



**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH**

**ASSESSMENT OF MAGNITUDE AND FACTORS OF OCCUPATIONAL
INJURY AMONG WORKERS IN LARGE SCALE METAL MANUFACTURING
INDUSTRIES IN ADDIS ABABA.**

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Acronyms

AOR: Adjusted Odds Ratio

CI: Confidence Interval

COR: Crude Odds Ratio

CSA: Central Statistical Authority

CSSTHF: Metal Cutting, Scraping, Sorting, Trimming, Haling and Feeding

DALY: Disability Adjusted Life Year

EPI Info: Epidemiological Information

ICOH: International Commission for Occupational Health

ILO: International Labor Organization

MOLSA: Ministry of Labor and Social Affairs

OR: Odds Ratio

OSH: Occupational Safety and Health

PI: Principal Investigator

PPD/E: Personal Protective Device/Equipment

PPS: Probability Proportional to Size

SNNPRG: Southern Nation Nationalities and Peoples Regional Government

SPSS : Statistical Package for Social Sciences

Abstract

Background: The burden of occupational injury in most developing countries including Ethiopia is becoming a public health problem. Therefore, information that shows the magnitude and predictors of occupational injury in most risky work places in Ethiopia such as metal processing and working industries is indispensable to inform proper intervention programs to have healthy workforce and sound economic development.

Objective: This study is intended to assess the magnitude and factors affecting occupational injuries among workers engaged in large scale metal manufacturing industries in Addis Ababa.

Method: Institutional cross sectional study was conducted in Addis Ababa from February to March 2010. 50% of large scale metal manufacturing industries were selected by simple random sampling after stratification. Then, calculated sample size was allocated for each industry by PPS. And then, Study subjects were stratified by working sections and those who were directly engaged in the work were selected from each stratum by simple random sampling after preparing a frame from payroll of those industries. Structured questionnaire was designed to collect information on outcome variables and factors. Observational checklist and in-depth interview with key informants was held to triangulate the information with quantitative findings.

Result: The overall prevalence of occupational injury was 489 per 1000 exposed workers per year. 119(29.4%) of injured workers were hospitalized or stayed at home bed with 98(82.4%) for 24 or more working hours and one death was reported in 12 months. Sex of workers [AOR:3.32, 95%CI: (1.88,5.85)], Safety and health supervision [AOR: 1.60,95%CI:(1.03,2.60)], Hours worked per week [AOR: 2.37,(95%CI:(1.55,3.61)], Cigarette smoking [AOR: 3.36,95%CI: (1.73,6.50)] and presence of functional danger signs/ posts [AOR: 2.65,(95%CI: (1.67,4.19)] were significantly associated factors with magnitude of occupational injury.

Conclusion and Recommendation: The burden of occupational injury in metal manufacturing industry is really significant public health problem. So continues health and safety information, basic occupational health services and additional cohort study for factors should be undertaken.

Key words: occupational injury, large scale metal manufacturing industries

1. Introduction

1.1. Background

Occupational injuries constitute 1.5% global public health burden in terms of disability adjusted life year and with estimated economic loss of 5-10% growth national product (1, 2). International labor organization conservatively estimated that about 2.3 million workers die each year from unintentional work related accidents and diseases(2, 3). Morbidity also estimated to be more than 270 million people at work(2, 4). People belonging to all economic groups suffer fatal injuries, but death rates due to injury tend to be higher in those developing countries where there is unsafe working environment (2, 4) less awareness(4) and trained workers, limited/no occupational services(5) psychosocial stress(6, 7) are prevailed.

In Ethiopia, occupational health and safety service has very low coverage with respect to injury recording system(8), basic occupational health services, research on occupational health issues (9) and prevention strategy. Therefore, the epidemiology of occupational injuries is scarce and reports coming from some manufacturing industries do not reflect the whole picture of the country(8).

Given the age of globalization and industrialization, the number of manufacturing industries is increasing in Ethiopia. However, health and safety information of workers in highly hazardous workplaces like large scale metal processing and metal manufacturing industry (10, 11) is very limited although Ministry of Labor and Social Affairs of the country is trying to emphasize on it (12). Studies showing the magnitude of injury in most risky work places in Ethiopia such as large scale metal processing and metal manufacturing industries and predictors of it are scarce. So, this study is intended to assess the magnitude and factors affecting occupational injuries among workers engaged in large scale metal manufacturing industries in Addis Ababa. The study will provide baseline information for policy makers to design strategy/give priority for prevention and control of occupational injuries to have healthy workforce and sound economic development. The information is also important for practitioners and researchers while it is in need.

1.2. Rationale of the study

Occupational morbidity, disability and death in most developing countries including Ethiopia is becoming a serious public health problem which pose challenge to achieve millennium development goals of poverty reduction and health for all. Evidence based occupational health and safety services are indispensable in Ethiopia. However, studies showing the magnitude of occupational injury in most risky work places in Ethiopia such as metal processing and metal working industries and predictors of it are scarce. So, this study aims to contribute in filling information gaps on the existing occupational health and safety service practice. Therefore, this study will provide baseline information for policy makers to design strategy needed for the prevention and control of occupational injuries.

2. Literature Review

2.1. Occupational health and safety services

International labor organization or World health organization joint Committee defined occupational health and safety as: "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations. The prevention of workers in their working section from risks adverse to their health and placement of workers in an occupational environment adapted to their physiological and psychological capabilities are also the objectives of occupational health (13). The issue of occupational health and safety has been a central point for the ILO ever since it began operations in 1919 and continuous to be a fundamental requirement for achieving the objective of decent work agenda along with WHO which endorsed a global strategy on occupational health for all (1996),but the overall situation on conditions of work for majority of workers did not meet the minimum standards and guidelines set by the two organization (3, 14). Occupational health services are available only to 10-15%of the 3 billion workers of the world. In industrialized countries, the coverage varies between 15 and 90% and in developing countries between a few percent and 20% (5, 15, 16).

The workplace has been considered an important arena and occupational health has been seen implicitly as key instrument for implementation of policies and strategies of "health for all" by 2000 and further development of health system in the global strategy on occupational health for all in the WHO global plan of action on worker's health which was approved by the world health assembly in 2007(5, 17).The Occupational health service guideline which was designed jointly by WHO/ILO/ICOH includes basic activities like, monitoring and assessing work environment and workers' health, initiatives, management and control of hazards, accidents and injuries to the branch and workplace in concern.

The role of occupational health services in most developing countries has been given less attention due to inadequate knowledge, shortage of information, lack of resources and lack of political will(5, 6, 18) which can impose greater burdens for occupational injuries. The experience and practice of occupational health service in Ethiopia is very limited. Recently, the

national Ministry of Labor and Social Affairs is giving emphasis and under plan to organize the service ,but the baseline information on magnitude and risk factors and representative data on occupational injuries is scarce /absent for planning and implementing to prevent and control it (9).

2.2 Burden of occupational injuries

WHO reported 1.5% of the global burden in terms of DALY from industrialized countries with economic cost of an estimated 5-10% GNP per annum in 2006 and 550 million people with 335 000 fatal occupational injuries in united states (1, 2). Globally quoted statistics tend to underreport occupational injuries in developing countries owing to lack of reliable information system, nor these data contains burdens of occupational injuries borne by many disadvantaged workers where there is lack of regulation, legislation, guidelines, health insurance, occupational health services (16).

According to the studies done in different small and medium sized manufacturing industries in Vietnam, Japan, and New Zealand, the rate of occupational injuries was reported as 583, 356, 132, per 1000 workers per year, respectively (1, 19, 20). A cohort Study in India glass manufacturing industries showed that 1106 workers per 1000 per year(21).

Some selected African countries including Ethiopia have started to report their national occupational injuries in industries to ILO year book of labor statistics. However, the data is not regularly reported and is not based on the framework for occupational safety and health convention (No-187) and recommendation(No-197) for national profiles on OSH (3).Based on this, the annual number of cases reported by Ethiopia ranks sixth among African countries.

In Ethiopia, there is scarcity of comprehensive data and nationwide researches on rate of occupational injuries and major determinants of occupational injuries in large scale metal manufacturing industries (8). The recent studies in small and medium scale industries showed that the occupational injury rate was 335/1000 workers exposed per year with two reported deaths .Of these, the severity is 17.1% of them being hospitalized with 40% of them for greater

than 24 hours, 53.9% absent from work, 191 days were lost due to injuries (22). Another study in afar showed that the overall prevalence rate was 783 per 1000 workers with the severity 11% is hospitalized and 6,153 days lost due to injuries (23).

Considering that the report is not regular and complete, the numbers of injury cases from 66 industries in 3 regions of the country was 2029 in 2008 with estimated cost of about 82,681 Ethiopian birr excluding treatment and transport cost. Among occupational injuries reported, 96.7% was reported from manufacturing industries including metal manufacturing industries(8). In 2009, 1275 occupational injuries with salary estimated cost of 122,160.19 Ethiopian birr was reported in Addis Ababa(24).

2.3. Body part affected, Sources and types of injury

Occupational Injuries can be occurred in different parts of the body. The knowledge on injured parts of the body with corresponding types of injury can help policy makers, managers, industrial hygienists, public health experts, initiators and job analysts to provide and design appropriate personal protective equipment and safe ergonomic design (17, 25-28).

Regarding parts of the body affected, Asian-Pacific countries including China, Vietnam ,Japan, India showed that most common parts of the body affected by work related injury/accidents were hands(fingers), head, lower limb, trunk, and upper limb,(16, 19, 21, 26). In African countries like Namibia and Egypt ,head, trunk, hands ,lower limb, upper limb, were the most regular victims(29, 30) .

The commonest parts of the body injured in a study conducted in Akaki textile factory were fingers(42%),lower leg(18.95%), hands(13.3%)(31). Another study in Afar Regional State revealed that finger(32%),lower leg(20.4%), and eye (12.9%) were among body parts commonly affected in that agricultural industry (23). A study conducted on small and medium scale industries in Gondar Woreda similarly showed that hands(30%),fingers(24%), and eye (19%) were commonly affected organs (22). Reports compiled by MOLSA from 66 industries also showed that head (7%), upper limb(47%), lower limb(25%) and trunk(8%) were affected.

Among industries, manufacturing industries including metal manufacturing industries holds first (91%) of reported injuries with regard to parts of the body affected (8).

With regard to causes or sources of injury, many studies showed machinery, hand tools, and hit by falling objects, are the frequent causes (1, 27, 32, 33). Study done at Gondar ,in small and medium sized industries showed that the commonest causes were machinery(23.9%), splinting(21.7%) ,hand tools(16.6%) (22). Another research in Tendaho agricultural industry indicated that ,the commonest causes were hand tools(53.6%), splinting/splashing objects(11.2%), falling accidents(8%),hit by falling objects (5.2%) (23).Reports from the ministry of labor and social affairs showed the causes were machinery(31%),style of loading/caring (18%) and hand tools(11%)(8).

2.4 Determinants of occupational injury

Most Researchers showed that several factors were related to the occurrence, severity, and types of injury. Socio-demographic factors, working environment variables, workers' behavior and ergonomic related variables are risk factors for workers to be injured in workplace of manufacturing industries including metal manufacturing industries(19, 21-23, 25, 34-37). Studies conducted in Japan revealed that the proportion of injury in male was significantly higher than females (19). Studies in Ethiopia, Addis Ababa and Gondar Woreda (22) showed that the prevalence of occupational injury is higher for males. In the reports compiled from 66 industries in 3 regions of the country, males constitute 69 % of cases (8).

Some Authors showed that age is significantly associated with occurrence of occupational injuries in which all showed the younger the age group the greater injury rate (19, 21-23).Workers' characteristics such as drinking alcohol (19, 36, 38) educational level(36-38) , sleeping disorder (22, 23), job satisfaction (34, 36, 37), use of personal protective devices (23), hours worked per week (22, 23), health and safety training (22, 23), work experience (23, 36, 38), employment pattern(19, 36, 37), regular supervision (21, 36), smoking(19, 38) , waste(dust) and protective maintenance (36) were statistically associated with magnitude of occupational injury. This study focused on determining magnitude and factors affecting occupational injuries in large scale metal manufacturing industries in Addis Ababa. And these industries are stated as

having the higher rate of injuries than most other industries (10, 11, 36) and little or no information is available in Ethiopia. The factors can be summarized as figure 1 bellow.

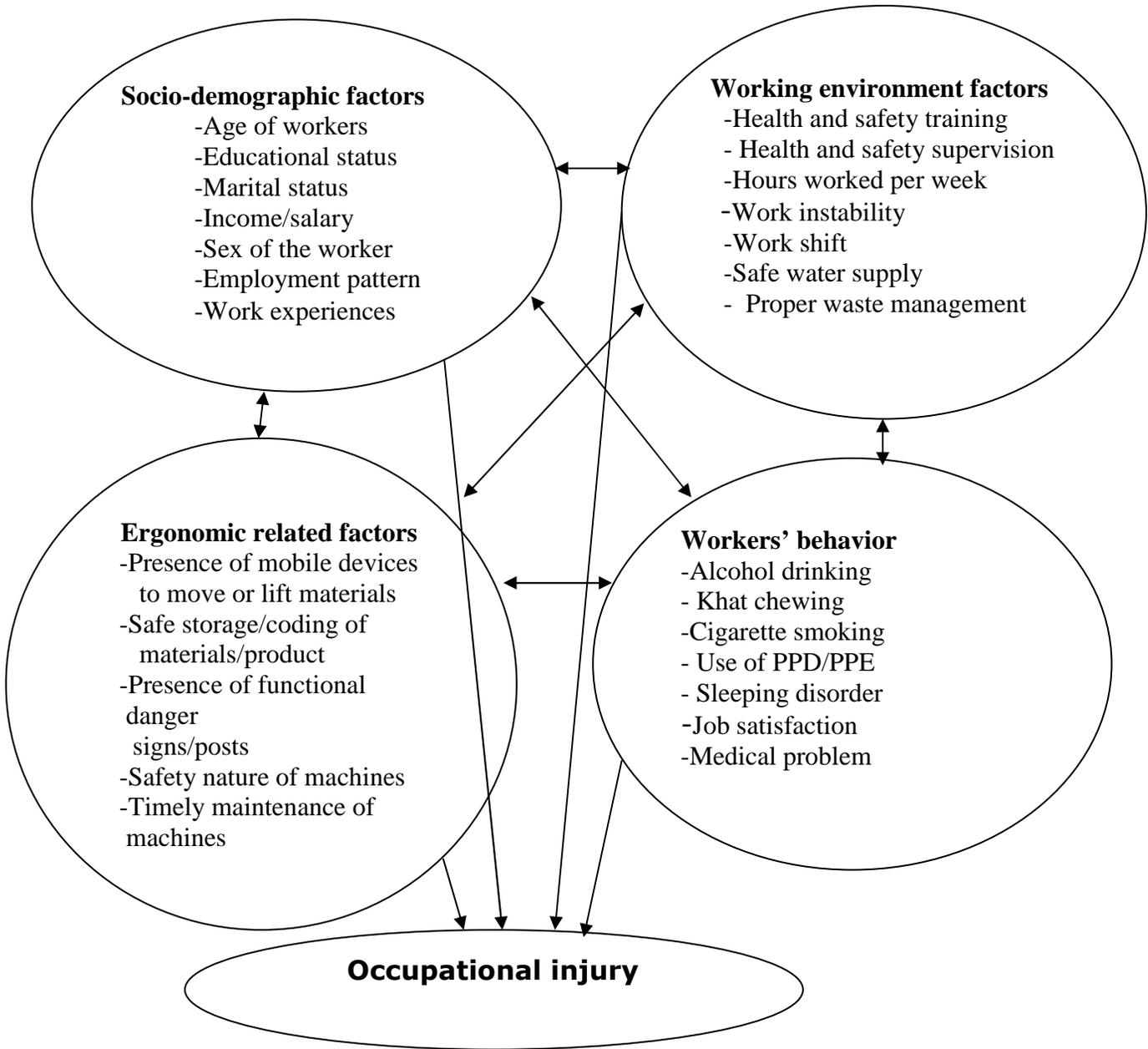


Figure-1: A conceptual framework adapted from literature reviews

3. Objective of the study

3.1. General objective

To assess the magnitude and factors affecting occupational injuries among workers engaged in large scale metal manufacturing industries in Addis Ababa.

3.2. Specific objectives

- ✓ To determine the prevalence of occupational injury among workers engaged in large scale metal manufacturing industries.
- ✓ To identify and describe factors affecting occupational injuries among workers in large scale metal manufacturing industries.

4. Methods

4.1. Study area and period: The study was conducted in Addis Ababa from February to March, 2010 G.C. The total population of the city administrative is 2,738,240 with 1,433,730 females and 1,303,518 males (39). The city is subdivided into ten sub city. There are 4,775 industries registered by bureau of trade and industries, of which, 634 are large and medium scale manufacturing industries. Of these, 95 are metal processing and metal manufacturing industries and out of these 51 are registered by ministry of trade and industry as large scale industry in the city(40).

4.2. Study design: Institution based cross sectional study was conducted.

4.3. Source population: All workers engaged in large metal manufacturing industries in Addis Ababa is the source population.

4.4. Study population: All employees who were directly engaged in the metal manufacturing industries and had the chance of being selected were **included** in the study whereas administrative workers were **excluded** assuming that they are not exposed to factors of occupational injuries.

4.5. Sample size determination: Sample size (n) was calculated by using single population proportion formula. Because no previous study has shown the magnitude of the proportion of occupational injuries at large scale metal manufacturing industries, 50% expected prevalence was taken and the margin of error (d) 5% with 95% degree of confidence level ($Z_{\alpha/2}$) to maximize the sample size and 10% contingency for non-response rate.

$$n = \left(\frac{Z_{\alpha/2}}{d} \right)^2 P(1 - P)$$

$$n = \left(\frac{1.96}{.05} \right)^2 0.5(0.5) = 384$$

Taking design effect of 2 and 10% non response rate=**846**

4.6. Sampling procedure: Number of manpower in 51 registered metal manufacturing industries in the city were counted to **include** those **metal manufacturing industries** which fulfill the criteria of **large scale** based on the operational definition of this study. The existence and functionality of these industries was checked from the records of Ministry of Industry and Trade. Then, those **large scale metal manufacturing industries** were stratified based on their expected risk similarity. 50% of large scale metal manufacturing industries were selected by simple random sampling from those strata that fulfilled the criteria. The calculated sample size (n=846) was allocated by probability proportional to size of each selected large scale metal manufacturing industries. The number allocated by PPS of **each industry** again was allocated by PPS of each **section or departments** of selected industry which was stratified by working section or departments. Finally, study subjects were selected by simple random sampling method from payroll or lists from each working section of each stratified large scale metal manufacturing industries. The sampling procedure is indicated in figure 2.

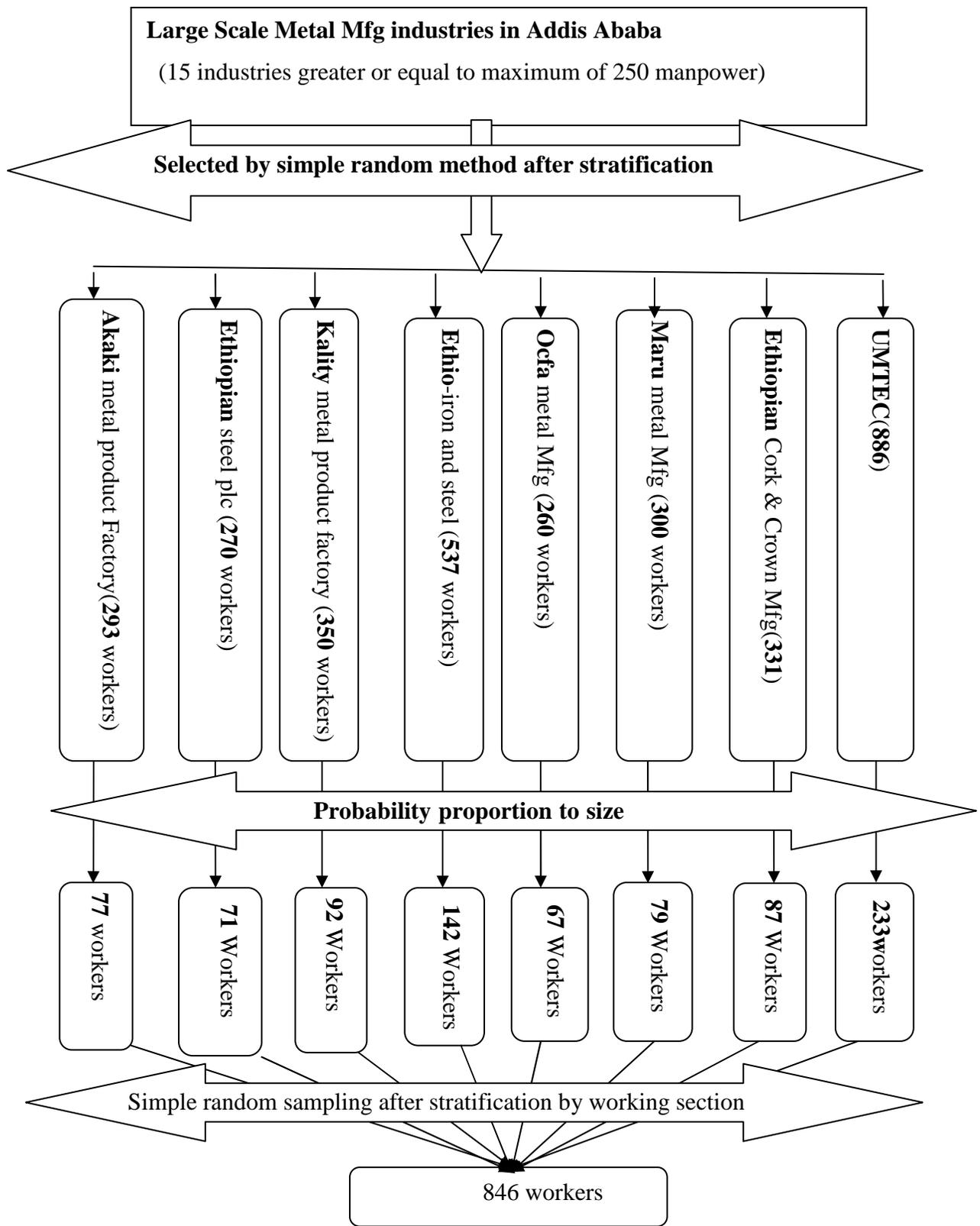


Figure 2: Schematic representation of sampling procedure

4.7. Data collection technique: Data were collected on Outcome variable and related predictors as depicted in the conceptual framework (Figure-1). Structured questionnaire developed from occupational health and safety guidelines, standards and others studies with little modification for the purpose of this study was used (Annex- 1). Observational checklist (Annex-4) was designed for evaluation of working environment, record review and employee's behavior on how to utilize personal protective devices during data collection. In depth interviews with key informants were held on indispensable thematic areas of occupational injury and its determinants with the purpose to triangulate the information with quantitative findings. The standard questionnaire was modified based on conceptual framework that was developed for this purpose. It was also tested 15 days prior to data collection in those industries which did not get the chance of selection.

4.8. Operational definition

Occupational injury: Tissue damage from transfer to individuals of one of the five forms of energy or from accidents arising out of or in the course of employment but not includes work related diseases that need exposure assessment or laboratory tests and doctoral examination (41).

Manufacturing industry: An industry that processes physical or chemical materials or components into new products where the work is performed by power driven machine or hands (42).

Large scale industry: Industry that employ 250 or more workers and uses power driven machines(41).

Severity of injury: Characterized by death, hospitalization more than 24 hours ,and absence from work over 3 days in the last one year(22).

Excessive heat: heat is recorded as excessive if a worker is found sweating when naked or with light clothing or if data collector or investigator feels sudden heat wave when entering to the industry (22, 43).

Excessive noise: When persons with 1 meter each other are unable to hear in normal communication unless loudly (43).

Excessive dust: inert or irritant dust particle is recorded as excessive if the investigator experiences sudden sneezing upon entering or if worker's eye brows, hair, nostrils and close is observed to be covered with dust particles.

4.9. Study Variables

4.9.1. Dependent variable: Occupational injury on workers

4.9.2. Independent variables

4.9.2.1. Socio-demographic variable: Age, sex, educational status, monthly income, marital status, employment pattern and work experience.

4.9.2.2. Work environment variables: Health and safety training, health and safety supervision, hours worked per week, work instability, work shift, safe water supply and proper waste management.

4.9.2.3. Workers' behavioral variables: Alcohol drinking, khat chewing, cigarette smoking, use of personal protective devices, sleeping disorder, job satisfaction and medical problem.

4.9.2.4. Ergonomic related variables: presence of mobile devices to move or lift materials, safe storage/coding of materials/product, presence of functional danger signs/posts, safety nature of machines and timely maintenance of machines.

4.10. Data quality management

Eight data collectors (1 Bsc in Evh, 3 MPH students, 1 Bsc in Eng, 2 Diploma in social sciences and 2 industrial safety inspectors) were trained about all aspects of data collection tools, questioning techniques and ethical issues. Data collectors also role played on how to fill the questionnaire and observational checklist during training. Discussion was held on all important components of the questionnaire such as operational definitions, ethical issues, and time of questioning of workers. Data collectors agreed to report and discuss their daily data collection

activities to take immediate corrections and checking errors until end of data collection. One supervisor in addition to the principal investigator was trained to check completeness and handling of the questionnaire during data collection. Data were checked for questionnaire completeness and rearrange the code to prepare for data entry.

4.11. Data analysis technique

Data were entered by using EPI INFO 3.5.1 version computer software package and cleaned to check completeness and consistency. Finally, data were exported to SPSS for windows version 17 for data management and analysis. Descriptive statistics, binary logistic and multivariate logistic regression analysis were applied to see the effect of predictor variables on occupational injuries. In multivariate analysis, those variables whose P values less than 0.30 at bivariate analysis were entered by using enter or standard method to avoid unstable estimates due to excess number of variables (44, 45). The analysis was based on the conceptual frame work depicted for this study at figure-1 to see all the effect of variables.

4.12. Ethical consideration:

The ethical approval and clearance was obtained from Addis Ababa university institutional review board. Permission letter for all managers of selected industry was distributed. Data collectors requested for respondents' consent by the consent form which incorporated confidentiality and autonomy of workers for the information they provide and range of participation.

4.13. Dissemination of Findings

The finding of the study will be disseminated to Addis Ababa University, School of Public Health, Ministry of Health, the Addis Ababa City Health Bureau, the Ministry of Labor and Social Affairs. Finally, the paper will be submitted to journal publishers for publication.

5. Result

5.1. Socio-demographic Characteristics

A total of 829 workers were participated in the study which gave the response rate of 97.99% . 720(86.9%) were males and 109(13.1%) were females .The median age of respondents was 32 with the minimum and maximum age of 18 and 61, respectively. Only 15(1.8%) of the study population were illiterate and the majority of the study population (73.0%) have educational level of grade 9 and above. Majority of the study participants (70.1%) were followers of the Orthodox religion. Of the total participants, 407(49.1) were married followed by single 385(46.4%). Regarding employment pattern, 609(73.5%) were permanently employed while the rest 220 (26.5%) were temporary workers. Four hundred thirteen (49.8%) of the study participants were earned greater than 880 Eth. Birr including overtime payment. Socio-demographic characteristics of the study subjects are presented in Table 1.

Table 1: Distribution of socio-demographic characteristics of respondents in large scale metal manufacturing industries in Addis Ababa, March, 2010 (n=829)

Variables	Number	Percent
Sex		
Male	720	86.9
Female	109	13.1
Age		
18-32	433	52.23
32+	396	47.77
Religion		
Orthodox	581	70.1
Protestant	118	14.2
Muslim	115	13.9
Others	15	1.8
Educational Status		
Illiterate	15	1.8
Read and write	41	4.9
Primary school(1-8)	168	20.3
Secondary school(9-12)	212	25.6
Technical /vocational or higher	393	47.4
Marital Status		
Married	407	49.1
Single	385	46.4
Divorced	29	3.5
Separated	8	1.0
Employment Pattern		
Temporary	220	26.5
Permanent	609	73.5
Monthly income*		
≤880	416	50.2
>880	413	49.8

* Total monthly income including overtime if any

5.2. Distribution of occupational injury and characteristics

405 (48.9%) of study participants had responded that they had incident at job that resulted occupational injury in the past 12 months which brings the overall prevalence rate of occupational injury 489 per 1000 exposed workers per year .Out of injured workers, ,109(26.9%) were injured at job in the past two weeks period. Regarding frequency of injury occurrence in the past 12 months, 209(51.6%), 117(28.9%), 28(6.9%), 51(12.6%) had Once,

twice, three times, and four or greater times, respectively. Among participants who had incidence at work in the past two weeks, 89(81.7%) injured once and 20(18.3%) injured twice or more (Table 2).

Injured respondents were asked about body part affected, types, sources, days of the week of occurrence, and time of occurrence of injury. Study participants responded that hand 188(46.4%), finger 135(33.3%), toe 131(32.3%), and eye 112(27.7%) were commonly affected parts of the body. Regarding types of injury, abrasion/laceration 214(52.8%), eye injury 112(27.7%), Cut 87(21.5%), puncture 76(18.8%) and dislocation 60(14.8%) were predominantly occurred types of injury. Concerning sources of injury, machines 169(41.7%), splintering objects 155(38.3%), hit by falling objects 58(14.3%), hand tools 43(10.6%), and hot substances 39(9.6%) were commonest sources of injury. Among days which were memorized by injured workers, Monday 109(26.9%), Wednesday 57(14.1%) and Tuesday 50(12.3%) were the first three days of the week whereas 124 (30.6 %) of respondents did not remember the days of the week that injury occurred. Regarding times of occurrence of injury, morning 208(51.4%) and afternoon 161(39.8%) were major time of occurrence and 48(11.9%) of respondents did not remember when injury occurred in reference of these periods (Table 3&4).

With regard to severity of occupational injuries, hospitalization and staying on the bed due to injury, 119(29.4%) of participants had responded that they were hospitalized or stayed at home bed due to injury. Of these, 98(82.4%) respondents lost 24 or more hours while 21(17.6%) of them lost less than 24 hours due to hospitalization or home bed staying (Table 2). Injured respondents were also asked about working days lost due to occurrence of occupational injury, 193(47.6%) workers had lost 3 or less working day but working with sufferings while 212(52.4%) lost more than 3 days (Table 2). A total of 3734 working days were lost due to injury which can be estimated to be 132, 258 .28 Ethiopian birr per month without estimating medical expenditure costs.

Table 2: Distribution of occupational injuries in the last 12 months among respondents in large scale metal manufacturing industries in Addis Ababa, March,2010

Occupational Injury	Industries by code and injury distribution, Number(%)								Total
	01(n ₁ =76)	02(n ₂ =70)	03(n ₃ =92)	04(n ₄ =142)	05(n ₅ =60)	06(n ₆ =72)	07(n ₇ =87)	08(n ₈ =230)	
Last 12 months (n=829)									
Yes	40(4.8)	44(5.3)	36(4.3)	84(10.1)	38(4.6)	39(4.7)	47(5.7)	77(9.3)	405(48.9)
No	36(4.3)	26(3.1)	56(6.8)	58(7.0)	22(2.7)	33(4.0)	40(4.8)	153(18.5)	424(51.1)
Frequency of occurrence (n=405)									
Once	9(2.2)	25(6.2)	17(4.2)	43(10.6)	13(3.2)	18(4.4)	30(7.4)	54(13.3)	209(51.6)
Twice	14(3.5)	15(3.7)	16(4.0)	21(5.2)	11(2.7)	12(3.0)	11(2.7)	17(4.2)	117(28.9)
Three times	4(1.0)	2(.5)	1(.2)	9(2.2)	4(1.0)	5(1.2)	1(.2)	2(0.5)	28(6.9)
Greater or four times	13(3.2)	2(.5)	2(.5)	11(2.7)	10(2.5)	4(1.0)	5(1.2)	4(1.0)	51(12.6)
Last 2 weeks(n=405)									
Yes	13 (3.2)	7(1.7)	6(1.5)	24(5.9)	24(5.9)	5(1.2)	16(4.0)	14(3.5)	109(26.9)
No	27(6.7)	37(9.1)	30(7.4)	60(14.8)	14(3.5)	34(8.4)	31(7.7)	63(15.6)	296(73.1)
Frequency of Occurrence(n=109)									
Once	9(8.3)	6(5.5)	5(4.6)	19(17.4)	19(17.4)	4(3.7)	14(12.8)	13(11.9)	89(81.7)
Greater or Twice	4(3.7)	0(0.0)	0(0.0)	9(8.3)	3(2.8)	1(0.9)	2(1.8)	1(0.9)	20(18.3)
Hospitalization (n= 405)									
Yes	12(3.0)	15(3.7)	12(3.0)	36(8.9)	17(4.2)	16(4.0)	2(0.5)	9(2.2)	119(29.4)
No	28(6.9)	29(7.2)	24(5.9)	48(11.9)	21(5.2)	23(5.7)	45(11.1)	68(16.8)	286(70.6)
Time lost on hospitalization (n=119)									
<24 hrs	3(2.5)	3(2.5)	0(0)	12(10.1)	2(1.7)	1(0.8)	0(0)	0(0)	21(17.6)
≥24	9(7.6)	12(10.1)	12(10.1)	24(20.2)	15(12.6)	15(12.6)	2(1.7)	9(7.6)	98(82.4)
Days lost due to injury(n=405)									
≤3	16(4.0)	18(4.4)	28(6.9)	43(10.6)	15(3.7)	17(4.2)	23(5.7)	33(8.1)	193(47.6)
>3	15(3.7)	27(6.7)	21(5.2)	36(8.9)	22(5.4)	17(4.2)	13(3.2)	61(15.6)	212(52.3)

01=Akaki metal product factory, 02=Kotebe Hand tools Gift nails mfg industry, 03=Kality product factory, 04=Ethiopian iron &steel factory, 05=Ocfa metal Mfg industry, 06=Maru metal Mfg industry, 07=Ethiopian Cork & crown industry, 08=United Machine tools Engineering complex

Table 3:Parts of the body injured and types of injury in large scale metal manufacturing industries in Addis Ababa, March,2010(n=405)

Injury characteristics	Number	Percent
Parts of the body affected*		
Hand	188	46.4
Finger	135	33.3
Toe	131	32.3
Eye	112	27.7
Back	52	12.8
Knee	42	10.4
Ear	27	6.7
Upper arm	27	6.7
Lower leg	27	6.7
Lower arm	25	6.2
Head	22	5.4
Upper leg	20	4.9
Chest	17	4.2
Tooth	9	2.2
Others	20	4.9
Types of injury*		
Abrasion/laceration	214	52.8
Eye injury	112	27.7
Cut	87	21.5
Puncture	76	18.8
Dislocation	60	14.8
Burn	56	13.8
Fracture	49	12.1
Ear injury	18	4.4
Electrocution	12	3.0
Poisoning	11	2.7
Suffocation	10	2.5
Amputation	3	0.7
Others	75	18.5

*Percentage exceeds 100 because of multiple responses

Table 4: Sources of injury , days of occurrence of injury and time of injury among injured workers in large scale metal manufacturing industries in Addis Ababa, March, 2010 (n=405)

Characteristics	Number	Percent
Sources of injury*		
Machine	169	41.7
Splintering objects	155	38.3
Hit by falling objects	58	14.3
Hand tools	43	10.6
Hot substances	39	9.6
Collision with objects	37	9.1
Fire	35	8.6
Falls	34	8.4
Acid and acidic substance	34	8.4
Lifting heavy objects	24	5.9
Electricity	11	2.7
Others	39	9.6
Days of the week of occurrence*		
Monday	109	26.9
Wednesday	57	14.1
Tuesday	50	12.3
Thursday	35	8.6
Friday	36	8.9
Saturday	28	6.9
Sunday	5	1.2
I don't remember	124	30.6
Time of injury*		
Morning	208	51.4
Afternoon	161	39.8
Evening	29	7.2
Midnight	25	6.2
I don't remember	48	11.9

*Percentage exceeds 100 because of multiple responses

Among injured workers who were assigned at different working sections or departments, 65(16.05 %), 52(12.84 %) and 48(11.85%) were injured at machine area or crane operation, welding section, CSSTHF section, respectively. 46(11.36%) were injured at different section or more than one area including those working sections specified and other sections (Table 5).

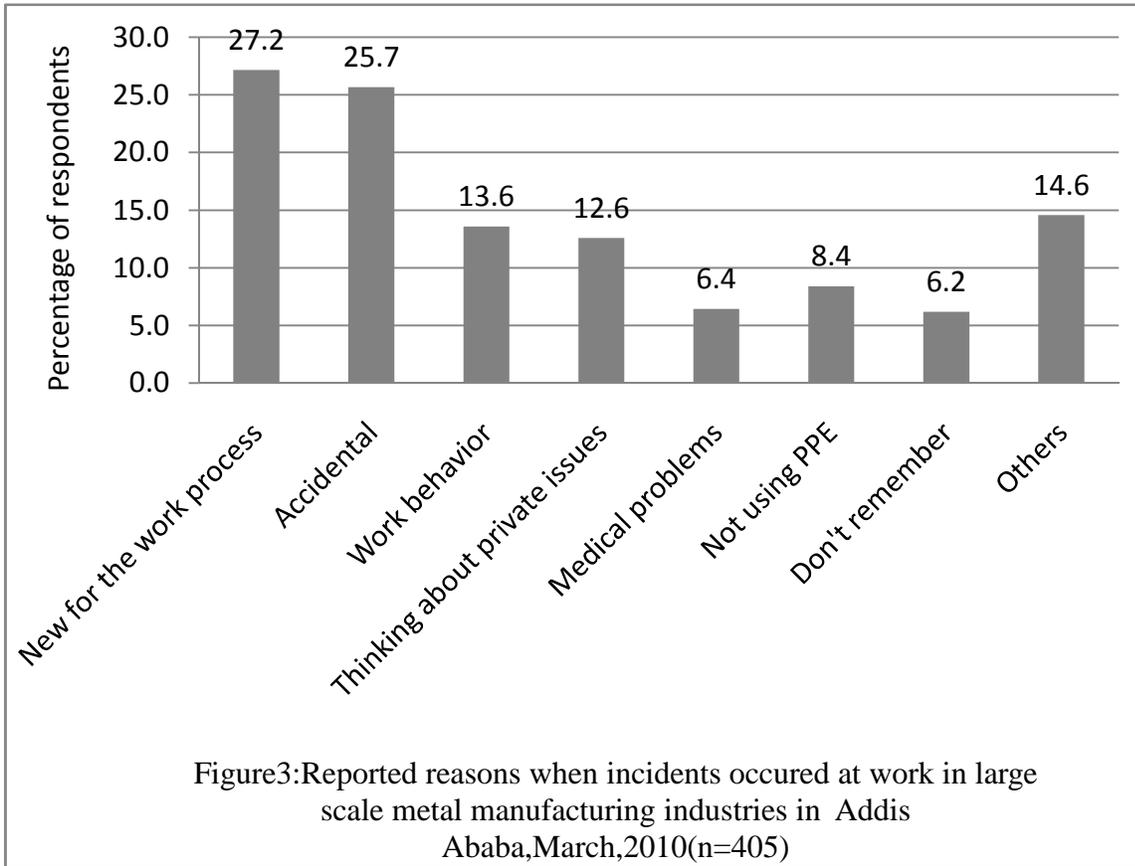
Table 5: Distribution of injuries among injured workers by job categories in large scale manufacturing industries in Addis Ababa, March, 2010 (n=405).

Job category	Number	Percent
Machine/Crane operator	65	16.05
Welding section	52	12.84
CSSTHF section **	48	11.85
Assembling, fabrication, engraving, and electroplating	38	9.38
Mechanic and maintenance	27	6.67
Corrugated/Pipe galvanizing section	23	5.68
Cork and can section	22	5.43
Melting and Rolling	22	5.43
Forging, grinding and foundering	19	4.69
Nailing and fencing	13	3.21
Tools and Spare part section	11	2.72
Packaging, Painting and Stamping	8	1.98
Cleaner ,Store keeper ,Guarding and Driving	8	1.98
Electrician	3	0.74
Miscellaneous works@	46	11.36
Total	405	100.00

** C= Metal Cutting, S=Scraping, S= Sorting, T=Trimming , H=Haling F=Feeding

Injured respondents were asked to recall that what they were doing during the occurrence(s) of the incident(s). Based on this, newness for the work process 110(27.2%) and perceiving that

injury as accidental (uncontrolled) 104(25.7%) were among main reported reasons by the workers whereas other reasons 59(14.6 %) and 25(6.2) were not recalled (Figure 3).



5.3. Distribution of work environment and Ergonomic Variables

Among study participants who were asked about work environment factors, 561(67.7%) of respondents reported that they were at work for 48 or more hours while 268(32.3%) were less than 48 hours per week. 473(57.1%) of respondents said that they had been regularly supervised at work about safety. Regarding safety and health training, 555 (66.9%) responded that they had not ever taken safety and health training. Only 70(8.4%) of participants had ever faced work related instability like work place violence, managerial conflict. About Work shift, 282(34.0%) of participants had work shift. Participants were also asked about sanitation components which may contribute for workplace accidents. 515(62.1%) and 479(57.8%) of them had safe water supply and proper waste management, respectively. Regarding ergonomic related factors, 384(46.3%), 333(40.2%), 229(27.6%),381(46.0), and 415(50.1%) of respondents revealed that availability of devices to move or lift objects, safely designed storage of materials, functionally danger signs, safely guarded machines and timely maintained machines, respectively(Table 6)

Table 6: Working environment and ergonomic factors among workers in large scale metal manufacturing industries in Addis Ababa, March, 2010 (n=829)

Variables	Number	Percent
Hours worked per week		
<48 hours	268	32.3
≥48 hours	561	67.7
Safety supervision		
Yes	473	57.1
No	356	42.9
Safety training		
Yes	274	33.1
No	555	66.9
Work shift		
Yes	282	34.0
No	547	66.0
Work related instability		
Yes	70	8.4
No	759	91.6
Safe water supply		
Yes	515	62.1
No	314	37.9
Proper waste management		
Yes	479	57.8
No	350	42.2
Mobile devices to lift or move objects		
Yes	384	46.3
No	445	53.7
Safe storage of materials/products		
Yes	333	40.2
No	496	59.8
Functional danger signs		
Yes	229	27.6
No	600	72.4
Safely Guarded machines		
Yes	381	46.0
No	448	54.0
Timely maintenance of machine		
Yes	415	50.1
No	414	49.9

5.4. Distribution of Behavioral variables

The result showed that 288(34.7%), 142(17.1%), and 119(14.4%) of participants were used to drink alcohol, chew khat, and smoke cigarette, respectively. The study also showed that 89(10.7%) respondents had sleeping disorder at work places and the reasons for the disorder were 50(56.2%) working more than 8 hours per day (work burden), 40(44.9%) working more than one task at a time, 27(30.3%) working at evening or mid night time and 16(17.9%) other reasons like absence of stimulant substance like khat. Two hundred one (24.2%) participants were not satisfied with the current job excluding other psychosocial characteristics outside the working environment. Respondent were also asked about medical problems they had before assignment or current working area, 113(13.6%) respondents had medical problems like extremity problem 48(42.5%), partial deafness 14(12.4%) ,and 9(7.9%) were specified medical problems and 47(41.6 %) were other several medical problems(Table 7).

Table 7: Distribution of behavioral factors among respondents in large scale metal manufacturing industries in Addis Ababa, March, 2010 (n=829)

Variables	Number	Percent
Chewing chat		
Yes	142	17.1
No	687	82.9
Cigarette smoking		
Yes	119	14.4
No	710	85.6
Drinking alcohol		
Yes	288	34.7
No	541	65.3
Sleeping disorder		
Yes	89	10.7
No	740	89.3
Job satisfaction		
Yes	628	75.8
No	201	24.2
Medical problem		
Yes	113	13.6
No	716	86.4
Work experience		
≤ 5 years	423	51.0
5 ⁺ years	406	49.0

Out of study participants 483 (58.3%) responded that they used personal protective devices at work places. Among participants, lack of personal protective 260(64.2), not comfortable to use 163(40.2%), perception of work performance reduction 78(19.3%), and lack of health and safety 49(12.1%) were common reasons why participants did not use personal protective devices at work. Among users, glove 398(98.3%), boots 307(75.8%), overalls 273(67.4%) and goggles 215(53.1%) were commonly used personal protective devices (Table 8).

Table 8: Distribution of Utilization of PPD ,type and reasons for not using among respondents in large scale metal manufacturing industries in Addis Ababa, February, 2010

Utilization distribution	Number	Percent
PPD utilization (n=829)		
Yes	483	58.3
No	346	41.7
Types of PPD used among users(n=483)*		
Glove	398	98.3
Boots	307	75.8
Overalls	273	67.4
Goggles	215	53.1
Ear plug	138	34.1
Respirators	101	24.9
Helmets	95	23.5
Faces shields	81	20.0
Others	23	5.7
Reasons for not using PPD(n=346)*		
Lack of PPD***	260	64.2
Not comfortable to use	163	40.2
Decrease work performance	78	19.3
Lack health education	49	12.1
Create health hazards	22	5.4
Others	20	4.9

***PPD= Personal protective devices, *percentage exceeds 100 because of multiple response

5.5. Observation of work environment

As shown in a table (Table 9), six occupational hazards were evaluated based on the operational definition given on the observational checklist in 28 working sections of eight selected industries. Based on that, 23, 27 and 19 were with excessive heat, excessive noise and excessive dust, respectively. Similarly, Warning signs or posts, availability and use of personal protective devices, appropriate or protective arrangements of materials including wastes were evaluated. As result, only four of 28 sections had warning signs and posts, three of them showed no lack of protective devices and workers were using devices and four of them had arranged materials in a protective manner (Table 9).

Among eight industries, only one had completed the required occupational health services such as specified preventive measures, copy of safety and health regulation, safety and health personnel and written plan of safety and health services. Three out of eight industries had complete first aid equipments that might serve if injury occurs at work before reaching to the clinics.

Seven industries had their own clinic although most of them could not give the required occupational health services like health and safety education while one industry had contract clinics which almost can be said no workers got services while they were in need. Only one industry had clinics which was giving the necessary occupational health services like safety education, accident registration books, monthly evaluation and motivation of working sections, planned and being implemented preventive services, waste management system, safe water supply (shower and other hygienic purposes), information education tools (warning posts/signs, prohibition signs, mandatory signs, safe condition signs, demonstration rooms how to use protective equipment) and related occupational health services. On controversy, most did not fulfill even the curative service components like treatment medicines and reagents for examination of sick workers at work.

Table 9: Occupational health and safety hazards identified in working sections of 8 selected metal manufacturing industries in Addis Ababa, March, 2010

Working sections(code)	Occupational Hards by code					
	001**	002**	003**	004**	005**	006**
Assembling(06)	0	1	1	0	0	0
CIS workshop(01)	0	1	1	0	0	0
Cutting, Furnace and Melting(02)	1	1	1	0	0	0
Fencing section(01)	1	1	0	0	0	0
Forging and foundry(03)	1	1	1	0	0	0
Foundry, casting, pump and turbine section(08)	1	1	0	1	1	1
Galva /Pipe section(01)	1	1	1	0	0	0
Galva CIS(01)	1	1	1	0	0	0
Hand tools, construction and (02) agricultural tools and spare parts	1	1	1	0	0	0
Engraving and pressing section(08)	0	1	0	1	1	1
Spare part(03)	1	1	0	0	0	0
Assembling(03)	1	1	0	0	0	0
Machine workshop(03)	1	1	1	0	0	0
Welding section(03)	1	1	1	0	0	0
Machine and workshop section(04)	1	1	1	0	0	0
Machine cork and crown section(07)	1	1	1	0	0	0
Machine section(06)	1	1	1	0	0	0
Metal unloading/loading/,storing, workshop(02)	1	1	1	0	0	0
Milliner section(01)	1	1	0	0	0	0
Nailing , fencing and wiring section(04)	1	1	1	0	0	0
Painting section(06)	0	0	0	0	0	0
Painting, Forging, grinding and foundering(02)	1	1	1	0	0	0
Rolling, melting and furnace (04)	1	1	1	0	0	0
Gearing section(01)	1	1	1	0	0	0
Store, unloading/loading/ section(07)	1	1	1	0	0	0
Tools, pare part and manufacturing(08)	1	1	0	1	1	1
Welding, Electroplating ,fiberglass, furniture and structure section(08)	0	1	0	1	0	1
Welding, high-tech tank, car, assembling(05)	1	1	1	0	0	0
Total score	23	27	19	4	3	4

** 001=excessive heat, 002=excessive noise,003=excessive dust,004=warning sign/posts,
005=Availability of PPD 006=Appropriate/Protective arrangement of materials. The cell
numbers indicate, 0=No and 1=Yes

5.6. Results of key informant

A total of eight key informants are participated in the study on six essential issues to triangulate with the quantitative findings. A minimum age of 42 and maximum age of 58 are participated. So they were asked to respond on the following themes.

5.6.1. Magnitude of occupational injury in the workplace

All participants stated that the occupational injury is a major health problem in the working areas. Participants had explained the considerable magnitude and severity of the problem. One of the respondents had said that "There is no question about the presence of the problem but our definition for occupational injury in such industry is not like that of your explanation for me but heavy injury like Amputation, Burning or death. Here, we can have up to 160 occupational related heavy injuries that need considerable insurance and intensive medical expenditures or minimum of a week seek leave". One of participants had given an amazing response quoted as "Why you are asking about **injury** while you know that metal industry is the most hazardous area. This is not only metal melting industry but also the probability of being melted may be another alternative for workers". Another participant (leader of workers union) said that "I believe that investment is crucial but should go with health of workers because the health of the worker is definitely a profit for the investor but here in our country investors are concentrated on a "**futile profit**" which endangers the country itself. If you take our company, there was 1 death, 2-hand amputation, and 1 completely paralyzed in this year. We had reported the problem to the city administrative as well as federal labor and social affairs beauro but there was no response". Similarly, another participant had also magnified the problem by giving examples as 1 hand amputation and loss of 2 fingers were also reported in another metal manufacturing industry. Only one participant reported that it can't be disclosed the problem but greater effort has been taking.

5.6.2. How, where, when and to whom the problem is severe

Most participants reported that the occurrence and severity of occupational injury varies as the behaviors and characteristics of working sections. One participant (Age 42, 25 year experience, Safety officer) said from his experience as “ In our set up, most occupational injuries occur when workers fail to use personal protective devices, to train workers at the entry points , respect safety rules and warning signs/posts, unsafe act like trying to move through intertwined machine areas , being new for the work processes, and perceiving that injury is not preventable or can’t be controlled. When we see the place where injury occurs, our quarterly evaluation showed that machine areas including fabrication, engraving, assembling, welding, pump and structural sections were the major areas. Regarding the time when injury occurs, most occur at the starting of the week”. Most key informants explained that it was difficult for them to state when and how injury occur as there was no focused and organized injury registration books and systems in the industry although they had stated that most occurs in machine areas and welding section. All key informants stated that workers who were exposed for these areas were nearer to different types of occupational injuries.

5.6.3. Major sources, factors and reasons for occurrence of occupational injury

Participants reported that, sources, factors and reasons of occupational injuries are very diverse and multiple as the working environment and sections varies greatly. The most common sources of injury which were clearly pointed out by participants were machines and splintering objects (trimmed metals, nails, melted metals, welding chips ...). Two of participants said that they did not have well and good registration system in their organization that enables them to describe major sources, factors and reasons. Anyway by experiences, workers usually had got injury by not using personal protective devices, unsafe work environment, not being trained for the work processes, irresponsible company owners for workers’ health, old or unguarded and not timely maintained machines, overburdened working environment, unsafe solid waste (metals) management, shortage of health and safety education, workers’ unsafe act, reluctant workers’ while working and having less experiences. Most key informants also reflected almost similar ideas.

5.6.4. Factors of occupational injury

One key informant (Age,42, Safety officer, 25 years work experience) quoted as “ In one and another way, we can classify socio demographic, working environment behavior, work place design/ergonomic related factors , workers’ behavioral factors and psychosocial factors. For our context, my colleague presented the six month analysis report in our organization. Based on that report, if you take sex, the proportion of injury in males was higher than females and this can be also logical because we usually assign males in highly risky areas such as machines as you know that we traditionally assume that as if males were strong. In my opinion, if workers are addicted to different substances, the worker might develop either elusive or reluctant behavior which can expose them to occupational injury □. Another participant, (Age, 57, workers’ union head, 27 years experiences) said “I am not actually clear of these classification because I am not safety personnel. But the common factors presented for me were unsafe working environment and work place design and some workers have not protective behaviors □. Another respondent (Age 49, Unit head) put that these all factors contributed for occurrence of occupational injury in their organization, but still now there is no compiled data which enables them to describe their association. Even, he did not know who is responsible for the issue, Ministry of Health? or Ministry of Labor and social affairs?. Except, they had started to report for the City Administrative Beauru of Labor and Social Affairs but we couldn’t get any feedback. All other participants had closest idea although they did not have figurative information in their organization

5.6.5. Current status of occupational health and safety services provided.

Only one key informant had specified occupational health services which can be said a model for other industries. He put his ideas as “ For sure, we are the second next to Ethiopian air line in occupational health and safety services although we cannot say that is standardized and no limitation at all”. He had also reported they provide services like annual examination for occupational disease, nearly complete first aid services, medical services for workers, training of new workers before engaging to work about new machines , complete injury registration system, giving insurances for injured workers, incentives for workers who were assigned risky working sections, provision

of nutrition like milk and flavors, detergents for hygiene, overtime as motivation, safe and adequate water supply for hygiene, and showers and toilets for males and females.

On contrary to the above ideas, two participants had stated that most managers assume that fulfilling occupational health services for the workers is not profitable. And they added, Ministry of Labor and Social Affairs did not take tangible measures on health and safety of workers in their organization or gives priority only for investment which is not workers' health centered. Even clinics could not give services better than first aid services and two participants similarly said they had contract clinics which did not give services whenever needed. The rest of participants said almost occupational health is compromised.

5.6.6. Supply and utilization of personal protective equipment

Except one participant, most responded that the word "adequate" should not be asked but most necessary equipments like glove, boots, overalls and goggles for welders might be provided. As participants explained, these personal protective devices might not be utilized by the users either they are not fit for each workers or unaware behaviors of the workers. On the other hand, managers perceive that providing personal protective devices will made the organization non profitable. It had also been pointed out that temporary workers could not get personal protective devices in almost all industries except that one industry would not accept them unless they were with their own protective devices. One industry had a rewarding ideas that it provides personal protective device and if the workers found to be not using it he/she will be punished based on the safety rule and regulation of the industry.

5.7. Analysis for determinant factors of occupational injury

5.7.1. Socio-demographic factors

Among selected socio-demographic variables, sex, educational status, age and employment pattern of workers showed statistically significant association with occupational injuries in the bivariate analysis. Sex of the workers showed significant association with magnitude of

occupational injury when adjusted for all variables whose P values is less than 0.30. Males were 3.32 times more likely to be injured when compared to females [AOR: 3.32, 95%CI :(1.88, 5.85)] (Table 10).

Table 10 : Selected Socio-demographic variables tested for association of occupational injuries among respondents in large scale metal manufacturing industries in Addis Ababa, March, 2010

Variables	Occupational injury		COR (95%CI)	AOR(95%CI)
	Yes	No		
Sex				
Male	382	338	4.23(2.61,6.85)	3.32(1.88,5.85)*
Female	23	86	1.00	1.00
Age				
18-32	194	239	0.71(0.54,0.93)	1.08(0.66,1.77)
32+	211	185	1.00	1.00
Educational Status				
Illiterate	9	6	2.33(0.81, 6.67)	1.82(0.54,6.12)
Read and write	26	15	2.69(1.38, 5.24)	1.86(0.86,4.03)
Primary school(1-8)	101	67	2.34(1.62,3.39)	1.19(0.74,1.92)
Secondary school(9-12)	115	97	1.84 (1.31,2.58)	1.10(0.73,1.67)
Technical / vocational or higher	154	239	1.00	1.00
Marital Status				
Ever Married	231	213	1.00	1.00
Never married	174	211	0.76(0.56,1.00)	0.94(0.61,1.49)
Employment Pattern				
Temporary	134	86	1.94(1.42,2.66)	1.35(0.85,2.14)
Permanent	271	338	1.00	1.00
Monthly income**				
≤880	43	41	1.11(0.70,1.76)	
>880	261	276	1.00	
Work experience				
≤ 5 years	195	228	1.25(0.95,1.65)	0.96(0.61,1.52)
5 ⁺ years	210	196	1.00	1.00

**= Variables whose p.value >0.30 in the bivariate analysis

5.7.2. Working environment and ergonomic related factors

Table 11: Working environment and ergonomic variables tested for association of occupational injury among workers in large scale metal manufacturing industry in Addis Ababa, March, 2010 (n=829)

Variables	Occupational injury		COR(95%CI)	AOR(95%CI)
	Yes	No		
Hours worked per week**				
<48 hours	68	200	1.00	1.00
≥48 hours	337	224	4.43(3.20,6.11)	2.37(1.55,3.61)*
Safety supervision**				
Yes	159	314	1.00	1.00
No	246	110	4.42(3.29,5.93)	1.60(1.03, 2.60)*
Safety training**				
Yes	96	178	1.00	1.00
No	309	246	2.33(1.73,3.14)	0.81(0.54,1.23)
Work shift**				
Yes	137	145	1.00	1.00
No	268	279	1.02(0.76,1.36)	0.75(0.52,1.09)
Work related instability**				
Yes	38	32	1.00	1.00
No	367	392	0.79(0.48,1.29)	0.75(0.42,1.36)
Safe water supply**				
Yes	194	321	1.00	1.00
No	211	103	3.39(2.52,4.56)	1.59(0.99,2.53)
Proper waste management**				
Yes	180	299	1.00	1.00
No	225	125	2.99(2.25,3.98)	0.81(0.51,1.30)
Mobile devices to lift or move objects @				
Yes	146	238	1.00	1.00
No	259	186	2.27(1.72,3.00)	1.03(0.68,1.56)
Safe storage of materials/products@				
Yes	112	221	1.00	1.00
No	293	203	2.85(2.13,3.80)	1.34(0.87,2.06)
Functional danger signs@				
Yes	42	187	1.00	1.00
No	363	237	6.82(4.69,9.89)	2.65(1.67,4.19)*
Safely Guarded machines@				
Yes	125	256	1.00	1.00
No	280	168	3.41(2.56,4.55)	1.11(0.66,1.86)
Timely maintenance of machine@				
Yes	134	281	1.00	1.00
No	271	143	3.97(2.98,5.30)	1.39(0.80,2.40)

Among work environment variables, health and safety supervision was significantly associated with occupational injury when adjusted for all categories of variables. Workers without health and safety supervision were 1.60 times more likely to be injured than those who were supervised [AOR: 1.60, 95%CI :(1.03, 2.60)]. Similarly, hours worked per week were also showed significant association with occupational injury when adjusted for all variables whose p value is less than 0.30. Participants who were engaged to work 48 hours or more per week were 2.37 times more likely to be injured compared to those who were engaged to work for less than 48 hours per week[AOR: 2.37,(95%CI:(1.55,3.61)].Likewise, ergonomic related factors, only presence of functional danger signs was significantly associated while others were not. Participants who were assigned at a work environment lacking functional danger signs were 2.65 times more likely to be injured than opposite work environment [AOR: 2.65,(95%CI: (1.67,4.19)] (Table 11).

5.7.3 Behavioral factors

Table 12: Behavioral variables tested for association of occupational injury among respondents in large scale metal manufacturing industries in Addis Ababa, March,2010(n=829).

Variables	Occupational injury		COR (95%CI)	AOR(95%CI)
	Yes	No		
Chewing chat				
Yes	96	46	2.55(1.74,3.74)	0.99(0.56,1.79)
No	309	378	1.00	1.00
Cigarette smoking				
Yes	96	23	5.42(3.36,8.74)	3.36(1.73, 6.50)*
No	309	401	1.00	1.00
Drinking alcohol				
Yes	159	129	1.48(1.11,1.97)	1.09(0.73,1.62)
No	246	295	1.00	1.00
Sleeping disorder				
Yes	62	27	2.66(1.65,4.27)	1.48(0.80,2.73)
No	343	397	1.00	1.00
Job satisfaction				
Yes	282	346	0.52(0.37,0.72)	0.84(0.56,1.27)
No	123	78	1.00	1.00
Medical problem				
Yes	65	48	1.50(1.00,2.24)	0.87(0.53,1.41)
No	340	376	1.00	1.00
Use of PPD**				
Yes	198	285	.47(0.35,0.62)	0.76(0.51,1.13)
No	207	139	1.00	1.00

**PPD=Personal protective device

Among chosen behavioral factors, only cigarette smoking was significantly associated when adjusted for all variables whose p values is less than 0.30. Smokers were 3.36 times more likely to be injured when compared to non smokers [AOR: 3.36, 95%CI: (1.73, 6.50)]. However, other behavioral variables were not significantly associated with occupational injury at final or adjusted model although they showed significant association in the bivariate analysis (Table 12).

In summary, the stable model can be explained by sex, safety and health supervision, hours worked per a week, cigarette smoking and functional danger signs /posts.

6. Discussion

6.1. Magnitude and severity of occupational injury

Occupational injury is a global public health burden and economic burden in addition to other public health challenges in both industrialized and less industrialized country (1, 2). However, the magnitude had got unstable estimate in developing once where occupational injury prevention system is not well organized and there by a challenge for development of occupational health services to prevent and control of the problem (2).

The overall prevalence of occupational injury in this study was 489 per 1000 exposed workers per year. Studies in Asian pacific countries, Vietnam, Japan and New Zealand showed the magnitude of occupational injuries was 583, 385, 132 workers per 1000 per year in Small and medium sized manufacturing industries((1, 19, 20) . A study conducted in Small and medium sized manufacturing industries in Gondar showed the prevalence was 335 workers per 1000 exposed workers per year(22) . The result in this study showed higher rate than those small and medium scale industry .This finding is supported by findings from observational and key informants' interview. The finding could have implications like occupational safety and health services might be compromised for reasons such as inadequate safety and health supervision, poor utilization of personal protective devices(46) or metal manufacturing industries are hazardous occupational area.

Regarding to severity which can be measured by hospitalization/staying on bed and days away from work, this study showed the most severe condition than other findings (22, 23, 43) with 119(29.4%) hospitalization or stayed at home bed with 98(82.4%) for 24 or more working hours and 3734 working days were lost due to injury which accounted for 132, 258 .28 Ethiopian Birr per month without estimating medical expenditure costs (Table.2). This also correlated from findings of key informants interviews. This result implied that most incidences made participants hospitalized or days away from work. This might be due to source for injuries are splintered metals which are sharps or molten that could have a great energy to cause heavy injury.

6.2. Major occupational injuries, sources/causes and parts of the body affected.

This study showed that Abrasion or laceration 214(52.8%), Eye injury 112(27.7%) Cut 87(21.5%), Puncture 76(18.8%) and dislocation 60(14.8%) were five most common types of injury. Studies in East Asia showed consistent result (1, 19, 20). Other studies in Ethiopia, Gondar on small and medium scale industry, and Addis Ababa in textile factory workers and Afar showed consistent result (22, 23, 31) except that Eye injury was higher in this result. This could be mainly by foreign metal chips which can splinter towards eye and poor utilization of goggles (13.2%) in these industries.

Five common parts of the body injured in this study were Hands 188 (46.4%), Finger 135(33.3%), Toe 131 (32.3%), Eye 112(27.7%) and back 52 (12.8%). This finding is consistent with other findings in Ethiopia (22, 31, 43) and other studies in East Asia (1, 19, 20) in terms of their types although the figures vary. With regard to causes or sources of injury, this study showed machinery 169(41.7%), splintering objects 155(38.3%) , Hit by falling objects 58(14.3%), hand tools 43(10.6%), and hot substances 39(9.6%) were among commonest sources of injury. Similarly, this study is in agreement with other studies which pointed out machinery, hand tools, and hit by falling objects, are the frequent causes in most industrial setups (1, 22, 27, 32, 33). The causes are also specified in key informants result consistently with this quantitative finding.

6.3. Determinants of occupational injury

Most Researchers showed that several factors were related to the occurrence, severity, and types of injury. Socio-demographic factors, working environment variables, worker's behavior and ergonomic factors are the possible risk factors for workers to be injured in workplace of manufacturing industries including metal manufacturing industries (21-23, 25, 32, 34, 36)

Sex of the workers showed significant association with magnitude of occupational injury when it is adjusted for all variables of interest. This finding is consistent with other studies (19, 22, 31, 36, 37) . Some findings showed that age is significantly associated with magnitude of occupational injuries in which all showed the younger the age group the greater injury rate (19, 20, 22, 23) . However, this study showed that age is not significantly associated with occupational injury when it is adjusted for other variables. This could be explained by young workers might be assigned at less machine areas as it need experiences in this study. Educational status is also was not significantly associated with magnitude of occupational injuries when adjusted all variables of interest. This is not also consistent with the study(36, 37) .This could be explained by the adjustment procedures used . Most authors concluded from crude analysis or entry for final model is different from this except two literatures in Ethiopia(22, 23). Or only education may not a guarantee for not being injured but safe practice.

Regarding the work environment factors, health and safety supervision was significantly associated with occupational injury when it is adjusted for all variables whose P value is less than 0.30. This correlates with other studies (19, 36). Similarly, hours worked per week were also showed significant association with occupational injury. This result is also in agreement with study done in Ethiopia (22, 23) . Safety and health training did not show significant difference when it is adjusted for all variables of interest ($P < 0.30$). However, this study is not consistent with other findings(22, 23) .This could be those workers who were not injured might respond as if they did not take due to the logic that they perceived they will take if they say no. Water supply and waste management are not also significantly associated factors with occupational injury. Although researches are scarce which correlates occupational injury with water supply and waste management in our country, literatures put these are important contributing factor for occupational injury in industrial set ups (2, 17, 36).

All behavioral and ergonomic related factors were significantly associated with magnitude of occupational injury before adjusted for other variables but only cigarette smoking and presence of functional danger signs were associated after adjustment for all variables($P < 0.30$). This study for cigarette smoking is consistent with study done in Japan(19) but not for drinking alcohol (19, 23), sleeping disorder (22, 23), job satisfaction (22, 23, 34, 37), and use of PPE(23) . This might be due to workers may not want to express this personal behaviors at a time of data collection. Other literatures (4, 25, 27, 36), stated ergonomic related factors are predictors for occupational injuries although as to my knowledge there is no study showing these relation in Ethiopia until this study is completed.

7. Conclusion and recommendation

7.1. Conclusion

- ✓ The overall prevalence of occupational injury and severity is significantly high among workers engaged in large scale metal manufacturing industries in Addis Ababa. This magnitude implied that occupational health service coverage in this workplaces need a due attention for policy makers to design strategy needed for the prevention and control of occupational injuries.

- ✓ Sex of workers , Safety and health supervision, Hours worked per week , Cigarette smoking and availability of functional danger signs/ posts were significantly associated factors with occupational injury .

7.2. Recommendation

The following recommendations are forwarded from findings of the study.

- ✓ Ministry of Health, Labor and Social Affairs and Bureau of investment should give integrated emphasis to reduce the current magnitude of occupational injury to have healthy workforce by ensuring enforcement of regulations and initiatives, occupational safety standards, workplace monitoring and evaluation system in large scale metal manufacturing industries in Addis Ababa.
- ✓ The Ministry of Labor and social affairs should monitor fulfillment of basic occupational health services by considering sex of the worker, regular health and safety supervision , hours worked per week , Cigarette smoking and availability of functional danger signs/ posts.
- ✓ Further cohort study should be conducted on related factors for occupational injuries.

8. Strength and limitation of the study

8.1. Strength of the study

- ✓ Study done on magnitude and factors affecting occupational injury in large scale metal manufacturing industry is scarce. Therefore, the finding will be important for policy makers to design strategy to prevent and control occupational injury and researchers for information.

- ✓ Consideration of design effect on the methodological provision will have greater power to detect differences among factors in multivariate analysis and representative of the source population.

- ✓ The use of key informant interviews and observational checklists for the whole working environment will give strength for quantitative findings.

8.2. Limitation of the study

- ✓ Study participants may not recalled occurrence(s) of occupational injury during one year period so that this may underestimate the overall prevalence (recall bias).

- ✓ Study participants might also perceive that responding as injured might bring benefits; this can result in overestimation of prevalence (social desirability bias).

- ✓ Annual leave, injured workers at home and low production seasons in industries may be responsible for underestimation of overall prevalence and unable to detect associations.

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Annex-1- English Version Questionnaire

Questionnaire for assessment of magnitude and factors of occupational injuries among workers in large scale metal manufacturing industries in Addis Ababa .

Questionnaire ID:_____

Name of industry by code _____ **Address by code** _____

1. Information sheet

Hello, I am _____. I am from Addis Ababa university research team. I would like to ask few questions which take 30 minutes about incident at work that resulted in injuries to you at work in the previous 12 months. Your genuine information that you are going to provide will help policy makers to design strategy/give priority for prevention and control of occupational injuries to have healthy workforce. You are selected scientifically to be participant of this study if you give me consent after you have understood the following information sheet:

Title of the study: Assessment of magnitude and factors of occupational injuries among workers in large scale metal manufacturing industries in Addis Ababa

Back ground of the study: Occupational injuries constitute global public health burden which millions of workers die each year from an intentional work related accidents and diseases and cause for economic loss. Morbidity, disability and death in most developing countries including Ethiopia is becoming a serious public health problem which contribute a challenge to achieve millennium development goals of poverty reduction and health for all.

Objective of the study: To assess the magnitude and factors affecting occupational injuries among workers engaged in large scale metal manufacturing industries in Addis Ababa.

Benefit of the study: -The participants will not get any direct benefit for being participated.

-The result can be used as a baseline for further studies that can be done in these occupational areas.

-The result will be disseminated to the Addis Ababa city health bureau, the ministry of Labor and social affairs for designing prevention and control measures.

- If injuries occurred during data collection, the data collector/investigator will report to health and safety clinic of the industry or first aid will be given if possible.

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

Rights of the participant: -participating and not participating is the full right and participants can stop from participation in the study at any time. And also the participant can skip question which the worker does not want to respond. Participants can ask any questions which is not clear for understanding.

Confidentiality: - Any information forwarded will be kept private and his name will not specified.

2. Informed consent

I have read this form or it has been read to me in the language I comprehend and understood all conditions stated above. Therefore, I am willing to participate in this study.

Name of participant _____

Signature _____

Name of **PI:** Yitagesu Habtu Address: Tell (E-mail)0911552560 /yitagesuh@yahoo.com

Signature _____ **IRB: AAU ,IRB** Tell:011553873

Name of witness' _____

Signature _____

Date of interview _____ starting time _____ Ending _____

Result of interview 1.Completed 2.Respondent not available 3.Refused 4.Partially Completed.

If the respondent is not voluntary, please skip to the next participant.

Questionnaire ID _____

Part-I – Sociodemographic information

No	Question	Possible response	Skipping	Code
101	Sex	1. Male 2. Female		
102	Age	_____		
103	Religion	1.Orthodox 3.Protestant 2.Muslim 4.Others(specify)		
104	Educational level	1.Illiterate 2.read and write 3.Primary school(1-8) 4.Secondary school(9-12) 5.Technical and vocational 6. Degree or higher		
105	Marital status	1.Maried 2.Single 3. Divorced 4.Window 5.Separated		
106	Employment pattern	1. Temporary 2. Permanent 3. Substitute		
107	Job category	_____		
109	Salary/income including overtime (Daily, monthly)	_____		

Questionnaire ID _____

Part –II-Occupational injury

No	Question	Possible response	Skipping	Code
201	Have you had an incident at work that resulted injury to you in the last 12 months?	1.Yes 2.No	If no, skip to Q 301	
202	Have you had an incident at work that resulted injury to you in the last 2 weeks?	1.Yes 2.No		
203	If yes for Q201 or 203, how many times?	----times in the last 12 months ----times in the last 2 weeks		
204	Parts of the body affected	1. Eye 1.Yes 2.No 2. Tooth 1.Yes 2.No 3. Hand 1.Yes 2.No 4. Ear 1.Yes 2.No 5. Knee 1.Yes 2.No 6. Toe 1.Yes 2.No 7. Fingers 1.Yes 2.No 8. Head 1.Yes 2.No 9. Upper arm 1.Yes 2.No 10. Lower arm 1.Yes 2.No 11. Upper leg 1.Yes 2.No 12. Lower leg 1.Yes 2.No 13. Back 1.Yes 2.No 14.Chest 1.Yes 2.No 15.Others(specify)_____		

Questionnaire ID: _____

No	Question	Possible response	Skipping	Code
205	Types of injury	1.Abrasion/laceration 1.Yes 2.No 2.Cut 1.Yes 2.No 3. Burn 1.Yes 2.No 4.Puncture 1.Yes 2.No 5.Fracture 1.Yes 2.No 6.Dislocation 1.Yes 2.No 7.Amputation 1.Yes 2.No 8.Electrocution 1.Yes 2.No 9. Suffocation 1.Yes 2.No 10..Ear injury 1.Yes 2.No 11.Eye injury 1.Yes 2.No 12.Poisoning 1.Yes 2.No 13.Others, specify_____		
206	What were doing at the time of injury?	1. I was new for the work process 1.Yes 2.No 2. Thinking about private affairs 1.Yes 2.No 3. Due to other medical problem 1.Yes 2.No 4. I think accident is beyond control 1.Yes 2.No 5. It is the working behavior 1.Yes 2.No 6. It is due to not using PPD/E 1.Yes 2.No 7. I don't remember 1.Yes 2.No 8. Others (specify)		
207	Sources Of injury	1.Machinery 1.Yes 2.No 2.Hit by falling objects 1.Yes 2.No 3.Electricity 1.Yes 2.No 4.Splintering objects 1.Yes 2.No 5.Collision with objects 1.Yes 2.No 6.Fire 1.Yes 2.No 7.Hand tools 1.Yes 2.No		

		8.Falls 9. Hot substances 10.Acid and acidic substance 11.Lifting heavy objects 12.Others ,specify	1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No		
--	--	--	--	--	--

No	Question	Possible response	Skipping	Code	
208	Days of the week of occurrence of injury	1.Monody 2.Wednesday 3.Tuesday 4.Thursday 5.Friday 6.Saturday 7.Sunday 8.I don't remember	1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No		
209	Time of injury	1.Morning 2.Afternoon 3.Evening 4.Midnight 5.I don't remember	1.Yes 2.No 1.Yes 2.No 1.Yes 2.No 1.Yes 2.No		
210	Were you hospitalized due to injury	1.Yes 2.No			
211	If yes for Q210, how long it takes (hours)	_____			
212	Days lost due to injury at work for the last 12 month	_____			

Questionnaire ID: _____

Part -III-Working environment

No	Question	Possible response	Skipping	Code
301	Hours worked per week	_____		
302	Regular health and safety supervision	1. Yes 2. No		
303	Have you had safety training in connection with new employment, equipment, or work process?	1. Yes 2. No		
304	Have you had any work shift ,	1.Yes 2.No		
305	If yes for Q304, How often?	1.Every 4 Hour 2. Every 8 hour 3.Every 24 hour 4. Others ,specify_____		
306	Have you ever faced any work related instability like workplace violence, nervousness, managerial (colleagues) disagreement ?	1.Yes 2.No		
307	Do you always get safe and adequate water for your hygiene?	1.Yes 2.No		
308	Do you have always safe solid and liquid waste disposal system that prevents you from accidents at work?	1.Yes 2.No		

Questionnaire ID _____

Part-IV- Workers behavior and characteristics

No	Question	Possible response	Skipping	Code
401	Duration in same workplace in hour/day/month/year	_____		
402	Have you had any medical problem before or after you work in this area ?	1.Yes 2.No		
403	If yes for Q402, types of problem	1. Deafness 1.Yes 2. No 2. Sight problem 1. Yes 2.No 3. Extremity disability 1.Yes 2. No 4. Other, specify_____.		
404	Do you smoke?	1.Yes 2.No	If no skip to Q406	
405	If yes for Q404, how often?	1.Every day 2.1-3 days/wk 3.Ocassionally		
406	Do you take excess alcohol?	1.Yes 2.No	If no skip to Q408	
407	If yes to Q406, how often?	1.Every day 2.1-3 days/wk 3.Ocassionally		
408	Do you chew chat?	1.Yes 2.No	If no skip to Q410.	
409	If yes to Q408, how often?	1.Every day 2.1-3 days/wk 3.Ocassionally		
410	Do have any sleeping disorders?	1.Yes 2.No	If no skip to Q412	

Questionnaire ID _____

No	Question	Possible response	Skipping	Code
411	If yes to Q410, what is the reason?	1.Working greater than 8 hours without Shifting 1.Yes 2.No 2.Working in evening 1.Yes 2.No 3. Trying to work more than one task at a time 1.Yes 2.No 4.Others, Specify_____		
412	Are you satisfied with job or task required to do?	1.Yes 2.No		
413	Do you use any personal protective device during working?	1.Yes 2.No		
414	If yes to Q413, what type?	1.Glove 1.Yes 2.No 2.Ear plug 1.Yes 2.No 3.Respirators 1.Yes 2.No 4.Helmet 1.Yes 2.No 5.Overalls 1.Yes 2.No 6.Goggles 1.Yes 2.No 7.Face shield 1.Yes 2.No 8.Boots 1.Yes 2.No 9.Others, specify_____		
415	What are your reasons for not using personal protective equipment?	1.Lack of protective equipment 1.Yes 2.No 2.Lack of safety and health education 1.Yes 2.No 3.Not comfortable to use 1.Yes 2.No 4.Decrease work performance 1.Yes 2.No 5.Create safety and health hazards 1.Yes 2.No 6.Others, specify_____		

Questionnaire ID _____**Part -5-Ergonomic factors**

No	Question	Possible response	Skipping	Code
501	Do you use mobile devices near worksites to lift or move materials safely at last 12 months?	1.Yes 2.No		
502	Are raw materials or products stored and color marked to prevent you from accidents?	1.Yes 2.No		
503	Are there always functional dangers or warning signs during your activities?	1.Yes 2.No		
504	Are machines always guarded or installed with safety devices during your activities?	1.Yes 2.No		
505	Are machines always maintained immediately when old or unsafe?	1.Yes 2.No		

አባራ-2-የአማርኛ ትርጉም መጠይቅ

ይህ መጠይቅ በአዲስ አበባ ከተማ በሚገኙ ትላልቅ የብረት ማምረቻ ኢንዱስትሪ ውስጥ ከሚሰሩ ሠራተኞች መካከል ከሙያ ጋር በተያያዘ የደረሱ ጉዳዮችን ለማጥናት የተዘጋጀ ነው።

የመጠይቁ መለያ ቁጥር-----

የድርጅቱ ስም -----አድራሻ-----

1.ለተመራዎች የሚሰጥ መረጃ

ጤና ይስጥልኝ፡ እባክዎን አሉ? እኔ -----እባላለሁ። እዚህ የመጣሁት ይህንን ጥናት የሚያካሂድ የአዲስ አበባ ዩኒቨርሲቲ ሕክምና ፋክልቲ የሕብረተሰብ ጤና ትምህርት ክፍል ቡድን አበል ሆኜ ነው። ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳዮችን ችግር ጥልቀትና የጉዳዮቹን መንስኤ ለመረዳት እንፈልጋለን ። በመሆኑም ይህንን መረጃ ለማግኘት በዚህ ድርጅት ላይ እንገኛለን ። የዚህ ጥናት ውጤት በከተማችን ለሚከናወነው የሙያ ደህንነትና አገልግሎትን ለማሻሻል መጠነኛ እገዛ ይኖረዋል ። ስለሆነም ከስራ ጋር በተያያዘ ባለፉት 12 ወራት ውስጥ የደረሱበዎትን

ጉዳዮች በተመለከተ 30 ደቂቃ የሚወስድ የተወሰኑ ጥያቄዎችን ልንጠይቀዎት እንወዳለን። እርሶዎ 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 የብረታብረት ማምረቻ ፋብሪካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳዮችን መጠን እና መንስኤ ፡- መግቢያ፡- በአሁኑ ጊዜ ከስራ ጋር በተያያዘ ሳይታሰቡ የሚከሰቱ ጉዳዮች አለማቀፋዊ ክብደት ከፍተኛ የህብረተሰብ የጤና እና የኢኮኖሚ ችግር ነው። በየአመቱ ለሚሊወኖች ሞት እና አካለስንኩልነት ምክንያት ናቸው። የጉዳዩ አስከፊነት እንደ ኢትዮጵያ ባሉ ታዳጊ ሀገሮችም የከፋ እና የሚሊኒውን ድህነት ቅንሳና ጤና ለሁሉም ግብ አደጋ ላይ ይጥላል።

የጥናቱ ዓላማ፡- በአዲስ አበባ ከተማ በሚገኙ ትላልቅ የብረታብረት ማምረቻ ፋብሪካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳዮችን መጠን እና መንስኤ ማወቅ

የጥናቱ ጥቅም፡ -ተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት ምንም ጥቅም የለም

-ከዚህ ጥናት የሚገኘው ውጤት በከተማው ወደፊት ለሚጠኑ ተመሳሳይ ጥናቶች ዕንደመነሻ ግብአት ያገለግላል

-የጥናቱ ውጤት ለከተማው ጤና ቢሮ እና ለሰራተኛና ማሸበራዊ ጉዳይ ቢሮ ይፋ ስለሚደረግ ጉዳዩን ለመከላከልና ለመቆጣጠር የሚያስችሉ መፍትሄዎችን ለመንደፍ ይጠቅማል

-ይህ መረጃ በሚሰበሰብበት ወቅት የተጎዳ ሰራተኛ ከተገኘ በኢንዱስትሪው ውስጥ ለሚገኘው ወይም በቅርብ ለሚገኝ ጤና ተቋም እንዲረዳ ይደረጋል ከተቻለም የመጀመሪያ ህክምና 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 ያለመሳተፍ መብቱ የተጠበቀ ነው። በመሳተፍ ላይ እያሉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ ለመመለስ የማይፈልጉትን ጥያቄ ካለ አለመመለስ ይቻላል።

-በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል።

የጥናቱ ሚስጥራዊነት፡- የተሳታፊው ማንነት በሚስጥር ይያዛል

2. የተሳታፊዎች የፈቃደኝነት ቅጽ

ከላይ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነባልኝ በትክክል ከተረዳሁ በኋላ በጥናቱ ለመሳተፍ ፈቃደኛ ሆኛለሁ።

የተሳታፊ ስም-----ፊርማ-----

አጥኝዉ ስም----- ፊርማ :አደራሻ:ስልክ(ኢ-ሜል)-----

የምስክር ስም-----ፊርማ-----

መጠይቁ የተሞላበት ቀን -----የተጀመረበት ሰዓት -----የተጠየናቀቀበት ሰዓት --

ዉጤት:: 1 ተማሪታል 2 ተጠያቂዉ አልተገኘም

 3 ተቃዉሞ 4 በከፊል ተሞላታል

የተሳታፊው/ዋ ፈቃደኛ ከልሆነ/ች/ ወደሚቀጥለው ይታለፍ

የጥያቄ የመለያ ቁጥር-----
 ክፍል 1: ማህበራዊና ሥነ-ሕዝባዊ ገጽታዎችን በተመለከተ

ተ.ቁ	ጥጫቁ	የሚጠበቅ መቁስ	የሚዘለል	ኮድ
101	ጾታ	1 .ወንድ 2. ሴት		
102	እድሜ	-----ወመት		
103	ሃይማኖት	1.አርቶዶክስ 2 መስሊም 3.ፕሮተስታንት 4.ሌላ ካለ ይጠቀስ		
104	የትምህርት ደረጃ	1.ማንበብና መጻፍ የማይችል/ት/ችል/ 2.ማንበብና መጻፍ 3.የመጀመሪያ ደረጃ ት/ት/1-8/ ክፍል. 4. የሁለተኛ ደረጃ ት/ት /9-12/ ክፍል 5.ተክኒክና ሞያ ት/ት የኮሌጅ 6. ድግሪ ወይም ከዚያ በላይ		
105	የጋብቻ ሁኔታ	1.ያገባ/ች 2.ያላገባ/ች 3.የፈታ 4.ሴተ ላጤ 5.ተነጣጥለው የሚኖሩ		
106	የቅጥር ሁኔታ	1.ጊዜያዊ 2.በቋሚነት 3.በምትክነት		
107	የስራ ድርሻ	-----		
109	ደመወዝ/ገቢ በወር/ዓመት	-----		

የጥያቄ መለያ ቁጥር-----

ክፍል 2-የሙያ ላይ ጉዳትን በተመለከተ

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
201	ባለፉት አስራ ሁለት ወራት ውስጥ ከሙያ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1 አዎ 2 የለም	የለም ካሉ ወደ ጥያቄ ቁ301 ይለፉ	
202	ባለፉት ሁለት ሳምንት ውስጥ ከስራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1 አዎ 2 የለም		
203	203 ለጥያቄ ቁ.201/202 አዎ ከሆነ ስንት ጊዜ?	-----ጊዜ ባለፉት 12 ወራት -----ጊዜ ባለፉት ሁለት ሳምንታት		
204	የተጎዳ የሰውነት ክፍል	1. ዐይን 1.አዎ 2.የለም 2. ጥርስ 1.አዎ 2.የለም 3.እጅ 1. አዎ 2.የለም 4. ጆሮ 1.አዎ 2.የለም 5.ጉልበት 1.አዎ 2.የለም 6.እግር 1.አዎ 2.የለም 7. የጅ ጣቶች 1.አዎ 2.የለም 8. ራስ 1.አዎ 2.የለም 9.የላይኛው ክንድ 1.አዎ 2.የለም 10.የታችኛው ክንድ 1.አዎ 2.የለም 11. ከጉልበት በላይ ያለው እግር 1.አዎ 2.የለም 12.ከጉልበት በታች ያለው እግር 1.አዎ 2.የለም 13.ጆርባ 1.አዎ 2.የለም. 14.ደረት 1.አዎ 2.የለም 15.ሌላ ካለ ይጠቀስ-----		

የጥያቄ መለያ ቁጥር-----

ክፍል 2-የሙያ ላይ ጉዳትን በተመለከተ

ተ.ቁ	ጥጫቄ	የሚጠበቅ መቁስ	የሚዘለል	ኮድ
205	የጉዳቱ ዓይነት	1.ጭረት/መላጥ 1.አዎ 2.የለም 2.መቆረጥ 1.አዎ 2.የለም 3.ቃጠሎ 1.አዎ 2.የለም 4.መወጋት 1.አዎ 2.የለም 5.ስብራት 1.አዎ 2.የለም 6.ወለምታ 1.አዎ 2.የለም 7.ተቆርጦ መውደቅ 1.አዎ 2.የለም 8.በኤሌክትሪክ መያዝ 1.አዎ 2.የለም 9.መታፈን 1.አዎ 2.የለም 10.የጆሮ ጉዳት 1.አዎ 2.የለም 11.የዓይን ጉዳት 1.አዎ 2.የለም 12.መመረዝ 1.አዎ 2.የለም 13.ሌላ ካለ ይጠቀስ-----		
206	አደጋው ሲከሰት ምን ያደርጉ ነበር?	1.ለስራው ሂደት አዲስ ነበርኩ 1.አዎ 2.የለም 2.ስለ ግል ህይወብ እያሰብኩ ነበር 1.አዎ 2.የለም 3.ሌላ የጤና ችግር ነበረብኝ 1.አዎ 2.የለም 4.አደጋን መከላከል ስለማይቻል ነው የተጎዳሁት 1.አዎ 2.የለም 5.የስራው ባህሪ ነው 1.አዎ 2.የለም 6.የጉዳት መከላከያ ባለማድረግ ነው 1.አዎ 2.የለም 7.አላስታውስም 1.አዎ 2.የለም 4.ሌላ ካለ ይጠቀስ-----		
207	የጉዳቱ መንስኤ ምን ነበር	1.ማሸን 1.አዎ 2.የለም 2.በሚደቀው እቃዎች 1.አዎ 2.የለም 3.በኤሌክትሪክ 1.አዎ 2.የለም 4.በሚፈናጠሩ ነገሮች 1.አዎ 2.የለም		

		5.ከእቃ ጋር በመጋጨት 1.አዎ 2.የለም 6.በእሳት 1.አዎ 2.የለም 7.በእጅ መሳሪያዎች 1.አዎ 2.የለም 8.በመውደቅ 1.አዎ 2.የለም 9.በሞቃት ነገሮች 1.አዎ 2.የለም 10.በአሲድ እና አሲዳማ 1.አዎ 2.የለም ነገሮች 11.ከባድ እቃዎችን በማንሳት 1.አዎ 2.የለም 12.ሌላ ካለ ይጠቀስ-----		
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የጥያቄ መለያ ቁጥር-----

ክፍል 2-የየሙያ ላይ ጉዳትን በተመለከተ

ተ.ቁ	ጥጫቄ	የሚጠበቅ መቁስ	የሚዘለል	ኮድ
208	አደጋው የተከሰተበት የሳምንቱ ቀናት	1.ሰኞ 1.አዎ 2.የለም 2.ማክሰኞ 1.አዎ 2.የለም 3.ረቡዕ 1.አዎ 2.የለም 4.ሀሙስ 1.አዎ 2.የለም 5.አርብ 1.አዎ 2.የለም 6.ቅዳሜ 1.አዎ 2.የለም 7.እሁድ 1.አዎ 2.የለም 8.አላስታውስም		
209	አደጋው የተከሰተበት ሰዓት	1.ጠዋት 1.አዎ 2.የለም 2.ከሰዓት 1.አዎ 2.የለም 3.በምሽት 1.አዎ 2.የለም 4. ሌሊት 1.አዎ 2.የለም 5.አላስታውስም		
210	በአደጋው ምክንያት በህክምና ድርጅቶች ወይም በቤት ውስጥ አልጋ ይዘው ያውቃሉ ?	1.አዎ 2.የለም		
211	ለጥያቄ ቁ210 መልስዎ አዎ ከሆነ ለምን ያህል ጊዜ?	-----		

212	በአደጋው ምክንያት ከስራ የቀሩባቸው ቀናት ብዛት	-----		
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የጥያቄ መለያ ቁጥር-----
ክፍል 3-የስራ ቦታን በተመለከተ

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
301	በሳምንት ምን ያህል ሰዓት ይሰራሉ?	-----		
302	በመደበኛ ስራዎ ቦታ ላይ የጤና እና ሴፍቲ ቁጥጥር ተደርጎ ያውቃል?	1.አዎ 2.የለም		
303	የስራ ላይ ደህንነትን በተመለከተ በአዲሱም ሆነ በነፃ ስራ ሂደት ነልጠና ወስደው ያውቃሉ?	1.አዎ 2.የለም		
304	የስራ ላይ መቀያያሪ አደድርገው ያውቃሉ?	1.አዎ 2.የለም	መልስዎ የለም ከሆነ ወደ ተ.ቁ 306 ይለፉ	
305	ለተ.ቁ 304 መቁስዎ አዎ ከሆነ በየስንት ሰዓቱ?	1.በየአራት ሰዓት 2.በየስምንት ሰዓት 3.በየ ሃያ አራት ሰዓት 4.ሌላ ካለ ይጠቀስ -----		
306	ከስራ ጋር በተገናኘውኩት ወይም በኃይል መደፈር የዓዕምሮ መሳት ወም ከዓለቃዎ ጋር አለመስማማት ገጥመዎት ያውቃሉ?	1.አዎ 2.የለም		
307	በስራዎ ቦታ ለንጽህና መጠበቂያ በቂና ንጹህ ውሃ ያገኛ	1.አዎ 2.የለም		

	ሉ ?(በግምት ከ55 ሊትር ያላነሰ)			
308	በሚሰሩበት የስራ ቦታ ራስዎን ለአደጋ በማያጋልጥ መልኩ ደረቅ ወይም ፈሳሽ ቆሻሻ ማስቀመጫ አለ?	1.አዎ 2.የለም		

የጥያቄ መለያ ቁጥር-----

ክፍል 4-የሰራተኞችን ባህሪበተመለከተ

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
401	በተመሳሳይ ስራ ድርጅት በጠቅላላ ለምን ያህል ጊዜ አገለገሉ በቀን/በወር/ባመት ይግለጹ?	-----		
402	ወደዚህ ስራ ከመግባትዎ በፊት ወይም በስራ ላይ እያሉ የጤና ችግር አለበዎት?	1.አዎ 2.የለም	መልሱ የለም ከሆነ ወደ ጥ.ቁ 404 ይለፉ	
403	ለጥያቄ ቁ402 መልስዎ አዎ ከሆነ የችግሩ አይነት ምን ነው?	1.አለመስማት 1.አዎ 2.የለም 2.የማየት ችግር1.አዎ 2.የለም 3.የመገጣጠሚያአካልችግር 1.አዎ 2.የለም 4.ሌላ ከለ ይጠቀሱ-----		
404	ያጨሳሉ?	1.አዎ 2.የለም	መልሱ የለም ከሆነ ወደ	

			ጥ.ቁ 406 ይለፉ	
405	ለጥያቄ ቁ404 መልስዎ አዎ ከሆነ መቼ?	1.በየቀኑ 2.1-3 ቀን በሳምንት 3.አልፎ አልፎ		
406	ከመጠን በላይ አልኮል መጠጥ ጠጥተው ያውቃሉ?	1.አዎ 2.የለም	መልሱ የለም ከሆነ ወደ ጥ.ቁ 408 ይለፉ	
407	ለጥያቄ ቁ406 መልስዎ አዎ ከሆነ መቼ?	1.በየቀኑ 2.1-3 ቀን በሳምንት 3.አልፎ አልፎ		
408	ጫት ይቅማሉ?	1.አዎ 2.የለም	መልሱ የለም ከሆነ ወደ ጥ.ቁ 404 ይለፉ	
409	ለጥያቄ ቁ408 መልስዎ አዎ ከሆነ መቼ?	1.በየቀኑ 2.1-3 ቀን በሳምንት 3.አልፎ አልፎ		
410	ምስራ ላይ እያሉ የእንቅልፍ ችግር አለበዎት?	1.አዎ 2.የለም		
411	ለጥያቄ ቁ410 መልስዎ አዎ ከሆነ ለምን?	1.በድርጅቱ ያለ እረፍት ወይም ቅያሬ 8 ሰዓት በላይ መስራት 1.አዎ 2.የለም 2.በምሽት መስራት 1.አዎ 2.የለም 3. በአንድ ጊዜ ከአንድ አይነት በላይ መስራት? 1.አዎ 2.የለም		

		4.ሌላ ከለ ይጠቀስ-----		
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የጥያቄ መለያ ቁጥር-----

ክፍል 4-የሰራተኞችን ባህሪበተመለከተ

412	በስራዎ ደስተኛ ነዎት?	1.አዎ 2.የለም		
413	በስራ ቦታዎ የጉዳት መከላከያ መሳሪያዎችን ይጠቀማሉ?	1.አዎ 2.የለም	መልሱ የለም ከሆነ ወደ ጥ.ቁ 415 ይለፉ	
414	ለጥያቄ ቁ413 መልስዎ አዎ ከሆነ ምን አይነት?	1.ንጎት 2.የጆሮ መከላከያ 3.የአፍንጫና አፍ መከላከያ 4.የጭንቅላት መከላከያ 5.ሁሉንም የሰውነት ክፍል 6.የዓይን መከላከያ መነጽር 7.የሌት መከላከያ 8.ቦቲ ጫማ 9.ሌላ ከለ ይጠቀስ-----	1.አዎ 2.የለም	
415	የማይጠቀሙ ከሆነ ምክንያትዎ ምንድን ነው?	1.የመከላከያ መሳሪያዎች ባለመኖራቸው 2.የደህንነትና የጤና ትምህርት ስለማይሰጠን ጥቅሙን አናውቅም	1.አዎ 2.የለም 1.አዎ 2.የለም	

		<p>3.ለአጠቃቀም ምቹ ስላልሆነ</p> <p>1.አዎ 2.የለም</p> <p>4.የስራ አፈጻጸምን ስለሚቀንስ</p> <p>1.አዎ 2.የለም</p> <p>5. ለደህንነትና ለጤና ሊያስከትል ስለሚችል</p> <p>1.አዎ 2.የለም</p> <p>6. ዓሌላ ከሰ ይጠቀስ-----</p>		
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የጥያቄ መለያ ቁጥር-----

ክፍል 5-የስራ-ቦታ ጥናትን ምክንያት በተመለከተ

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
501	ላለፉት 12 ወራት በስራ ቦታ ለደህንነት ጠቃሚ የሆኑ ዕቃዎችን ለማንሳት ወይም ለማንቀሳቀስ የሚጠቅሙ ተንቀሳቃሽ መሳሪያዎችን ይጠቀማሉ?	1.አዎ 2.የለም		
502	ጥሬ ዕቃዎች ወይም የፋብሪካ ውጤቶች ለአደጋ ወይም ለጤናዎ ጠንቅ ባልሆነ እና ለመለየት አመች በሆነ ቀለም በተቀለመ ማስቀመጫ ይቀመጣሉ?	1.አዎ 2.የለም		
503	በስራዎ ቦታ በሚሰሩበት ጊዜ የአደጋ አመልኞች አሉ?	1.አዎ 2.የለም		
504	ስራዎን በሚሰሩበት ጊዜ ማሽኖች ሁልጊዜ አደጋ በማያደርሱበት መልኩ የተጠበቁ ናቸው?	1.አዎ 2.የለም		
505	ማሽኖች ሁልጊዜ በሚበላሹበት ወይም በሚያረጁበት ጊዜ አደጋ ከማድረሳቸው በፊት ወዲያውኑ ይጠገናሉ?	1.አዎ 2.የለም		

Annex-3- Questions for key informants

1. Is Occupational injury or accident a major problem in this workplace?
2. How, where, when, and to whom the problem is severe?
3. What are major sources and reasons for the problem?
4. What are major factors for occurrence of injury?
5. Would you classify the factors for the occurrence of injury as
 - Socio-demographic factors
 - Working environment
 - Ergonomic/work place design
 - Workers behavior and characteristics
 - Other factors if any specify
6. Would you specify any occupational health and safety services provided for the workers in this industry? If not why?
7. Is there adequate supply and utilization of protective equipment in this industry? If
 - Yes what are they? If not why?

Annex -4- Observational checklist for the work environment (Modified from industrial inspection guide line)

Name of industries (Code)_____

Name of the working section_____

Hazards in the working industries

1. Is there excessive heat in the workplace? 1. Yes 2. No, Yes requires that a worker is found sweating when naked or with light clothing or if data collector or investigator feels sudden heat wave when entering to the industry.
2. Is there excessive noise in the workplace? 1. Yes 2. No, yes requires when that is difficult to communicate with nearby workers without shouting.
3. Is there excessive dust in the workplace? 1. Yes 2. No , Yes requires if the investigator experiences sudden sneezing upon entering or if worker's eye brows, hair, nostrils and close is observed to be covered with dust particles.
4. Is there warning signs or safety rules in the workplace? 1. Yes 2. No ,Yes requires no lack of such signs or posts while inspection around.
5. Do the employees use the necessary personal protective devices? 1. Yes 2. No requires no lack of such equipment and used by each workers while inspection around.
6. Do all production equipments have appropriate protective arrangement?
1. Yes 2. No , Yes requires no lack of such arrangement while inspection around.
7. What is the most dangerous incident in the industry during the last 12months?_____
8. Was there any preventive measures implemented? 1. Yes 2. No, Yes requires specification of preventive measures.
9. Does the industry have copy of the most important safety and health regulation?
1. Yes 2. No , Yes requires showing a copy of the regulation?
10. Does the industry have safety and health personnel? 1. Yes 2. No , Yes requires either implementation as result of initiatives from health and safety personnel or written action worked out with them?
11. Does the industry follow written health and safety plan of action in the workplaces? 1. Yes 2. No , Yes requires the completion of at least one of the measures in the plan.
12. Does the working section have first aid equipment? 1. Yes 2. No , Yes requires the presence of first aid equipment during data collection .

Letter for declaration

I, the undersigned, declare that this is my original work and to my knowledge, has never been presented in this or other university or other parts of the country, and that all the resources and materials used for the thesis, have been fully acknowledged.

Name: Yitagesu Habtu(Bsc)

Signature: _____

Place: Addis Ababa, Ethiopia

Date submission: June,2010

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

Name: Abera Kumie(MD,MSc,PhD)

Signature: _____