ADDIS ABABA UNIVERSITY FACULITY OF
MEDICINE DEPARTMENT OF COMMUNITY HEALTH

ASSESSMENT OF KNOWLEDGE AND PRACTICE ON SAFETY INFORMATION AMONG FACTORY WORKERS

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DECLARATION

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

Name: _____

Signature: _____

Place: Addis Ababa, Ethiopia

Date of submission: _____

This thesis has been submitted for examination with my approval as a university advisor.

Name: _____

Signature: _____

Date: _____

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Table of Contents

List of tables Page

List of figures Page

Abbreviations

ANSI - American National Standards Institute

FGD - Focus group discussions

LRA- Logistic regression analysis

MSDSs - Material Safety Data Sheets

NIOSH - National Institute of Occupational Safety and Health

OR - Odds Ratio

OSHA - Occupational Safety Hazard Administration

PPD - Personal Protective Devices

RTK - Right-To-Know

Abstract

Background: Annually, throughout the world, an estimated 271 million people suffer from work related injuries, and 2 million die from the injury. In recent years, in developed countries the occupational health and safety of workers has improved, but it is not true in developing countries. Ethiopia is categorized among under developed countries and do not have much data on health and safety.

Objective: The objective of the study was to assess the knowledge and practice of factory workers on occupational safety information.

Methods: A descriptive cross- sectional study was conducted in Kality Metal Product and Ethiopian Iron and Steel factories in March 2007. A total of 417 study subjects were randomly selected from the two factories according to their worker number proportions. The data was collected using the questionnaires, focus group discussion, and observational checklists. The questionnaire was pre-tested for their accuracy and validation prior to the actual study and the necessary adjustments were done accordingly. The data were entered after being encoded and analyzed using Epi info and SPSS.

Results: The mean (standard deviation) age of the respondents was 39.56± (11.08). Sixty nine percent of the respondents recognized at least one safety sign. Two hundred eighteen (52.3%) respondents got training on different occupational health and safety information and 71.5% of the respondents used glove and 48.2% used boots.

Safety recommendation, sex, and work experience were found to be the determinant factors of respondents knowledge level [OR: 2.394(1.439, 3.984)], [OR: 2.398(1.169, 4.922)], and [OR: 1.934(1.178, 3.174)] respectively. Health and safety training was found to be a positive determinant factor for PPD usage [OR: 1.970(1.146, 3.386)].

Conclusion and recommendation: The workers have less knowledge level compared to other studies. Health and safety recommendations have positive effects on both knowledge levels and safe practices. Health and safety training has positive effects on safe practice but did not impact knowledge. Health and safety recommendation should be given to the workers. Safety signs should posted at a reasonable work sites.

Keywords: occupational health and safety information,knowledge,practice

1. Introduction

Development and industrialization in particular, have made immense positive contributions, to health, social wealth and improved education service. However, industrialization has also had adverse health consequences on work places. These effects have been caused either directly by exposure to safety hazards and harmful agents or indirectly through environmental degradation [1] .

The British Health and Safety at Work Act 1974 makes provision for the health, safety and welfare of all people at work and for the controlled use of dangerous substances and emissions[2]. The Act places on the whole community a responsibility for caring, and the co-operation of all in creating safer working environment. There is a responsibility on all employers to arrange adequate instruction, training and supervision; and to lay down a safety policy and to tell their employees about it[3]. The prime responsibility for the health and safety of workers in their employment rests with employers, who should provide and maintain proper working environments.

Employers through out the world provide a vast amount of safety information to workers both to encourage safe behavior and to discourage unsafe behavior. These sources of safety information include, among others, relations, codes and standards, industry practices, training courses, Material Safety Data Sheets (MSDSs), written procedures, safety signs, product labels, and instruction manuals. Occupational safety information (sign, label, and symbol) contains specific information that is of interest at various activities or handling stages. It is the users' responsibility to read and understand the label when buying, working, storing and handling as well as disposing[4].

The International Labor Office (ILO) estimates that every year there are some 125 million work related accidents, 220000 of them fatal. According to WHO, 160 million new cases of occupational diseases are caused annually by exposure and dangerous conditions at the work place; 30-40% of them can be expected to lead to chronic diseases and about 10% are likely to result in permanent disability [5].

Every nine minutes, some one is killed by their job. In 1994, employers reported 6.3million disabling work injuries and 515000cases of occupational diseases[6]. Annually, throughout the world, an estimated 271 million people suffer from work related injuries, and 2 million die from these injuries[7].

Hazard exposure at work is higher than the exposures of the general population. Therefore, the adverse effects of different work hazards are most likely to appear at work. In recent years, in developed countries, on the whole the occupational health and safety of the population has improved, and the situation can be described as relatively satisfactory. The same, however, cannot be said for the developing countries, in many of which occupational health receives little attention and comes low on the list of national priorities[8].

It is assumed to be similar for Ethiopia, due to the above same reasons. The rationale of the study is that, Ethiopia is one of the countries in which industries are growing up and at the same time information, concerning on occupational safety to workers is minimal, as well work related injuries are likely to rise among workers with less information. Designing any intervention programme needs a thorough assessment of the knowledge, attitude and practice of the population at which the intervention programme is carried out.

Thus, in order to formulate appropriate control methods to reduce the occupational or work place incidences, it is necessary to assess the knowledge and practice of factory workers on occupational safety information to design appropriate intervention methods and make the workers safe while they are undergoing different activities.
Therefore, this study is designed to assess the knowledge and practice of industrial workers and will provide the necessary information for policy makers and others who are interested in the field.

2. Literature Review

2.1. General description

Safety, hazard and warning signs ensure that employees, visitors, building occupants, and emergency personnel have adequate information concerning dangers in the workplace[9]. Both the American National Standards Institute (ANSI) and the Occupational Safety Hazard Administration (OSHA) have recommended standards for the use of different kinds of warning signs[12]. Occupational health and safety information in general could be signs, symbols, pictograms, and written safety manuals, material safety data sheets, working procedures, guidelines, instructing labeling and others that could provide the necessary information for the workers and others who come across the working environments. Safety and/or health at work sign means signs referring to a specific object, activity or situation and providing information or instructions about safety and/or health at work by means of a signboard, a colour, an illuminated or acoustic signal, a verbal communication or a hand signal, as the case may be. Knowledge is what the individual/worker knows about safety information (labels, symbols, signs, pictograms, guidelines, manuals) used as indication to describe the safe activity in the work place. Practice is what the workers are actually practicing based on the safety information. There are many types of Right-To-Know (RTK) sign and label designs used to inform employees which can be categorized in to four classes.

1. Material Safety Data Sheets (MSDSs)

The OSHA hazard communication standard specifies that employers must have a MSDS in the work place for each hazardous chemical used [12]. The standard requires the MSDS to describe; the physical and chemical characteristics of the hazardous chemical; physical hazards, including potential for fire, explosion, and reactivity; Health hazard, including signs and symptoms of exposure and health conditions potentially aggravated by the chemical, and, the name, address and telephone number of the party able to provide other additional information about the chemical[11, 12, 21].

2. Instructional labels and manuals

The ANSI guide for developing user product information was published in 1990, and several other consensus organizations are working on draft documents. They have included sections entitled: “Organizational Elements”, “Illustrations”, “Instructions”, “Warnings”, “Standards”, “How to use Language”, and “An Instructions Development Checklist”. While the guideline is brief, the document represents a useful initial effort in this area[3, 12, 20].

Ethiopia has been a member state of ILO since 1923. However the national occupational safety and health policy is not issued though it is required by the country as a result of ratifying occupational safety and health conventionNo.155/1981[28].

3. Safety symbols

Numerous standards throughout the world contain provisions regarding safety symbols. Among such standards, the ANSI Z535.3 standard, Criteria for Safety symbols, is particularly relevant for industrial users[12].

4. Warning signs, labels and tags

ANSI and other standards provide very specific recommendations regarding the design of warning signs, labels, and tags. These include among other factors, particular signal words and text, color-coding schemes, typography, symbols, arrangement and hazard identification. Among the most popular signal words recommended are: DANGER to indicate the highest level of hazard; WARNING to represent an intermediate hazard: and CAUTION, to indicate the lowest level of hazard. Color coding methods are to be used to consistently associate color with particular levels of hazard [12, 20, 21].

A. Notice signs

Notice signs can include information about procedures, operating instructions, maintenance information, information about rules, or directional information. Notice signs are never used for safety related information or warnings. They are only used to provide general information [21].

B. Caution signs

A caution sign indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. Caution signs are used in areas where potential injury or equipment damage is possible, or to caution against unsafe practices[11].

C. Danger signs

Danger signs indicate an immediate hazard and they inform people about special precautions that are necessary. OSHA states that there is to be no variation in the type of design of signs posted to warn of specific dangers [11, 15, 21].

2.2. Knowledge, Attitude and Practice

The study carried out in five different Southern African countries(Malawi, Lesotho, Namibia, Swaziland, and Zimbabwe) on knowledge status of safety signs and labels of chemicals showed that on average, 81% of the employees knew warning symbols of toxic, 14% corrosive, 14% harmful, 67% flammable, 0% oxidizing, and 19% explosive [16].

A study conducted on four different companies in Namibia showed that the employees were not trained in chemical safety including procedures and measures to prevent exposure during mixing and application of chemicals. Employees were only familiar with trade names of the

chemicals and knowledge of the intrinsic hazards with the chemicals was minimum to non-existent among employees.

Almost all employees interviewed were not aware of material safety data sheets of the chemicals. In cases where the safety data sheets were available, only employers representatives were aware of them. Employees felt they should have access to material safety data sheets on all chemicals. Of the employees interviewed, an average of 90% employees could correctly identify two of the hazard symbols, particularly the "toxic and flammable" symbols. The symbol for harmful was invariably identified as "No Entry, Red Cross or Railway Crossing" signs. The majorities of employees were illiterate and cannot read or write especially in English[16].

Similar study in Swaziland describe that the majority of employees interviewed could identify warning symbols relating to "toxic and flammable" and in a number of cases the symbols for "harmful" was identified to mean "No Entry or Red Cross" signs. All employees could not identify the symbols for oxidizing substances[16].

Loewenson et al reported in 1992 that of the 100 employees interviewed, the majority of employees could not put the Zimbabwe warning symbols in the correct order. However, the employees had a high recognition level of "toxic" (90%) and "flammable" (69%) international symbols and the "harmful" symbols had the lowest recognition (15%). The above table shows that the levels of recognition of the warning symbols ranged from 81% to 67% for both "toxic and flammable" and "oxidizing" having zero and the lowest recognition[16].

Except few major, reputed, public and private industries, other industrialists are not sensitized about the importance of occupational safety in their industries. In another public sector industry, Indian Oil Corporation limited, prevalence of work related injuries are 35% among all injuries reported in their hospital and burn injuries were about 6% of all injuries[17]. Inadequate information and the lack of education and training, about workplace safety and health greatly concern workers. The culture and attitudes of workers, supervisors, and companies about health and safety often disregard risk taking and unsafe work practices, passing "bad" habits from one generation of workers to the next. A study by national institute of occupational safety and health (NIOSH) showed that 31% of the workers at times they are assigned a task at first they are not sure how to do it[18].

Studies by NIOSH and the U.S. Department of the Army found that most tools, equipment, and clothing were not designed for a women's physique. When asked if they could easily find protective clothing to fit, 46% of women in the second NIOSH said "no" with respect to work shoes and 41% with respect to finding work gloves. One survey of manufacturers of protective equipment, taken at a National Safety Council Annual meeting, found that only 14 percent offered ear, head, and face protection in women's sizes. The highest percentage, 59 percent, was manufacturers who offered foot protection in women's sizes[18].

Different studies conducted in different areas showed that factors like, lack of any safety training, or had no training specific to their job needs, “policy/action lapses" are used to address training gaps after injury occurrence. The "inexperience factor" was included in the listing insofar as it warrants even greater concern for adequate training. Entries here show that from 22% to as many as 78% of the affected workers had no more than 1 year's experience at the time of injury; for several categories more than 15% were injured within the first 6 months at the job[19].

Zohar, Cohen & Azar (1980) undertook a program to promote awareness of the damaging effects of noise on hearing among workers who were at risk and to increase their motivation to wear ear protection. Use of the protectors minimized such loss and the audiograms of those who routinely wore protection were posted along with those who didn't to show the benefits of the protection.

The nonusers' audiograms showed profound permanent hearing losses which further accentuated the program's end goals. This approach yielded a 50% increase in ear protector usage[19].

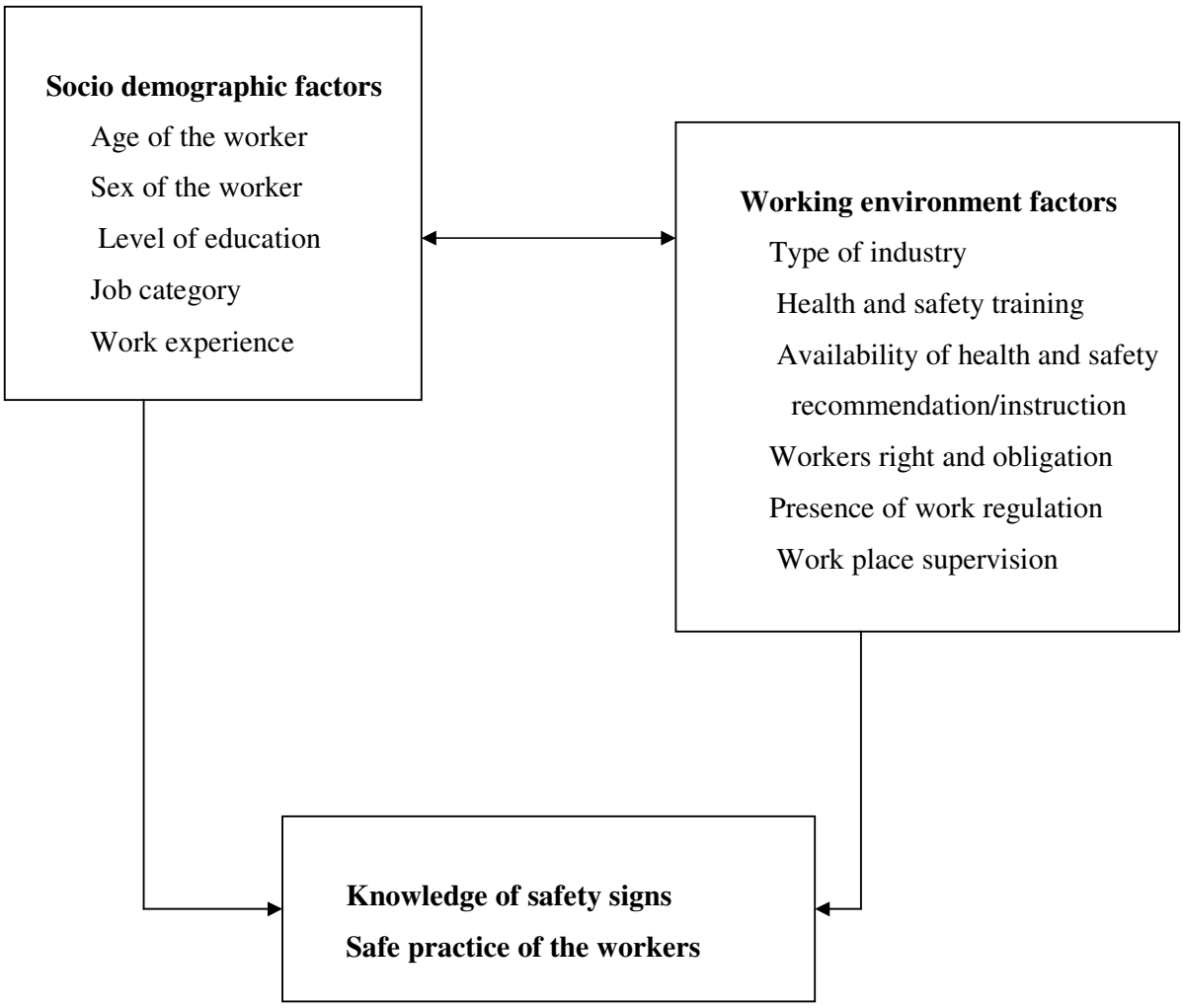
Reber & Wallin (1984) divided the 11 plant departments that accounted for 95% of the company's injury reported into 3 groups. One group received safety training only; another, training plus goal setting; and the third, training plus goal setting plus feed-back according to a staggered schedule. Results showed that workers could identify over 80% of the safe and unsafe conditions at the midpoint of the training and that training, goal setting, and feedback were each found to increase the frequency of observed safe behaviors. Adding feedback to goal setting provided the greatest increase in safety performance[19].

Saarela (1990) used a small group approach for effecting improved housekeeping practices in a shipyard where poor housekeeping was implicated in about one-third of the injuries reported. A steering committee of top management plus safety staff provided information and the basic aims of the program. Overall, there was a 20% reduction in injuries associated with housekeeping during the intervention year[19].

Safe practice was positively associated with being informed of safety precautions and being supplied with chemical information by supervisors or as health and safety training26.Sspesfic safety information related directly to workers' job and work place would likely be more relevant in improving safe practice than the general knowledge about industrial chemicals or safety signs26.

Although there are not national wide studies that describe the burden of injuries related to their work some studies done in different parts of the country showed that there was high prevalence of occupational injuries. A study done in North Gondar zone on small and medium scale industry workers showed 335/1000 and 324/1000 injury rates respectively[24]. Other study done in Addis Ababa, urban factory of Ketena one and Akaki textile factory showed 80 accidents per 1000 workers and 200 incidents per 1000 workers respectively [29, 30]. A study done in Tendaho Agricultural Development, Afar region, showed that783 per 1000 workers were injured in relation to their work. Working more than 48 hours per week, absence of health and safety training, and absence of PPD were the significant factor to the occupational injury [31]. Another study done in Jimma showed that the majority of the workers have no health and safety education and only 40.2% used PPD[32]. Similarly the study done in Akaki textile factory showed that 86.1% and 87.4% of the workers had no health and safety training and not used PPD respectively[30]. Therefore, to design intervention method and alleviate this work related problems, it is worth to assess the knowledge and practice of workers on safety information.

Figure 1: Conceptual frame work for the study of knowledge and practice on safety information



3. OBJECTIVES

3.1. General objective

The general objective of the study was to assess the knowledge and practice of factory workers on occupational safety information.

3.2. Specific Objectives

- **To assess the knowledge of workers on safety labels, signs, pictograms, symbol.**
- **To assess the practice of workers on safety guidelines and personal protective device.**
- **To describe safety features affecting knowledge and practice on safety information.**

4. MATERIALS AND METHODS

4.1. Study design

A descriptive cross-sectional study was conducted to assess the knowledge level and practice of the workers on safety information.

4.2. Study area and period

The study was conducted in Ethiopian Iron and Steel Factory and Kality Metal Product Factory both of which are found in Addis Ababa city in March 2007. Each factory has its own work characteristics. The Ethiopian Iron and Steel factory was established in 1945 and has 365 total permanent workers with 332 males and 33 females. The Kality Metal Product Factory was established in 1968 and has 286 males and 49 females totally 335 permanent workers. The Ethiopian Iron and Steel factory has five different working sections, namely: melting room, rolling mill room, scraping section, wire production room, and nail production room. On the other hand, Kality Metal Product Factory has three departments such as manufacturing section, construction section, and maintenance section. As the final product Kality Metal Product Factory produces rectangular hollow section, circular hollow section, blue section, angle iron, omega, plate iron, LGZ-28, and secoprofile. The Ethiopian Iron and Steel factory produces different sizes of iron bars, fencing net, barbed wire, bed spring, and different size nails. Each factory has different kinds of hazard exposures and health problems that will be resulted from the working environment and their activities.

4.3. Source population

All the workers in the selected industries were considered as a source population and the required sample size were drown from this population.

4.4. Study population

The selected samples in the two industries were considered as the study population and all the require information were collected from these population.

4.6. Sample size determination

The sample size were determined using a single proportion formula taking proportion of 50% knowledge, a conservative estimate to obtain a large sample size at 95% certainty and a maximum discrepancy of 5% between the sample and the underline population.

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

Where, n = sample size

p = workers knowledge proportion (50%)

Z = standard normal distribution curve value for the 95% confidence interval (1.96)

d = the margin of error or accepted error

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2}$$

n = 384 persons.

With 10% contingency of the non-response rate, the total sample sizes were 422 persons.

4.5. Sampling technique

The two industries were purposely selected in the assumption of time and financial constraints to account the whole industries in the city and no other descriptive studies that showed any variation in their working characteristics. In addition, most safety information through out the

world in work areas are identical and the work related accidents are assumed to be higher in these factories since there are difficult work activities.

A stratified random sampling technique that considered a fair representation of all workers in the two industries was employed. The study samples that have been determined in the sample size determination technique were distributed in the two industries fairly according to their worker number proportion. Workers registrations were used as sampling frame. To select the study subject the total number of workers in each industry were categorized in to administrative and product workers and further the product workers were grouped in to sections and the study subjects were drown according to their number proportions.

To determine sampling interval and select the first subject, the total number of workers was divided to the total sample size and the first person was selected by lottery method and follow the already determined sequences.

4.7. Data collection technique

4.7.1. Quantitative part

Using tools such as structured questionnaire, different safety signs, and observational checklist were used to collect the required quantitative information. The questionnaire was first developed in English and then translated in to Amharic and back to English by different persons to check its reliability and validity. Five percent of the questionnaires were tested in other factory workers for the accuracy and validity and the necessary adjustments were done prior to the actual study time.

The English version questionnaire, which was translated to Amharic version, has three parts: the socio demographic character, the knowledge, and the practice of the workers. The data was collected by diploma graduates after have been given a thorough training.

Ten data collectors and two supervisors were participating to conduct the interview. The investigator was use the checklist to collect working environment related factors like presence of safety signs at the required position, emergency alarms, and fire extinguishers, is the working place is free of electrical hazards, and is the corridors are

free to move easily. A day to day supervision was under taken during the whole period of data collection. At the end of each day, the questionnaire were revised and checked for completeness and consistency.

4.7.2. Qualitative part

Focus group discussions (FGD) were conducted during the study period to generate more detailed information and those issues missed by quantitative methods concerning their knowledge and practice on the occupational health and safety. There were a total of two FGDs with eight participants in Kality metal product factory group and ten participants in Ethiopian iron and steel factory group. Settings were arranged with privacy and comfortable locations. The principal investigator was moderate the FGD and non- probability purposive sampling were employed to select the potential participants. The principal investigator was free of information bias, which is to mean that he was not leading the participants towards his desire. Semi structured discussion guide lines was used to under go the discussion. Two rap porters were record the whole issues while the participants are discussing.

4.8. Study variables

4.8.1 Independent variables

Socio-demographic variables:

Age

Sex

Educational status

Work experience

Work environment variables:

Health and safety training

Workers right and obligation

Safety recommendations

Availability of personal protective equipments

Presence of supervision

4.8.2 Dependent variables

Knowledge of safety signs

Safe practice of the workers

4.13. Operational Definitions

Knowledge means assessment of what the individual/worker knows about safety information (labels, symbols, signs, pictograms, guidelines, manuals) used as indication to describe the safe activity in the work place.

Practice means assessment of respondents what they are actually practicing prior to the study.

Safety means the state for which the risks are judged to be acceptable.

Incidents mean all hazard related events that have been referred to as accidents, mishaps, near misses, occupational illnesses, environmental spills, loses, fires, explosions.

Safety and/or health at work signs means signs referring to a specific object, activity or situation and providing information or instructions about safety and/or health at work by means of a signboard, a colour, an illuminated or acoustic signal, a verbal communication or a hand signal, as the case may be.

Warning sign means a sign giving warning of a hazard or danger.

Emergency escape or first-aid sign means a sign giving information on emergency exits or first-aid or rescue facilities.

Information sign means a sign providing information to any person in the work area to perform any activity or movement safely.

Hand signal means a movement or position of the arms or hands, in coded form, for guiding persons who are carrying out maneuvers, which constitute a hazard.

4.9. Data quality control

At the beginning emphasis was given in designing data collection tools (questionnaire and checklist). The principal investigator and supervisors were making a day to day on site supervision on the data collection how to handle the questionnaire. At the end of each day, the

questionnaires were checked for completeness and consistency and were submitted to the principal investigator, and corrective discussion was undertaken through meetings with all the data collectors, supervisors, and the principal investigator.

Pre test was conducted in other similar industries to check the accuracy and validity of the questionnaire prior to the actual study period. Five percent (5%) of the questionnaire were tested for their accuracy and the necessary adjustment was made accordingly.

4.10. Data analysis

The data collected from the field was entered after being encoded and analyzed using Epi info version 6.04d and Statistical Package for Social Science Studies (SPSS) version 13. Any logical and consistency error identified during data entry were corrected after revision of the original completed questionnaire. The cleaned and edited data was ready for appropriate statistical analysis. The mean, standard deviation and the proportion of the variables were done. Logistic regression analysis (LRA) extends the techniques of multiple regression analysis to research situations in which the outcome variable is categorical. So logistic regression method was used to measure how the out come variables (knowledge of safety sins and safe practice of workers) were depend on the covariate variables (working environment & socio demographic variables). The result of the analysis was presented using tables, charts and graphs.

4.11. Ethical considerations

Ethical clearance was obtained from Addis Ababa University Medical Faculty. Factory managements were informed and consent obtained. Informed consent was obtained from respondents who were participating in the study. Confidentiality was maintained by omitting their names and personal identification or privacy.

4.12. Dissemination and utilization of result

The result of the study will be disseminated or/and communicated to Addis Ababa University Faculty of Medicine Department of Community Health, the factories, Ministry of Labour and Social Affairs and publications. Further more the study finding will be addressed to the people through publication.

5. Results

5.1. Socio-demographic characteristics

A total 417(98.55%) respondents were interviewed. The majority of the respondents 374(89.7%) were males. Respondents' age ranged from 18 to 60 with the median of 40. The

mean (standard deviation) age of the respondents was 39.56± (11.08). The majority, 119 (29%) were in 40-49 age group.

The dominant religion in the study area was Orthodox Christian 362(86.8 %) followed by Muslim 35(8.4%).

Two hundred seventy three (65.6%) of the respondents were married, 136 (32.6%) were single, and 8(1.92%) were widowed.

The educational levels of the study subjects was 15 (3.6%) illiterate, 15 (3.6%) can read and write, 132(31.7%) complete elementary school (1-8) , 133(31.9%) complete high school (9-12), 40(9.6%) certificate, and 82(19.66%) were diploma and above(Table 1).

From the total respondents three hundred ninety seven (95.3%) were production workers and 20(4.7%) were white collars or administrative staffs. Three hundred twenty nine (78.9%) were permanent workers and the rest eighty eight (21.1%) were temporary or contractual workers.

The majority of the study subjects were found in 21 to 30 service year group, 135 (32.4%), followed by 0 to 5 service year group which accounts 127(30.45%)

Table 1 Distribution of socio-demographic characteristic of the respondents, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007, (n=417).

Variable	number	%
Sex:		
Male	374	89.7
Female	43	10.3
Age:		
18-29	97	23.26

30-39	99	23.74
40-49	122	29.25
50+	99	23.74
Religion:		
Orthodox	362	86.8
Muslim	35	8.4
Protestant	17	4.1
Catholic	3	0.7
Marital status:		
Married	273	65.5
Single	136	32.6
Widowed	8	4.7
Educational label:		
Illiterate	15	3.6
Can read and write	15	3.6
Elementary school (1-8)	132	31.7
High school (9-12)	133	31.9
Certificate	40	9.6
Diploma	74	17.7
Degree and above	8	1.9
Service years		
0 -5	127	30.45
6 -10	46	11.0
11-20	77	18.5
21-30	135	32.4
30+	32	7.7

5.2. Knowledge on occupational health and safety information

From the total study subjects two hundred ninety (69.5%) knew the presence of different kinds of occupational health and safety information where as the rest one hundred twenty seven (30.5%) of the respondents never heard about it. Among 290 respondents, who have knowledge about occupational health and safety information, 265 (63.5%) knew about danger sign, 171 (41.0%) knew warning sign, and 8 (1.9%) knew about corrosive sign.

Fifty four (12.9%) respondents knew exit signs, fifty four (12.9%) respondents knew flammable sign, 53 (12.7%) knew harmful sign, 10 (2.4%) irritant sign, and 19(4.6%) knew

explosive sign. Thirty (7.2%) study subjects knew about oxidizing sign and the rest twenty three (5.5%) and one hundred fifty two (36.5%) respondents knew about toxic and high voltage or electrical risk signs respectively (Table 2).

Table 2: The knowledge level of respondents on safety information, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007, (n=417).

Safety sign/symbol	(n)	%
1. Danger signs		
Yes	**265**	**63.5**
No	**25**	**6.0**
2. Warning signs		
Yes	**171**	**41.0**
No	**119**	**28.5**
3. Corrosive		
Yes	**8**	**1.9**
No	**282**	**67.6**
4. Exit signs		
Yes	**54**	**12.9**

No	**236**	**56.6**
5. Flammable		
Yes	**54**	**12.9**
No	**236**	**56.6**
6. Harmful signs		
Yes	**53**	**12.7**
No	**237**	**56.8**
7. Irritant		
Yes	**10**	**2.4**
No	**280**	**67.1**
8. Explosive		
Yes	**19**	**4.6**
No	**271**	**65.0**
9. Oxidizing		
Yes	**30**	**7.2**
No	**260**	**62.4**
10. Toxic		
Yes	**23**	**5.5**
No	**267**	**64.0**
11. High voltage/ electrical risk		
Yes	**152**	**36.5**
No	**138**	**33.1**

Among the respondents three hundred fourteen (75.3%) knew fire class A, three hundred twenty four (77.7%) knew fire class B, and 245 (58.8%) knew fire class C, and lastly 149 (35.7%) of the interviewees knew about fire class D (Figure 1).

Three hundred fifty eight (85.9%) respondents believed that different kinds of occupational health and safety signs or symbols should present and labeled at the different area of the working environment.

Figure 2: The knowledge status of the respondents on fire classes, Kality Metal Product and Ethiopian Iron and Steel factories, March 2007.

Table3: Workers who get training in relation to their source of trainer, Kality metal product and Ethiopian iron and steel factories, March 2007.

Trainers	Number	Percent
Health professionals		
Yes	61	14.6
No	375	89.9

Experienced workers		
Yes	173	41.5
No	44	10.6
Material or machine producer or seller organizations		
Yes	24	5.8
No	194	46.5

The majority of the study participants who got health and safety training, 173 (41.5%) were trained by experienced workers in the factory, 61(14.6) were by health professionals, and 24(5.8%) respondents were trained by machine producer or seller organizations (Table 3).

From the study subjects who responded as they knew different occupational health and safety signs, 59 (20.3%) got the knowledge from their higher education training, 72(24.8%) from the factories training, and 192 (46.0%) did get from their work experiences.

5.3. Personal protective device usage practice of workers

The majority of the respondents 269 (75.35%) used over alls followed by gloves 298 (71.5%). Two hundred one respondents (48.2%) used boots, 80 (29.52%) used earplug, 77 (35.16%) used goggles (Figure 2).

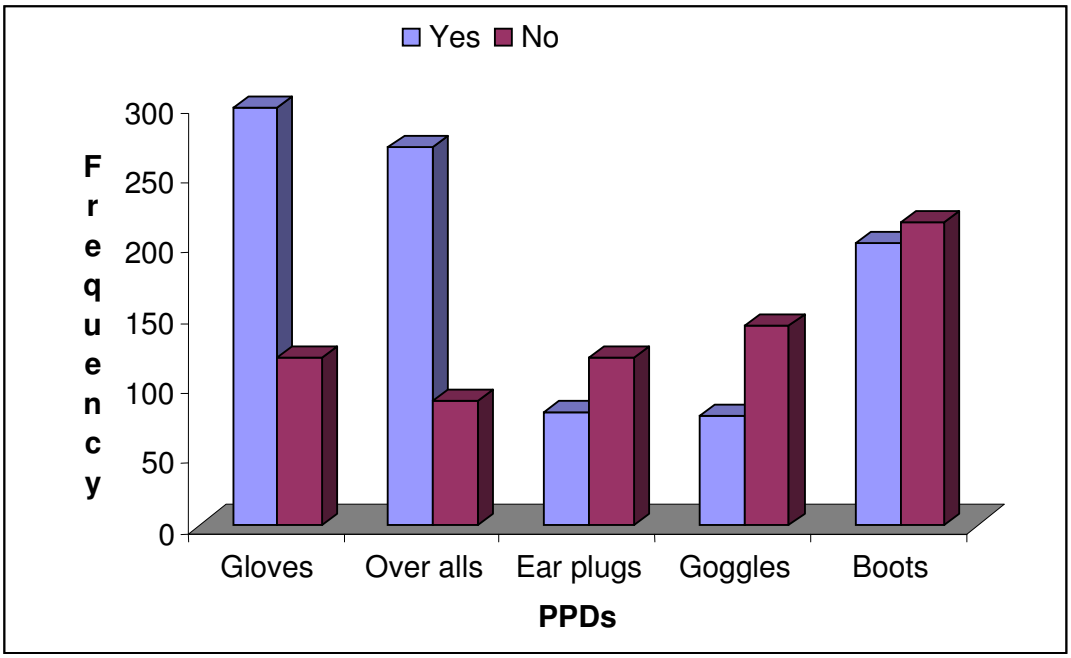


Figure 3: Personal protective device utilization characteristics of the workers, Kality Metal Product and Ethiopian Iron and Steel factories, March 2007.

From the total study subjects, 218 (52.3%) respondents had training on different occupational health and safety information in the last 12 months and of these trained workers 201 (92.2%) responded as they applied practically what they have been trained. From the workers who participated in the study 261 (62.6%) can implement fire extinguishers whenever there is fire accidents.

5.4. Work environments or safety measure features

Almost all the study participants, 410(98.3) have been at their work site for 40 hours per week. Five (1.2%) workers spent more than 40 hours per week on work and the rest two (0.5%) spent less than 40 hours per week.

Four hundred six (97.4%) participants knew the presence of workers right and obligation in working areas where as the rest 11(2.6%) of the study subjects did not know about it. From the total respondents, 151 (36.2%) answered that there were supervision in the last 12 months by different bodies and 266(63.8%) responded as they did not seen such activity.

Two hundred fourteen (51.3%) respondents explained that different kinds of health and safety recommendations were encountered in their working areas by their immediate supervisors or written labeled.

5.5 Qualitative Findings

5.5.1. Focus group discussion (FGD)

5.5.1.1. Knowledge of safety signs

It is impossible to say that workers have knowledge about safety signs and symbols, because they mentioned during their discussion time that no training was given to the workers, no displayed signs and symbols or written materials in each working sections. There is only one precaution sign which is very old and covered by dust and most of the discussion members described as they did not know its use. Some participants said that few workers knew some safety symbols and labels, for example, danger sign, precaution sign are known by some of the workers. As stated by one worker, the cylinder that contains oxygen gas is blue in colour, while the cylinder that contains acetylene is rose in colour, but it does not mean that all workers know it (Ethiopian iron and steel factory).

5.5.1.2. Safe practice of workers on safety features

They stated that safety signs or symbols should present in all working sections because if they were there, workers could kept themselves before the problem occurred. Personal Protective Devices (PPD) are very necessary especially for factory workers but in these factories especially, for temporary or contract workers, no any protective devices, even for those permanent workers only glove and over coat were given. Training is very important and necessary and workers need it, but there was no any training, because the administrative staffs

are very careless or negligent for production workers. Therefore, because of both reasons that was shortage of PPDs and absence of training on health and safety issues, workers practice on the PPDs usage and safety procedures were poor.

5.5.1.3. Environmental and socio-demographic settings

The focus group discussion members have raised the following issues during their discussion time. For example, in Kality metal product factory no occupational health and safety committee, no trainings were given to the workers when they were newly employed or as refreshment. In some working sections, there was no even a simple safety signs or labels that alert the worker before problems have been occurred. As an example, in the maintenance section there was sulfuric acid for the car battery, but on the container there was no any label or descriptions that mentioned the substance. Occupational injuries mostly occurred on night shift workers. The frequencies of the injuries were not high but when it happened, it was very dangerous. For example, in the manufacturing section, one worker failed and was absent from work for three months and one worker has been cut his fingers. As it has been mentioned by most of the discussion members repeatedly, no any occupational health and safety committee in the factory to teach the workers on safety information as well as methods of prevention before the health problem was coming. Except very few safety signs that displayed on certain machines, no signs and symbols. Therefore, there were conditions in which injuries occurred on some gusts that came for supervision.

5.5.2. Observation findings

1. Manufacturing room (Kality metal product factory)

- No emergency exit signs.
- Fire extinguishers were present and easily accessible, but there were no fire alarms.
- Stair ways were kept free of obstructions and were not used as storage for other materials.

- Work areas were free of electrical hazards: no exposed wiring, damaged electrical cords, or unsafe use of extension cords.
- Since there is no dust particle, there were no hoods but there was a slip hazard resulted from the leakage of milky lubricant oils that used in the working room.
- Some hazard signs like: high voltage/electrical risk, falling risk, not allowed to pedestrian, and general safety are posted at the machines, but there is no other sign or written materials. The above mentioned signs are easily visible.
- All the workers were use over alls, gloves.
- Personnel are not familiar with applicable material safety data sheet.

2. Construction room (Kality metal product factory)

- No emergency exit signs.
- Fire extinguishers were present, and easily accessible, but there were no fire alarms.
- Corridors and stair ways are not used for storage of materials, but some immediate products were there in the working area.
- Electrical cables joined from the socket and extended to the welding site are considered as some obstruction and there were exposed nuts at the socket that may result in electrical hazards.
- The floor is dry, but not clean, it is dusty and unorganized.
- There is no a hazard sign or symbols except the general safety sign that indicate the workers to use eye protective device while they are welding.
- The workers used over coat, glove, and eye protective device.
- Personnel are not familiar with applicable material safety data sheets.

3. Maintenance room (Kality metal product factory)

- No emergency exit symbols are listed.
- There was fire extinguisher but not found at the reasonable place, because it was simply at the floor with other materials, there were no fire alarms.
- The working places were kept free, but the room that used as an office was full of many unlabeled materials, chemicals, and greases and oils.
- Working areas were free of electrical hazards.

- The floor was free and no slip hazard.
- No any hazard sign/symbols were posted in the maintenance section.
- Workers used over coats.
- Personnel were not familiar with applicable material safety data sheets.

2. Ethiopian Iron and Steel factory

- In all the working rooms that are rolling mill, melting section, wire production section , nail production section, and at the open environment at which scraping was done there were no any safety signs/symbols and/or written precautions that give information on occupational health and safety.
- The working sections as well as the general environment of the factory were very unsightly, not properly organized. Especially, melting section, rolling mill and scraping areas were very crowded with different metal products and waste metals that used as the raw materials for melting.
- Workers used over coats, gloves, and boots, but the workers at the melting process used eye protective glass.
- Personnel were not familiar with applicable material safety data sheets.
- The general working environment of the factory is an emergency prone environment.

5.6. Bivariate analysis

5.7.1. Knowledge of safety signs in relation to socio-demographic and work environment characteristics

Socio-demographic variables such as sex, age, educational level, job category, employment pattern, and work experience of the study subjects were assessed to saw the presence of association between them and the knowledge level. The Odds Ratio (OR) was calculated for the variables to compare the relative knowledge levels of those who have the information with that of have not the same information. Educational level, job category, and work experience of the workers were significantly associated with occupational health and safety sign knowledge.

Production workers were more likely to have higher knowledge level than the administrative staffs [OR: 1.727(1.046, 2.851)]. It was also true for workers who had work experience of five and above years compared to those who had the work experience of less than five[OR: 1.845(1.163, 2.926)] (Table 4).

Sex, age, and employment of the study subjects did not show any significant association with the knowledge level.

Variables such as health and safety training, and presence of supervision did not show significant association with the knowledge of the workers.

Type of factory, occupational health and safety recommendation, and workers right and obligation were significantly associated with the knowledge of safety signs.

Table 4: Selected socio-demographic characteristics related to knowledge of safety signs, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007 (n=417).

Variables	Knowledge		
	Yes	No	
	n (%)	n (%)	Crude OR (95% CI)
Sex			
Male	263(70.3)	111(29.7)	1.404(0.728, 2.708)
Female	27(62.8)	16(37.2)	1.00
Age			
18-29	70(72.2)	27(27.8)	1.00
30+	220(68.8)	100(31.3)	0.849(0.513, 1.403)
Educational level			
Illiterate	10(66.7)	5(33.3)	0.523(0.158, 1.735)

Can read and write	183(65.4)	97(34.6)	0.536(0.299, 0.959)*
Diploma and above	97(79.5)	25(20.5)	1.00
Job category			
Productive workers	241(71.9)	94(28.1)	1.727(1.046, 2.851) *
Administrative staffs	49(59.8)	33(40.2)	1.00
Employment pattern			
Permanent	227(69.0)	102(31.0)	0.883(0.526, 1.484)
Temporary/contractual	63(71.6)	25(28.4)	1.00
Work experience			
<5	176(65.2)	94(34.8)	1.00
5+	114(77.6)	33(22.4)	1.845(1.163, 2.926) **

** Significant at p-value <0.01, * significant at p-value <0.05.

Table 5: Work environments related to knowledge of occupational health and safety signs, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007 (n=417).

Characteristics	Knowledge		
	Yes	No	
	n (%)	n (%)	Crude OR (95% CI)
Type of factory			
Kality metal product factory	149(79.3)	39(20.7)	2.384 (1.533, 3.709) ***
Ethiopian Iron and Steel factory	141(61.6)	88(38.4)	1.00
Occupational health and safety training			
Yes	151(69.3)	67(30.7)	0.973(0.641, 1.477)
No	139(69.8)	60(30.2)	1.00
Occupational health and safety recommendation			

Yes	170(79.4)	44(20.6)	2.672(1.732, 4.124) ***
No	120(59.1)	83(40.9)	1.00
Workers right and obligation			
Yes	282(69.5)	124(30.5)	0.853(0.223, 3.269)
No	8(72.7)	3(27.3)	1.00
Presence of supervision			
Yes	110(72.8)	41(27.2)	1.282(0.825, 1.993)
No	180(67.7)	86(32.3)	1.00

*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.

Study subjects who worked in Kality metal product factory were 2 times more likely to know safety signs compared to those who worked in Ethiopian iron and steel factory[OR: 2.384(1.533, 3.709)].

Respondents who have faced different occupational health and safety recommendations at their work sites were about 2 times more likely to know safety signs than who did not[OR: 2.672(1.732, 4.124)]. And workers who knew the presence of workers right and obligation were 2 times more likely to know safety signs than who did not know (Table 5).

5.7.2. Personal protective device usage practice in relation to socio-demographic and work environment characteristics

Similar to the knowledge level, the analysis were done for selected personal protective device usage practice of the workers in relation to socio-demographic and work environment characteristics.

Comparison between those who used the glove and who did not was made for socio-demographic characteristics and sex, educational level, and employment pattern were significantly associated with glove usage but not work experiences.

Male participants were 6 times more likely to use glove than females [OR: 6.610(3.346, 13.058)]. Those who can read and write used the glove more than about 4 times compared to those who have educational levels of diploma and above[OR: 4.620(2.896, 7.370)].

From the work environment variables, type of factory and health and safety training were significantly associated. Health and safety recommendation, workers right and obligation, and presence of supervision did not show significant association with glove usage practice of the workers (Table 6).

Table 6: Selected socio-demographic and working environment characteristics related to glove usage, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007 (n=417).

Variables	PPD usage		
	Yes	No	
	n (%)	n (%)	Crude OR (95%CI)
Sex			
Male	284(75.9)	89(23.8)	6.610(3.346, 13.058) ***
Female	14(32.6)	29(67.4)	1.00
Educational level			
Illiterate	10(66.7)	5(33.3)	2.067(0.667, 6.402)
Can read and write	228(81.4)	51(18.6)	4.620(2.896, 7.370) ***
Diploma and above	60(49.2)	62(50.8)	1.00
Employment pattern			
Permanent	225(68.7)	103(31.3)	2.228(1.220, 4.070) **
Contractual	73(83.0)	15(17.0)	1.00
Work experience			
0-5	198(73.3)	72(26.7)	1.00
>5	100(68.0)	46(31.3)	0.791(0.508, 1.229)
Type of factory			
KMPF	124(66.0)	64(34.0)	0.601(0.391, 0.924) **
EISF	174(76.0)	54(24.0)	1.00

Health and Safety training			
Yes	146(67.0)	72(33.0)	0.636(0.412, 0.980)*
No	152(76.4)	47(23.6)	1.00
Health and safety recommendation			
Yes	154(72.0)	59(28.0)	1.069(0.698, 1.638)
No	144(70.9)	59(29.1)	1.00
Workers right and obligation			
Yes	292(71.9)	114(28.1)	2.153(0.644, 7.196)
No	6(54.5)	5(45.5)	1.00
Presence of supervision			
Yes	102(67.5)	49 (32.5)	0.759(0.490, 1.176)
No	196 (73.7)	70 (26.3)	1.00

*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.
KMPF = Kality Metal Product Factory.
EISF = Ethiopian Iron and Steel Factory

Boots usage practice of the study subjects were assessed in relation to socio-demographic and work environment characteristics. From the socio-demographic variables sex, educational level, and employment pattern were significantly associated with boots usage practice of the workers [OR: 10.913(3.821, 31.152), [OR: 2.914(1.853, 4.582)], and [OR: 10.874(5.433, 21.766)] respectively but did not work experience.

For work environment variables except the presence of supervision the others were significantly associated with boots usage practice of the workers. Respondents who knew the presence of workers right and obligation were 9 times more likely to use boots compared to who did not know [OR: 9.756(1.237, 76.917)] (Table 7).

Table 7: Selected socio-demographic and working environment characteristics in relation to boots usage, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007(n=417).

Variables	PPD usage		
	Yes	No	
	n (%)	n (%)	Crude OR (95%CI)
Sex			
Male	197(52.7)	177(47.3)	10.913(3.823, 31.152) ***
Female	4(9.3)	39(90.7)	1.00
Educational level			
Illiterate	8(53.3)	7(46.7)	2.625(0.887, 7.773)
Can read and write	156(55.7)	124(44.3)	2.914(1.853, 4.582) ***
Diploma+	37(30.3)	85(69.7)	1.00
Employment pattern			
Permanent	191(58.0)	138(42.0)	10.874(5.433, 21.766) ***
Temporary/contractual	10(11.4)	78(88.6)	1.00
Work experience			
0-5	123(45.6)	147(54.4)	1.00
>5	78(53.1)	69(46.9)	1.342(0.897, 2.008)
Type of factory			
KMPF	75(39.9)	113(40.1)	0.547(0.370, 0.810) ***
EISF	126(55.0)	103(45.0)	1.00
Health and Safety training			
Yes	112(56.0)	96(44.0)	1.914(1.296, 2.828) ***

No	79(39.7)	120(60.3)	1.00
Health and safety recommendation			
Yes	128(59.8)	86(40.2)	2.630(1.770, 3.909) ***
No	73(36.0)	130(67.0)	1.00
Workers right and obligation			
Yes	200(49.3)	205(50.7)	9.756(1.237, 76.917) *
No	1(9.1)	10(90.9)	1.00
Presence of supervision			
Yes	74(49.1)	77 (50.9)	1.044(0.700, 1.558)
No	127(47.9)	138 (52.1)	1.00

*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.
KMPF = Kality Metal Product Factory.
EISF = Ethiopian Iron and Steel Factory

5.8. Multivariate analysis

The multivariate analysis was done for both the knowledge level and personal protective device usage practice of the study subjects.

Logistic regression technique by Enter method was used hierarchically to assess the relative effect of socio-demographic and work environment characteristics on the out come factors, which are knowledge level and personal protective device usage practice. Variables that have p-value greater than 0.25 in the first step were omitted in the second step to avoid instability of the results[27].

In the first step, the effect of work environment factors on the knowledge level was assessed. Then, socio-demographic characteristics were included and their effect was seen in the presence of work environment factors. The ways of analysis were similar for both knowledge level and personal protective device usage practices.

Variables such as health and safety training, workers right and obligation, and presence of supervision entered in the first step of the analysis did not show significant association with the knowledge level. Type of factory and safety recommendation showed significant association in both first and second steps to the knowledge level of the respondent with [OR:

1.854(1.138, 3.021)], [OR: 2.267(1.420, 3.612)] firs and [OR: 2.394(1.439, 3.984)], [OR: 1.988(1.203, 3.287)] second steps respectively.

From socio-demographic factors that were added in the second step, sex, educational level, and work experience were significantly associated with knowledge [OR: 2.398(1.169, 4.922)], [OR: 0.464(0.247, 0.874)] and [OR: 1.934(1.178, 3.174)] respectively.

Age, employment, and job category did not show significant association (Table 8).

Table 8: Summary of hierarchical logistic regression analysis of the relative effects of socio-demographic and work environment variables on knowledge, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007.

Variables	Crude OR (95%CI)	Adjusted OR (95%CI) Model 1	Model 2
Model 1- Working environments/safety features			
Type of factory (KMPF Vs EISF [RG])	2.384 (1.533, 3.709) ***	1.854(1.138, 3.021)**	2.394(1.439, 3.984)***
Occupational health and safety training (Yes Vs No [RG])	0.973(0.641, 1.477)	0.804(0.514, 1.257)	1.006(0.630, 1.607)
Occupational health and safety recommendation (Yes Vs No [RG])	2.672(1.732, 4.124) ***	2.267(1.420, 3.612)***	1.988(1.203, 3.287)**
Workers right and obligation (Yes Vs No [RG])	2.672(1.732, 4.124) ***	0.851(0.212, 3.409)	
Presence of supervision (Yes Vs No [RG])	1.282(0.825, 1.993)	0.987(0.608, 1.601)	
Model 2- Working environments/setting + Socio-demographic characteristics			
Sex (Male Vs Female [RG])	1.404(0.728, 2.708)		2.398(1.169, 4.922) **
Age (30+ Vs 18-29[RG])	0.849(0.513, 1.403)		1.060(0.484, 2.323)
Educational level (Illiterate Vs diploma+ [RG])	1.940(0.608, 6.189)		0.121(0.016, 0.923)*
(Read and write Vs			

diploma[+ RG])	2.057 (1.243, 3.404) **	0.464(0.247, 0.874) **
Employment pattern (Permanent Vs temporary [RG])	0.883(0.526, 1.484)	0.489(0.208, 1.152)
Job category (Productive Vs administrative [RG])	1.727(1.046, 2.851) *	1.462(0.796, 2.686)
Work experience (>5 Vs 0-5 [RG])	1.845(1.163, 2.926) **	1.934(1.178, 3.174) **

RG: Reference group.
KMPF = Kality Metal Product Factory. EISF = Ethiopian Iron and Steel Factory
*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.

In the same manner, the work environment factors were assessed in the presence of socio-demographic factors for PPD usage practices. Type of factory, health and safety training and safety recommendation showed significant association in the first step and resist their association until the final step with glove usage practice of workers. Where as workers right and obligation and presence of supervision did not show significant association in the first step and omitted in the second step since their p-value were greater than 0.3(Table 9).

All the socio-demographic factors were entered in the second step and sex, educational level, and work experience showed significant association with glove usage practices of the respondents [OR: 2.706(1.072, 6.829)], [OR: 1.903(1.045, 3.467)], and[OR: 2.058(1.211, 3.501)] respectively.

It is similar for boots usage practices of the workers. Type of factory and safety recommendation maintained their significant association in both first and last steps. But workers right and obligation did not show significant association with boots usage practices of the workers in both steps. Health and safety training showed significant association in the first step even thought it could not resist the association in the last step.

From the socio-demographic variables, sex, educational level, and employment were significantly associated with [OR: 9.449(3.114, 28.674)], [OR: 3.287(1.722, 6.275], and [OR: 23.319(9.880, 55.039] respectively.

Work experience did not significantly associate with boots usage practice of the respondents (Table 10).

Table 9: Summary of hierarchical logistic regression analysis of the relative effect of socio-demographic and work environment variables on glove usage, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007.

Variables	Crude OR (95%CI)	Adjusted OR (95%CI) Model 1	Adjusted OR (95%CI) Model 2
Model 1 - Working environments/safety features			
Type of factory			
(KMPF Vs EISF [RG])	0.601(0.391, 0.924) **	2.868(1.661, 4.952)***	2.749(1.537, 4.915)***
Occupational health and safety training			
(Yes Vs No [RG])	0.636(0.412, 0.980)*	1.844(1.100, 3.092)**	1.970(1.146, 3.386)**
Occupational health and safety recommendation			
(Yes Vs No [RG])	1.069(0.698, 1.638)	2.587(1.482, 4.515)***	2.390(1.326, 4.308)***
Workers right and obligation			
(Yes Vs No [RG])	2.153(0.644, 7.196)	1.190(0.225, 6.290)	
Presence of supervision			
(Yes Vs No [RG])	0.933(0.583, 1.493)	0.787(0.464, 1.335)	
Model 2- Working environments/safety features + Socio-demographic characteristics			
Sex			
(Male Vs Female [RG])	6.610(3.346, 13.058) ***		2.706(1.072, 6.829) **
Educational level			
(Illiterate Vs diploma[+ RG])	2.067(0.667, 6.402)		0.617(0.129, 2.943)
(Read and write Vs diploma[+ RG])	4.620(2.896, 7.370) ***		1.903(1.045, 3.467) **
Employment pattern			
(Permanent Vs			

temporary [RG])	2.228(1.220, 4.070) **	1.082(0.461, 2.543)
Work experience		
(>5 Vs 0-5 [RG])	0.791(0.508, 1.229)	2.058(1.211, 3.501) **

RG: Reference group.
*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.
KMPF = Kality Metal Product Factory.
EISF = Ethiopian Iron and Steel Factory

Table 10: Summary of hierarchical logistic regression analysis of the relative effects of socio-demographic and working environment characteristics on boots usage, Kality Metal Product and Ethiopian Iron and Steel Factories, March 2007.

Variables	Crude OR (95%CI)	Adjusted OR (95%CI) Model 1	Adjusted OR (95%CI) Model 2
Model 1- Working environments/safety features			
Type of factory			
(KMPF Vs EISF [RG])	0.547(0.370, 0.810) ***	0.259(0.155, 0.433)***	0.140(0.073, 0.269)***
Occupational health and safety training			
(Yes Vs No [RG])	1.914(1.296, 2.828) ***	1.883(1.223, 2.898)***	1.412(0.835, 2.386)
Occupational health and safety recommendation			
(Yes Vs No [RG])	2.630(1.770, 3.909) ***	4.394(2.677, 7.214)***	4.945(2.689, 9.096) ***
Workers right and obligation			
(Yes Vs No [RG])	9.756(1.237, 76.917) *	7.444(0.888, 62.398)	3.919(0.362, 42.466)
Presence of supervision			
(Yes Vs No [RG])	1.044(0.700, 1.558)	1.015(0.640, 1.611)	
Model 2- Working environments/safety features + Socio-demographic characteristics			
Sex			
(Male Vs Female [RG])	10.913(3.823, 31.152) ***		9.449(3.114, 28.674) ***
Educational level			
(Illiterate Vs diploma+ [RG])	2.625(0.887, 7.773)		
(Read and write Vs diploma+ [RG])	2.914(1.853, 4.582) ***		3.287(1.722, 6.275) ***
Employment pattern			
(Permanent Vs temporary [RG])	10.874(5.433, 21.766) ***		23.319(9.880, 55.039)***
Work experience			
(>5 Vs 0-5 [RG])	1.342(0.897, 2.008)		1.390(0.8132, 0.375)

RG: Reference group.
*** Significant at p-value <0.001, ** significant at p-value <0.01, * Significant at p-value <0.05.
KMPF = Kality Metal Product Factory.
EISF = Ethiopian Iron and Steel Factory

6. Discussion

In this study, from the total study subjects 69.5% knew the presence of at least one safety sign. It showed that 63.5% of the respondents knew about danger sign and this was the highest figure of all the other signs recognized in this study.

The study indicated that 41.0% of the respondents knew about warning sign which was considerably lower as compared to the study conducted in Zimbabwe where 81% of the 100 respondents recognized the sign[16]. This might be due to the absence of safety signs at the work place as confirmed by the observational check list and focus group discussion prior to the study time.

In this study, only 1.9% of the respondents were aware about corrosive sign which was very minimal compared to the studies conducted in five different South African countries (Malawi, Lesotho, Namibia, Swaziland, and Zimbabwe) where their knowledge status on the mentioned sign was 14%[16]. Respondents had also less knowledge status on other safety signs such as flammable (12.7%), harmful sign (2.4%), explosive sign (4.6%), and toxic (5.5%) when compared to the above studies have knowledge levels of flammable (67.0%), harmful sign (14.0%), explosive sign (19.0%), and toxic (90.0%). Only on oxidizing sign have the respondents the reverse result, which was 7.2% in this study and zero percent in other similar studies[16].

This discrepancy might be explained by the fact that as confirmed by the check list result there was no any safety signs or symbols which were displayed or posted prior to the study time. It was also raised by focus group members during their discussion that there were no different safety signs, which enabled the workers to know safety information.

The questionnaire and observational check list results were consistent because the majority of the data collected by using these tools. Most of the time FGD participants were emphasized on administrative issues although they were below 5% of the study subjects.

Other possible explanation could be absence of health and safety training on safety signs during their firs time employment. More over the training given might not focus on health and safety issues or not be periodically.

Although there was no significance association between health and safety training and safety information knowledge level in this study, literature reviews showed that training increased the knowledge levels of identifying of safe and unsafe conditions[19]. It was also possible to observed that the high voltage/electrical risk knowledge level of the respondents was 36.5%. This was better when compared from the rest other than danger and warning signs. This was due to the fact that the high voltage or electrical risk sign was found in Kality Metal Product factory at every machine of the manufacturing room. The majority of the respondents to this sign also were found in Kality Metal Product factory.

The study has revealed that the age variation of the workers was not statistically significant with their knowledge level which was similar to other study carried out in India[25]. In contrast to other study conducted in India, work experiences have significant association [Adj. OR: 1.934(1.178, 3.174)] with health and safety knowledge level of the respondents and workers who worked more than five years had better knowledge level[25]. This might be stated that as their service year increased there might be a possibility to faced different signs.

The study also showed that educational levels showed statistical differences in the knowledge levels of the workers. This is supported by other studies done in India[25]. In the bivariate analysis, although there were few proportions of the respondents, those who can read and write have better knowledge level than those who have diploma and above educational level. But when it is adjusted, those who have educational levels of diploma and above were more likely to know than the others.

In this study, health and safety training, presence of supervision, and workers right and obligation did not show significant association with the knowledge of the workers. The possible reason for this might be that the training and the supervision emphasized on the product rather than the occupational health and safety issues.

Although there were no other works to compare, type of factory, health and safety recommendations (legislations) have significant association [OR: 2.394(1.439, 3.984)], and [OR: 1.988(1.203, 3.287)] respectively.

This showed that workers in Kality Metal Product factory were more likely to know safety signs than workers were in Ethiopian Iron and Steel factory. This agreed with the observation result that a few sign were found in Kality Metal Product factory but not in Ethiopian Iron and Steel factory.

Among the safe practices of the workers, 71.5% used a glove that was almost similar to other study carried out in Hong Cong on printing workers whose proportion was 75.6%[26]. Being informed of safety precautions by health and safety training and being supplied with safety information by supervisor or as health and safety recommendation were the significant factor leading to safe practice after adjusting for socio demographic factors. It is similar from other study conducted in Hong Cong that being informed of safety precautions supervisor and being supplied with chemical information by a supervisor were the significant factors to safe practice[26].

Such association emphasized the importance role played by front line workers who gave health and safety training at the work place or those who gave recommendation by means of labeling or direct instruction to the workers at the work place. Specific safety information given as recommendation related directly to workers' job and work place would likely be more relevant in improving safe practice than general work supervision.

In this study, occupational health and safety recommendation that have been supplied to the workers by different means might be by labeling or direct instruction by immediate

supervisors has a strong association with both the knowledge level and safe practice of the workers. This association emphasized that direct health and safety instructions at the work site would be more effective in insuring safe practice.

7. Strengths and limitations of the study

7.1. Strength of the study

1. Safety signs and symbols were used during data collection time for cross-check the knowledge level of the respondents.
2. Triangulation methods (questionnaire, FGD, and check list) were used to collect the data.

7.2. Limitations

1. Lack of similar studies especially in Ethiopia made difficult in comparing results.
2. Social desirability which occurs because subjects are systematically more likely to provide a socially acceptable response.

8. Conclusion and Recommendation

8.1. Conclusion

To design intervention method and alleviate work related problems, it is worth to assess the knowledge and practice of workers on safety information.

So the results of this study have important implications for the practice of occupational health and safety, especially in industries or occupational groups dealing with safety information.

- The workers have less knowledge level compared to other studies although they have faire practices on safety measures or personal protective devices usages.

- Health and safety recommendations that have been described in work places as a direct instruction by the immediate supervisors or by different labeling had a positive effect on both knowledge level and personal protective devices usage practices.

- Health and safety training have been identified as important factor to safe practice, but it did not work for knowledge.

- Workers who employed in work places in which different safety signs posted were more likely to know safety signs as well as have safe practice characteristics.

- There were no occupational health and safety committee and occupational hygienists in both factories that could join with trade unions to ask about health and safety training programmes, accessibility of PPDs, supervise the work environment and inform the employer for the adjustments.

8.2. Recommendations

Based on the study findings and the above conclusions the following recommendations are forwarded.

1. Employers should give different health and safety training for workers; during first employment, change working departments, when new machines or chemicals are brought and give safety instructions by immediate supervisors or front line workers or by labeling on work sites.

2. Different safety signs should be posted at reasonable working sites and labeled at different materials and equipments to improve the knowledge level and safe practice of the workers.

3. Issues that describe why they use personal protective devices, how they select the appropriate PPDs, how they practicing the safety procedures or the guidelines could be included in the safety training topics.

4. Occupational health and safety committee should be established in both factories.

5. Further detailed studies should be done to assess the needs of the workers and the employers to develop the appropriate programmes for health and safety training and to investigate the relationship between knowledge and practice as well as their health impacts.

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10. Annexes

Annex I. English version questionnaire

Addis Ababa University Faculty of Medicine Department of Community Health Questionnaire for assessment of knowledge, attitude and practice among industry Workers in Addis Ababa

Questionnaire identification number----------

Name of industry----------

Final product----------

Address: kebele---------- sub city----------

Verbal consent form before conducting interview

Greeting

How are you, I am----------. I am working in the research team of Addis Ababa University Medical Faculty Department of Community Health. I would like to ask you a few questions about occupational health and safety labels, symbols, signs and pictograms your knowledge and attitude on them and your practices in your work life. This will help us to improve occupational health safety and wok environment management provided to you base on your answers to our questions. Your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obligate to answer any question you do not wish to answer. IF you fill discomfort with the interview, please fill free to drop it any time you want. This interview will take about 30 minutes. Could I have your permission to continue?

1. If yes, continue the interview.
2. If no, skip to the next participant by writing reasons for his/her refusal

Informed consent Certified by

Interviewer: Code----------Name----------signature----------

Date of interview----------Time started---------- Time completed----------

Result of interview: 1. Completed 2. Respondent not available 3. Refused

4.Partially completed

Checked by:

Supervisor Name----------signature----------Date----------

Questionnaire identification number----------

Part one: Socio demographic information.

No	Question	Possible response	Skipping	Code
101	Sex	1. Male 2. Female		
102	Age in year	----------years		
103	Religion	1. Orthodox 2. Muslim 3 Protestant 4. Catholic 5. Others (specify)----------		
104	Marital status	1. Married 2. Single 3. Divorced 4. Widowed 5. Separated		
105	Educational label	1. Illiterate 2. Can read and write 3. 1-8 4. 9-12 6. Diploma (10+3 or 12+2) 5. Certificate 7. Degree and above		
106	Employment pattern	1.Permanent 2.Temporary/contract		
107	Job category or responsibility	----------		
108	Work experience in years in industrial settings	---------- ----------		
109	Working hours	1. < 8 hour 2. 8hours 3. > 8 hours, specify----------		

Questionnaire identification number----------

Part two: Knowledge on occupational safety labels, signs, symbols and pictograms.

No	Question	Possible answers	Skipping	Code
	Do you know any			

201	occupational health and safety information that can be described in pictures, signs, labels or other else?	1. Yes 2. No		
202	If yes in Q201, what type of information?	1. Danger signs 2. Warning signs 3. Corrosive 4.Exit signs 5.Flammable 6. Harmful 7. Irritant 8. Explosive 9. Oxidizing 10.Toxic 11.High voltage 12. Others(specify)-------		
203	If the respondent answered Q202 as s/he knew, check it by using the symbols in your hand.	1. Danger signs 2. Warning signs 3. Corrosive 4.Exit signs 5.Flammable 6. Harmful 7. Irritant 8. Explosive 9. Oxidizing 10.Toxic 11. High voltage 12. Others(specify)		
204	In what ways the above information described?	1. Symbol 2. Safety colour 3. Labeling 4. Guide lines 5. Acoustic signal 6. Hand signal 7. Others (specify)----------		
205	What types of signs are available in your organization (203)?	1. All are available 2. Symbol 3. Safety colour 4. Labeling 5. Guide lines 6. Acoustic signal 7. Hand signal 8. Others (specify)		

Questionnaire identification number----------

	How do you get the information you mentioned?	1.Training in the organization 2.Training in higher education 3. Work experience.		

206		4.Others (specify)---------		
207	Do you know fire classes?	1. Yes 2. No		
208	If yes in Q206, what class?	1. Class A 2. Class B 3. Class C 4. Class D		
209	Are there fire extinguisher devices in the organization	1. Yes 2. No		
210	Can you implement it?	1. Yes 2. No		

Part three: Attitude and practice

No	Question	Possible answers	Skipping	Code
301	Have you had any safety training in connection with new employment, new equipment or other changes?	1. Yes 2. No		
302	If yes in Q301, who does give the training?	1. Occupational hygienist 2. Health professionals (nurse, sanitarian, health officer, physician) 3. Experienced worker 4. Others (specify)---------		
303	Do you practically apply the given training?	1. yes 2. No		

Questionnaire identification number----------

304	Some activities order the workers to implement some recommendation, have you ever faced such conditions?	1. Yes 2. No	If no skip to Q307	

305	If yes in Q304, what type of recommendation do you have faced?	1. Wear personal protective equipment 2. Confined area 3. Toxic 4. Flammable 5. Irritant 6. Wash with water 7. Harmful 8. Explosive 9. Oxidizing 10. Others		
306	Do you believe that occupational health and safety should present in work places?	1. Yes 2. No		
307	What type of personal protective equipment do you used then?	1. Gloves 2. Ear plug 3. Respirators 4. Helmets 5. Overalls 6. Goggles 7. Face shields 8. Boots 9.Others (specify)----------		
308	Why did you use the personal protective equipments?	1. I knew the advantages 2. Supervisors forced us to do so 3. Others (specify)----------		
309	What are your reasons for not using personal protective equipment?	1. Lack of protective equipment 2. Lack of safety education 3. Not comfortable to use them 4. Decrease work performance 5. They are creating safety and health hazards 6. Others (specify)----------		

Questionnaire identification number----------

No	Question	Possible answers	Skippin	Code
310	Is there a regular supervision undertaken?	1. Yes 2. No		
311	If yes in Q10, who did it?	1. Ministry of health 2. Ministry of Labour and Social Affairs		

		3. Others (specify)----------		
312	Do you know the presence of the regulation that concerns the workers and their responsibilities?	1. Yes 2. No		
313	Do you know that workers have the right and obligation concerning work regulation?	1. Yes 2. No		
314	Have you ever faced any injury or accident in the past 12 months related to your works?	1. Yes 2. No		
315	If the answer is yes for Q314, what kind of injuries or accidents?	1. Abrasion 1. Yes 2. No 2. Cut 1. Yes 2. No 3. Burn 1. Yes 2. No 4. Piercing 1. Yes 2. No 5. Fracture 1. Yes 2. No 6. Dislocation 1. Yes 2. No 7. Eye injury 1. Yes 2. No 8. Ear injury 1. Yes 2. No 9. Safocation 1. Yes 2. No 10. Electricity 1. Yes 2. No 11. Amputation 1. Yes 2. No 12. Poisoning 1. Yes 2. No 13. Others (specify)----------		

Questionnaire identification number----------

No	Question	Possible answers	Skipping	Code
		1. Machine 1. Yes 2. No 2. Falling objects 1. Yes 2. No 3.Electriccity		

316	What are the causes of the injury or the accident?	1. Yes 2. No 4. Splitting objects 1. Yes 2. No 5. Hand tools 1. Yes 2. No 6. Fire 1. Yes 2. No 7. Acid and hot objects 1. Yes 2. No 8. Falling 1. Yes 2. No 9. Collision 1. Yes 2. No 10. lifting heavy objects 1. Yes 2. No 11. Others (specify)----------		

This is the end of our questionnaire. Thank you very much for taking time to answer the questions. We appreciate your help.

Annex II- Amharic version questionnaire

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203	”ÅT>Á¨<k¨</”ÅU¨<k¨< ŸSKc/‹ uÏl ÁK¨<” UM¡ƒ uSÖkU ¾ƒ—¨<” UM¡ƒ ”ÅT>Á¨<l ›[ÒÓØ	1. ¾›ÅÒ UM¡ƒ 2. ¾TcÖ”km UM¡ƒ 3. ¾T>´Ó ’¨< ¾T>M UM¡ƒ 4. ¾S¨<Ý/ TUKÝ UM¡ƒ 5. }k××Ã ’¨< ¾T>M UM¡ƒ 6. ¾T>ÔÇ ’¨< ¾T>M UM¡ƒ 7. ¾T>qÖlØ UM¡ƒ 8. ¾T>ð’Ç ¾T>M UM¡ƒ 9. *¡c=ÇÃ²=”Ó ¾T>M UM¡ƒ 10. S`³T ’¨< ¾T>M UM¡ƒ 11. Ÿõ}— ¾›?K?¡ƒ]¡ ÃM 12. K?L "K ÃÑKê----------		
204	ŸLÃ ¾}Ökc<ƒ ¾TeÖ”kmU J’ K?KA‹ UM¡„‹ uU” SMŸ< ÃÑKéK<;	1. uUM¡ƒ ¨ÃU ue°M 2. ukKU 3. uêG<õ 4. uSS]Á SM¡ 5. ÉUê uTcTƒ 6. ¾Ï ”penc? uTd¾ƒ 7. K?L "K ÃÑKê----------		
205	u“”} ów]" ¨<eØ ¾ƒ™‡ UM¡„‹ ÃÑ—K<;	1. G<K<U ÃÑ—K< 2. e°K< 3. ukKU ¾}ÑKç 4. uêG<õ SM¡ ¾}ÑKç 5. uSS]Á SM¡ ¾}ÑKç 6. ÉUê ¾T>ÁcT¨< 7. ¾Ï ”penc? UM¡ƒ 8. K?L "K ÃÑKê----------		

¾nKSÖÃp pê SK? lØ`----------

}.lØ`	ØÁo-‹	›T^ß SMf‹	iÓÓ`	¢É
206	ŸLÃ¾ÑKêG†¨</h†¨<” ¾Ö?“ Ñ<Çƒ SŸLŸÁ S[Í-‹ ”Èƒ MÑ— †¨< ‰Ml/i;	1. ów]"¨< ›cMØ•” 2. uƒUI`ƒ u?ƒ ¨<eØ 3. uMUÉ 4. K?L "K ÃÑKê----------		
207	¾}KÁ¿ ¾dƒ ¯Ã’„‹ ”ÇK< ¨<nKl/mÁKi;	1. ›- 2. ¾KU		

208	KØÁo }^ lØ` 206 SMe ›- ŸJ' ¾~" ¾dƒ ¯Ã'ƒ ¨<nKl/mKi;	1. ¾}KSÅ¨<" ŸT"—¨< SnÖM ŸT>‹M TKƒU Ÿ"Úƒ& Ÿ¨[kƒ&ŸÚ`nÚ`p& ŸÔT" ŸýLe+¡ ¾T>Ñ–¨<" ¾dƒ ®Ã'ƒ 2. }k××Ã ŸJ'< Ò´" ðdiK=Ñ˜ ¾T>‹K¨<" ¾dƒ ¯Ã'ƒ 3. Ÿ›?K?¡ƒ]¡ ÃM K=Ñ˜ ¾T>‹K¨<" ¾dƒ ¯Ã'ƒ 4. S"ÅÉ ¨ÃU SnÖM ŸT>‹K< ¾w[ƒ ¯Ã'„‹ K=Ñ˜ ¾T>‹K¨<" ¾dƒ ¯Ã'ƒ		
209	¾dƒ nÖKA ›ÅÒ u='d TØòÁ Sd]Á uów]"¨< ¨<eØ ›K;	1. ›- 2. ¾KU		
210	¾dƒ nÖKA u=Ÿcƒ Sd]Á¨<" u^el/i SÖkU ƒ‹LKl/ÁKi;	1. ›- 2. ¾KU		

¡õM Zeƒ: ´"vK?" }Óv`

}.lØ`	ØÁo-‹	›T^ß SMf‹	iÓÓ`	¢É
301	ÁK‹Ó` ¨ÃU ÁK›ÅÒ KSY^ƒ ¨ÃU KSÖkU ›Ç=e u}kÖ`luƒ/iuƒ ¨ÃU ›Ç=e Sd]Á uT>S×uƒ Ñ>²? ¨ÃU ¾Y^ K¨<Ø eÅ`Ó/Ñ> eMÖ" ÃcØGM/hM;	1. ›- 2. ¾KU		
302	KØÁo }^lØ` 301 SMc< ›- ŸJ' eMÖ"¨<" ¾T>c}¨< T"¨<;	1. ¾S<Á '¡ Ö?" }q××] 2. ¾Ö?" vKS<Á('`e&Ö?" }q××]&Ö?"S¢""& NŸ=U) 3. MUÉ ÁK¨< W^}— 4. K?L "K ÃÑKê----------		

¾nKSÖÃp pê SKÁ lØ` ----------

}.lØ`	ØÁo-‹	›T^ß SMf‹	iÓÓ`	¢É
303	¾}cÖ¨<" eMÖ" uY^ LÃ uƒ¡¡M Á¨<LK<	1. ›- 2. ¾KU		
304	›"Ç"É Y^-‹ ¨ÃU SX]Á-‹ u^d†¨< W^}—¨< SŸLŸÁ "Ç=ÖkU ¨ÃU Y^¨<" uƒ¡¡M "Ç=Á"H>É Á³K<:: "Å²=I ¯Ã'ƒ G<'@ ÑØVl/i Á¨<nM;	1. ›- 2. ¾KU	SMc< ¾KU ŸJ' ¨Å ØÁo lØ` 307 }hÑ`	

305	KØÁo }^ lØ` 304 SMc< ›- ŸJ' U" ¯Ã'ƒ ƒ³´ ÑØVl/i Á¨<nM;	1. ¾Y^ Mwe Mue/i 2. TKõ ¡M¡M '¨< ¾T>M 3. S`³T '¨< ¾T>M 4. }k××Ã '¨< ¾T>M 5. ¾T>qÖlØ '¨< ¾T>M 6. u¨<H Öw ¨ÃU ¨<H ›õeeuƒ ¾T>M 7. ÔÏ '¨< ¾T>M 8. ¾T>ð'Ç '¨< ¾T>M 9. *¡c=ÇÃ´É '¨< ¾T>M 10. K?L "K ÃÑKê----------		
306	¾Ål"'ƒ/¾Ö?"'ƒ UM¡„‹ uY^ x LÃ ¾ÓÉ S•` ›Kv†l¨< ƒLKl/Áki;	1. ›- 2. ¾KU		
307	U" ¯Ã'ƒ SŸLŸÁ Mwe ¨ÃU SX]Á ƒÖkTKl/T>ÁKi;	1. Õ"ƒ 2. ¾Đa SŸLŸÁ 3. ¾›õ“ ¾›õ"Ý SŸLŸÁ 4. ¾ýLe+¡ qw ¨ÃU ¾ß"pLƒSŸLŸÁ 5. ¾e^ Mwe 6. ¾w¾Ç S'ê` 7. ßUwM ¨ÃU ¾òƒ ió" 8. xƒ ÝT 9. K?L "K ÃÑKê----------		
308	¾SŸLŸÁ Mwc<" ¨ÃU Sd]Á¨<" KU" ƒKwdKl/iÁKi ¨ÃU ØÖkTKl/T>ÁKi;	1. ØpS<" uT¨p ^c?" Ÿ›ÅÒ KSÖup 2. ›Kn eKT>ÁeÑÉÅ˜ 3. K?L "K ÃÑKê----------		
309	¾SŸLŸÁ Mwc<" ¨ÃU Sd]Á¨<" LKSÖkU U¡"ÁƒI/i U"É" '¨<;	1. ¾SX]Á ¨ÃU ¾Mwe Ø[ƒ 2. ØpS<" vKT¨o 3. eKTÃS†˜“ uY^¨ ¨<Ö?ƒ LÃ }ê• eKT>•[¨< 5. K?L "K ÃÑKê----------		

¾nKSÖÃp pê SKÁ lØ`----------

}.lØ`	ØÁo-‹	›T^ß SMf‹	iÓÓ`	¢É
310	uów]'"¨< ¨<eØ SÅu— ¾J' ¾Ñ<w˜ƒ Y^ Ã"H@ÇM;	1. ›- 2. ¾KU		
311	¾ØÁ« }^ lØ` 310 SMe ›- ŸJ' Ñ<w˜ƒ ¾T>ÁÅ`Ñ¨< T'¨<;	1. ¾Ö?“ Øun T>'>e,` 2. ¾TQu^©“ ¾W^}™‹ Ñ<ÇÃ T>'>e,` 3. K?L "K ÃÑKê----------		
312	uów]'"¨< ¨<eØ Y^"“ W^}™‹" u}SKŸ} SS]Á ›K;	1. ›- 2. ¾KU		

313	W^}™‹ eK Y^ lÓ“ Ÿe^ Ò` K}ÁÁ² Ö?“”“ Ål”’ƒ” u}SKŸ} Swƒ“ ÓÈ ”ÇL†¨< ¨<nKl/mKi;	1. ›- 2. ¾KU		
314	vKñƒ 12 ¨^„‹ u²=l ów]" uc^luƒ ¨pƒ uUƒW^uƒ ¾Y^ ›Ò×T> ŸY^l Ò` u}ÁÁ² U¡”Áƒ ¾Ö?“ Ñ<Çƒ ¨ÃU ›ÅÒ ›ÒØVl/i Á¨<nM;	1. ›- 2. ¾KU		
315	KØÁ« }^ lØ` 314 SMe ›- ŸJ’ U” ¯Ã’ƒ ›ÅÒ ¨ÃU Ñ<Çƒ ÑØVl/i Á¨<nM;	1. ß[ƒ 1. ›- 2. ¾KU 2. Sq[Ø 1. ›- 2. ¾KU 3. nÖKA 1. ›- 2. ¾KU 4. S¨Òƒ 1. ›- 2. ¾KU 5. ew^ƒ 1. ›- 2. ¾KU 6. ¨KU 1. ›- 2. ¾KU 7. ¯Ã” LÃ ¾Å[c Ñ<Çƒ 1. ›- 2. ¾KU 8. Đa LÃ ¾Å[c Ñ<Çƒ 1. ›- 2. ¾KU 9. S ð” 1. ›- 2. ¾KU 10. u›?K?¡ƒ]¡ SÁ´ 1. ›- 2. ¾KU 11. ¾›"M SÑ<ÅM 1. ›- 2. ¾KU 12. SS[´ 1. ›- 2. ¾KU 13. K?L "K ÃÑKê----------		

¾nKSÖÃp pê SKÁ lØ`----------

}.lØ`	ØÁo-‹	›T^ß SMf‹	iÓÓ`	¢É
316	¾›ÅÒ¨< ¨ÃU ¾Ñ<Ç~ UŸ[”Áƒ ¨ÃU S”e›? U”É” ’¨<;	1.Ti•‹ 1. ›- 2. ¾KU 2.uT>¨Él n-‹ uSS ƒ 1. ›- 2. ¾KU 3.u›?K?¡ƒ]¡ 1. ›- 2. ¾KU 4.u}eð”×] ’Ña‹ 1. ›- 2. ¾KU 5.¾ Ï SX]Á-‹ 1. ›- 2. ¾KU		

		6.eƒ 1. ›- 2. ¾KU 7.u›c=É“ ƒŸ<e 'Ña‹ 1. ›- 2. ¾KU 8.S¨<Åp 1. ›- 2. ¾KU 9.Óßƒ 1. ›- 2. ¾KU 10.ŸvÉ n-‹" uT"dƒ 1. ›- 2. ¾KU 11.K?L "K ÃÑKê----------		

ÃI ¾SÚ[h¨< ¾nKSÖÃp pê '¨<:: Ñ>²?l"/i" c¨<}l/i Øáo-‹" uSSKe eK}vu`Ÿ˜/i˜ uÖU ›ScÓ"KG<:: ƒww`l" ›Å"nKG<! ÅI" ªM::

Annex III. Checklist for safety information

General safety

Ser. No	**Description**	Yes	No	Not available
1	Emergency exit sign list properly			
2	Fire alarms and fire extinguishers are visible and accessible			
3	Corridors and stairways are kept free of obstruction and not used for storage			

4	Are work areas free of electrical hazards? (No exposed wiring, damaged electrical cords, or unsafe use of extension cords/ power strips)			
5	Are floors dry and free of slip hazards; bench tops (including hoods) reasonably organized and clean?			
6	Do the workers know to report unsafe condition, emergencies, or accidents?			
7	Do different hazard signs posted properly in the appropriate places?			
8	Do these different hazard signs easily understandable and easily visible?			

Training

Ser.No	**Description**	Yes	No	Not available
9	**New employees given basic safety training**			
10	**Job specific safety training held for employees on regular base**			
11	Personnel familiar with applicable material safety data sheets			

12	All Personnel familiar with emergency evacuation plan			
13	Training documentation current and accessible			

Annex IV: Focus Group Discussion (FGD) Guide Lines

Name of the facilitator ----------

Name of the rapportors 1. ----------

2. ----------

Date ---------- time taken ----------

Participants:

Identity of participants

Se. number	Age	Work experience	Educational level	Job category	remarks
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.					

Discussion points

Part I: knowledge

1. Do you have knowledge regarding to occupational health and safety information? If yes, what does it means?
2. What kind of symbols, pictograms, or guidelines do you know? Can you mention some of them? What kinds of signs or pictures are found in your factory?
3. How do you know these safety signs or symbols?

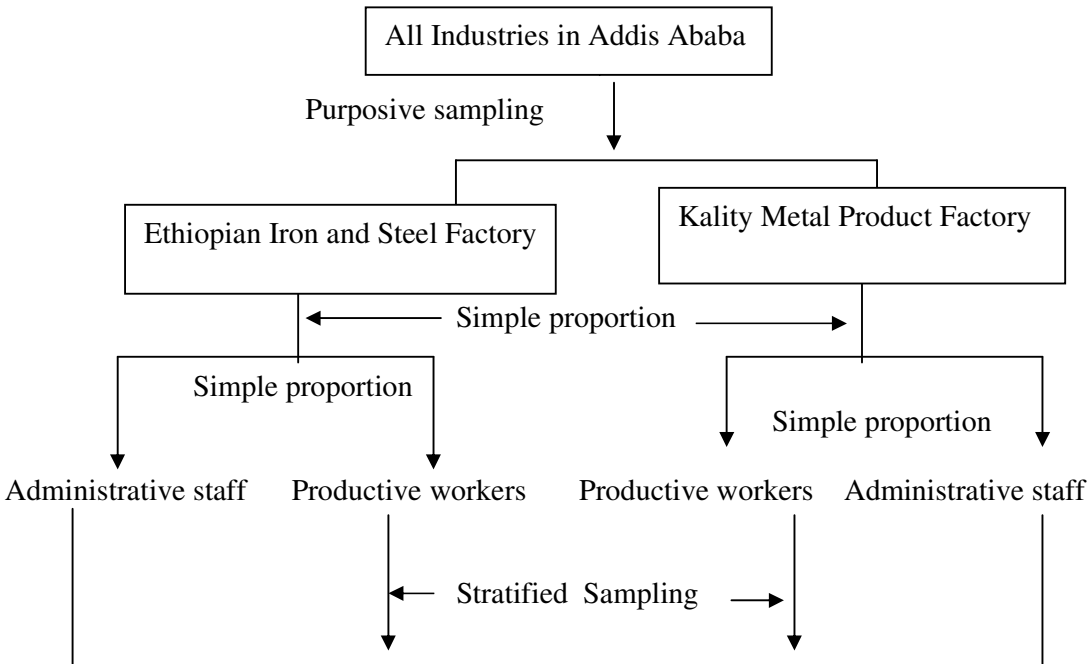
Part III: Practice

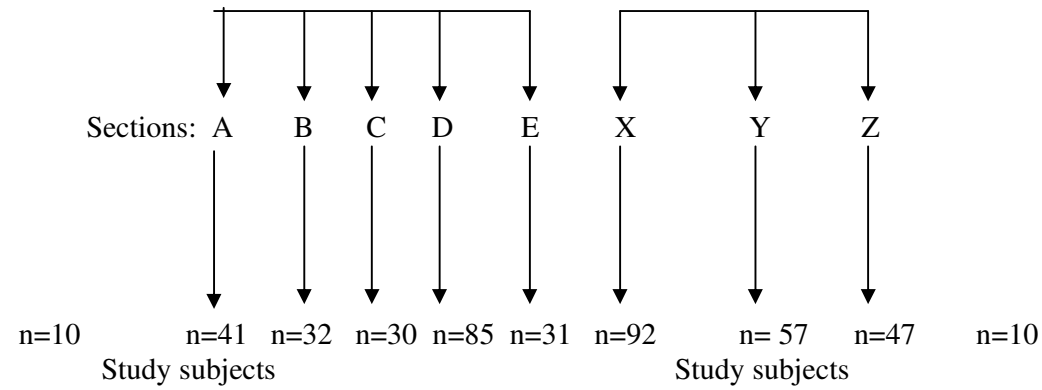
1. What kinds of personal protective devices are available in your factory or working area? Do you use them? Why?
2. Do the administrative staffs force you to use the devices? Why? How?
3. Where do the PPDs found? Are they made from locally available materials or are they standard?

Part IV: Environmental and socio-demographic settings

1. Is there a safety committee in your working area? If yes who are the members? What are their objectives? What are their action and services?
2. If there is no safety committee in your factory, do not you think that it is necessary? If it does not, why?

Annex. V. Sampling chart





Note: A= melting section.

B= rolling mill section.

C= wire production room.

D= nail production section.

E= scraping processing section.

X= manufacturing section

Y= construction section

Z= maintenance Section

Annex VI: An International Occupational Health and Safety Signs.

Oxidizing agent (**O**)

Explosive (**E**)

Highly flammable (**F**)

Extremely flammable (**F+**)

Toxic (**T**)

Very toxic (**T+**)

Harmful (**Xn**)

Irritant (**Xi**)

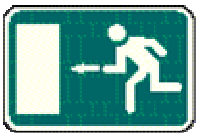
Corrosive (**C**)

Ear protection must be worn

General danger

Emergency stop.

Eye protection must be worn



Exit sign

No access for pedestrians

Safety helmets must be worn

Warning sign

High voltage/ electrical hazard

Adapted from: Technical Guide for Safety and Health Signs at Work[15].