checked for its consistency between the question guide and the related responses. Recorded information transcribed and then transcripts, scribbles and summuary data read again and again to find main themes (catagories) and related meanings. By following the objective of the study, specific themes developed based on work environment and Personal Protective Equipment utilization.

4.13 Data quality assurance

The questionnaire was prepared first in English and then translated into Amharic finally retranslated back to English by independent translator to check for consistency.The quality of data was assured before, during and after the data collection. Prior to the actual data collection 5% of study participants were pre tested in metal manufacturing factory in Addis Ababa outside the identified factories. Two days training was given for data collectors and supervisor, before and after pretest of the questionnaire . During the training session topics like the objectives of the study, the procedure of data collection and review of key terminologies and ethical issue of the study were discussed in detail by the principal investigator.

During data collection period, the collected data was checked for completeness and for its consistencies by the principal investigator and supervisor every day. After the data collection, the collected data was rechecked for its completeness and consistency by the supervisor and principal investigator. Polite effort made to elicit concent from the respondent to participate in the study.

4.14 Ethical consideration

Ethical clearance was obtained from the Ethical Review Committee of Addis Ababa University School of Public Health. Formal letter for cooperation was obtained from School of Public Health, College of Health Sciences, Addis Ababa University. Permision was asked and obtained from selected metal manufacturing factories. Verbal consent was obtained from respected participants after a necessary explanation about the purpose, benefit and risk of the study and also their right on decision of whether or not participating in the study. The study participants were strongly informed that there is no any direct financial benefit and risk from this study, on the other hand the study findings would be used to design strategies for prevention and control mechanism of injury among metal workers in metal manufacturing factories. Concerning confidentiality, name of the respondents not included in the questionnaire. The study does not inflict any harm except taking few minutes for the interview.

4.15 Dissemination of results

The finding of this study would be presented to School of Public Health, College of Health Sciences of Addis Ababa University, Ministry of Health, Addis Ababa City Administration Health Bureau, City Administration of Addis Ababa Bureaue of Labour and Social Afairs (AABOLSA), Ministry of Labor and Social Affaire (MOLSA), selected metal manufacturing factories, and further efforts would be made to publish the findings on national or international journal.

5. Results

5. 1 Socio demographic characteristics of the respondents

A total of 583 participants responded making the response rate 99.1%. Among the respondents majority 514 (88.2%) were males. Vast majority 319 (55%) of participants were in the age range of 18-30 years. Pertaining to religion, 437 (75%) were Orthodox, 86 (15%) protestant and 48 (8%) Muslims (Table1). Regarding educational status, 12 (2%) read and write, 118 (20%) primary school, more than half 306 (53%) attended secondary school and only 147 (25%) of the respondents continued education above secondary school (Table1).

Looking at marital status, 7 (1%) divorced, 9 (2%) widowed, majority of the participants were married 301 (52%) followed by single 266 (46%) [Table1]. As shown in Table 1, 410 (70%) of the respondents have less than 11 years, 67 (12%) of the respondents have 12 - 20 years, 74 (13 %) of the respondents have 21 - 30 years, and 32 (6%) of the respondents have 30 years and above worke experiences (Table1). In terms of income, around half 286 (49%) earn 2000 Birr and less per month, while the remaining participants earn more than 2000 Birr per month (Table1). .

Table 1: Socio-Demographic Characteristics of Participants in the selected mental manufacturing factories in Addis Ababa, (n= 583)

Category of variables		Frequency	Percentage (%)
Sex	Male	514	88.2
	Female	69	11.8
Age in Years	18-30	319	54.7
	31-44	134	23.0
	45+	130	22.3
Religion	Orthodox	437	75
	Muslim	48	8
	Protestant	86	15
	Other	12	2
Educational	Read and write	12	2.1
level	Primary school (1-8)	118	20.2
	Secondary school (9-12)	306	52.5
	Above secondary school	147	25.2
Marital status	Married	301	51.6
	Single	266	45.6
	Divorced	7	1.2
	Widowed	9	1.5
Employment Status	Permanent	458	78.6
	Temporary	125	21.4
Work experience	≤ 10 yrs	410	70.3
	11-20	67	11.5
	21-30	74	12.7
	31+	32	5.5
Income per month	≤2000 birr	286	49.1
	2001-4000 birr	213	36.5
	≥ 4001 birr	84	14.4

5.2 Work related injuries among respondents

The study showed that, the prevalence of work related injury among the respondents in metal manufacturing factories was 49.9% [95%CI:45.8-53.9]. Among those 291 who have had work related injury in 12 months, 72 (24.7%) had injury in the last two weeks. In other words the two weeks prevalence of injury was 12.3% (95%CI: 9.6-15.1). Among those who had injury, majority 200 (68.8%) encountered injury more than once while the remaining respondents had injury only once (Table 2).

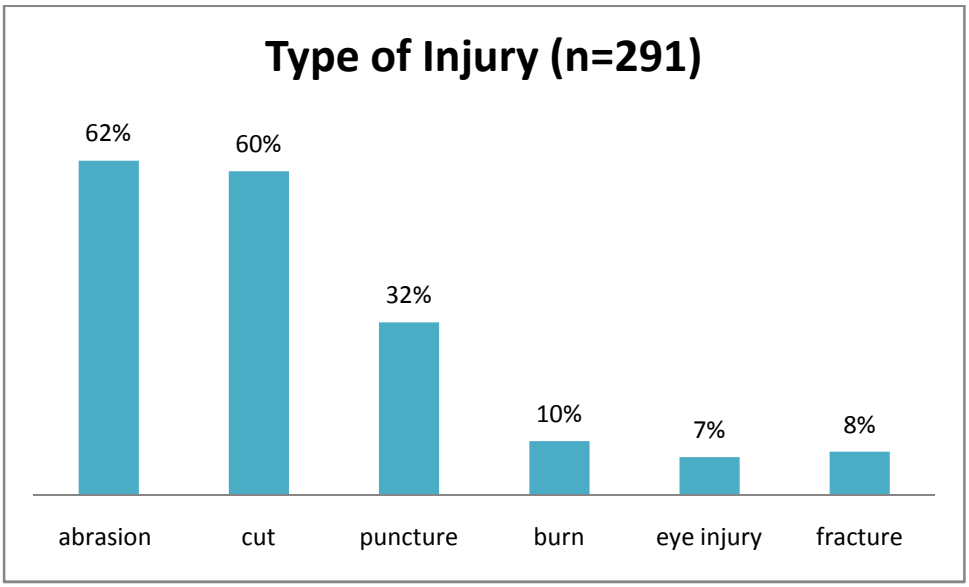
Regarding the affected body parts, majority injured their hands 191 (66%) followed by fingers 169 (58%). Only 9 (3%) and5 (2%) of injuries occurred in lower and upper arms respectively (Table 2).

Among those injured respondents, 149 (51%) did not use Personal Protective Equipment (PPE) at the time of injury and the main reason for not using Personal Protective Equipment mentioned by respondents was lack of PPE 111 (75%). Majority of the respondents 113 (39%) mentioned not using PPE as a reason for injury occurrence, followed by beyond control accident72 (25%) and the work behavior 32 (11%) (Table 2).

Looking at the causes of injury, machinery took the biggest share 219 (75%), followed by lifting heavy objects 36 (12%) and electricity 21 (7%) (Table 2).

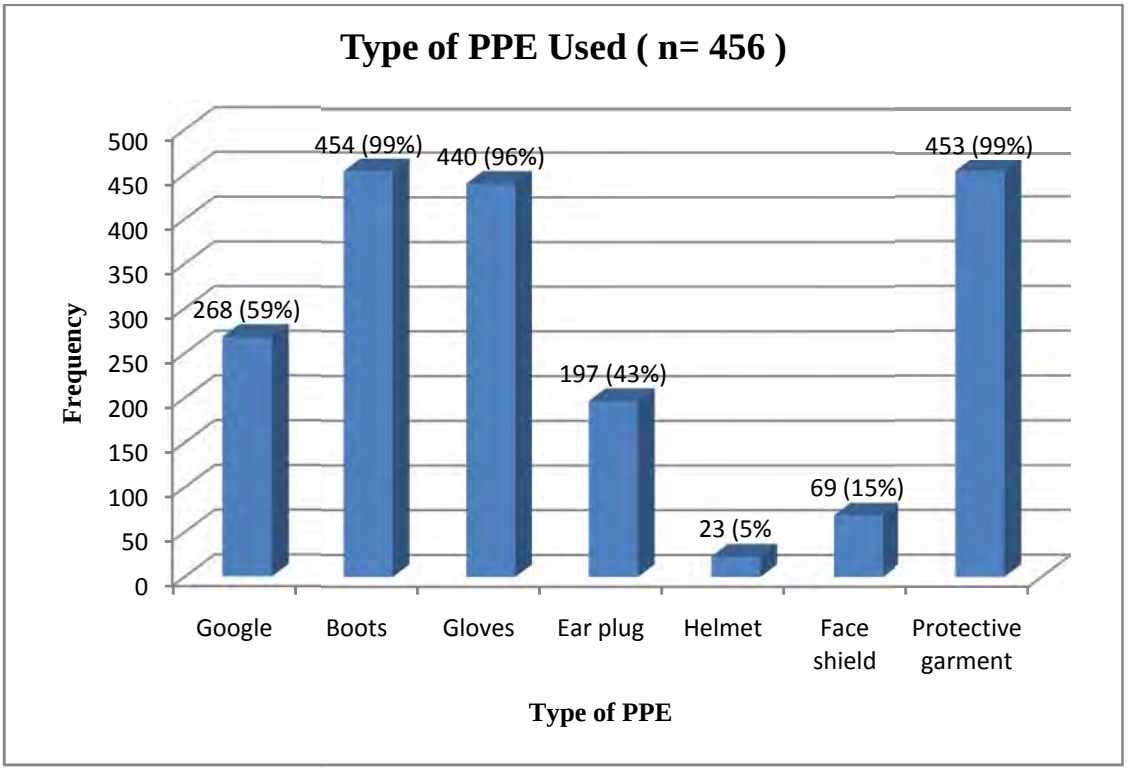
Table 2: Work related injuries among respondents in the selected metal manufacturing factories in the last 12 months in Addis Ababa, (n= 583)

Category of variables		Frequency	Percentage (%)
Injury in the last 12 months	Yes	291	49.9
	No	292	50.1
Injury in the last 2 weeks (n=291)	Yes	72	24.7
	No	219	75.3
Occurrence of injury (n= 291)	Once	91	31.2
	More than once	200	68.8
	Hand	191	65.6
	Fingers	169	58
Parts of body affected (n=291)	Toe	52	17.9
	Eye	22	7.6
	Lower arm	9	3
	Upper arm	5	1.7
Used PPE at the time of injury	Yes	142	48.8
	No	149	51.2
Reason for not using PPE (n=149)	Lack of PPE	111	74.5
	Not comfortable	38	25.5
	Due to not using PPE	113	38.8
Reasons for injury (n= 291)	Accident is beyond control	72	24.7
	Its working behavior	32	11
	I do not remember	18	6.2
Causes of injury (n=291)	Machinery	219	75.3
	Lift heavy objects	36	12.4
	Electricity	21	7.2
	Hand tools	10	3.4
	Fire	9	3
	Falling objects	6	2


Type of Injury (n=291)
62%
60%
32%
10%
7%
8%
abrasion
cut
puncture
burn
eye injury
fracture

As depicted in Figure 4 below, almost all 454 (99.6%) of the respondents used boots, 440 (96.5%) gloves, 268 (59%) goggle, 197 (43%) ear plug, 23 (5%) helmet, 453 (99%) protective garment and 69 (15%) face shield to be protected from work related injury.

Figure 4: Type of Personal Protective Equipment (PPE) used among respondents in the selected metal manufacturing factories in Addis Ababa



N.B. Percenatge does not add up 100% due to the nature of multiple responses

5.3 Work environment characteristics

Regarding the working environment in the metal manufacturing factories, only 267 (45.8%) of respondents said there was health and safety supervision. In terms of injury occurrence, lower proportion 120 (45%) of injury occurred in those who have healthy and safety supervision while the proportion was higher among those who didn't have health and safety supervision 171 (54%). Majority of respondents 478 (82%) also have no work shift and the proportion of injuries was higher among those who have work shift 55 (52%) while it is lower among those who didn't have work shift 236 (49%) (Table3).

The study depicted that majority 307 (53%) of the respondents had no information regarding Occupational Health and Safety (OSH) and the proportion of injury was higher among these respondents (52%). Only one fourth of respondents took training on OSH and among them only 46% had work related injury (Table 3).

The vast majority 494 (85%) of respondents work greater than 40 hours per week of which only 44.5% have had work related injury. On the other hand, among those respondents who work less or equal to 40 hours per week 80% had work related injury (Table 3).

Table 3: Working environmental characterstics in the selected metal manufacturing factories in Addis baba, (n=583)

Category of variables		Frequency	Injury	
			Yes	No
Health and safety supervision	Yes	267(45.8%)	120(44.9%)	147(55.1%)
	No	316(54.2%)	171(54.1%)	145(45.9%)
Work shift	Yes	105(18%)	55(52.4%)	50(47.6%)
	No	478(82%)	236(49.4%)	242(50.6%)
Information regarding OSH	Yes	276(47.3%)	131(47.5%)	145(52.5%)
	No	307(52.7%)	160(52.1%)	147(47.9%)
Training on OSH	Yes	141(24.2%)	65(46.1%)	76(53.9%)
	No	442(75.8%)	226(51.1%)	216(48.9%)
Work hour per week	≤40	89(15.3%)	71(79.8%)	18(20.2%)
	>40	494(84.7%)	220(44.5%)	274(55.5%)

5.4 Behavioral characteristics

The study also assessed the behavioral characteristics of the respondents as follows. Only 23 (4%) of the respondents smoke cigarette. Among the smokers, 11 (47.8%) encountered work related injury and among the non smokers the proportion of injury was 280 (50%). Similarly, few respondents 29 (5%) consumed alcohol of which 18 (62%) had work related injury. Among those who didn't drink alcohol the proportion of injury was 273 (49.3%) (Table 4).

Regarding chat chewing, the vast majority 559 (96%) didn't chew chat of which 50% encountered work related injury. Among those who chew chat 45.8% have had work related injury (Table4).

Pertaining to sleeping disorders,532 (91%) of respondents have no sleeping disorder. The proportion of injury was around 50% for those having no sleeping disorder, and 49% for those having the sleeping disorder (Table 4).

As shown in table 4, majority of respondents 504 (86%) had no job stress of which 48% encountered work related injury. Among those who had work stress the proportion of injury occurrence was higher (63.3%) (Table 4).

Regarding PPE use, majority 456 (78%) of respondents use Personal Protective Equipment (PPE) regularly in which the proportion of injury occurrence was lower (43%). Among the respondents who didn't use Personal Protective Equipment regularly 127 (22%) the work related injury was higher (74%). Among the reasons for not using Personal Protective Equipment, 80% was due to lack of Personal Protective Equipment, 8% mentioned it will decrease work performance and 13% said it is not comfortable. Regarding the quality of Personal Protective Equipment, majority of the respondents (70%) said it was poor quality.

Table 4:Behavioral characteristics of respondents in the selected metal manufacturing factories in Addis Ababa, (n=583)

Category of variables		Frequency	Injury	
			Yes	No
Smoking cigarette	Yes	23(3.9%)	11(47.8%)	12(52.2%)
	No	560(96.1%)	280(50%)	280(50%)
Alcohol consumption	Yes	29(5%)	18(62.1%)	11(37.9%)
	No	554(95%)	273(49.3%)	281(50.7%)
Chew Chat	Yes	24(4%)	11(45.8%)	13(54.2%)
	No	559(96%)	280(50.1%)	279(49.9%)
Sleeping Disorder	Yes	51(8.8%)	25(49%)	26(51%)
	No	532(91.2%)	266(50%)	266(50%)
Job stress	Yes	79(13.6%)	50(63.3%)	29(36.7%)
	No	504(86.4%)	241(47.8%)	263(52.2%)
Use of PPE regularly	Yes	456(78.2)	197(43.2%)	259(56.8%)
	No	127(21.8)	94(74%)	33(26%)

5.5 Bivariate Analysis Results

Bivariate and multivariate regression analysis was done to assess the association between independent variables and the outcome variable. Accordingly, in the bivaraite analysis age of respondents, marital status, educational status, work experience, regular health and safety supervision, job stress and PPE use were found to have a statistically significant association with work related injury in metal factories (Table 5).

Those respondents in the age range of 18 to 30 years were 46% [COR = 0.54;95%CI: 0.358-0.820] less likely to have work related injury as compared to the age range of 45 years and above and the association was statistically significant.

Looking at marital status, those who were married had a 42% [COR=0.58; 95%CI: 0.413-0.805) less likely chance to have work related injury as compared to widowed ones (Table 5).

Pertaining to educational status, respondents who read and write were 3.7 times [COR=3.75; 95%CI: 1.124-12.481], who attended primary school were 5.4 times [COR=5.42; 95%CI: 3.195-9.190] and who attended secondary school were 3.1 times [COR=3.13; 95%CI: 2.042-4.798] more likely to have work related injury as compared to those who had educational level above secondary school and the association was statistically significant (Table 5).

In terms of work experience, those who had less than 11 years work experience were 2.3 times more likely [COR=2.35; 95%CI: 1.359-4.047] to have work related injury as compared to those who have above 31 years work experience and the association was significant. There was no significant difference among the groups 11 to 20 years and 21 to 30 years as compared to the reference category (Table 5).

As depicted in table 5, in factories where there was no regular health and safety supervision the chance of having work related injury increases by 44% [COR=1.45; 95%CI: 1.041-2.004] and the association was statistically significant.

The result also showed that respondents who have no job stress were 65% less likely [COR=0.36; 95%CI: 0.202-0.629] to have work related injury as compared to those who have job stress and the association was statistically significant (Table 5).

Looking at Personal Protective Equipment use, respondents who didn't use Personal Protective Equipment (PPE) were 3.7 times more likely [COR=3.75; 95%CI: 2.417-5.802] to have work related injury as compared to those who used Personal Protective Equipment and the association was statically significant (Table 5).

5.6 Multivariate Analysis Results

Those variables p-value less than 0.05 in the bivaraite analysis were included for the multivariate analysis.

Holding other factors constant, respondents in the age range of 18 to 30 years were 58% [AOR=0.42;95%CI: 0.186-0.950] less likely to have work related injury as compared to the age range of 45 years and above and the association was statistically significant. On the other hand there was no statistically significant association between the age range of 31 to 44 years and the reference category [AOR=0.52; 95%CI: 0.249-1.067].

Pertaining to educational status, respondents who attended primary school were 5.6 times [AOR=5.64; 95%CI: 3.049-10.430] and who attended secondary school were 4.2 times [AOR=4.20; 95%CI: 2.567-6.883] more likely to have work related injury as compared to those who had educational level above secondary school and the association was statistically significant after keeping other factors constant. While those who read and write were had no statistically significant difference from the reference category [AOR=1.76; 95%CI: 0.455-6.781].

In terms of work experience, those who had less than 11 years work experience were 3.6 times [AOR=3.62; 95%CI: 1.214-10.824] and those who had 11 to 20 years work experience were 7.8 times [AOR=7.88; 95%CI: 2.596-23.904] more likely to have work related injury as compared to the reference category after keeping other factors constant. There was no significant difference among the group 21 to 30 years as compared to the reference category [AOR=2.30; 95%CI: 0.878-6.024].

Keeping other factors constant, respondents who have no job stress were 62% less likely [AOR=0.38; 95%CI: 0.219-0.668] to have work related injury as compared to those who have job stress and the association was statistically significant (Table 5).

Looking at PPE use, respondents who didn't use PPE were 4.8 times more likely [AOR=4.84; 95%CI: 2.929-8.012] to have work related injury as compared to those who used PPE and the association was statically significant after keeping other factors constant (Table 5).

Table 5: Bivariate and mulitivariate logistic regression analysis of factors associated with work related injuries, (n=583)

Variables		Injury		Crude OR [95% CI]	Adjusted OR [95% CI]
		Yes	No		
Age	18-30	143	176	0.54 (0.358,0.820)	**0.42 (0.186,0.950)**
	31-44	70	64	0.73 (0.448,1.188)	0.52 (0.249,1.067)
	45+	78	52	Ref	Ref
Education	Read and write	7	5	3.75(1.124, 12.481)	1.757 (0.455,6.781)
	Primary l (1-8)	79	39	5.42 (3.195, 9.190)	**5.64 (3.049,10.430)**
	Secondary school (9-12)	165	141	3.13 (2.042, 4.798)	**4.20(2.567,6.883)**
	Above secondary	40	107	Ref	Ref
Marital status	Married	169	132	0.58 (0.413,0.805)	0.32 (0.050,2.013)
	Single	113	153	1.04 (0.229,4.734)	0.40 (0.061,2.669)
	Divorced	4	3	0.98 (0.257,3.708)	0.38 (0.025,5.742)
	Widowed	5	4	Ref	
Employment pattern	Temporary	56	69	0.77 (0.518,1.146)	
	Permanent	235	223	Ref	
Work experience	≤10 yrs	191	219	2.35 (1.359,4.047)	**3.62 (1.214,10.824)**
	11-20 yrs	45	22	1.28 (0.778,2.098)	**7.88 (2.596,23.904)**
	21-30 yrs	39	35	1.15 (0.558,2.355)	2.30 (0.878,6.024)
	31+	16	16	Ref	
Income	≤ 2000birr	132	154	0.71 (0.434,1.154)	
	2001-4000 birr	113	100	0.93 (0.562,1.550)	
	≥ 4001	46	38	Ref	Ref
Health ad safety supervision	No	171	145	1.45 (1.041,2.004)	0.83 (0.563,1.232)
	Yes	120	147	Ref	
Safety training	No	226	216	1.22 (0.837,1.789)	
	Yes	65	76	Ref	Ref

Drink alcohol	No	273	281	0.59 (0.275,1.280)	
	Yes	18	11	Ref	
Job stress	No	241	263	0.36 (0.202,0.629)	**0.38 (0.219,0.668)**
	Yes	50	29	Ref	Ref
Use of PPE	No	94	33	3.75 (2.417,5.802)	**4.84 (2.929,8.012)**
	Yes	197	259	Ref	Ref

5.7 Result of observation

Work environments were observed in five selected metal manufacturing factories by using observation checklist.

Health and safety supervison

Regarding health and safety supervision, supervision was done by safety officers and it was not program based supervision. Actions not taken by the administrative body on the problems identified during supervision, this may be the cause for absence of active supervision in the metal factories.

Clinical data, affected body parts observed and PPE utilization

Four metal factories have their own clinic, except one factory which uses private clinic in the town. As one year clinical data reviewed from medical record of each clinic, the common types of minor injuries identified were puncture, abrasion, cut, dislocation, bone fracture, burn, tooth fracture, eye injury, muscle damage. The body parts affected were back, eye, hand, lower leg, toe, chest, finger, waist, tooth. Regarding major physical injuries, in the metal factory"A" there were 18 workers amputated and fractured their hands, legs, fingers in one year and they were certified by medical board and permanently disabled. Affected body parts eye, hand, lower leg, chest and physical injuries cut, puncture, abrasion, and burn were observed on the body parts of respondnts. Regarding Personal Protective Equipment utilization among metal workers, some workers do not use Personal Protective Equipment while on duty.

Availability of safety and health regulations

In metal factory "B" and "E" warning signs and safety rules fixed on the wall in each work sections, but in the rest three metal factories no warning signs and safety rules observed. No safety and health regulations were seen in all five metal factories.

Availability of safety officers and safety committe

Clinical nurses and health officers assigned as safety officer in three metal factories, and in one metal factory mechanical engineer assigned as safety officer. All assigned safety officers did not receive training on occupational health and safety. In metal factories "A", "B", "C", and "D" have health and safety committees, but they were not active, this may be because of less attention given by the administration for health and safety program. In metal factory "E" totally there was no health and safety committee established.

5.8 Results of Focus Group Discusion (FGD)

Five FGDs were held and a total of 30 discussunts were participated on the discussion with age range of from 20 to 55 years. In each focus group discussion there were six discussants and the discussion was centered on occurance of injury, Personal Protective Equipment utilization and working environment.

Occurance of injury

The discussion started with the question if the occupational injury is a major problem in this work place and all the discussants stated that physical injury was the major health problem among factory workers and the main cause for physical injury were work load, lack of Personal Protective Equipment, use of old machine, low quality of PPE, lack of adequate space in working sections, lack of supervision, and lack of awareness.

Personal Protective Equipment utilization, health and safety supervision

Regarding Personal Protective Equipment utilization the discussants stated that there was lack of Personal Protective Equipment, the organization do not provide any type of Personal Protective Equipment for temporary workers, the quality of Personal Protective Equipment was very poor specially gloves were delicate and easily torn which can not prvent the workers from injuries, some workers sale their and their friends Personal Protective Equipment and work without use of Personal Protective Equipment. The discussants in factory 'E' stated that the factory provide us unsafe shoes which cannot protect us from injury. One discussant responded that I am over qualified so no need of using PPE. Almost all discussants stated that, there was no regular health and safety supervision, more attention was not given by the administrative body for health and safety program.

6. Discussion

The 12 month prevalence of injury was 291(49.9%) and among those who had injury, majority (68.8%) encountered injury more than once while the remaining respondents had injury only once. Among those 291 who have had work related injury in 12 months, 72 (24.7%) had injury in the last two weeks. The finding is consistent with studies conducted in Addis Ababa metal factories and in Mekele small scale industry showed the prevalence of occupational injury was 48.9% and 58.2% respectively in one year (44, 47) . This high prevalence shows that occupational injury is becoming a global public health and economic burden in addition to other public health challenges in both industrialized and less industrialized countries (48, 49).

This study showed that from 291 self reported injuries majority were abrasion or laceration (62%) followed by cut (60%), puncture (32%), burn (10%), fracture (8%) and eyeinjury (7.6%). Studies in Addis Ababa metal factory (44) and coastal south India (50) showed consistent result. Findings of observation also supported this study finding.

The most affected parts of were hands (66%) and fingers (58%). This finding is consistent with other findings in Ethiopia (44). This qualitative study was also supported by observation result. Regarding major injury, one year clinical data of metal factory "A" indicated that 18 workers were amputated and fractured their hands, legs, fingers and they were certified by medical board and became permanently disabled. This study is in agreement with study done in Mugger Cement Factory in Ethiopia (51).

. This study showed machinery 219 (75.3), lift heavy objects 36 (12.4%), Electricity 21 (7.2%), hand tools 10 (3.4%), fire 9(3%) and falling objects 6(2%) were the commonest sources of injury. This study is in agreement with other studies which pointed out the above mentioned causes of injury were frequent and common in most industrial setups (28, 48, 51). This finding is also supported by results of observation.

In this study respondents age has shown a statically significant association with work related injury in which younger respondents were less likely to have injury as compared to those above 45 years of age. This finding is in line with a study in India (52) and could be explained by the fact that aging would result in a decrease in physical and mental abilities which may in turn alter the quality of work performance and the ability to notice work environment hazards, particularly when the demanding level of the tasks is high. In contrary, this finding is inconsistent with studies in Amhara regional state (12, 28).

Respondents who attended primary and secondary school were had increased odds of work related injury as compared to those who had educational level above secondary school and the association was statistically significant. This finding is consistent with findings from another study in Addis

Ababa (13), and this may be explained by the assignment of workers in factories where employees with low educational status put in less technical and relatively safer works and higher education may help to have safety precautions.

In terms of work experience, those who had less work experience were more likely to have work related injury as compared to those respondents who had more years work experience and the association was statistically significant. 'This might be due to the reason that more experienced employees adapted the working environment and comply with safety precautions (14).

Respondents who have no job stress were less likely to have work related injury as compared to those who have job stress and the association was statistically significant. This finding corroborates with a study in steel and iron factories of Addis Ababa where workers who had work stress had higher injury (13), workers with job tress may have different problems such as loss of concentration, sleep disturbances, poor recall and negligence of work related hazards.

Respondents who did not use Personal Protective Equipment were more likely to have work related injury as compared to those who used Personal Protective Equipment and the association was statically significant. Other studies are also in line with this finding in which nonuse of Personal Protective Equipment increased the occurrence of work related injuries (13, 14, 47). This could be explained by the fact that proper utilization of PPE highly reduces the occurrence of unexpected injuries in the metal factories. Findings of observation and Focus Group Discusion also supported this finding.

Strengths and limitations

Strength

- As there is no published data on the prevalence of injury and its association with Personal Protective Equipment utilization in metal manufacturing factories in Ethiopia, the result of this study can provide some information.
- Use of multiple methods of data collection like work place observation, and focus group discussion.
- To assure the quality of the data, standardized data collection tool was used and pre-testing was done.
- Day to day supervision was undertaken in a way that bias could not occur during data collection time.
- Large sample size was taken to get more representative data to the source population

Limitation

- Since the study was a one year crosssectional study, there might be possibility of recall bias result in under reporting and misreporting of injuries.
- Study participants might perceive that responding as injury might bring benefit and failure to report socially sensitive information.

7. Conclusions and Recommendations

Conclusions

- There is high prevalence of work related injury among workers engaged in large scale metal manufacturing factories in Addis Ababa.
- In this study respondents age, educational status, work experience, job stress and Personal Protective Equipment use were found to have statically significant association with work related injury.
- The work environment inspection revealed that in all metal manufacturing factories there were no program based supervision by safety officers, no warning sgins and safety rules and regulations in some factories, some workers do not use Personal Protective Equipment while on duty, there were no trained safety officers in all metal manufacturing factories, even the existing safety officers did not recive health and safety traing, the established health and safety committees in four factories were not active, and in one factory totally there was no safety committee established.
- During Focus Group Discussion (FGD) lack of Personal Protective Equipment, poor quality of Personal Protective Equipment, lack of regular health and safety supervision were the major issues stated by the discussants.

Recommendations

Based on the above findings and conclusions for sustained prevention and control of workrelated injuries, the following recommendations are made for action:

For metal factories:

- Threre should be quality and adequate supply of Personal Protective Equipment for all metal workers (for permanent, temporary, and daily workers who are directly engaged on metal work).
- There should be warning signs in each work section, safety rules and regulations in the metal factories

For Beureaue of Lab Labor and Social Afaires:

- Provide health and safety education for metal factory workers
- There should be program based health and safety supervision in the metal manufacturing factories.

8. Reference

1. Resolution concerning statistics of occupational injuries [Internet]. 1998.
2. Mathers CD, Bernard C, Iburg KM. Global Burden of Disease in 2002: Data Sources, Methods and . Global Programme on Evidence for Health Policy. In: Organization WH, editor.: World Health Organization; 2003.
3. Eijkemans G. WHO and ILO joint effort on occupational health and safety in Africa. Afr Newslett Occup Health Saf. 2004;14(2):28–9.
4. Abugad AH. The Economic Burden of Work-related Injuries, and Descriptive Profile of the Current Situation in the Kingdom of Saudi Arabia. 2009.
5. Ergor OA, Demiral Y, Piyal YB. A significant outcome of work life: occupational accidents in a developing country Turkey. J Occup Health. 2003;45:74-80.
6. Hämäläinen P, Leena Saarela K, J. T. Global trend according to estimated number of occupational accidents and fatal work-related diseases at region and country level. J Safety Res 2009;40(1):25-39.
7. WHO/ILO. Occupational health and safety in Africa. WHO/ILO, 2001 Contract No.: 5.
8. Mohammadfam I, Moghimbeigi A. Evaluation of injuries among amanufacturing industry staff in Iran. J Res Health Sci. 2009;9(1):7-12.
9. Barcelona NL. Work-related Injuries, Illnesses Claims Millions of Lives, Dollars Yearly. 2009.
10. Industry FMo. Ethiopian industrial development strategy plan. Addis Ababa: 2013.
11. Tadesse T. prevalence and factors affecting work and work related injury among small and medium scale industries in Gondar woreda. Ethiopian Journal of Health Development. 2007;21:25–34.
12. Aderaw Z. Determinants of Occupational Injury: A Case Control Study among Textile Factory Workers in Amhara Regional State, Ethiopia Journal of Tropical Medicine. 2011.
13. Manay K. Work related injuries and associated risk factors among iron and steel industries workers in Addis Ababa, Ethiopa. 2013.
14. Sebsibe Tadesse DI. Occupational injuries among building construction workers in Addis Ababa, Ethiopia Journal of Occupational Medicine and Toxicology. 2016 11 April.
15. Mazaheri MA, Hidarnia A, Ghofranipour F. Occupational injuries in Isfahan steel company during 2001–2006. Eur J Sci Res. 2009;31(4):546-52.
16. National social protection policy of Ethiopia. Addis Ababa, Ethiopia2012.
17. Occupational safety and health profile for Ethiopia, (2006).
18. Motbainor A. Assessment of Knowledge and Practice on Safety Information among Factory Workers. 2007.
19. Antonio G. Economic and health effects of occupational hazards in latin America and the Caribbean. 2001.
20. Ahn Y. Comparison of unintentional fatal occupational injuries in the Republic of Korea and the United States Injury Prevention. 2004;10:199-205.
21. Ahasan M, Mohiuddin G, Vayrynen S, Ironkannas H, Quddus R. Work-related problems in metal handling tasks in Bangladesh: Obstacles to the development of safety and health measures. Ergonomics. 1999;42(3):85-96.
22. Koskela R. Mortality, morbidity and health selection among metal workers. Scand J Work Environ Health. 1997;23:1-80.
23. Nikitina VN, Liashko GG, Nikanov AN, NIu. N. Electromagnetic fields in melting divisions of nickel production. Med Tr Prom Ekol. 2004:39-41.
24. Jovanovic J, M. J. Occupational accidents and injuries: Results of a safety preventive programme. Arh Hig Rada Toksikol 2004;55(26):1-8.
25. Seblework D. Occupational safety and health profile for Ethiopia: Ministry of Labour and Social Affairs. 2006.
26. Organization IL. Report prepared for the G20 Labour and employement Ministrial Meeting. 2014.
27. Barcelona N. Work-related Injuries, Illnesses Claims Millions of Lives. 2009.

28. Tadesse T, Kumie A. Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-Scale Industries in Gondar wereda, north Gondar zone, Amhara Regional State, Ethiopia. Ethiop J Health Dev. 2007;21(1):25-34.
29. Barry S, H. D. Occupational Health recognizing and preventing work related diseases. ed r, editor1995.
30. Senbeto E. The incidence of injuries and their determinants in Akaki textile factory. Addis Ababa: Addis Ababa university; 1991.
31. Health DoE. Occupational Health and safety assessment in selected factories in Ethiopia. Ministry of Health, 1996.
32. Fulle A. Injuries in urban factories of ketena one. Addis Ababa. MPH Thesis, Addis Ababa University, Addis Ababa 1988.
33. Amhara National Regional State Bureau of labour and social affairs. Employment Accident statistics. Bilingual annual Bulletin. 2007.
34. Senbeto E. The incidence of injuries and their determinants in Akaki textile factory, Addis Ababa. Addis Ababa University;. 1991. .
35. Bhattacherjee A. Relationships of job and some individual characteristics to occupational injuries in employed people: a community-based study. JOccup Health. 2003;45(6):382-91.
36. Chau N, Mur JM, Touron C, Benamghar L, D. D. Correlates of occupational injuries for various jobs in railway workers: a case-control study. J Occup Health. 2004;46(4):272-80.
37. Rhys D. Trends and context to rates of workplace injury. Health and safety executive. Warwick Institute for Employment Research University of Warwick Coventry. 2005.
38. Nearkasen C, Marie J, Lahoucine B. Relationships between some individual characteristics and occupational accidents in the construction industry: a case-control study. Journal of Occupational Health. 2002;44(13):131-9.
39. Asim S. An accident-risk assessment study of temporary piece rate workers Occupational Medicine Division, National Institute of Occupational Health. India. industrial Health. 2004;42:240–5.
40. Ghosh A. Relationships of working conditions and individual characteristics to occupational injuries: a case-control study in coal miners Journal of Occupational Health. 2004;46(6):470–8.
41. Nearkasen C. Relationships between some individual characteristics and occupational accidents in the construction industry: a case-control study. . Journal of Occupational Health. 2002; 44(3): 131–9.
42. AKBAR Z, SWATHI K. A study on Knowledge, Attitude and practice of Personal Protective Equipment in VISAKHAPATNAM STEEL PLANT. VISAKHAPATNAM: Andhra University; 2000-2003.
43. Ministry of Health; Ethiopia. National Health Policy Addis Ababa: 1997.
44. Yitagesu H. Assessing of magnitude & factors of occupational injury among workers in large scale metal manufacturing industries in Addis Ababa. Addis Ababa: Addis Ababa University; 2010.
45. Administrative AAcg. Addis Ababa city government administrative. Addis Ababa.
46. Metal Industy Development Istitute MoI. Addis Ababa: Metal Industry Development Institute, 2015.
47. Abera Berhe1 DY. Magnitude of Occupational Injuries and Associated Factors among Small- Scale Industry Workers in Mekelle City, Northern Ethiopia. 2015.
48. Nyguyen TaL, M. Occupational Injuries and Prevention Activities in Vietnam. Asia-Pacific Journal of Public Health,. Asia-Pacific Journal of Public Health, . 2009;15: 7- 10.
49. Organization IL. Decent Work-Safe Work. Geneva: 2005.
50. Kumar S G DA. Prevalence and pattern of occupational injuries, at work place welders in costal south India: . Indian J occup Environ Med. 2014 sept-Dec.; 18 (3: 135-9.
51. Nyguyen T, Thihong. Occupational Health and Safety in Small, Medium Sized and Informal Sector Enterprise in Vietnam. . Asia-Pacific Journal of Public Health, . 2003; 10 7-10.
52. Ghosh A. Relationships of working conditions and individual characteristics to occupational injuries: A case-control study in coal miners Journal of Occupational Health 2004;46(6):470–8.

9. ANNEXES:

Annex 9.1: PARTICIPANT'S INFORMATION SHEET

Title of the study: Assessing prevalence of occupational injury and its association with Personal Protection Equipment utilization among metal workers in metal products factory in Addis Ababa, Ethiopia.

Investigator:

Advisor: **Sponsoring Organization**: Addis Ababa University School of Public Health

Introduction: The risk of occupational diseases and injuries increasing from time to time and become the most prevalent and major public health problem in the world. The numbers of different industriesare increasing from time to time in Ethiopia, and meanwhile due to low awareness work related injuries are more likely to occur among industry workers in Ethiopia.

Purpose: The objective of this study is to identify prevalence of injury and its association with personal protective equipments utilization among metal production workers in metal products factory in Addis Ababa, Ethiopia.

Procedure and Participation: The method of this study is institution-based Cross–sectional study. The expected duration of the participant's contact with the interviewer will be not more than thirty minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter. Moreover, your particular participation is affirmed by the sampling frame through the procedure of probability sampling technique which provides equal chance of selection. You will be asked about your Socio- demographic, behavioral characteristics, work environmental and ergonomic variables.

Confidentiality: To establish secured safeguards of the confidentiality of research data, the principal investigator (PI) will use codes during data collection period instead of using names. The original data will be locked in cabinets until the data analysis carryout and no person shall access except the principal investigator and the advisor for data checking and cleaning purpose. The use of information for any purpose other than that to which participants consented is unethical to the participants. The information you provide is not disclosed in the way it identified your personal characteristics and privacy. After the research defense and final work is approved by the school of public health and academic commission and university senate, the original data questionnaire will be incinerated in secure manner.

Benefit of the study: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design of occupational health and safety programs based on the recommendations and the findings. The result can be used as a baseline for further studies that can be done in these occupational areas. If injuries occur

during data collection, the data collector or investigator will report to health and safety clinic of the factory or first aid will be given if possible.

Risk and /discomfort of the study: The study has no any risk for the participants and interview also will be private to make safe participants from management related problems.

Inducement, incentive and Compensation: This study process has no any form of inducement, coercion and the study does not bring any risks that incur compensation.

Results Dissemination: The result will be disseminated to the Addis Ababa City Administration Health Bureau, MoLSA, identified metal work factories, FMoH for designing prevention and control measures of occupational health and safety program.

Right of the participant: Participating and not participating is the full right and participants can stop from participation in the study at any time. This would have no effect at all on your health benefit or other administrative effect and no body will enforce you to explain the reason of withdrawal. Participant can skip question which the worker dose not want to respond.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa university school of public health. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.

If you want more information and check about this study you can contact through the following address.

Addis Ababa University School of public health: Secretary Office Tel.

Investigator:

Advisor:

Annex 9.2. INFORMED CONSENT FORM

Title of the study: Assessing prevalence of occupational injury and its association with Personal Protection Equipment utilization among metal workers in metal products factory in Addis Ababa.

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by Addis Ababa University School of Public Health and the designate investigator is Abate Benti. I have been fullyinformed in the language I understand about the research project objective is to assess prevalence of work related injury and its association with Personal Protection equipmentsutilization among metal workers.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted no body will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the metal products factory.

I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact

Addis Ababa University, School of public health, Secretary Office Tel.

Investigator:

Advisor:

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of witness signature_____ (Data collector, supervisor, any third person)

Signature _____ Date_____

Annex 9.3: Questionnaire- English version

Name of factory _____Questionnaire ID:_____

Part 1: The following section will be onSocio demographic characterstics (Q1-8)

No	Question	Possible response	Skipping	Code
1	Sex	1. Male, 2. Female		
2	Age	---------- in year		
3	Religion	1. Orthodox, 2. Muslim, 3. Protestant, 4. Others (specify)		
4	Educational level	1. Illiterate 2. Read and write 3. Primary school (1-8) 4. Secondary school (9-12) 5. 12 +		
5	Marital status	1.Married 2.Single 3. Divorced 4. Widowed		
6	Employment pattern	1. Temporary/contract 2. Permanent 3. Other		
7	Work experience	---------- in year		
8	Income per month	1. Salary ---------- 2. Other----------		

Name of factory _____Questionnaire ID:_____

Part 2: The following section will be onoccupational injury (Q 9-33)

No	Question	Possible response	Skipping	Code
9	Have you had an injury at work that resulted to you in the last 12 months?	1. Yes 2. No	If No for Q 9 skip to Q 21	
10	If yes for Q 9 how many times?	_____		
11	If yes for Q 9, have you used PPE at time of injury?	1. Yes 2. No		
12	If Yes for Q 11, list type of PPE you have used at the time of injury	1. Glove 2. Ear plug 3. Mask 4. Helment 5. Goggle 6. Face shiled 7. Boot 8. Other		
13	If No for Q 11, why you did not use PPE?	_____		
14	If yes for Q 9, Parts of the body affected	1.Eye 2.Tooth 3. Hand 4. Ear 5. Knee 6. Toe 7. Fingers 8. Head 9. Upper arm 10. Lower arm 11. Upper leg 12.Lower leg 13. Back 14. Chest 15. Others		
15	If Yes for Q 9, types of injury	1. Abrasion 2. Cut 3. Burn 4. Puncture 5. Fracture 6. Dislocation 7. Amputation 8. Electrocution 9. Suffocation 10. Ear injury 11. Eye injury 12. Others.		

16	If yes for Q 9, What do you think the reason for injury?	1. I was new for the work process, 2. I was thinking about private affairs, 3. I think accident is beyond control, 4. It is the working behavior, 5. It is due to not using PPE 6. I do not remember 7. Others		
17	If yes for Q9 , cause of injury	1. Machinery 2. Hit by falling object 3. Electricity 4. Splintering object 5. Collision with objects 6. Fire 7. Hand tools 8. Fall 9. Hot substances 10. Acid and acidic substances 11. Lift in heavy objects 12. Others		
18	If yes for Q 9, days of the week of occurance of injury	1.Monday 2. Tuesday 3.Wednsday 4. Thursday 5.Friday 6. Saturday 7. Sunday 8. I do not remember		
19	If yes for Q 9, were you hospitalized during injury?	1. Yes 2. No		
20	If yes for Q 19, how long it takes (hours)	_____		
21	Have you had an injury at work that resulted in the last 2 weeks?	1. Yes 2. No	If No for Q 21, skip to Q 34	
22	If yes for Q 21, how many times?	_____		
23	If yes for Q 21, have you used PPE at time of injury?	1. Yes 2. No	If no for Q 23 skip to Q 25	
24	If Yes for Q 23, list type of PPE you have used at the time of injury	1. Glove 2. Ear plug 3. Mask 4. Helment 5. Goggle 6. Face shiled 7. Boot 8. Other		

25	If No for Q 23, why you did not use PPE?	_____		
26	If yes for Q 21, Parts of the body affected	1.Eye 2.Tooth 3. Hand 4. Ear 5. Knee 6. Toe 7. Fingers 8. Head 9. Upper arm 10. Lower arm 11. Upper leg 12. Back 13. Chest 14. Others		
27	If Yes for Q 21, types of injury	1. Abrasion 2. Cut 3. Burn 4. Puncture 5. Fracture 6. Dislocation 7. Amputation 8. Electrocution 9. Suffocation 10. Ear injury 11. Eye injury 12. Others.		
28	If yes for Q 21, What do you think the reason for injury?	1. I was new for the work process, 2. I was thinking about private affairs, 3. I think accident is beyond control, 4. It is the working behavior, 5. It is due to not using PPE 6. I do not remember 7. Others		
29	If yes for Q21 , cause of injury	1. Machinery 2. Hit by falling object 3. Electricity 4. Splintering object 5. Collision with objects 6. Fire 7. Hand tools 8. Fall 9. Hot substances 10. Acid and acidic substances 11. Lift in heavy objects 12. Others		

30	If yes for Q 21, days of the week of occurance of injury	1.Monday 2. Tuesday 3.Wednsday 4. Thursday 5.Friday 6. Saturday 7. Sunday 8. I do not remember		
31	If yes for Q 21, what was the time of injury	1. Morning 2. After noon 3. Evining 4. Mid night 8. I do not remember		
32	If yes for Q 21, were you hospitalized during injury?	3. Yes 4. No		
33	If yes for Q 32, how long it takes (hours)	_____		

Part 3: The following section will be on working environment (Q 34 -39)

34	For how many hourse do you work per week?	_____		
35	Is there regular health and safety supervision?	1. Yes 2. No		
36	Have you had safety training in connection with new employment equipment, or work process?	1. Yes 2. No		
37	Have you had any work shift?	1. Yes 2. 2. No		
38	If yes, for Q28, how often	1. Every 4 hours 2. Every 8 hours 3. Every 24 hours 4. Other		
39	Have you had any information regarding occupatiobnal health and safety through mass media or from any other sourcemonthes in the last two week or towelve monthes?	1. Yes 2. No		

Part 4: The following section will be on workers behavior and characterstics (40 – 52)

40	Duration in the same work place	_____		
41	Have you had any medical problem before or after you work in this area?	1. Yes 2. No		
42	If yes for 41, types of problem	1. Deafness 2. Sight problem 3. Extremity disability 4. Other		
43	Do you smoke cigaret?	1. Yes 2. No		
44	If yes for Q 43, how oten do you smoke regularly?	1. Every day 2. Sometimes 1. 1-3 day/ week		
45	Do you drink alcohol during working time ?	1. Yes 2. No		
46	If yes to Q 45, how often	3. Every day 4. Sometimes 5. 1-3 day/ week		
47	Do you chew chat?	1. Yes 2. No		
48	If yes to Q 47, how often do you chew ?	1. Every day 2. Sometimes 3. 1-3 day/ week		
49	Do you have any sleeping disorders when at work in the factory?	1. Yes 2. No		
50	If yes to Q 49, what is the reason?	1. Working greater than 8 hours without shifting 2. Working in evening 3. Trying to work more than one task at a time 4. Others		
51	Do you have any job stress?	1. Yes 2. No		
52	If yes to Q 51, what is the reason?	----------		

The following section will be on Personal Protective Equipment (PPE) utilization (53 – 63)

53	Have you used personal protective equipments (PPEs) regularly while working in the last 12 monthes?	1. Yes 2. No		
54	If Yes to Q 53, what type of PPE did you use?	1. Glove 2. Ear plug 2. Mask 3. Helment 4. Goggle 5. Face shiled 6. Boot 7. Other		
55	If No to Q 53 what were your reasons for not using personal protective equipments?	1. Lack of protective equipment 2. Lack of safety and health education 3. Not comfortable to use 4. Decrease work performance 5. Creates safety and health hazards 6. Others (specify)_____		
56	Have you used personal protective equipment (PPE) in the last 2 weeks while working?	8. Yes 2. No		
57	If Yes to Q 56, what type of PPE did you use?	1. Glove 2. Ear plug 3. Mask 4. Helment 5. Goggle 6. Face shiled 7. Boot 8. Other		
58	If No to Q 56 what were your reasons for not using personal protective equipments?	7. Lack of protective equipment 8. Lack of safety and health education 9. Not comfortable to use 10. Decrease work performance 11. Creates safety and health hazards 12. Others (specify)_____		
59	Have you used Personal protective equipment while working yesterday?	1. Yes 2. No		
60	Do you know the importance of using PPE?	1. yes 2. No		
61	If yes to Q60, what is the	_____		

	importance of PPE (Specify)			
62	Do you believe that PPE utilization helps in preventing from injury?	1. Yes 2. No		
63	What do you suggest about the quality of protectiveequipment	1. Good 2. poor		

Annex 9.4: Quietion guide for FGD

Factory name:_____

Working section_____

Participants background information:

1. Sex: Male------ Female------- Age---------- (minimum------, maximum-----)
2. Educational level:
   2.1 Illiterate--------
   2.2 Read and write-------
   2.3 Primary school (1-8)-----
   2.4 Secondary school (9-12)----------
   2.5 12+----------

PPEUtilization and work environment related information:

3. Is occupational injury a major problem in this work place?
4. If yes How, where, when and to whom the problem is sever?
5. What are the types of injury?
6. What are major causes for the problem (s)?
7. Is there regular health and safety supervision? If yes how often?
8. Have you had safety training in connection with new employment equipment, or work process?
9. If yes, what type of training have you received? When? by whom? Is there adequate supply ofprotective equipment in this factory? If yes what type of PPE are they? If not why?
10. How did you observe Personal Protective Equipment utilization among the workers in this factory? If the workers do not use PPE what do you think the reason?
11. How did you see the effect of Personal Protective equipment utilization among metal workers in this factory? has it impact on the prevalence of injury?
12. What do you suggest about the quality of PPE?

Annex 9.5: Observational checklist (Adapted from literature review)

Name of Factory_____Working section_____

1	Is there regular health and safety supervision program and plan in each work section/office? (Requieres showing a schedule and work plan in the office/ or work section while inspection around)	1. Yes 2. No
2	Is there medical record in the clinic? Yes shows the availability of medical record for injury in the clinic while inspection arround. One year injury data will be collected from the medical record while inspection arround.	1. Yes 2. No
3	Is there warning signs or safety rules in the work place? (yes indicates signs or posts in the work place while inspection around. No indicates lack of such signs or posts while inspection around)	1. Yes 2. 2. No
4	Is there adequate supply of PPE for employees? (while inspection around, requires no lack of such equipment)	1. Yes 2. No
5	Do the employees use necessary personal protective devices? (Yes indicates PPE used by each workers while inspection around.)	1. Yes 2. No
6	Is there afected body parts and types of injuries observed	1. Affected body part: 2. Type of injury:
7	Dose the factory has the most important safety and health regulation? (Requires showing a copy of regulation)	1. Yes 2. No
8	Dose the factory has trained safety and health personnel? Requires either implementation as result of initiatives from health and safety personnel or written action worked out with them.	1. Yes 2. No
9	Dose the working section have first aid equipment? (Requires the presence of first aid equipment during data collection)	1. Yes 2. No
10	Is there occupational health and safety committee in the factory? (Requieres showing a copy lists of committee members)	1. Yes 2. No

Annex 9.6: Lists of Large scale metal manufacturing factories in Addis Ababa

No	Name of company	Location
1	Asmen plc.	Gerji/goble
2	Lejo Aluminum plc	Lideta
3	Akaki metal products	Akaki
4	Alem steel plc	Lafto hanamariam
5	Alemgenet trade and ind.	Mekanisa
6	AMCE Automotive	Megenagna
7	Beza industry plc	Kolfe
8	Dan lift Technology	Addis Ababa
9	Ethiopian crown cork & can factory	Kality
10	Ethiopian iron & steel	Akaki
11	Ethiopian steel	Akaki
12	Gatepro plc	Yosef
13	Kality leaf spring	Kality
14	Kality metal products factory	Kality
15	Kasma Engineering	Kality
16	KIG Engineering	Gof
17	Leggio aluninum	Mexico
18	Maru metals	Kality
19	NA metal Engineering industry	Lafto hanamariam
20	Nehimiya Engineering industry	Gofa
21	Osaka steel	Lafto hana mariam
22	Pasqua Guissepe	Nifassilk
23	Zenebe Firew nail factory	Wolete
24	Combolcha metal work	Akaki Kality
25	ABYA Mechanical Engineering plc/metal	Addis Ketema
26	B & C Aluminum plc	Bole medhanalem
27	Anbo plc/metal	Kirkos
28	Kality constraction/Tibebu Ayalew metal	Akaki Kality
29	Tana Engineeering	Kirkos
30	Kotobe metal factory	Kotobe
31	M.R.R.G sare company/Dallo worse Eth. plc	Akaki Kality
32	Akaki spare part	Akaki Kality
33	KG (Kassay/Gegziabher) metal work	Nifas silk lafto
34	Alu Addis plc/ Aluminum work	Kirkos/mexico
35	Hibret metal and fabrication industry	Mexico

Annex 9.7፡ ለተጠያቂዎች የሚሰጥ መረጃ (informed concent form)

ጤና ይስጥልኝ እንደምን አሉ? እኔ _____ እባላለሁ እዚህ የመጣሁት ይህንን ጥናት የሚያካሄድ የአዲስ አበባ ዩኒቨርሲቲ ሕክምና ፋኩልቲ የሕብረተሰብ ጤና ትምህርት ክፍል ቡድን አባል ሆኜ ነው፡፡ ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳቶችን ችግር ጥልቀትና የጉዳቶቹን መንስኤ ለመረዳት እንፈልጋለን፡፡ በመሆኑም ይህንን መረጃ ለማግኘት በዚህ ድርጅት ላይ እንገኛለን፡፡ የዚህ ጥናት ውጤት በከተማችን ለሚከናወነው የሙያ ድርጅት ላይ ደህንነትና አገልግሎትን ለማሻሻል መጠነኛ እገዛ ይኖረዋል፡፡ ስለሆነም ከስራ ጋር በተያያዘ ባለፉት 12 ወራት ውስጥ የደረሰበትን ጉዳቶች በተመለከተ 30 ደቂቃ የሚወስድ የተወሰኑ ጥያቄዎችን ልንጠይቅዎት እንወዳለን፡፡ እርስዎ ከዚህ በታች የተሰጠውን የጥናቱን መግለጫ ተገንዝበው ፍቃደኛ ከሆኑ መረጃ በመስጠት የዚህ ጥናት ተሳታፊ እንዲሆኑ ሳይንሳዊ በሆነ መንገድ ተመርጠዋል፡፡

የጥናቱ ርዕስ፡- በአዲስ አበባ ከተማ በሚገኙ ትላልቅ የብረታ ብረት ማምረቻ ፋብሪካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳቶችን መጠን እና መንስኤ እንዲሁም ስራ ቦታ ሊከሰቱ የሚችሉ ጉዳቶችና መከላከያ ቁሳቁስ ጋር ያላቸዉን ግኑኝነት ማጥናት

የአጥኝዉ ስም፡

የጥናቱ አማካሪ ስም፡

የጥናቱ አስተባባሪ፡ በአዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት

መግቢያ፡- በአሁኑ ጊዜ ከስራ ጋር በተያያዘ ሳይታሰቡ የሚከሰቱ ጉዳቶች አለማቀፋዊ ክብደት ከፍተኛ የሕብረተሰብ የጤና እና የኢኮኖሚ ችግር ነው፡፡ በየአመቱ ለሚሊዮኖዎች ሞት እና አካለስንኩልነት ምክንያት ናቸው፡፡ የጉዳቱ አስከፊነት እንደ ኢትዮጵያ ባሉ ታዳጊ አገሮች የከፍ እና የሚሊኒሙን ድህነት ቅነሳና ጤና ለሁሉም ግብ አደጋ ላይ ይጥላል፡፡

የጥናቱ ጥቅም: ተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት ምንም ጥቅም የለም

ከዚህ ጥናት የሚገኘው ውጤት ለከተማው ወደፊት ለሚጠኑ ተመሳሳይ ጥናቶች ዕንደመነሻ ግብአት ያገለግላል፡፡

- የጥናቱ ውጤት ለከተማው ጤና ቢሮ እና ለሰራተኛና ማህበራዊ ጉዳይ ቢሮ ይፋ ስለሚደረግ ጉዳቱን ለመከላከልና ለመቆጣጠር የሚያስችሉ መፍትሄዎችን ለመንደፍ ይጠቅማል፡፡
- ይህ መረጃ በሚሰበሰብበት ወቅት የተጎዳ ሰራተኛ ከተገኘ በኢንዱስትሪው ውስጥ ሚበገኘው ወይም በቅርብ በሚገኝ ጤና ተቋም እንዲረዳ ይደረጋል፡፡ ከተቻለም የመጀመሪያ ሕክምና ይሰጣል፡፡

የጥናቱ ጉዳት፡ የቃለ መጠይቁ ተሳታፊ በጥናቱ የሚደርስባቸው ምንም ዓይነት ጉዳት አይደርስባቸውም፡፡ ተሳታፊው የሚሰጠው መረጃ ሚስጥራዊነት ስለሚኖረው ተሳታፊው ከአስተዳደራዊ ጫና ነፃ ነው፡፡

የቃለ መጠይቁ ተሳታፊ መብቶች፡-

- ተሳታፊው በዚህ ጥናት ላይ የመሳተፍ ወይም አለመሳተፍ መብቱ የተጠበቀ ነው፡፡
- በመሳተፍ ላይ እያሉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ ለመመለስ የማይፈልጉትን ጥያቄ አለመመለስ ይቻላል፡፡

▪ በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል፡፡ የጥናቱ ሚስጥራዊነት፡- የተሳታፊው ማንነት በሚስጥር ይያዛል፡፡

Annex 9.8፡ የተሳታፊው የፈቃደኝነት ቅጽ

ከዚህ ቀጥሎ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ተረድቻለሁ

- **ይህ ጥናት በአዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት ድጋፍና አስተባባሪነት ተማሪ አባት በንቲ ለምረቃ ጽሁፍ ጥናቱን እንደሚያካሂዱ**
- **የጥናቱ ርዕስ በአዲስ አበባ ከተማ በሚገኙ ትላልቅ የብረታብረት ማምረቻ ፋብርካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ ሳይታሰቡ የሚከሰቱ ጉዳቶች መጠንና መንስኤ እንዲሁም ከጉዳት መከላከያ ቁሳቁስ ጋር ያላቸዉን ግኑኝነት ማጥናት**
- **የጥናቱ ዋንኛ አላማ በብረታብረት ፋብርካዎች ስራ ቦታ ሊከሰቱ የሚችሉ ጉዳቶችና መከላከያ ቁሳቁስ ጋር ያላቸዉን ግኑኝነት ማጥናት**
- **የምሰጣቸዉ መረጃዎች በሚስጥር እንደሚያዙ**
- **ጥናቱ ምንም አይነት ጉዳት እንደማያደርስብኝ**
- **ጥያቄዉ ካልተስማማኝ ማቋረጥ ወይም ወደሌላ ጥያቄ መዝለል እንደምችልና ማንም ሰዉ ሊያስገድደኝ እንደማይችል**
- **ብረታብረት ፋብርካዉ በጤናየም ላይ ሆነ አስተዳደርን በተመለከተ ምንም አይነት ጉዳት ሊያደርስብኝ እንደማይችል**
- **ጥናቱን በተመለከተ ያልገባኝን ነገር ቀጥሎ በተሰጠኝ አድራሻ ጠይቄ መረዳት ንደምችል ተገንዚቤአለሁ**

አዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት

የአጥኝዉ ስም፡

የጥናቱ አማካሪ ስም፡ 1

ከላይ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ከተረዳሁ በኋላ በጥናቱ ለመሳተፍ ፈቃደኛ ሆኛለሁ፡፡

የተሳታፊ ስም _____**ፊርማ** _____

የአጥኝው ስም _____**ፊርማ አድራሻ ስልክ /ኢ.ሜል/** _____

የምስክር ስም _____ **ፊርማ** _____

Annex 9.9፡ የአማርኛ ትርጉም መጠይቅ

የፋብሪካው ስም ----------

የሥራ ክፍሉ መለያ ቁጥር ----------

የጥያቄ የመለያ ቁጥር ----------

ክፍል1፡ማህበራዊ ሥነ ሕዝባዊ ገጽታዎችን በተመለከተ (ጥያቄ ቁጥር 1-8)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
1	ጾታ	1. ወንድ 2. ሴት		
2	ዕድሜ	---------- ዓመት		
3	ሃይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ኘሮቴስታንት 4. ሌላ ካለ ይጠቀስ		
4	የትምህርት ደረጃ	1. ማንበብና መፃፍ የማይች/ችል 2. ማንበብና መፃፍ 3. የመጀሪያ ደረጃ ት/ት/1–8/ ክፍል 4. የሁለተኛ ደረጃ ት/ት /9–12 ክፍል 5. 12 +		
5	የጋብቻ ሁኔታ	1. ያገባ/ች 2. ያላገባ/ች 3. የፈታ 4. Widowed/ባልየፈታች/ባልየሞተባት/		
6	የቅጥር ሁኔታ	1. ጊዜያዊ 2. በቋሚነት 3. የቀን ሠራተኛ		
7	የስራ ልምድ	---------- ዓመት		
8	ገቢ በወር	1. ደሞዝ ---------- ብር በወር 2. ሌላ ----------		

የፋብሪካው ስም ----------

የጥያቄ የመለያ ቁጥር ----------

ክፍል 2. የስራ ላይ ጉዳትን በተመለከተ (ጥያቄ ቁጥር 9 - 33)

ተ.ቁ	ጥያቄ	የሚጠበቅመልስ	የሚዘለል	ኮድ
9	ባለፉት አስራ ሁለት ወራት ውስጥ ከሙያ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1. አዎ 2. የለም	ለጥያቄ ቁጥር 9 መልስዎ የለም ከሆነ ወደ ጥያቄቁጥር 13 ይሂዱ	
10	ለጥያቄ ቁጥር 9 መልስዎ አዎ ከሆነ ስንት ጊዜ	_____		
11	ለጥያቄ ቁጥር 9 መልስዎ አዎ ከሆነ ከአደጋ ወይም ከጉዳት መከላከያ ልብስ ለብሰው ነበር?	1. አዎ 2. የለም		
12	ለጥያቄ ቁጥር 11 መልስዎ አዎ ከሆነ በአደጋው ጊዜ የተጠቀሙትን መከላከያ ልብስ ዓይነት ይግለጹ?	1. ግላቭ 2. የጆሮ መከላከያ ኘላግ 3. ማስክ/ የአፍንጫ መሸፈኛ/ 4. ሄለሜንት /የጭንቅላት መከላከያ/ 5. የጨረር መከላከያ መነጽር (Gogle) 6. የፊት መሸፈኛ (Face Shield) 7. ቡት ጫማ 8. ሌላ ካለ ይግለጹ		
13	ለጥያቄ ቁጥር 11 መልስዎ የለም ከሆነ በጊዜው ለምን መከላከያ ልብስ እንዳልተጠቀሙ ይግለጹ	----------		
14	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ የተጎዳ የሰውነት ክፍል	1. ዐይን 2. ጥርስ 3. እጅ 4. ጆሮ 5. ጉልበት 6. እግር 7. የእጅ ጣቶች 8. ራስ 9. የላይኛው ክንድ 10. የታችኛው ክንድ 11. ከጉልበት በላይ ያለው		

		እግር 12. ከጉልበት በታች 13. ጀርባ 14. ደረት 15. ሌላ ካለ ይጠቀስ----------		
15	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ የጉዳቱ ዓይነት	1. ጭረት/መላጥ 2. መቆረጥ 3. ቃጠሎ 4. መወጋት 5. ስብራት 6. ወለምታ 7. በኤሌክትሪክ መያዝ 8. መታፈን 9. የጆሮ ጉዳት 10. የዓይን ጉዳት 11. መመረዝ 12. ሌላ ካለ ይጠቀስ --------		
16	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ ለአደጋው መከሰት ምክንያቱ ምን ነበር?	1. ለስራው ሂደት አዲስ ነበርኩ? 2. ስለ ግል ሕይወት እያሰብኩ ነበር 3. አደጋን መከላከል ስለማይቻል ነው የተጎዳሁት 4. የስራው ባህሪ ነው 5. የጉዳት መከላከያ ባለማድረጌ ነው 6. አላስታውስም 7. ለላ ካለ ይጠቀስ ---------		
17	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ የጉዳቱ መንስኤ ምን ነበር	1. ማሽን 2. በሚወድቁ ዕቃዎች 3. በኤሌክትሪክ 4. ከዕቃው ጋር በመጋጨት 5. በእሳት 6. በእጅ መሣሪያዎች 7. በመውደቅ 8. በአሲድ እና አሲዳማ ነገሮች 9. ከባድ ዕቃዎች በማንሳት 10. ሌላ ካለ ይጠቀስ----------		

18	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ አደጋው የተከሰተበት የሳምንቱ ቀናት	1. ሰኞ 2. ማክሰኞ 3. ረቡዕ 4. ሐሙስ 5. አርብ 6. ቅዳሜ 7. እሁድ 8. አላስታውስም		
19	ለጥያቄ ቁጥር 9 መልሶዎ አዎ ከሆነ በአደጋውምክንያትበሕክምናድርጅቶችአልጋይዘውያውቃሉ	1. አዎ 2. የለም		
20	ለጥያቄ ቁ 19 መልስዎ አዎ ከሆነ ለምን ያህል ጊዜ?	----------		
21	ባለፉት ሁለት ሳምንት ውስጥ ከስራ ጋር በተያያዘ የደረሰበዎት ጉዳት አለ?	1. አዎ 2. የለም	ለጥያቄ ቁጥር 21 መልስዎ የለም ከሆነ ወደ ጥያቄቁጥር 34 ይሂዱ	
22	ለጥያቄ ቁጥር 21 መልስዎ አዎ ከሆነ ስንት ጊዜ	_____		
23	ለጥያቄ ቁጥር 21 መልስዎ አዎ ከሆነ ከአደጋ ወይም ከጉዳት መከላከያ ልብስ ለብሰው ነበር?	1. አዎ 2. የለም	ለጥያቄ ቁጥር 23 መልስዎ የለም ከሆነ ወደ ጥያቄቁጥር 25 ይሂዱ	
24	ለጥያቄ ቁጥር 23, መልስዎ አዎ ከሆነ በአደጋው ጊዜ የተጠቀሙትን መከላከያ ልብስ ዓይነት ይግለጹ?	1. ግላቭ 2. የጆሮ መከላከያ ኘላግ 3. ማስክ / የአፍንጫ መሸፈኛ/ 4. ሄለሜንት /የጭንቅላት መከላከያ/ 5. የጨረር መከላከያ መነጽር (Gogle) 6. የፊት መሸፈኛ (Face Shield) 7. ቡት ጫማ 8. ሌላ ካለ ይግለጹ		
25	ለጥያቄ ቁጥር 23 መልስዎ የለም ከሆነ ከአደጋ ወይም ከጉዳት መከላከያ ልብስ ለምን አለበሱም?	----------		

26	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ የተጎዳ የሰውነት ክፍል	1. ዐይን 2. ጥርስ 3. እጅ 4. ጆሮ 5. ጉልበት 6. እግር 7. የእጅ ጣቶች 8. ራስ 9. የላይኛው ክንድ 10. የታችኛው ክንድ 11. ከጉልበት በላይ ያለው እግር 12. ከጉልበት በታች 13. ጀርባ 14. ደረት 15. ሌላ ካለ ይጠቀስ----------		
27	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ የጉዳቱ ዓይነት	1. ጭረት/መላጥ 2. መቆረጥ 3. ቃጠሎ 4. መወጋት 5. ስብራት 6. ወለምታ 7. ተቆርጦ መውደቅ 8. በኤሌክትሪክ መያዝ 9. መታፈን 10. የጆሮ ጉዳት 11. የዓይን ጉዳት 12. መመረዝ 13. ሌላ ካለ ይጠቀስ ----------		

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
28	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ ለአደጋው መከሰት ምክንያቱ ምን ነበር?	1. ለስራው ሂደት አዲስ ነበርኩ? 2. ስለ ግል ሕይወት እያሰብኩ ነበር 3. ሌላ የጤና ችግር ነበረብኝ 4. አደጋን መከላከል ስለማይቻል ነው የተጎዳሁት 5. የስራው ባህሪ ነው 6. የጉዳት መከላከያ ባለማድረጌ ነው 7. አላስታውስም 8. ለላ ካለ ይጠቀስ ----------		
29	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ የጉዳቱ መንስኤ ምን ነበር	1. ማሽን 2. በሚወድቁ ዕቃዎች 3. በኤሌክትሪክ 4. ከዕቃው ጋር በመጋጨት 5. በእሳት 6. በእጅ መሣሪያዎች 7. በመውደቅ 8. በሞቃት ነገሮች 9. በአሲድ እና አሲዳማ ነገሮች 10. ከባድ ዕቃዎች በማንሳት 11. ሌላ ካለ ይጠቀስ----------		
30	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ አደጋው የተከሰተበት የሳምንቱ ቀናት	1. ሰኞ 2. ማክሰኞ 3. ረቡዕ 4. ሐሙስ 5. አርብ 6. ቅዳሜ 7. እሁድ 8. አላስታውስም		
31	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ አደጋው የተከሰተበት ሰዓት	1. ጠዋት 2. ከሰዓት 3. በምሽት 4. ሌሊት 5. አላስታውስም		
32	ለጥያቄ ቁጥር 21 መልሶዎ አዎ ከሆነ በአደጋውምክንያትበሕክምናድርጅቶችአልጋይዘውያ ውቃሉ	1. አዎ 2. የለም		
33	ለጥያቄ ቁ 32 መልስዎ አዎ ከሆነ ለምን ያህል ጊዜ?	----------		

የፋብሪካው ስም ----------

የጥያቄ መለያ ቁጥር ----------

ክፍል 3. የሥራ ቦታን በተመለከተ (ጥያቄ ቁጥር 34-39)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
34	በሣምንት ምን ያህል ሰዓት ይሰራሉ?	…….		
35	በመደበኛ ስራዎ ቦታ የጤና እና ሲፍቲ ቁጥጥር በየጊዜው ተደርጎ ያውቃል?	1. አዎ 2. የለም		
36	የስራ ላይ ደህንነትና በተመለከተ በአዲሱም ሆነ በነባሩ ስራ ሂደት ስልጠና ወስደው ያቃውሉ?	1. አዎ 2. የለም		
37	የስራ ላይ መቀያየር አድርገው ያውቃሉ?	1. አዎ 2. የለም		
38	ለተ.ቁ. 37 መልስዎ አዎ ከሆነ በምን ያህል ጊዜ የሥራ መቀያየር ይደረጋል?	1. በየአራት ሰዓት 2. በየስምንት ሰዓት 3. በየ ሃያ አራት ሰዓት 4. ሌላ ካለ ይጠቀስ----------		
39	ባለፈው ሁለት ሣምንት ወይም አንድ ዓመት ውስጥ ስለ ሙያ ደህንነትና ጤንነት በሜዲያ ወይም በሌላ ዘዴ ትምህርት ወይም መረጃ አግኝተው ያውቃሉ?	1. አዎ 2. የለም		

የፋብሪካው ስም ----------

የጥያቄ የመለያ ቁጥር ----------

ክፍል 4. የሰራተኞችን ባህሪ በተመለከተ (ጥያቄ ቁጥር 40–52)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
40	በተመሳሳይ ሥራ በዚህ ድርጅት በጠቅላላ ለምን ያህል ጊዜ አገለገሉ፣	----------		
41	ወደዚህ ስራ ከመግባትዎ በፊት ወይም በስራ ላይ እያሉ የጤና ችግር አለበዎት?	1. አዎ 2. የለም		
42	ለጥያቄ ቁ. 41 መልስዎ አዎ ከሆነ የችግሩ አይነት ምንድነው?	1. አለመስማት 2. የማየት ችግር 3. የመገጣጠሚያ አካል ችግር ሌላ ካለ ይጠቀስ----------		
43	ሲጋራ ያጨሳሉ?	1. አዎ 2. የለም		
44	ለጥያቄ ቁ. 43 መልስዎ አዎ ከሆነ ምን ያህል ጊዜ ያጨሳሉ	1. በየቀኑ 2. አልፎ አልፎ 3. በአንድ ሣምንት ከ1–3 ቀን		
45	አልኮል መጠጥ በሥራ ሰዓትጠጥተው ወደ ሥራ ይገባሉ?	1. አዎ 2. የለም		
46	ለጥያቄ ቁ. 45 መልስዎ አዎ ከሆነ ምን ያህል ጊዜ አልኮል መጠጥ ይጠጣሉ?	1. በየቀኑ 2. አልፎ አልፎ 3. በአንድ ሣምንት ከ1–3 ቀን		
47	ጫት ይቅማሉ?	1. አዎ 2. የለም		
48	ለጥያቄ ቁ. 47 መልስዎ አዎ ከሆነ ምንያህል ጊዜ ጫት ይቅማሉ?	1. በየቀኑ 2. አልፎ አልፎ 3. በአንድ ሣምንት ከ1–3 ቀን		
49	በሥራ ላይ እያሉ የእንቅልፍ ችግር አለቦት ?	1. አዎ 2. የለም		
50	ለጥያቄ ቁ. 49 መልስዎ አዎ ከሆነ መንስኤው ምንድነው ይላሉ?	1. ያለፈረቃ /ሽፍት/ በተከታታይ 8፡00 ሰዓት መስራት 2. ማታ መስራት 3. ከአንድ ሥራ በላይ መስራት 4. ለላ----------		
51	በምሰሩበት ቦታ ጭንቀት ይሰማዎታል?	1. አዎ 2. የለም		
52	ለጥያቄ ቁ.51 መልሶ አዎ ከሆነ ምክንያቱ ምንድነው ይላሉ?	---------		

የአካል ጉዳት መከላከያ ልብስ /ቁሳቁስ/ አጠቃቀም በተመለከተ (Q53 -63)

53	ባለፉት 12 ወራት ውስጥ ሥራ ላይ በሚሆኑበት ጊዜ የአካል ጉዳት መከላከያ ልብስ /ቁሳቁስ/ ዘወትር ሳያቋርጡ ይጠቀሙ ነበር?	1. አዎ 2. የለም		
54	ለጥያቄ ቁ. 53 መልስዎ አዎ ከሆነ ምን አይነት መከላከያ ልብስ /ቁሳቁስ/ ተጠቅመዋል	1. ግላቭ 2. የጆሮ መከላከያ ኘላግ 3. ማስክ / የአፍንጫ መሸፈኛ/ 4. ሄለሜንት /የጭንቅላት መከላከያ/ 5. የጨረር መከላከያ መነጽር (Gogle) 6. የፊት መሸፈኛ (Face Shield) 7. ቡት ጫማ 8. ሌላ ካለ ይግለጹ		
55	ለጥያቄ ቁ. 53 መልስዎ የለም ከሆነ ከአደጋ ወይም ከጉዳት ወዘተ ለመከላከል የማይጠቀሙበት ምክንትያ ምንድነው?	1. መከላከያ ቁሳቁስ /ልብስ ስለሌለ 2. ስለ ሙያ ደህንነትና ጤንነት ግንዛቤ ስለሌለኝ 3. ምቾት ስለሚነሳኝ 4. የሥራ ውጤታማነት ስለሚቀንስ 5. ጤና ላይ ጉዳት ስለሚያስከትል 6. ሌላ----------		
56	ስራ ላይ በሚሆኑበት ጊዜ ከአደጋ እና ከጉዳት መከላከያ ልብስ ቁሳቁስ ባሰፉት ሁለት ሣምንት ተጠቅመዋል?	1. አዎ 2. የለም		
57	ለጥያቄ ቁ. 56 መልስዎ አዎ ከሆነ ምን አይነት መከላከያ ልብስ /ቁሳቁስ/ ተጠቅመዋል	1. ግላቭ 2. የጆሮ መከላከያ ኘላግ 3. ማስክ / የአፍንጫ መሸፈኛ/ 4. ሄለሜንት /የጭንቅላት መከላከያ/ 5. የጨረር መከላከያ መነጽር (Gogle) 6. የፊት መሸፈኛ (Face Shield) 7. ቡት ጫማ 8. ሌላ ካለ ይግለጹ		
58	ለጥያቄ ቁ. 56 መልስዎ የለም ከሆነ ከአደጋ ወይም ከጉዳት ወዘተ ለመከላከል የማይጠቀሙበት ምክንትያ ምንድነው?	1. መከላከያ ቁሳቁስ /ልብስ ስለሌለ 2. ስለ ሙያ ደህንነትና ጤንነት ግንዛቤ ስለሌለኝ 3. ምቾት ስለሚነሳኝ 4. የሥራ ውጤታማነት ስለሚቀንስ 5. ጤና ላይ ጉዳት ስለሚያስከትል 6. ሌላ----------		

59	ትናንት ሲሰሩ ከአደጋና ከጉዳት መከላከያ ልብስ /ቁሳቁስ/ ለብሰው ነበር	1. አዎ 2. የለም		
60	ስለ መከላከያ ልብስ ወይም ቁሳቁስ ጥቅም ያውቃሉ?	1. አዎ 2. የለም		
61	ለጥያቄ ቁ. 60 መልስዎ አዎ ከሆነ የአደጋ ወይም ጉዳት ወዘተ መከላከያ ልብስን /ቁሳቁስ/ ጥቅም ምን እንደሆነ ቢገለጹ?	--------		
62	የአደጋ ወይም የጉዳት መከላከያ ልብስ /ቁሳቁስ/ መጠቀም በስራ ቦታ ልደርስ ከምችል ጉዳት ይከላከላል ብለው ያምናሉ?	1. አዎ 2. የለም		
63	ስለ መከላከያ ልብስ /ቁሳቁስ/ ጥራት ምን አስተያየት አለዎት?	1. ጥሩ ነው 2. መጥፎ ነው		

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Annex 9.10፡የቡድን ውይይት መጠይቅ

የቡድኑ ተሳታፊዎች መረጃ በተመለከተ

የፋብሪካው ስም ----------

የሥራ ክፍሉ መለያ ቁጥር ----------

1. ዕድሜ ---------- ፆታ፡ወንድ_____ሴት_____
2. ትምህርትደረጃ_____
   2.1. ያልተማረ_____
   2.2. ማንበብናመፃፍየሚችል_____
   2.3. የመጀመሪያደረጃ /ከ1ኛ—8ኛክፍል/ _____
   2.4. ሁለተኛደረጃ /ከ9ኛ--12ኛክፍል/ _____
   2.5. 12+

I. በሥራ ቦታ ላይ የሚደርሱ የአካል ጉዳት መንስኤዎች በተመለከተ

3. በስራ ቦታ ላይ የሚደርሱ የአካል ጉዳትና አደጋ በዚህ ፋብሪካ ዋነኛ ችግር ነው?
4. የሥራ ደህንነትና ጤንነት ጉብኝት ይደረጋል?
5. በዚህ ፋብሪካ ውስጥ ለሠራተኞች የሙያ ደህንነትና ጤንነትን በተመለከተ የተሰጠ ትምህርት ወይም ሌላ የተሰጠ ሥልጠና ካለ ይግለጹ። ካልተሰጠ ለምን እንዳልተሰጠ ምክንያቱን ይገለጽ?

II. የአካል ላይ ጉዳት መከላከያ ቁሳቁስ አጠቃቀም በተመለከተ

6. በዚህ ፋብሪካ ውስጥ ለሠራተኞች በቂ መከላከያ ልብስ ወይም ቁሳቁስ አለ? ካለ ዓይነቱን ይግለጹ? ከሌለ ለምን እንዳሌለ ምክንያቱ ይገለጽ?
7. የመከላከያ ልብስ /ቁሳቁስ አጠቃቀም በሠራተኛው ዘንድ እንዴት ያዩታል /ሁልጊዜ ይጠቀማሉ፣ አልፎ አልፎ ይጠቀማሉ፣ ጨርሶ አይጠቀሙም
8. ሠራተኞች የመከላከያ ልብስ /ቁሳቁስ/ የማይጠቀሙ ከሆነ ምክንያቱ ምን ይመስላል?
9. የመከላከያ ልብስ /ቁሳቁስ/ መጠቀም በፋብሪካው ሠራተኞች ዘንድ ምን ለውጥ አመጣ ብለው ይገምታሉ? /የአካል ጉዳትን ቀንሷል?/
10. ስለ መከላከያ ልብስ /ቁሳቁስ/ ጥራት ምን አስተያየት አለዎት?
11. ስለ መከላከያ ቁሳቁስ ጠቀሜታ የሚያውቁትን ይግለጹ? መከላከያ ቁሳቁስ ከአካል ጉዳት ይከላከላል ብለው ያስባሉ? እንዴት ሊከላከል እንደሚችል ይግለጹ?

Annex 9.11፡ ምልከታ መጠይቅ ለሥራ አካባቢ

የፋብሪካው ስም ----------

የሥራክፍሉ መለያ ቁጥር ----------

በሥራ አካባቢ ልደርሱ የምችሉ ጉዳቶች በተመለከተ፡

1. መደበኛ ሱኝር ቪዥርን ኝሮግራም በየሥራ ክፍሉ አለ? ሱኝር ቪዥርን በኝሮግራሙ መሠረት ሳይቋረጥ ይደረጋል?(ኝሮግራሙ ቢታይ)
2. በፋብሪካው ክሊኒክ ሕክምና መዝገብ አለ? 1. አለ 2. የለም
   (መዝገብ ይታይ የአካል ጉዳት ወይም አደጋ ደርሶባቸው የታከሙ ሠራተኞች ብዛት ተመዝግቦ ይያዝ)
3. በየስራ ክፍሉ የአደጋ ማስጠንቀቂያ ምልክቶች ወይም የአደጋ መከላከያ ደንቦች ተሰቅለዋል?
   1. አዎ 2. የለም
   /መልሱ አዎ ከሆነ የአደጋ ማስጠንቀቂያ ምልክቶችና የአደጋ መከላከያ ደንቦች ጉብኝቱ ወቅት ተሰቅለው መገኘት አለባቸው/
4. የአደጋ ወይም የአካል ጉዳት መከላከያ ልብሶች /ቁሳቁሶች/ ለሰራተኛው በበቂ ሁኔታ አሉ?
   1. አዎ 2. የለም
   /በጉብኝት ወቅት የመከላከያ ቁሳቁስ እጥረት ያለመኖር መታየት አለበት /
5. ሠራተኞች በሥራ ክፍሎቻቸው አስፈላጊውን መከላከያ ቁሳቁስ እየተጠቀሙ ነው?
   1. አዎ 2. የለም
   /በጉብኙቱ ወቅት ሁሉም ሠራተኛ መከላከያ ቁሳቁሶችን ሲጠቀም መታየት አለበት/
6. በጉብኝት ወቅት ሠራተኛው አካል ላይ የደረሰ አደጋ ወይም ጉዳት ካለ ይታይ?
7. ፋብሪካው የሥራ ቦታደህንነትና ጤንነት መቆጣጠሪያ ደንቦች አሉት?
   1. አዎ 2. የለም
   /ካለ የደንቦች ኮፒ ይታይ/
8. ፋብሪካው በሙያደህንነትና ጤንነት መስክ የሰለጠነ ባለሙያ አለው?
   1. አዎ 2. የለም
   /መልሱ አዎ ከሆነ ከባለሙያው ጋር የተፈራረሙበት የሥራ ዝርዝር ይታይ/
9. በስራ ክፍሎች የመጀመሪያ ሕክምና ዕርዳታ መስጫ ኪት አለ? 1. አዎ 2. የለም
   /መልሱ አዎ ከሆነ የዕርዳታ መስጫ ኪት መኖሩ በጉብኝት ወቅት መታየት አለበት/
10. በፋብሪካው የሙያ ደህንነትና ጤንነት ኮሚቴ አለ? 1. አዎ 2. የለም
    /መልሱ አዎ ከሆነ የሥራ ኃላፊነታቸው ይገለጽ? በጉብኝት ወቅት የሥራ ዕቅዳቸው ይታይ/

Annex 9. 12: ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Research Publications Office in effect at the time of grant is forwarded as the result of this application.

Name of the student:

Date._____ Signature _____

Approval of the primary advisor

Name of the primary advisor:

Date._____ Signature _____

Approval of the seconary advisor

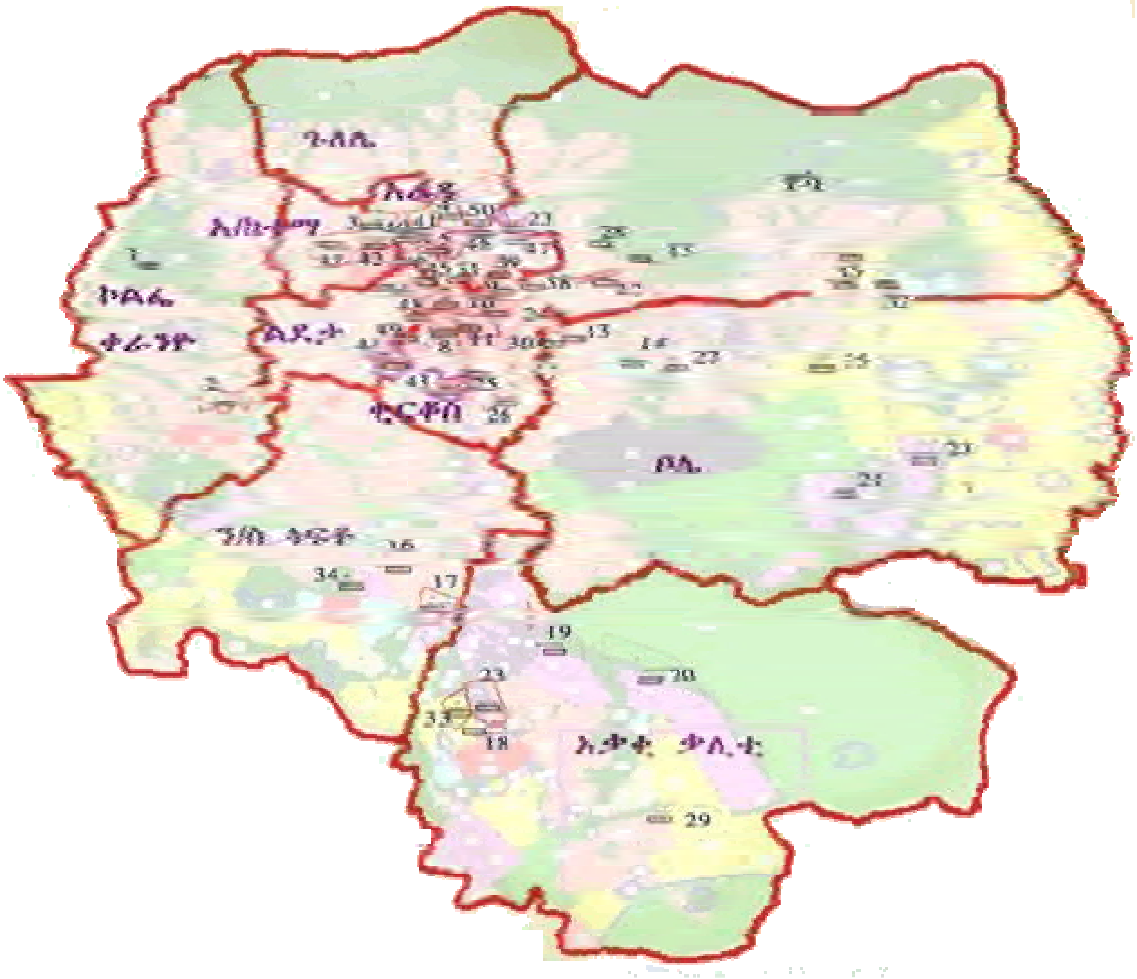
Name of the secondary advisor:

Date._____ Signature _____


አቃቂ ቤዚክ ሜታልስ ኢንዱስትሪ
AKAKI BASIC METALS INDUSTRY
INDUSTRIAL SAFETY RULES
1. Don't take chances, follow instructions. If you don't know ask.
2. Rectify or report unsafe conditions in your workplace.
3. Help to keep everything clean, tidy and safe.
4. Employ the right tool and equipment in the safe way.
5. Report all injuries, get qualified treatment promptly.
6. Wear protective clothing and keep in good repair.
7. Repair and use only the tools you are authorized.
8. Lift the correct way; get help for very heavy loads.
9. Don't horse play, or distract others at work.
10. Obey all safety rules, signs and factory instructions
THINK SAFETY ALWAYS


የሥራ ላይ ደህንነት መመሪያዎች
1. ሥራህን ከመጀመርህ በፊት ለአደጋ የሚጋብዙትን ነገሮች ሁሉ አስወግድ::
2. ሁልጊዜ አደጋ ይፈጠራል ብለህ ከማሰብ ወደ ኋላ አትበል::
3. የአደጋ መከላከያ ደንቦችንና ህጎችን ተግባራዊ ማድረግ ህይወትንና ንብረትን ያድናል::
4. በስራ ቦታ ለስራ የሚያስፈልጉትን የአደጋ መከላከያ ልብሶችን በመጠቀም ስራህን መስራት አትዘንጋ::
5. በስራ አካባቢ መቀለድና መላፋት አደጋን እንደሚጋብዝ አትዘንጋ::
6. ከሰለጠንክበትና ከተፈቀደልህ መሳርያ ውጭ በሌላ በማታውቀው መሳርያ ለመስራት አትሞክር::
7. የምትሰራበትን መሳርያ ሥራ ከመጀመርህ በፊት ደህንነቱን (ሴፍቲውን) በቅድሚያ አረጋግጥ::
8. ለቅርብ አለቃህ በአካባቢው ሊፈጠሩ ይችላሉ ወይም አደጋን ይጋብዛሉ ብለህ የምታምንበትን ለመንገር ወደ ኋላ አትበል::
9. በስራ ቦታህ ወይም በአካባቢህ የደረሰውን ጉዳት (አደጋ) በእስቸኳይ ለአለቃህ አስታውቅ::
10. ማንኛውንም ስለደህንነት (ሴፍቲ) የሚሰጡትን መመርያዎችና ደንቦች ከመደገፍ፡ ከማላወቅ፡ ከማስተባበር አትቆጠብ::
ቅድሚያ ለደህንነት
PERSONAL SAFETY EQUIPMENT &
UNSAFE
SAFE
LONG HAIR
SMOKING
LOOSE SCARF
POINTED TOOLS
BUTTON MISSING
LOOSE CUFFS
RINGS
HANGING NAPKIN
DRIPPING GREASE GUN
TORN POCKET
UNFIT CLOTHING
LOOSE SHOE LACE
ORDINARY SHOES
Safety F

Annex 9.15: Map of study settings



Source: Map of study area accessed from website of Addis Ababa City Administration Health Bureau.