



ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH

**PREVALENCE AND ASSOCIATED FACTORS OF OCCUPATIONAL INJURY
AMONG GLASS FACTORY WORKERS IN ADDIS ABABA, ETHIOPIA.**

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Table of Contents	pages
Acknowledgment	I
Table of Contents	III
List of tables and figures	V
Abbreviations/Acronyms	VI
Abstract	VII
1. Introduction	1
1.1. Background	1
1.2. Statement of the problem	3
1.3. Significance and Rationale of the study	4
2. LITERATURE REVIEW	5
2.1. The burden of occupational injuries	5
2.2. Body part affected	5
2.3. Determinants of occupational injury	6
2.3.1. Socio-demographic variables	6
2.3.2. Work environment factors	7
2.3.3. Behavioral determinants /human factors	8
2.4. Conceptual framework	8
3. Objectives of the study	10
3.1. General objective:	10
3.2. Specific objectives:	10
4. Methods	11
4.1. Study setting	11
4.2. Study design	11
4.3. Source population	11
4.4. Study population	11
4.5. Inclusion and exclusion criteria	12
4.6. Sample size determination:-	12
4.7. Sampling techniques:	13
4.8. Data collection tools and techniques	15
4.9. Study variable	15
4.10. Operational definition	16
4.11. Data processing and analysis	16
4.12. Data quality management	17
4.13. Ethical Consideration	17
4.14. Dissemination of Results	17

5. Result.....	18
5.1. Socio-demographic characteristics of the respondents	18
5.2. Occupational injury characteristics	20
The severity of occupational injuries	24
5.3. Working environment characteristics.....	25
5.4. Behavioral characteristics	25
5.5. Bivariate analysis for socio-economic, environmental and behavioral factor	29
5.5.1. Socio-demographic factors	29
5.5.2. Environmental factors.....	31
5.5.3. Behavioral factors.....	31
5.6. Multivariate analysis	34
5.7: Result of work observation	38
6. Discussion.....	39
7. Strengths and Limitations of the study	42
Strengths.....	42
Limitations	42
8. Conclusions and Recommendations	43
Conclusions:	43
Recommendations	44
9. Reference	45
10. ANNEXES:	47
Annex 10.1: PARTICIPANT’S INFORMATION SHEET	47
Annex 10.2. INFORMED CONSENT FORM	49
Annex 10.3. English version questionnaire.....	50
Annex 10.4. Work environment observation checklist.....	57
Annex 10.5: ለተጠያቂዎች የሚሰጥ መረጃ (informed consent form)	58
Annex 10.6: የተሳታፊው የፈቃደኝነት ቅጽ	60
Annex 10.7: የአማርኛ ትርጉም መጠይቅ	61
Annex 10.8: ምልክታ መጠይቅ ለሥራ አካባቢ	67
Annex 10.9: Overview of the glass manufacturing process (35)	68
Annex 10.10: ASSURANCE OF PRINCIPAL INVESTIGATOR	69

List of tables and figures

List of tables

Table 1 Socio-demographic characteristics of the respondent in glass factories in Addis Ababa, Ethiopia, April-May 2019 (n=357).....	19
Table 2: Distribution of occupational injuries in the last 12 months among respondents in glass factories works, Addis Ababa, Ethiopia, April-May 2019.	20
Table 3 Occupational injuries distribution by type and parts of the body affected in the last 12 months among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April- May 2019.....	21
Table 4 Distribution of occupational injuries in the last 12 months by causes among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April-May 2019.....	23
Table 5 Distributions of occupational injuries by days and time among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April-May 2019.	24
Table 6 Reported work environment and behavioral characteristics of the respondent in glass factories, Addis Ababa, Ethiopia, April-May 2019.	27
Table 7 The Selected socio-demographic determinants of occupational injuries in a glass factory, Addis Ababa, Ethiopia, April-May 2019 (n=357).....	30
Table 8 Selected work environment and behavioral factors related to occupational injuries in a glass factory, Addis Ababa, Ethiopia, April-May 2019 (n=357).....	32
Table 9 Multivariate logistic regression analysis of the relative effect of the socio-demographic, work environment and behavioral factors on the prevalence of occupational injuries among glass Factory workers in Addis Ababa, May 2019.	36

List of figures

Figure 1- Conceptual framework for the study of the magnitude and factors related to occupational injuries adapted from the literature review (11).	9
Figure 2 Schematic presentation of the sampling procedure	14

Abbreviations/Acronyms

Epi-info	epidemiological information
ETB	Ethiopian birr
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
ILO	International Labour Organization
MOLSA	ministry of labour and social affairs
OR	odds ratio
OSH	occupational safety and health
PI	principal investigator
PPE	personal protective equipment
SPSS	Statistical Package for Social Sciences
US	United States
WHO	World Health Organization

Abstract

Background: - In manufacturing industries, workplace injuries and property damages were highly significant and becoming bigger than before in developing countries. Body of pieces of evidence showed that injuries are common among workers involved in the glass manufacturing industry; cuts, burns are the common one, however, there is insufficient evidence on the magnitude and associated predictors in Ethiopia. Thus, the study aimed to assess the prevalence of occupational injuries and associated factors among glass factory workers in Addis Ababa, Ethiopia, 2018/2019.

Methods: - Institutional based cross-sectional study was conducted from April to May, 2019, on 363 randomly selected workers after stratified by working department. A structured questionnaire and observational checklists were used to collect the data. The collected data were entered into Epi-data 3.1 software and transported to SPSS version 23.0 software for analyses. Bivariate logistic regression was used to identify candidate variables and multivariate logistic regression was employed to identify independent predictors of occupational injuries and to control confounders.

Results: The overall occupational injury rate was 58.3% workers per year. Twenty-one (11.1%) injured workers were hospitalized. A total of 254 workdays were lost, being 2.54 days lost on average per an injured worker. Service duration of five years or less in the present job [AOR=5.052, 95% CI: (1.886-13.535)], absence of health and safety information [AOR: 2.371, 95% CI: (1.375- 3.955)], sleeping disorder [AOR: 3.073, 95% CI: (1.535- 6.153)] and use of personal protective devices [AOR: 6.506, 95% CI: (2.645- 16.000)] were significant factors to occupational injuries in glass factories. Work section of forming [AOR: 14.04, 95% CI: (4.268- 46.179)] was also another factor positively affecting injuries.

Conclusion: working section, work experience in the present job, health and safety information, sleeping disorder and absence of protective devices increases the risk of occupational injuries. Ongoing health and safety information and/or training, periodic supervision, and occupational health and safety services should be emphasized to promote the health and safety conditions of the worker. Thus more attention should be given to these industries to improve occupational safety measures and a safe working environment and promoting health and safety for their workers.

Key Words: -occupational injury, prevalence, associated factors, glass factory, Addis Ababa

1. Introduction

1.1. Background

Glass has a large variety of end-products, such as architectural glass in the form of home glass windows and glass doors, and non-architectural glass used for decoration, such as glass tables, or containers such as glass bottles (1). Glass, even though it is an extremely important material, which is used in the form of glass bottles, cookware, containers, and building or decorative materials, has the potential to be very harmful. Throughout history, it has been associated with danger and potential eye injuries from broken glass and flying glass particles are a common risk factor in glass manufacturing, burn, and severe cutting injuries that can arise if flat glass breaks during handling (2).

According to Labor Proclamation No. 377/2003 of Ethiopia, "Occupational injury" means any organic injury or functional disorder sustained by a worker as a result of any cause extraneous to the injured worker or any effort he makes during or in connection with the performance of his work and includes:- any injury sustained by a worker while carrying out the employer's order, even away from the workplace or outside his normal hours of work, and before or after his work or during any interruption of work if he is present in the workplace or the premises of the undertaking because of his duties in connection with his work; Any injury sustained by a worker while he is proceeding to or from place of work in a transport service vehicle provided by the undertaking which is available for the common use of its workers or in a vehicle hired and expressly destined by the undertaking for the same purpose, and as a result of an action of the employer or a third party during the performance of his work (3).

The consequences of occupational injuries and diseases, and major industrial disasters have long been causing concern at all levels from the individual workplace to the wider community and international level. Measures and strategies designed to prevent, control, reduce or eliminate occupational hazards and risks have been developed and applied continuously over the years to keep pace with technological and economic changes (4).

Ethiopia's Growth and Transformation Plan (GTP) seeks to transform the economy from a predominantly agrarian to a modern and industrialized economy with the goal to become a manufacturing powerhouse. Growth in the industrial sector is essential for sustained long-term growth and job creation (5). However, rapid economic development has brought changes in workplaces especially in developing countries, including Ethiopia (6). Yet, despite continuous if

slow improvements, occupational accidents, and diseases are still too frequent and their cost in terms of human suffering and economic burden continues to be significant (4).

Globally, the International Labour Organization (ILO) estimates that around 4 percent of the world's Gross Domestic Product (GDP), or about US \$2.8 trillion is lost annually in direct and indirect costs owing to occupational accidents and work-related diseases (7,8). This loss is 4 times higher for developing countries than that of industrialized countries (7). Ethiopian ministry of labour and social affairs (MOLSA) report in 2014/2015 showed that from 5135 work-related accidents 12,612 days and 2,195,960.74 ETB costs were lost due to work-related accidents regardless of its poor reporting culture and availability of data accuracy (9).

Due focus is not given for injuries prevention and had low commitment levels along with occupational health in developing countries, including Ethiopia (10). Thus more attention should be given by the owners of both small and large scale industries to improve occupational safety measures and safe working environments (6,11–14).

1.2. Statement of the problem

In manufacturing industries, many employees suffer from workplace injuries and property damage which resulted in an economic crisis (15). Different industries are increasing in Ethiopia, of which glass factory is one of the industries grouped under manufacturing industries by the ministry of the industry with code 03 (5,9). The health hazards of glass factories have been enlisted in the ILO encyclopedia and other studies. Studies conducted in India showed that injuries are common in glass factory workers i.e. cuts, burns, etc with a higher prevalence of 54% (16,17). The International Labour Office report published in 2015 says that the incident rate of injury/ illness per 10,000 full-time workers in glass manufactures is high compared to all other private manufacturers, 118.9 and 102.6 respectively in number for the year 2012 in United State (18). Studies conducted in Ethiopia showed that occupational injury in manufacturing industries was highly significant (6,11,12).

Occupational Safety and Health issue are indirectly positively addressed by the Government policy. However, currently, the implementation of legislation, infrastructure skills and capacity in Ethiopia are limited (19). In emerging economies, workplace safety and health have been overlooked in their industrial development policy and strategies. They are mostly focused on the production volume or profit undermining the latent effect of a dissatisfactory working environment. For instance, in Ethiopia, no workplace safety and health-related stringent policy were standing alone for the manufacturing industries (15).

Hence, the Ministry of Labour and Social Affairs (MOLSA) of Ethiopia did not address well the prevention of occupational health and safety issues of workers in glass and bottle factories and others (15,20). There is no clear strategy developed to prevent glassworkers from occupational injuries. The prevalence of occupational injury and associated factors is not determined among glass manufacturing factory workers in Ethiopian; even if, different studies indicated that there is a high prevalence of occupational injury in this manufacturing industry. Promotion of occupational health and the prevention of injury require reliable, detailed information and adequate knowledge about where hazardous exposures create problems, and in which ways workers are exposed to occupational injuries (14,20). This assessment, therefore, is designed to fill the gap by identifying the prevalence of occupational injuries and its associated factors among workers in glass manufacturing factories in Addis Ababa, Ethiopia.

1.3. Significance and Rationale of the study

At present many people are working under unsafe conditions, particularly in developing countries including Ethiopia, which pose injury and death. Besides, the economic costs of occupational injuries are also responsible for more lost time from work, decrease working years of life and reduce the productivity of the individual and the society at large. Information on occupational health and safety services helps raise awareness at all level and make the problem of injuries more visible to policymakers and managers (14,20). Evidence-based occupational health and safety services are essential in Ethiopia. However, in Ethiopia, there is no systematized recording and reporting of occupational injuries. Data on the injury at the national level is also inadequate. In general, the assessment made on occupational injuries among glass and bottle factory workers is useful in the development and suggestions of injury prevention strategy so that morbidity, disability, and death among workers due to occupational injury are minimized and promote production opportunity. Besides, it can also serve as baseline information to undertake studies on similar settings because no studies did till now on glass factories in Ethiopia.

2. LITERATURE REVIEW

2.1. The burden of occupational injuries

Globally there were 380,500 deaths, an increase of 8% in 2014 compared to 2010. It is also estimated that every day more than 7,500 people die; 1,000 from occupational accidents and 6,500 from work-related diseases. This work-related mortality accounted for 5% of the global total deaths. The number of non-fatal occupational accidents was estimated to be 374 million. The new global estimate of the economic cost of work-related fatal and non-fatal injuries and illnesses amounts to 3.94 percent of the world's GDP (8).

Published evidence in India showed that the prevalence of injury in workers of the glass factory was more than subjects in a comparison group. The study indicated that 239 (90.9%) workers had work-related injuries sustained in a year and the comparison group, was 66 (25.1%), the difference was found to be statistically significant (21). Another study in this country on the magnitude of injuries in glass bottle manufacturing plants found that 347 injuries among 341 glass workers followed for one year (17). The rate for all injuries in each of the glass industries in the united kingdom is higher than the overall rate for “manufacturing” and higher than the combined rate for all industries (18)

Worldwide, Weak occupational health and safety services every year causes for 274 million work-related injuries and illness, 2.4 million work-related deaths, and 380,500 were due to occupational accidents (8). According to reports of MOLSA of Ethiopia by year 2014/2015, among 5135 work-related accidents, 5092(99.16%) of the accidents were non-fatal work-related accidents. From this total (5135) work-related accidents manufacturing industry (code 03) accounted the highest number 2886 (56.2%) of which 2878 (56% from the total) were non-fatal work-related accidents and 8 of them were fatal accidents from 43 total fatal accidents, which is the highest number next to construction industry (code 05) with 20 fatalities (9).

In Ethiopia, the fatal occupational accident rate is 5,596 per year with a fatality rate of 21.5/100,000 workers and an accident rate of 16,426/100,000 workers regardless of its poor reporting culture and availability of data accuracy (15).

2.2. Body part affected

A study done in India on the magnitude of injuries in glass bottle manufacturing plant showed that cuts and laceration 50.1%, injuries to eye 30%, sprains 8% and burns 7.1% were the major types of occupational injury (17). Another study conducted in India found that cuts 59.3% in workers and burns 27.7% as a direct effect of heat exposure were the commonest occupational

injury (16). Findings of a study done among small and medium industry workers in Bahir Dar, Ethiopia demonstrated that abrasions 42.6%, cuts 23.2% and burns 14.5% were the commonest occupational injury types (13). In most studies, abrasions, cuts, burns, puncture, and fracture were common injury types among manufacturing industrial workers (11).

A follow up of glassworkers in India demonstrated that injuries to the hand and wrist accounted for more than 40% of the overall injuries (17). Similarly, another study revealed that most commonly affected body parts were upper extremities (53.7 %) and the second most common region involved in injury was lower extremities (15.3%) (22). The Ethiopian ministry of labour and social affairs (MOLSA) 2014/2015 also reported that most of the accidents were located in lower and upper parts of the body which is 15.8% and 15.2% respectively (9). A study done in Bahir Dar among small and medium industry workers reported that the most commonly affected body parts due to work-related injuries were fingers 38.7%, hands 22.3%, legs 14.6% and eyes 7.4% (13). A study done in Ethiopia among cement factory workers reported that hands 21.2%, lower leg 19.2%, fingers 17.3% and eyes 13.5% were the most commonly affected body parts due to work-related injuries (6).

2.3. Determinants of occupational injury

A study done in France indicated that environmental hazards were implicated in 24.7%, technical dysfunctions in 16.0%, lack of work organization in 13.7%, lack of know-how in 17.6%, lack of job knowledge in 5.2%, and the other human factors in 31.9% of occupational injuries (23).

Different studies in Ethiopia indicated that Socio-demographic, socio-economic, personal work behavior and the working environment are found to contribute to the injuries (6,10–13,24).

2.3.1. Socio-demographic variables

Reports of MOLSA showed that even if most of the accidents 2856(55.62%) victim age category doesn't stated from the source, among the stated one the age from 19-24 years old were accounted 536(10.44%) the highest followed by the age from 25 – 29 years which was 519(10.1%) and the least number of accidents occurred in the age category above 54 years old which was 53(1.03%) (9).

Some study conducted at different places showed that sex (11,13,14,22,25,26), age (11,14,17,22,26,27), educational status (6,12,22,26), marital status (12,26,28), job category (6,13,26), monthly salary (6,17), work experience (10,12,14,17,26,28) were the major socio-demographic determinants of occupational injury with significant association. On the other hand age (6,10,12,13,28), sex (6,12,14,17,28,29), marital status (6,11,12,17,25,27,29), educational status (11,13,14,17,25,27–29), religion (6,11,25), job category (14,25,29), monthly salary

(11,12,14,25,27–29), work experience (6,12–14,17,25,27,29) did not show a significant association with occupational injury occurrence in some studies.

2.3.2. Work environment factors

Among different studies conducted work environment determinant variables, workplace supervision (25,26), working hour per week (12–14,25,28), health and safety training (14,25–28,30), manual handling of very heavy objects (12), maintenance of machine (12), work department (14), work shift (22) had showed significant association with the prevalence of occupational injuries. While some of the studies indicated that health and safety training (10,12,13,29), working hours per week (6,10,27), workplace supervision (6,12,28,29), work department (11,12) were not associated with occupational injury.

Follow up of 75 glass bottle manufacturing plant workers in India reveals that out of 96 total injuries most of the injuries were due to contact with glass 34.4%, machines 28.1% and metal 16.6%, welding sparks 6.3%, etc (17). Studies done in Ethiopia indicated that there were different causes of occupational injury (12). Findings of a study done among construction workers in southwestern Ethiopia demonstrated that major object injuries were due to sharps, and a strike by movable objects, falling from heights and falling from the same level were the most frequent causes of occupational injury (29). According to a study done among workers of small and medium industries in Bahir Dar, it was indicated that machine 29.5%, electricity 28.9% and hand tools 11.6% were the commonest cause of injury (13). Another study conducted among cement factory workers in Ethiopia demonstrated that machine 48.1%, splintering objects 19.2%, falls 19.2%, hot substances 17.3%, hit by falling objects 17.3% were the dominant cause of occupational injury from 52 total injuries (6).

Unsafe conditions such as machinery and equipment accounted for a significant proportion of accidents in Ethiopia. Human error also contributes to a considerable number of accidents. Exposure to chemicals, being struck by falling objects, heavy lifting, unguarded machinery, and slippery floors and uneven surfaces are some of the main causes of accidents in Ethiopian workplaces (31). Ethiopian ministry of labour and social affairs (MOLSA) 2014/2015 report indicated that from 5135 work-related accidents hand tools 7.65%, machine 6.75%, falling and slipping 5.4%, mishandling 5.3% were the frequent cause of occupational injury in all industries. This report again showed that in manufacturing industry from 2886 accidents machine accounts 8.9%, mishandling 7.6%, transportation 5.4%, collision 4.7%, worker's fault 4.2% were the commonest cause of injury even if more than half of cause of the accident was not stated (50.4 %) (9).

2.3.3. Behavioral determinants /human factors

From behavioral determinants, sleeping disorder (11,12,14), job stress (11), no PPE use (10,14,25,28,30), chat chewing (10), alcohol use (14,27), Job satisfaction (14) were factors associated with occupational injury in a study done in Ethiopia and some other countries. However, in some studies behavioral determinant variables such as alcohol drinking (6,10,12,17,29), chat chewing (6,11,12,14,28), cigarette smoking (6,10–12,14,17,29), sleeping disorder (6,10,29), job dissatisfaction (6,12,14,29), personal protective equipment (PPE) use (6,12,14,17,27) did not show a significant association with occupational injury.

There are great discrepancies in the previous works of literature explained above about the associated factors of occupational injuries in different industry sectors. Besides, there is no study conducted on the prevalence and associated factors of occupational injury in a glass factory. Occupational health and safety affect not only the worker but also his/her family, the employers and the community in large. The type, magnitude, and depth of injury are likely to bring significant changes in productivity and affect expenses through medical and compensation costs. Therefore, it is important to know the prevalence and determinants of occupational injuries among glass factory workers.

2.4. Conceptual framework

This framework was developed based on the existing literature review on injury and related factors. The framework will be used to develop study tools and designing methods. The study outcome is injury, while the exposure variables in concern are Socio-demographic factors, Work environment factors, Behavioral factors as shown in figure 1.

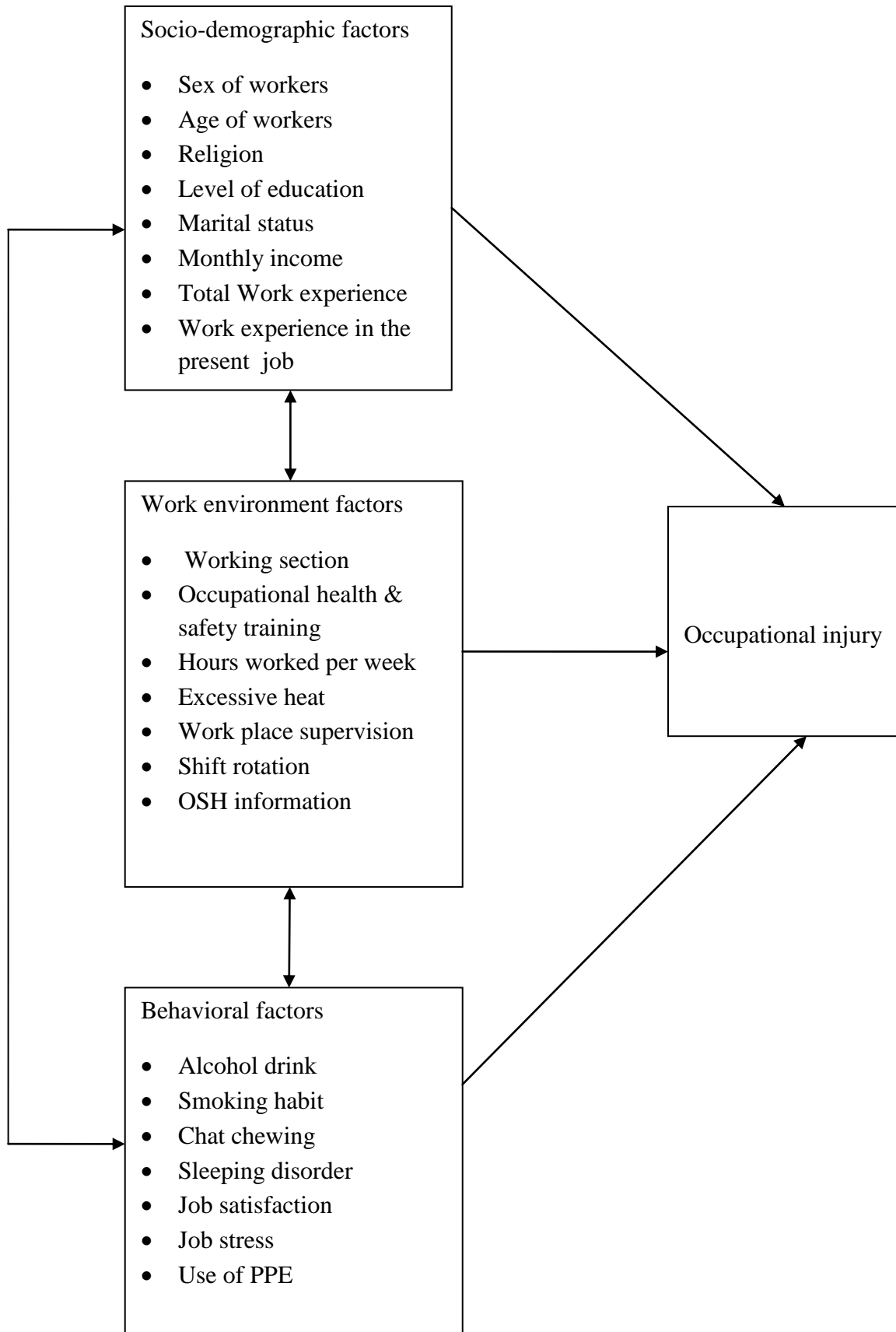


Figure 1: Conceptual framework for the study of the magnitude and factors related to occupational injuries adapted from the literature review (11).

3. Objectives of the study

3.1. General objective:

- ❖ To assess the prevalence of occupational injuries and associated factors among glass factory workers in Addis Ababa, between April and May 2019.

3.2. Specific objectives:

- ❖ To determine the prevalence of occupational injuries among glass factory workers in Addis Ababa, Ethiopia.
- ❖ To identify factors associated with occupational injuries among glass factory workers in Addis Ababa, Ethiopia.

4. Methods

4.1. Study setting

This study was conducted among workers of glass factories in the capital city of Ethiopia, Addis Ababa. There were three glass factories in Addis Ababa. But one factory was closed for the time being. Therefore, the study was carried out on two glass factories, one container and one flat glass producer with 520 workers. The two factories were included in the study to get an adequate sample size for cases by considering that the two factories were homogeneous for variables under investigation.

Glass manufacture, regardless of the final product, requires four major processing steps: batch preparation, melting and refining, forming, and post-forming. Batch preparation is the step where the raw materials for glass are blended to achieve the desired final glass product. Conveyors, including screw, bucket and belt conveyors, are widely used in the glass making process. The primary hazards associated with the conveyors are mechanical breakdown, electrical breakdown, and fire in combustible belts. The potential hazards associated with the mixing process are loss of computer control and breakdown of mixing equipment. Abrasion, puncture, cut and eye injuries from broken glass and flying glass particles are the potential risks in this glass manufacturing section especially around the cullet. The potential hazards associated with glass melting furnaces and forming sections are fuel firing, refractory damage, and molten glass breakout. Workers may be exposed to electrical hazards due to the presence of electrical equipment throughout glass manufacturing facilities and during maintenance.

4.2. Study design

- The institution-based cross-sectional study design was conducted to assess the prevalence and associated factors of occupational injuries among glass industry workers in Addis Ababa from April to May 2019.

4.3. Source population

- All workers who are directly engaged in glass production in manufacturing factories were the source population.

4.4. Study population

- Workers who directly engaged in the glass factories and randomly selected for data collection were study Population for this study.

4.5. Inclusion and exclusion criteria

❖ Inclusion criteria:-

All workers who were working in glass production departments of the factory in Addis Ababa and who were on duty for at least one year were included in the study.

❖ Exclusion criteria

Workers who were absent from work for more than 3 times of visit at the time of data collection were not included.

4.6. Sample size determination:-

The sample size was determined by a single population proportion formula using Epi-info version 7.

$$n = \frac{Deff * (Z \alpha/2)^2 P (1 - P)}{d^2} \quad n = 330$$

10% of anticipated non-response rate was added and the sample size becomes:

$$330 * 0.1 = 33$$

Therefore, $n = 330 + 33 = \underline{363}$

Where:

nf: Total sample size to be studied.

P=54 no local or national data on the prevalence of occupational injuries in glass industrial setting. Hence the prevalence of 54% was taken from abroad study conducted in India on the magnitude and risk factor of the glass manufacturing industry (17).

Z $\alpha/2$: A standard Z score 1.96 corresponding to 95% confidence level.

Deff: design effect =1.5

d: marginal error =0.05

Sample size for the second specific objective

Sample size for the second specific objective was calculated by double population proportion formula using EPI-INFO version7 with the following assumptions:

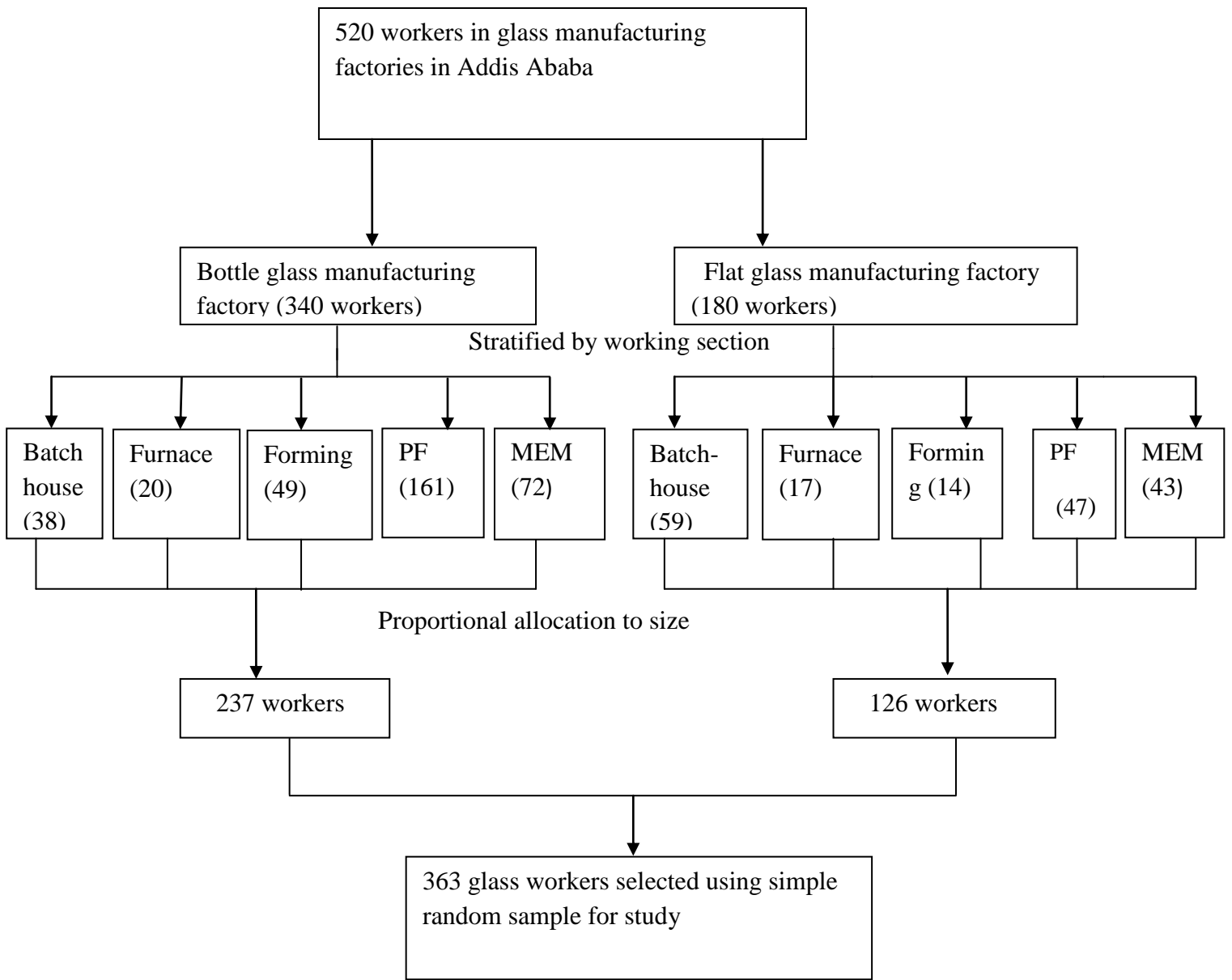
Confidence interval = 95%, Power of test = 80% ,Ratio (Exposed: unexposed) = 1:1, prevalence of injury among PPE users (Outcome in unexposed group = 33,3%) (17) , Odds Ratio (OR) = 2 and 10% non-response rate. Therefore, the sample size was: Exposed group 148 + unexposed group 148 = 296. With 10% of non- response rate 296+ 30=326.

The decision made by comparing the sample size in the first objective and second objective. The first objective yields the largest sample size which was 363, so, it was representative of both objectives. Therefore, by taking into consideration time and other resources sample size 363 in the first objective was considered as an appropriate sample size for this study.

4.7. Sampling techniques:

Based on the inclusion criteria the glass factory workers were first stratified by their job category. Work-related injuries could differ with the nature of the work and working conditions since a particular job will generate predominantly a specific hazard. The appropriate sample size of workers from each stratum was determined by using proportional allocation.

The calculated sample size ($n = 363$) was allocated by probability proportional to the size of each selected glass manufacturing factory. The number allocated by PPS of each factory again was allocated by PPS of each section of the selected factory which was stratified by working sections. Finally, study subjects were selected by a simple random sampling method from payroll or lists from each working section of each stratified glass manufacturing industry.



Note: - PF= post-forming

MEM= mechanical and electrical maintenance & utility

Figure 2 Schematic presentation of the sampling procedure

4.8. Data collection tools and techniques

Data was collected by using a pre-tested and structured questionnaire adapted from previous similar works of literature (14,32). The questionnaire contained detailed information on socio-demographic, behavioral and environmental factors that could have an association with injuries. The respondents were asked the question stated as “Have you had an incident at the job that resulted in an injury in the last 12 months?” to determine the prevalence of injury. Work environment observation checklist was also used to identify different workplace hazards, the availability and use of personal protective equipment and other facilities.

Four nurse and public health professionals were assigned to collect data and one supervisor who was the first-degree holder in Environmental Health was involved in the data collection process. Data was collected using pretested and structured Amharic version questionnaires via face to face interviews of the study participants after getting ethical clearance from responsible bodies and informed verbal consent from study subjects. Two days of training was given to all data collectors and a supervisor before pretesting. The questionnaire was pre-tested to identify potential problem areas; unanticipated interpretations and cultural objections to any of the questions. Hence, 5 % of the sample population was pre-tested in one metal manufacturing factory in Addis Ababa. Based on the pre-test results, some modifications were made on the questionnaire before the actual data collection. The questionnaire focused on mainly socio-demographic, behavioral, and environmental variables. It also contains observational checklists.

4.9. Study variable

❖ **Dependent variable:** This includes occupational injury.

❖ **Independent variables:** This includes the following:

1. Socio-demographic factors: Sex, age, religion, educational level, marital status, monthly income, total work experience, job category and work experience in the present job.
2. Work environment factors: Hours worked per week, workplace supervision, health and safety training, excessive heat, working section, shift rotation, occupational safety, and health information.
3. Behavioral factors: Alcohol use, chat chewing, cigarette smoking, sleeping disorder, job satisfaction, job stress, and use of personal protective equipment.

4.10. Operational definition

- Occupational Injury- an injury sustained on workers in connection with the performance of his or her work in a glass factory within one year. It includes minor injuries such as scratches, puncture, cuts, burns, sprains and strains, and severe injury (disabilities and death) that cause hospitalization, working days lost as reported by the worker but not include work-related diseases that need exposure assessment or laboratory tests and doctoral examination.
- Personal protective equipment (PPE); Utilization of the worker's specialized clothing or equipment is worn by employees for protection against health and safety hazards at the time of the interview. Personal protective equipment is designed to protect many parts of the body, that is, eyes, head, face, hands, feet, and ears(10,12).
- Health and Safety Information; A worker who has got any kind of information in-one year period through any kind of media about the health and safety of factory workers (11).
- Sleeping disorder; the presence of sleeping problems when the workers are at work in the factory (11,12).
- Excessive heat: heat is recorded as excessive if a worker is found sweating when naked or with light clothing; if the investigator feels a sudden heatwave when entering to the work (14,25).
- Job satisfaction; a state of pleasurable emotional feeling reported by the worker as the result of one's job. It is a subjectively perceived response of study participants to their job (14).

4.11. Data processing and analysis

The collected data were coded and entered into Epi-data version 3.1 and transferred to SPSS version 23.0 for cleaning and analysis. Frequency distribution and percentage calculations were made to describe socio-demographic characteristics and to determine the magnitude of occupational injuries. Logistic regression analysis was used, and crude and adjusted odds ratios were estimated with a confidence interval of 95%. To avoid an excessive number of variables and unstable estimates, only variables with a P-value of less than 0.2 were included in the subsequent analysis (multivariable logistic regression analysis model). The Hosmer–Lemeshow test was applied to assess goodness-of-fit for the logistic regression models. The effect of multicollinearity of the independent variable was also assessed to determine whether there was a similarity between the independent variables in a model using VIF value(1-10 value no multicollinearity and VIF (<1 or >10 there is multicollinearity)).

4.12. Data quality management

Data quality was assured with tool development and pretest, training, data collection, coding, entry and analysis. All questionnaire items were translated to Amharic to test for clarity and retranslated to check its consistency. Confusing or misleading questions/concepts were modified after the pretest. The training of data collectors and supervisors mainly focused on issues such as data collection tools, field methods, inclusion-exclusion criteria and record keeping. The investigator was coordinated the interview process, and review the completed questionnaire daily to ensure the completeness and consistency of the data collected.

4.13. Ethical Consideration

The ethical clearance was obtained from the Ethical Review Committee of Addis Ababa University School of Public Health. Verbal consents were taken from each participant in the data collection process. Study identification numbers were used instead of participant names and the information collected was kept confidential. The information collected from any participants was not being made available to other participants. Data collectors informed as participation was completely voluntary and participants may choose to withdraw at any time and refusal to participate will not impair any existing relationships between the participants and institutions or people involved. The study participants were strongly informed that there is no direct financial benefit and risk from this study; on the other hand, the study findings would be used to design strategies for prevention and control mechanisms of injury among glass workers in glass manufacturing factories. The study does not inflict any harm except taking a few minutes for the interview.

4.14. Dissemination of Results

The final copy of the report with appropriate recommendations could be submitted to Addis Ababa University, School of public health. It is hoped that the result of the study could be disseminated to the ministry of industry, Ministry of Health, Ministry of Labor and Social Affairs, glass factories and other concerned bodies. Finally, the effort could be made to publish in national or international journals for dissemination worldwide.

5. Result

5.1. Socio-demographic characteristics of the respondents

Out of 363 workers, 357 participated in the study which gave the response rate of 98.35%. Among respondents 239(66.9%) were males. About one hundred ninety (53.2%) participants were in the age group 15-29 years and the median age of the participants was 29 years with the range of (18-59 years). Pertaining to religion 246 (68.9%) of the respondents were Orthodox Christian religion followers. Nearly half, 159 (44.5%) of the study participants have attended above grade 12, 96(26.9%) from grade 9-12 and only 4.2% can't read and write. Regarding the marital status of the respondents, around half of the respondents, 178(49.8%) were single followed by married 165(46.2%). Considering the total work experience in the factory, more than half, 192 (53.8%) of the respondents have 5 years and below, 85 (23.8%) of the respondents have 6-10 years, 32 (9 %) of the respondents have 11-15 years, and 48 (13.4%) of the respondents have above 15 years work experiences. In terms of work experience in the same job, 235(65.8%) study participants had 5 and fewer years and 122(34.2%) had above 5 years of work experience in the same job. The median monthly income of respondents was 2100 birr with a range of (600-10000) and 174(48.7%) had 2000 birr and less per month, while the remaining participants earn more than 2000 Birr per month.

Table 1: Socio-demographic characteristics of the respondent in glass factories in Addis Ababa, Ethiopia, April-May 2019 (n=357).

Characteristics	Name of the factory		Total	Injury	
	A (n=124) Number (%)	B (n=233) Number (%)	(n=357) Number (%)	Yes Number (%)	No Number (%)
Sex					
Male	95(76.6)	144(61.8)	339(66.9)	142(68.4)	97(65.1)
Female	29(34.7)	89(38.2)	118(33.1)	66(31.7)	52(34.9)
Religion					
Orthodox	73(58.9)	173(74.2)	246(68.9)	151(72.6)	95(63.8)
Muslim	14(11.3)	12(5.2)	26(7.3)	14(6.7)	12(8.1)
Protestant	37(29.8)	46(19.7)	83(23.2)	41(19.7)	42(28.2)
Others	0(0)	2(0.9)	2(0.6)	2(1)	0
Age in years					
15-29	92(74.2)	98(42.1)	190(53.2)	118(57)	72(48.3)
30-44	32(25.8)	103(44.2)	135(37.8)	74(35.7)	61(40.9)
≥45	0(0)	32(13.7)	32(9)	15(7.2)	16(10.7)
Educational level					
Can't read & write	4(3.2)	11(4.7)	15(4.2)	8(3.8)	7(4.7)
Can read & write	5(4)	12(5.2)	17(4.8)	8(3.8)	9(6)
Grade 1-8	27(21.8)	43(18.5)	70(19.6)	40(19.2)	30(20.1)
Grade 9-12	56(45.2)	40(17.2)	96(26.9)	52(25)	44(29.5)
12+	32(25.8)	127(54.5)	159(44.5)	100(48.1)	59(39.6)
Marital status					
Married	34(27.4)	131(56.2)	165(46.2)	87(41.8)	78(52.3)
Single	90(73.6)	88(37.8)	178(49.9)	114(54.8)	64(43)
Divorced	0(0)	7(3)	7(2)	4(1.9)	3(2)
Widowed	0(0)	7(3)	7(2)	3(1.3)	4(2.7)
Monthly income(in birr)					
≤2000	99(79.8)	75(32.2)	174(48.7)	101(48.6)	73(49)
2000-4000	25(20.2)	87(37.3)	112(31.4)	71(34.1)	41(27.5)
≥4001	0(0)	71(30.5)	71(19.9)	36(17.3)	35(23.5)
Total work experience					
≤5 years	98(79)	94(40.3)	192(53.8)	118(56.7)	74(49.7)
6-10 years	26(21)	59(25.3)	85(23.8)	49(23.6)	36(24.2)
11-15 years	0(0)	32(13.7)	32(9)	20(9.6)	12(8.1)
>15 years	0(0)	48(20.6)	48(13.4)	21(10.1)	27(18.1)
Work experience in same job					
≤5 years	103(83.1)	132(56.7)	235(65.8)	152(73.1)	83(55.7)
>5 years	21(16.9)	101(43.3)	122(34.2)	56(26.9)	66(44.3)

Note: A= Ethiopian hansom international glass factory plc, B=Addis Ababa bottle glass factory sc.

5.2. Occupational injury characteristics

More than half, 208(58.3%), of study participants had an incident at job that resulted occupational injury in the last 12 months with the overall occupational injury prevalence rate of 583 per 1000 exposed workers per year. Fifty-eight (27.9%) respondents were also injured at the job in the last two weeks period. Regarding the frequency of injury occurrence in the last 12 months, 51(24.5%) had once, 45(21.6%) twice, 29(13.9%) three times and 83(39.9%) more than 3 times, which made 5.12 injuries per worker per year. Of those who had an incidence of injury in the last two weeks, majority, 48 (82.8%) injured once and 10 (17.2%) more than once with a total of 1.2 injuries per worker per 2 weeks (Table-2).

Table 2: Distribution of occupational injuries in the last 12 months among respondents in glass factories works, Addis Ababa, Ethiopia, April-May 2019.

Characteristics	Name of the factory		Total (n=357)
	A (n=124) Number (%)	B (n=233) Number (%)	Number (%)
Occupational injury in the last 12 months			
Yes	75(60.5)	133(57.1)	208(58.3)
No	49(39.5)	100(42.9)	149(41.7)
No. of occurrence of injury (n=208)	n=75	n=133	n=208
Once	25(33.3)	26(19.5)	51(24.5)
Twice	20(26.7)	25(18.8)	45(21.6)
Three times	12(16)	17(12.8)	29(13.9)
More than three	18(24)	65(48.9)	83(39.9)
Occupational injury in the last 2 week			
Yes	17(22.7)	41(30.8)	58(27.9)
No	58(77.3)	92(69.2)	150(72.1)
No. of occurrence of injury (n=58)	n=17	n=41	n=58
Once	13(76.5)	35(85.4)	48(82.8)
More than once	4(23.5)	6(14.6)	10(17.2)

Note: A= Ethiopian hansom international glass factory plc, B=Addis Ababa bottle glass factory sc.

Fingers were the body part with the highest frequency of occupational injuries 101(23.2%), hands 89(20.4%), lower arm 44(10.1%), lower leg 42(9.6%) and eye 34(7.8%) were other sites predominantly affected body parts. The main types of injuries reported were cuts 114(24.9%), crashing 105(23%), abrasions 80(17.5%), burn 46(10.1%), puncture 30(6.6%) and eye injury 25(5.5%) (Table3).

Table 3: Occupational injuries distribution by type and parts of the body affected in the last 12 months among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April- May 2019.

Characteristics	Number	Percent
Parts of the body affected		
Eye	34	7.8
Tooth	1	0.2
Hand	89	20.4
Ear	3	0.7
Knee	15	3.4
Toe	17	3.9
Finger	101	23.2
Head	6	1.4
upper arm	12	2.7
lower arm	44	10.1
upper leg	10	2.3
lower leg	42	9.6
back injury	10	2.3
Chest	12	2.7
Face	18	4.1
multiple injuries	16	3.7
Other	6	1.4
Total	436	99.9
Types of injury		
Abrasion/laceration	80	17.5
Cut	114	24.9
Burn	46	10.1
Crashing	105	23
Puncture	30	6.6
Fracture	3	0.7
Dislocation	6	1.3

Sprains	18	3.9
Electrocution	6	1.3
Suffocation	4	0.9
Ear injury	1	0.2
Eye injury	25	5.5
Back pain	16	3.5
Poisoning	2	0.4
Other	1	0.2
Total	457	100

Regarding causes of injury, 88(24%) of injuries were caused by glass, 46(12.5%) by splinting /splashing objects, 44(12%) were falling accident, 43(11.7%) were by fire and 43(11.7%) were by lifting heavy objects (Table 4).

The perceived reasons for the causes of injury, 142(41.2%) participants responded due to not using protective devices, 89(25.8%) due to absence of safety education, 36 (10.4%) due to misuse of protective devices, 22(6.4%) due to disorder of normal operation, 11(3.2%) due to improper hand working instruments, and 8(2.3%) were also mentioned absence / inadequate machine safeguards for the causes of injury. Only 7(2%) did not remember and other option 10(3.1%) of which 8 were said PPE, not in good quality and proper size.

Table 4 Distribution of occupational injuries in the last 12 months by causes among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April-May 2019

Characteristics	Number	Percent
Causes of injury		
Struck by/against an object	31	8.4
Machinery	21	5.7
Glass	88	24
Falling accident	44	12
Hand tools	30	8.2
Fire	43	11.7
Lifting heavy objects	43	11.7
Electricity	9	2.5
splinting objects	46	12.5
Others	12	3.3
Total	367	100

One hundred nineteen (34.4%) study participants did not remember actual days of injury, 54(15.6%) injured on Monday, 35(10.1%) on Tuesday, 33(9.5%) on Wednesday, 30(8.6%) on Thursday, 28(8.1%) on Friday, 24(6.9%) on Saturday and 24(6.9%) were on Sunday. The study was also indicated that 123(38.2%) were injured in the morning working time, 81(25.3%) in the afternoon, 46(14.3%) in evening / mid-night working time, 32(10%) in mid-night working time and 39(12.2%) did not remember the actual time of injury (Table 5).

Table 5 Distributions of occupational injuries by days and time among 208 injured respondents in glass factories, Addis Ababa, Ethiopia, April-May 2019.

Characteristics	Number	Percent (%)
Days of injury		
Monday	54	15.6
Tuesday	35	10.1
Wednesday	33	9.5
Thursday	30	8.6
Friday	28	8.1
Saturday	24	6.9
Sunday	24	6.9
Do not remember	119	34.3
Total	347	100
Time of injury		
In the morning	123	38.2
In the afternoon	81	25.3
In the night time	78	24.3
Do not remember	39	12.2
Total	321	100

The severity of occupational injuries

Of the total 208 injured respondents within a year 21 (11.1%) were hospitalized, of those admitted cases 16(76.2%) hospitalization were for 1 day and 15(23.8%) were admitted for more than a day.

A total of 528 workdays were lost among 208 injured respondents, being 2.54 days lost on average per an injured worker in the last 12 months.

5.3. Working environment characteristics

Regarding work environment factors, the vast majority of 337 (94.4%) of respondents were at work for 48 or fewer hours while 20 (5.6%) were more than 48 hours per week. One hundred fifty-five (43.4%) of respondents had been regularly supervised at work about safety, but more than half, 56.6%, complained that there was no safety supervision during their work. In terms of injury occurrence, lower proportion 81 (38.9%) of injury occurred in those who have health and safety supervision while the proportion was higher among those who didn't have health and safety supervision 127 (61.1%) (Table-6).

Three-fourths, 76.5%, reported that they had not taken safety and health training, only 84 (36.1%) had taken safety and health training and the proportion of injury was higher among those respondents who had not taken a training (80.3%). Nearly two thirds, 65.3%, stated that they had shift rotation and 124 (34.7%) of participants were under in general shift (from 2 am to 5 pm). The study depicted that majority 198 (55.5%) of the respondents had no information regarding Occupational Health and Safety (OSH) and the proportion of injury was higher among these respondents (63.5%) (Table-6).

5.4. Behavioral characteristics

The study assessed the behavioral characteristics of the respondents as follows. Only 33 (9.2) of the respondents chews chat. Among those who chew chat, 24 (72.7%) encountered occupational injury and among those who didn't chew chat, the proportion of injury was 184 (56.8%). Similarly, a few respondents 59 (16.5%) consumed alcohol of which 39 (66.1%) had an occupational injury (Table6).

Regarding smoking cigarettes, the vast majority 349 (97.8%) didn't smoke a cigarette of which 57.6% encountered occupational injury. Among smokers, 87.5% have had an occupational injury. Pertaining to sleeping disorders, 283 (79.3%) of respondents had not a sleeping disorder and 74(20.7%) had sleeping disorder which was mainly due to evening or mid-night work time 35(47.3%) and work burden 30(40.5%). The proportion of injury was around 54.1% for those had not a sleeping disorder and 74.4% for those who had a sleeping disorder (Table 6).

The majority of respondents, 302 (84.6%) had no job stress of which 55.2% encountered occupational injury. Among those 55 (16.4%) who had work stress the proportion of injury occurrence was higher (74.5%). The main reasons for job stress were due to high temperature in the room and have worked in sunny places without shade, not conducive environment to work and high noise in the work section. The study also showed that 74 (20.7%) participants were not satisfied with the current job of which 50 (67.7%) had an occupational injury in the last 12

months (Table 4). The reasons for that job dissatisfaction were low wage payment not balanced to workload, educational preparation and work not met and managers did not give attention to the worker's health and safety only focus on work.

Regarding PPE use, majority 310 (86.8%) of respondents use Personal Protective Equipment (PPE) regularly in which the proportion of injury occurrence was lower (54.5%). Among the respondents who didn't use Personal Protective Equipment regularly 47 (13.2%), the occupational injury was higher (83%) (Table6). Among the reasons for not using Personal Protective Equipment, 84.2% was due to lack of Personal Protective Equipment and 15.8% said it was not comfortable to use at work.

Table 6: Reported work environment and behavioral characteristics of the respondent in glass factories, Addis Ababa, Ethiopia, April-May 2019.

Characteristics	Name of the factory		Total (n=357)	Injury	
	A (n=124) Number (%)	B (n=233) Number (%)	Number (%)	Yes Number (%)	No Number (%)
Hours worked/week					
≤48	124(100)	213(91.4)	337(94.4)	193(57.3)	144(42.7)
>48	0(0)	20(8.6)	20(5.6)	15(75)	5(25)
Workplace supervision					
Yes	36(29)	119(51.1)	155(43.4)	81(52.3)	74(47.7)
No	88(71)	114(48.9)	202(56.6)	127(37.1)	75(62.9)
Work section					
batch house	41(33.1)	26(11.2)	67(18.8)	37(55.2)	30(44.8)
Furnace	9(7.3)	34(14.6)	43(12)	16(51.6)	15(48.4)
Forming	17(13.7)	14(6)	31(8.7)	38(88.4)	5(11.6)
post-forming	32(25.8)	110(47.2)	142(39.8)	81(57)	61(43)
mechanical , electrical maintenance & utility	25(20.2)	49(21)	74(20.7)	36(48.6)	38(51.4)
Health & Safety training					
Yes	0(0)	84(36.1)	84(23.5)	41(48.8)	43(51.2)
No	124(100)	149(63.3)	273(76.5)	167(61.2)	106(38.8)
Shift rotation					
Yes	74(59.7)	159(68.2)	233(65.3)	140(60.1)	93(39.9)
No	50(40.3)	74(31.8)	124(34.7)	68(54.8)	56(45.2)
OSH information					
Yes	53(42.7)	106(45.5)	159(44.5)	76(47.8)	83(52.2)
No	71(57.3)	127(54.5)	198(55.5)	132(33.3)	66(66.7)
Chew chat					
Yes	15(12.1)	18(7.7)	33(9.2)	24(72.7)	9(27.3)
No	109(87.9)	215(92.3)	324(90.8)	184(56.8)	140(43.2)
Drinking alcohol					
Yes	16(12.9)	43(18.5)	59(16.5)	39(66.1)	20(33.9)
No	108(87.1)	190(81.5)	298(83.5)	169(56.7)	129(43.3)
Smoking cigarette					
Yes	0(0)	8(3.4)	8(2.2)	7(87.5)	1(12.5)
No	124(100)	225(96.6)	349(97.8)	201(57.6)	148(42.4)
Sleeping disorder					
Yes	21(16.9)	53(22.7)	74(20.7)	55(74.3)	19(25.7)
No	103(83.1)	180(77.3)	283(79.3)	153(54.1)	130(45.9)
Job Stress					
Yes	20(16.1)	35(15)	55(15.4)	41(74.5)	14(25.5)
No	104(83.9)	198(85)	302(84.6)	167(55.3)	135(44.7)

Job satisfaction

Yes	100(80.6)	183(78.5)	283(79.3)	158(55.8)	125(44.2)
No	24(19.4)	50(21.5)	74(20.7)	50(67.6)	24(32.4)

Use of PPD

Yes	85(68.5)	225(96.6)	310(86.8)	169(54.5)	141(45.5)
No	39(31.5)	8(3.4)	47(13.2)	39(83)	8(17)

Note: **A**= Ethiopian hansom international glass factory plc. , **B**= Addis Ababa bottle glass factory share company, **PPD** = personal protective devices

5.5. Bivariate analysis for socio-economic, environmental and behavioral factor

5.5.1. Socio-demographic factors

Bivariate and multivariate regression analysis was done to assess the association between independent variables and the outcome variable. Accordingly, in the bivariate analysis marital status of the respondent, total work experiences, work experiences in the same job were identified as the major socio-demographic determinant of occupational injury in glass factories (Table 7).

Total work experience in the factory was another variable that showed association with the prevalence of occupational injury. Workers who were worked less in the factory ≤ 5 years during the interview were more likely to report occupational injury [COR=2.05, 95 CI: 1.081-3.888] compared to those who were worked >15 years in the factory. There was no significant difference among the groups 6 to 10 years and 11 to 15 years as compared to the reference category.

Pertaining to work experience in the same job, it was also another characteristic that depicted association with the prevalence of occupational injury. Study participants who had work experience less than 5 years were 2.2 times more likely [COR=2.158; 95%CI: 1.383-3.369] to have an occupational injury as compared to those who have above 5 years work experience in the same job, and the association was significant.

However, in this study occupational injury was not associated with sex, age, religion, educational level and monthly income of the respondents.

Table 7 The Selected socio-demographic determinants of occupational injuries in glass factories, Addis Ababa, Ethiopia, April-May 2019 (n=357).

Characteristics	Injured		COR (95% CI)
	YES	No	
Sex			
Male	142(59.4)	97(40.6)	1.153(0.739-1.801)
Female	66(55.9)	52(44.1)	1
Religion			
Orthodox	151(61.4)	95(38.6)	1.628(0.987-2.687)
Muslim	14(53.8)	12(46.2)	1.366(0.576-3.239)
Protestant	41(49.4)	42(50.6)	1
Age in years			
15-29	118(62.1)	72(37.9)	1.639(0.772-3.478)
30-44	74(54.8)	61(45.2)	1.213(0.561-2.624)
≥45	16(50)	16(50)	1
Educational level			
Can't read & write	8(53.3)	7(46.7)	0.674(0.233-1.954)
Can read & write	8(47.1)	9(52.9)	0.524(0.192-1.433)
Grade 1-8	40(57.1)	30(42.9)	0.787(0.444-1.394)
Grade 9-12	52(54.2)	44(45.8)	0.697(0.417-1.166)
12+	100(62.9)	59(37.1)	1
Monthly income(in birr)			
≤2000	101(58)	73(42)	1.345(0.773-2.341)
2000-4000	71(63.4)	41(36.6)	1.684(0.921-3.079)
≥4001	36(50.7)	35(49.3)	1
Total work experience			
≤5 years	118(61.5)	74(38.5)	2.05(1.081-3.888)*
6-10 years	49(57.6)	36(42.4)	1.75(0.857-3.575)
11-15 years	20(62.5)	12(37.5)	2.143(0.858-5.351)
>15 years	21(43.8)	27(56.3)	1
Work experience in same job			
≤5 years	158(64.7)	83(35.3)	2.158(1.383-3.369)***
>5 years	56(45.9)	66(54.1)	1

Note: significant at, * p≤0.05, ** p≤0.01, *** p≤0.001

5.5.2. Environmental factors

From the workplace environmental variables, the presence of workplace supervision, working section, health and safety training, and information about occupational health and safety (OSH) showed a significant association with the prevalence of occupational injuries (Table 8).

Workers without health and safety supervision were 1.55 times more likely to be injured than those who were supervised [COR: 1.547, 95% CI: (1.011, 2.367)]. Participants not trained about health and safety were 1.65 times more likely to be injured than those who were trained [COR: 1.652, 95% CI: (1.010, 2.703)]. Similarly, workers who were not got information about health and safety were about 2-fold more likely to injured in crude odds ratio [OR: 2.184, 95% CI: (1.422, 3.355)] than those who got information (Table 8).

The occupational injury was statistically associated with the working section. Workers who were working in the forming section had 8.02 times more likely to have occupational injuries than workers who were in mechanical, electrical maintenance and utility service [COR=8.022, 95% CI: 2.842-22.648]. There was no statistical difference between other categories of working sections compared to those who were mechanical, electrical maintenance and utility service.

However, working hours per week and shift rotation did not show a statistical significance associated with the prevalence of occupational injury in glass factories.

5.5.3. Behavioral factors

Among selected behavioral factors, sleeping disorder, job stress and use of personal protective devices showed significant association with injuries in the crude analysis (Table 8). However, drink alcohol, chew chat, smoking cigarette, and job satisfaction did not show statistical significance with occupational injury.

Workers who had a sleeping disorder were about 2.5 times more likely to be injured than those who had not a sleeping disorder [COR: 2.460, 95% CI: (1.389-4.356)]. Study participants who had job stress were also more likely to be injured than those who had not to job stress [COR: 2.367, 95% CI: (1.239-4.525)]. Similarly, workers who were not used personal protective devices were about 4 times more likely to be injured than those used in crude odds ratio [COR: 4.067, 95% CI: (1.841- 8.988)] (Table 8).

Table 8 Selected work environment and behavioral factors related to occupational injuries in glass factory, Addis Ababa, Ethiopia, April-May 2019 (n=357).

Characteristics	Injured		COR (95% CI)
	Yes	No	
Hours worked/week			
≤48	193(57.3)	144(42.7)	1
>48	15(75)	5(25)	2.238(0.795-6.300)
Workplace supervision			
Yes	81(52.3)	74(47.7)	1
No	127(62.9)	75(37.1)	1.547(1.011-2.367)*
Work section			
batch house	37(55.2)	30(44.8)	1.302(0.671-2.527)
Furnace	16(51.6)	15(48.4)	1.126(0.487-2.606)
forming	38(88.4)	5(11.6)	8.022(2.842-22.648)***
post-forming	81(57)	61(43)	1.402(0.797-2.464)
mechanical, electrical maintenance & utility	36(48.6)	38(51.4)	1
Health & Safety training			
Yes	41(48.8)	43(51.2)	1
No	167(61.2)	106(38.8)	1.652(1.010-2.703)*
Shift rotation			
Yes	140(60.1)	93(39.9)	1
No	68(54.8)	56(45.2)	0.807(0.519-1.253)
OSH information			
Yes	76(47.8)	83(52.2)	1
No	132(66.7)	66(33.3)	2.184(1.422-3.355)***
Chew chat			
Yes	24(72.7)	9(27.3)	2.029(0.914-4.502)
No	184(56.8)	140(43.2)	1
Drinking alcohol			
Yes	39(66.1)	20(33.9)	1.488(0.829-2.674)
No	169(56.7)	129(43.3)	1
Smoking cigarette			
Yes	7(87.5)	1(12.5)	5.154(0.627-42.344)
No	201(57.6)	148(42.4)	1
Sleeping disorder			
Yes	55(74.3)	19(25.7)	2.460(1.389-4.356)**
No	153(54.1)	130(45.9)	1
Job Stress			

Yes	41(74.5)	14(25.5)	2.367(1.239-4.525)**
No	167(55.3)	135(44.7)	1
Job satisfaction			
Yes	158(55.8)	125(44.2)	1
No	50(67.6)	24(32.4)	1.648(0.960-2.829)
Use of PPD			
Yes	169(54.5)	141(45.5)	1
No	39(83)	8(17)	4.067(1.841-8.988)***

Note: significant at, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

5.6. Multivariate analysis

The multivariate analysis was done based on the conceptual framework illustrated in Figure 1. The logistic regression technique by Enter or standard SPSS method was used to assess the effect of socio-demographic, environmental and behavioral factors on the outcome factor (occupational injuries). To avoid many variables and unstable estimates in the subsequent model, only variables reached a p-value of less than 0.2 at the bivariate analysis were kept in the subsequent analysis (11). The odds ratio (OR) with a 95 % confidence interval (CI) was used to test the statistical significance of variables.

Among selected socio-demographic explanatory variables including age, religion, educational level, marital status, monthly income and total work experience of the worker entered in the multivariate analysis were not significantly associated with occupational injuries, even though, total work experience of the worker [COR: 2.05, 95% CI: (1.08, 3.89)] showed significant association with occupational injuries in the bivariate analysis. However, work experience in the present job as the worker showed a significant association with occupational injuries in all levels of analysis.

The odds of having occupational injuries in workers who had working experience of 5 years or below in the present job were 5 times higher than the odds of workers who had served more than 5 years and above at the time of the survey [AOR=5.05, 95% CI: (1.89, 13.54)].

From working environment variables analyzed, information about health and safety found to be statistically significant in the multivariate analysis. Respondents who had no information about health and safety at the time of the survey were more likely to experience an occupational injury than those who had information [AOR: 2.371, 95% CI: (1.375, 3.955)]. According to this study forming section, workers continued more than fourteen times higher odds of having occupational injuries than the mechanical, electrical maintenance and utility service work section [AOR:14.04 (4.26, 46.17)].

Although job stress showed a significant association with occupational injuries in the bivariate analysis [COR: 2.37, 95% CI: (1.24, 4.53)], their significance disappeared in the multivariate analysis [AOR: 1.82, 95% CI: (0.79, 4.17)]. However, sleeping disorder [AOR: 3.073, 95% CI: (1.54, 6.15)] and use of personal protective devices [AOR: 6.51, 95% CI: (2.65-16.00)] remained significant in the final multivariate analysis (Table 9). The odds of having occupational injuries among workers who did not use personal protective equipment were 6.5 times higher than those who use it [AOR: 6.51, 95% CI: (2.65-16.00)]. The odds of having occupational injuries among

workers who had sleeping disorders were 3 times higher than those who had not [AOR: 3.073, 95% CI: (1.54, 6.15)].

In general, a summary of the logistic regression analysis in this study showed that work experience in the same job, monthly income, the working section of the worker, health and safety information, sleeping disorder and absence of protective devices remained significant in the final multivariate of analysis.

Table 9 Multivariate logistic regression analysis of the relative effect of socio-demographic, work environment and behavioral factors on the prevalence of occupational injuries among glass Factory workers in Addis Ababa, May 2019.

Characteristics	Occupational injury		COR(95% CI)	AOR(95% CI)
	Yes (%)	No (%)		
Age group (in years)				
15-29	118(62.1)	72(37.9)	1.639(0.772-3.478)	0.426(0.1-1.806)
30-44	74(54.8)	61(45.2)	1.213(0.561-2.624)	0.381(0.11-1.34)
≥45	16(50)	16(50)	1	1
Educational level				
Can't read & write	8(53.3)	7(46.7)	0.674(0.233-1.954)	0.305(0.059-1.567)
Can read & write	8(47.1)	9(52.9)	0.524(0.192-1.433)	0.301(0.071-1.276)
Grade 1-8	40(57.1)	30(42.9)	0.787(0.444-1.394)	0.386(0.148-1.007)
Grade 9-12	52(54.2)	44(45.8)	0.697(0.417-1.166)	0.484(0.213-1.122)
12+	100(62.9)	59(37.1)	1	1
Monthly income(in birr)				
≤2000	101(58)	73(42)	1.345(0.773-2.341)	0.948(0.382-2.349)
2000-4000	71(63.4)	41(36.6)	1.684(0.921-3.079)	1.96(0.880-4.359)
≥4001	36(50.7)	35(49.3)	1	
Total work experience				
≤5 years	118(61.5)	74(38.5)	2.05(1.081-3.888)	0.809(0.177-3.695)
6-10 years	49(57.6)	36(42.4)	1.75(0.857-3.575)	2.05(0.658-6.387)
11-15 years	20(62.5)	12(37.5)	2.143(0.858-5.351)	2.308(0.632-8.427)
>15 years	21(43.8)	27(56.3)	1	1
Work experience in present job				
≤5 years	158(64.7)	83(35.3)	2.158(1.383-3.369)	5.052(1.886-13.535)**
> 5 years	56(45.9)	66(54.1)	1	1
Hours worked/week				
≤48	193(57.3)	144(42.7)	1	1
>48	15(75)	5(25)	2.238(0.795-6.300)	3.123(0.816-11.949)
Workplace supervision				
Yes	81(52.3)	74(47.7)	1	1
NO	127(62.9)	75(37.1)	1.547(1.011-2.367)*	1.373(0.809-2.329)
Work section				
batch house	37(55.2)	30(44.8)	1.302(0.671-2.527)	0.914(0.391-2.137)
Furnace	16(51.6)	15(48.4)	1.126(0.487-2.606)	1.272(0.457-3.537)
forming	38(88.4)	5(11.6)	8.022(2.842-22.648)***	14.04(4.268-46.179)***
post-forming	81(57)	61(43)	1.402(0.797-2.464)	1.907(0.873-4.162)
mechanical, electrical maintenance & utility	36(48.6)	38(51.4)	1	1
Health & Safety training				
Yes	41(48.8)	43(51.2)	1	
NO	167(61.2)	106(38.8)	1.652(1.010-2.703)*	1.385(0.692-2.773)

OSH information				
Yes	76(47.8)	83(52.2)	1	
NO	132(66.7)	66(33.3)	2.184(1.422-3.355)**	2.371(1.375- 3.955)**
Chew khat				
Yes	24(72.7)	9(27.3)	2.029(0.914-4.502)	2.009 (0.780- 5.174)
NO	184(56.8)	140(43.2)	1	
Drinking alcohol				
Yes	39(66.1)	20(33.9)	1.488(0.829-2.674)	1.516 (1.516- 3.148)
NO	169(56.7)	129(43.3)	1	
Smoking cigarette				
Yes	7(87.5)	1(12.5)	5.154(0.627-42.344)	8.921 (0.806- 98.67)
NO	201(57.6)	148(42.4)	1	
Sleeping disorder				
Yes	55(74.3)	19(25.7)	2.460(1.389-4.356)**	3.073 (1.535- 6.153)**
NO	153(54.1)	130(45.9)	1	
Job Stress				
Yes	41(74.5)	14(25.5)	2.367(1.239-4.525)**	1.643 (0.736- 3.667)
NO	167(55.3)	135(44.7)	1	
Job satisfaction				
Yes	158(55.8)	125(44.2)	1	
NO	50(67.6)	24(32.4)	1.648(0.960-2.829)	1.361(0.674-2.746)
Use of PPD				
Yes	169(54.5)	141(45.5)	1	1
NO	39(83)	8(17)	4.067(1.841-8.988)**	6.506 (2.645-16.000)***

Note: * Significant at p<0.05, ** Significant at p<0.01 and * significant at p<0.001**

PPD: Personal Protective Devices

5.7: Result of work observation

Work environments were observed in two selected glass manufacturing factories by using the observational checklist.

Health and safety supervision

Regarding health and safety supervision, supervision was done by a safety officer in one factory and it was not program based supervision. Actions not taken by the administrative body on the problems identified during supervision may be the cause for the absence of active supervision in the glass factories. One factory did not have a safety officer, rear supervision by managers.

Clinical data, affected body parts observed and PPE utilization

One factory has its clinic the other factory uses a private clinic in the town. As one year of clinical data reviewed from the medical record of the clinic, the common types of minor injuries identified were punctured, abrasion, cut, dislocation, bone fracture, burn, eye injury and muscle damage. The body parts affected were fingers, lower leg, hand, toe, eye, chest, waist and tooth. Regarding Personal Protective Equipment utilization among glass workers, some workers do not use Personal Protective Equipment while on duty.

Availability of safety and health regulations

In one glass factory warning signs and safety rules fixed on the wall in some work sections, but in the other factory, no warning signs and safety rules observed. No safety and health regulations were seen in both glass factories.

Availability of safety officers and safety committee

In one glass factory, a mechanical engineer was assigned as a safety officer, but the other one did not assign a safety officer. In the glass factory “B”, they have a health and safety committee, but they were not active, this may be because of less attention given by the administration for health and safety program. In the glass factory “A” totally there was no health and safety committee established.

Occupational health and safety hazards identified in work sections

Excessive heat (raw material, furnace, forming), excessive dust (in raw material, furnace), excessive noise (furnace, forming, mold and workshop, and mechanical maintenance), sharps (raw material, maintenance, post-forming) were identified as occupational health and safety hazards in working sections.

6. Discussion

In this study, the overall prevalence rate of occupational injury was 583 per 1000 exposed glass factory workers in the last 12 months. The risks of a worker being injured in the factories are high, considering that 58.3% of the workers had an injury. Among those 208 who have had occupational injuries in the last 12 months, 58 (27.9%) had injuries in the last two weeks. There was a significant association between working sections, monthly income, and work experiences in the present job; sleeping disorder, health and safety information and use of PPE.

The overall prevalence was relatively low compared with other studies (14,33), and comparatively high rate of injury compared to other studies conducted on occupational injury in one year (6,9,14,15,17,18,26,29). These variations might be due to the differences in socio-economic levels of the workforce, lack of safety training and information/awareness; and limited occupational safety and health services and practices; absence of workplace supervision and limited use of PPE of the factory workers may contribute for occurrence of injury. This high prevalence shows that occupational injury is becoming a global public health and economic burden in addition to other public health challenges in both industrialized and less industrialized countries (15,20).

The study showed that the main types of injuries were cuts 114(24.9%), crushing 105(23%), abrasions 80(17.5%), burn 46(10.1%), puncture 30(6.6%) and eye injury 25(5.5%). This is consistent with a study done in India (16) and Ethiopia, Mugher cement factory, Tendaho agricultural development in Afar and among workers in the Saudi star agro-industry in Gambella where laceration, cuts, puncture, eye injury and crushing were common injury type (6,11, 29). The previous study in India showed that cut and lacerations had the highest rate with 40.6% followed by injuries to the eyes 29.9%, sprains 7.9% and burns 7.1% (17). The study in Addis Ababa construction workers also showed that cuts 36.2% and abrasions 26.6 were main injury types reported (25). Another study among waste collectors in Addis Ababa revealed that main occupational injury types were cut, 57.7% and puncture, 38.1% (24).

Fingers 101(23.2%), hands 89(20.4%), lower arm 44(10.1%), lower leg 42(9.6%) and eye 34(7.8%) were predominantly affected body parts in this study. Studies done in Addis Ababa on construction workers showed that fingers and hands are the commonest injury body parts that are consistent with this study (25). The study done in Bahir Dar on small and medium industrial workers showed that fingers were the most affected parts of the body (13). Similarly, hands and wrists were the most frequent sites of injury (40.6%) in a study conducted on glass manufacturing factories in India (17) which is in line with this study.

Studies carried out among industrial settings showed that machinery, falling, hand tools, splinters, struck by/against an object, and hit by falling objects are common causes of occupational injuries (6,14,28). A study conducted in India identified that glasses (34.4%) were the leading cause of occupational injury (17). This study also revealed that 88(24%) of injuries were caused by glass, 46(12.5%) by splinting /splashing objects, 44(12%) were falling accident, 43(11.7%) were by fire and 43(11.7%) by lifting heavy objects were common causes of injury which is consistent with previous studies.

Most Researchers showed that several factors were related to the occurrence, severity, and types of injury. Socio-demographic factors, working environment variables and worker's behavioral factors are the possible risk factors for the workers to be injured in the workplace of manufacturing industries including glass manufacturing industries (6,11–14,16,17,28).

The multivariate analysis result revealed that working sections, work experiences in the same job; monthly income, health and safety information, sleeping disorder and use of PPE were significantly associated with occupational injury in this study.

Some findings showed that sex and age are significantly associated with the prevalence of occupational injuries in which all showed the younger the age group the greater injury rate (12,14,18,27,28,32) and being male were a risk for occupational injury (12,14,26,27). However, this study showed that sex and age are not significantly associated with occupational injury. This could be explained by females and young workers might be assigned at fewer machine areas as it needs experiences in this study.

It has previously been reported that the rate of occupational accidents increases when the educational level decreases (6,13), however, in this study it was not significantly associated with the prevalence of occupational injuries when adjusted all variables of interest; results would be the same as those of other studies (6,11,13,14,24,25,32). This implied that education may not a guarantee for not being injured but safe practice.

This study revealed that those who had less work experience in the same job were more likely to have a work-related injury as compared to those respondents who had more years of work experience and the association was statistically significant. 'This might be due to the reason that more experienced employees adapted the working environment and comply with safety precautions. The result was in line with other studies in Ethiopia (6,29) and Iran (26). Besides, the study was consistent with findings in the India glass manufacturing factory (17). Job categories of Forman, mechanic maintenance, mold and workshop repairer, and cold end and

finished product selector experienced more work-related injuries than other workers. Multivariate analysis showed that the result was found significant which is consistent with studies in North Gondar (32) and mugger cement factory (6).

Regarding the work environment factors, health and safety information was significantly associated with occupational injury when it is adjusted for all variables. On the other hand, health and safety training, work hours per week and workplace supervision did not show a significant difference when it is adjusted for all variables. However, this study was inconsistent with other findings such as safety and health training (14,24–26,32), work hours per week (12,14,24,25,32) and workplace supervision (25,26,32) in other studies.

The occurrence of occupational injury was significantly related to a sleeping disorder. This could explain that sleep disorder affects the ability to maintain wakefulness, loss of concentration, ability in assessing or watching the work environment and working conditions and performing duties and health status. The report of most occupational health and safety studies conducted in Ethiopia strongly agrees with these findings (11,12,14,32).

Respondents who did not use Personal Protective Equipment were more likely of had higher odds of a work-related injury as compared to those who used Personal Protective Equipment and the association was statically significant. Other studies were also in line with this finding in which the nonuse of Personal Protective Equipment increased the occurrence of occupational injuries (17,24,28,29). This could be explained by the fact that proper utilization of PPE highly reduces the occurrence of unexpected injuries in the glass factories. Findings of observation also supported this finding.

7. Strengths and Limitations of the study

Strengths:

- The finding could serve as base line information for further research and important for policy makers to design strategy to prevent and control injury in glass factories.
- Observational checklists were used to address issues which were not included in the main parts of the checklist like the practice of the worker and the condition of working environment.

Limitations:

- Study participants might perceive that responding as an injury might bring benefits and failure to report socially sensitive information.
- The study was a one year cross sectional study, the possibility of recall bias may result in under reporting and misreporting of events.
- The level of noise, temperature, dust particles and other chemicals were not objectively measured.

8. Conclusions and Recommendations

Conclusions:

The study showed that there is a high prevalence of occupational injury and severity among workers engaged in glass manufacturing factories in Addis Ababa. In this study, the overall occupational injury prevalence rate of 583 per 1000 exposed workers year. Twenty-one (10.1%) injured respondents were hospitalized. A total of 528 workdays were lost among 208 injured respondents, being 2.54 days lost on average per an injured worker.

In this study respondent's working section, work experience in the same job, occupational health and safety information, sleeping disorder and use of personal protective devices were found to have a statistically significant association with occupational injury.

The work environment observation revealed that in all glass manufacturing factories there were no program based supervision, no warning signs and safety rules and regulations in factories, some workers do not use Personal Protective Equipment while on duty, there were no trained and professional safety officers in all glass manufacturing factories, the established health and safety committees in one factory was not active, and in one factory there was no safety committee established.

Recommendations

In the view of the above findings and conclusions for sustained prevention and control of occupational injuries, the following recommendations are made for action:

For glass factories:

- ❖ There should be standard quality and adequate supply of Personal Protective Equipment for all glass workers and its utilization should also be monitored regularly.
- ❖ There should be warning signs in each work section, safety rules and regulations in the glass factories.
- ❖ Establishment of active and functional occupational health and safety committee is essential in the glass factories to safeguard the health and safety condition of the workforce, conduct regular review meetings on occupational health & safety programs, and include as an integral part of their concern.

For the Bureau of Lab Labor and Social Affairs:

- ❖ Ongoing health and safety information and / or training should be given to the factories and employees
- ❖ Periodic supervision on health and safety conditions of workplaces should be emphasized accordingly at all levels.
- ❖ The existing laws, policies, regulations, directives and workplace standards in the country as to occupational safety, health and work environment conditions should be implemented and enforced at all levels to maintain the safety and health of the worker. Like, enforcing the factory to assign professionals and trained officers on occupational health and safety services.

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10. ANNEXES:

Annex 10.1: PARTICIPANT'S INFORMATION SHEET

Title of the study: Assessment of prevalence and associated factors of occupational injuries among glass factory workers in Addis Ababa, Ethiopia.

Investigator: Mengistie Simegnew

Advisor: Dr. Teferi Abegaz

Mr. Yifokire Tefera

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

Purpose: The objective of this study is to assess the prevalence of occupational injuries and associated factors among glass factory workers in Addis Ababa, Ethiopia.

Procedure and Participation: The method of this study is an institution-based cross-sectional study. The expected duration of the participant's contact with the interviewer will be no more than thirty minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter. Moreover, your particular participation is affirmed by the sampling frame through the procedure of probability sampling technique which provides an equal chance of selection. You will be asked about your Socio-demographic, behavioral characteristics and work environment variables.

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

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

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

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

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

Right of the participant: Participating and not participating is the full right and participants can stop participation in the study at any time. This would not affect at all on your health benefit or other administrative effect and nobody will enforce you to explain the reason for withdrawal. The participant can skip a question which the worker does not want to respond to.

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

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

Investigator: Mengistie Simegnew

Phone no. 0929364317

E-mail address: mengisties@gmail.com

Advisor: Dr. Teferi Abegaz

Mr. Yifokire Tefera

Annex 10.2. INFORMED CONSENT FORM

Title of the study: Assessment of prevalence and associated factors of occupational injuries among glass factory workers in Addis Ababa, Ethiopia.

I have been well aware that this research undertaking is a post-graduate degree partial fulfillment of research thesis which is coordinated by Addis Ababa University School of Public Health and the designate investigator is Mengistie Simegnew. I have been fully informed in the language I understand about the research project objective is to assess the prevalence and associated factors of occupational injuries among glass factory workers.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that research has no risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason for withdrawal. It is also enlightened there would not affect at all in my health benefit or other administrative effects that I get from the glass products factory. I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact Addis Ababa University, School of public health, Secretary Office Tel.

Investigator: Mengistie Simegnew

Phone no. 0929364317

E-mail address: mengisties@gmail.com

Advisor: Dr. Teferi Abegaz

Mr. Yifokire Tefera

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

Name of the participant _____

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

Signature _____ (if written consent)

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

Signature _____ Date _____

Annex 10.3. English version questionnaire

Questionnaire for the assessment of occupational injuries among glass factory workers in Addis Ababa, Ethiopia.

Name of the factory _____

Questionnaire identification number _____

Name of the working section _____

Introduction and consent form

Hello, my name is _____. I am here on behalf of the research team of Addis Ababa University School of Public Health Department of General Master of Public Health. We would like to understand how big the problem of occupational injury is and what causes this injury. To get this information, we are carrying out interviews in this factory. The results from this project will be used to help policymakers and other responsible bodies to improve occupational safety and health services in the factory. I would like to ask you some questions about an incident that resulted in an injury to you while at a job in the previous 12 months. The question about occupational injuries that I would like to ask you will take about 30 minutes of your time. What you tell me will be kept strictly confidential. This information will be kept securely and no one outside of this research team will find out the answers that you give me. During the period of the interview, you are free to stop the interview at any point, or not to answer any of the questions that we ask. Do I have your permission to proceed?

1. Yes

2. No

Informed consent certified by

Interviewer name _____ Signature _____

Date of interview _____ Time started _____ Time completed _____

Result of the interview: 1. Completed 2. Respondent not available.

3. Refused 4. Incomplete

Checked by supervisor: Name _____ Signature _____

Date _____

	times?			
205	Parts of the body affected		Per year	Per 2 weeks
		1.Eye	_____	_____
		2.Tooth	_____	_____
		3.Hand	_____	_____
		4.Ear	_____	_____
		5.Knee	_____	_____
		6.Toe	_____	_____
		7.Fingers	_____	_____
		8.Head	_____	_____
		9.Upper arm	_____	_____
		10.Lower arm	_____	_____
		11.Upper leg	_____	_____
		12.Lower leg	_____	_____
		13.Back	_____	_____
		14.Chest	_____	_____
		15.Face	_____	_____
		16.Multiple	_____	_____
		99.Other, specify _____		
206	Type of injury	1. Abrasion/laceration		
		2. Cut		
		3. Burn		
		4. Crushing		
		5. Puncture		
		6. Fracture		
		7. Dislocation		
		8. Amputation		
		9. Electrocutions		
		10. Suffocation		
		11. Ear injury		
		12. Eye injury		
		13. Back pain		
		14. poisoning		
		99.Other, specify _____		

207	What were you doing at the time of injury?	_____		
208	Causes of injury	<ol style="list-style-type: none"> 1.Struck by/against an object 2.Machinery 3.Hit by falling objects 4.Falling accident 5.Hand tools 6.Fire 7.Lifting heavy objects 8.Electricity 9.Splinting objects 99.Other,specify _____ 		
209	What was the reason given by the respondent for the causes of injury?	<ol style="list-style-type: none"> 1. Disorder of normal operation 2.Improper hand working Instruments 3.Absence/inadequate machine safeguards 4. Absence of safety education 5. It is due to not using PPE 6. Misuse of protective devices 7. I do not remember 99. Other, specify 		
210	Day of injury	<ol style="list-style-type: none"> 1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday 22. Do not remember 		
211	Time of injury	<ol style="list-style-type: none"> 1. In the morning 2. In the afternoon 3. In the evening 4. In the mid-nigh 22. Do not remember 		

212	If yes to Q 201 how was its severity	<ol style="list-style-type: none"> 1. Serious (permanent/disability lasting months) 2. Moderately severe (disability lasting a few days/weeks) 3. Minor (disability where the worker returns to work on the same day or the next day) 		
213	Were you hospitalized as a result of injury in the last 12 months?	1.Yes 2.No		
214	If yes to Q.211, for how long?	_____ days		
215	Number of working days lost due to injury at work for the last one year	_____ days		
Part III. Working Environment Information				
301	Hours worked per week	_____ hrs		
302	Is there regular health and safety supervision?	1.Yes 2.No		
303	Have you had occupational safety training/ education?	1. Yes 2. No		
304	How long since your last training/education?	_____ months		
305	Have you had any shift rotation in your work?	1. Yes 2. No		
306	If yes, for Q305, how often?	<ol style="list-style-type: none"> 1. Every 24 hours 2. Every 48 hours 3. Every month 4. Every 3 months 5. Every 6 months 99. Other, specify 		
307	If no, for Q305, In which shift you are working	<ol style="list-style-type: none"> 1. Morning shift 2. Afternoon shift 3. Night shift 4. General shift 		

308	Have you had any information regarding occupational health and safety through mass media or from any other source?	1.Yes 2.No		
Part IV. Worker's Behavior Information				
401	Do you chew chat?	1.Yes 2.No	If no, skip to Q403	
402	If yes to Q401, how often?	1. Every day 2. 1-3 days/week 3.Occasionally		
403	Do you drink alcohol?	1.Yes 2.No	If no, skip to Q405	
404	If yes to Q403, how often?	1. Every day 2. 1-3 days/week 3.Occasionally		
405	Do you smoke a cigarette?	1.Yes 2.No	If no, skip to Q407	
406	If yes to Q405, how often?	1. Every day 2. 1-3 days/week 3.Occasionally		
407	Do you have sleeping disorders?	1. Yes 2. No	If no, skip to Q409	
408	What is the reason for this sleeping disorder?	1. Working more than 8 hrs/day in the enterprise 2. Engage in additional duties outside the enterprise 3. Evening/Mid-night working 4. Work burden 99. Other, specify		
409	Do you have job stress in your work?	1. Yes 2. No		
410	If yes to Q409 what is the reason for this job stress?	_____		
411	Are you satisfied with your assigned job?	1. Yes 2. No		
412	If No to Q411 what is the			

	reason for not satisfied in your assigned job?	_____		
413	Do you use personal protective devices?	1. Yes 2. No	If no, skip to Q414	
414	If yes to Q412, what type?	1. Gloves 1.Yes 2.No 2. Respirators 1.Yes 2.No 3. Goggles 1.Yes 2.No 4. Face shield 1.Yes 2.No 5. Boots 1.Yes 2.No 6. Earplug 1.Yes 2.No 7. Helmet 1.Yes 2.No 99. Other, specify		
415	What is your reason for not using personal protective devices?	1. Absence of protective devices 2. Not comfortable to use 3. Absence of safety & health education 4. It decreases work performance 5. Create health & safety hazards 99. Other, specify		

Annex 10.4. Work environment observation checklist

Checklist for the observation of the working environment in glass and bottle factory in Addis Ababa, Ethiopia which is adapted from other studies (14).

• Name of the factory_____ • Name of the working section_____

Hazards in the working environment

1	Is there excessive heat in the workplace? Yes requires that a worker is found sweating when naked or with light clothing; if the investigator feels as sudden heatwave when entering into the industry.	1. Yes 2. No.
2	Are there regular health and safety supervision programs and plans in each work section/office? (Requires showing a schedule and work plan in the office/ or work section while inspection around)	1. Yes 2. No
3	Is there a medical record in the clinic? Yes shows the availability of medical records for injury in the clinic while inspection round. One year injury data will be collected from the medical record while inspection round.	1. Yes 2. No
4	Is there warning signs or safety rules in the workplace? (Yes indicates signs or posts in the workplace while inspection around. No indicates lack of such signs or posts while inspection around)	1. Yes 2. No
5	Is there an adequate supply of PPE for employees? (while inspection around, requires no lack of such equipment)	1. Yes 2. No
6	Do the employees use necessary personal protective devices? (Yes indicates PPE used by each worker while inspection around.)	1. Yes 2. No
7	Does the factory have the most important safety and health regulation? (Requires showing a copy of regulation)	1. Yes 2. No
8	Does the factory has trained safety and health personnel? Requires either implementation as a result of initiatives from health and safety personnel or written action worked out with them.	1. Yes 2. No
9	Does the working section have first aid equipment? (Requires the presence of first aid equipment during data collection)	1. Yes 2. No
10	Is there an occupational health and safety committee in the factory? (Requires showing a copy lists of committee members)	1. Yes 2. No

Thank you!

Annex 10.5: ለተጠያቂዎች የሚሰጥ መረጃ (informed consent form)

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

የጥናቱ ርዕስ:- በአዲስ አበባ ከተማ በሚገኙ የብርጭቆና ጠርመራ ማምረቻ ፋብሪካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ የሚደርሱ ጉዳዮችን መጠን እና መንስኤ ማጥናት

የአጥኝዉ ስም: መንግስቱ ስመኛው

የጥናቱ አማካሪ ስም: 1. ዶ/ር ተፈሪ አበጋዝ

1. አቶ ይፎክር ተፈሪ

የጥናቱ አስተባባሪ: በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ሳይንስ ት/ክፍል

መግቢያ:- በአሁኑ ጊዜ ከስራ ጋር በተያያዘ ሳይታሰቡ የሚከሰቱ ጉዳዮች አለማቀፋዊ ክብደት ከፍተኛ የሕብረተሰብ የጤና እና የኢኮኖሚ ችግር ነው። በየአመቱ ለሚሊዮኖች ሞት እና አካለንክላጊነት ምክንያት ናቸው። የጉዳቱ አስከፊነት እንደ ኢትዮጵያ ባሉ ታዳጊ አገሮች የከፍ ያለ ነው ።

የጥናቱ ጥቅም:- ተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት ምንም ጥቅም የለም።

- ❖ ከዚህ ጥናት የሚገኘው ውጤት ለከተማው ወደፊት ለሚጠኑ ተመሳሳይ ጥናቶች ዕንደመነሻ ግብአት ያገለግላል።
- ❖ የጥናቱ ውጤት ለከተማው ጤና ቢሮ ፣ኢንዱስትሪ ሚኒስቴር እና ለሰራተኛና ማህበራዊ ጉዳይ ቢሮ ይፋ ስለሚደረግ ጉዳቱን ለመከላከልና ለመቆጣጠር የሚያስችሉ መፍትሄዎችን ለመንደፍ ይጠቅማል።
- ❖ ይህ መረጃ በሚሰበሰብበት ወቅት የተጎዳ ሰራተኛ ከተገኘ በኢንዱስትሪው ውስጥ በሚገኘው ወይም በቅርብ በሚገኝ ጤና ተቋም እንዲረዳ ይደረጋል። ከተቻለም የመጀመሪያ ሕክምና ይሰጣል።

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

የቃለ መጠይቁ ተሳታፊ መብቶች፡-

- ተሳታፊው በዚህ ጥናት ላይ የመሳተፍ ወይም አለመሳተፍ መብቱ የተጠበቀ ነው።
- በመሳተፍ ላይ እያሉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ ለመመለስ የማይፈልጉትን ጥያቄ አለመመለስ ይቻላል።
- በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል። የጥናቱ ሚስጥራዊነት፡- የተሳታፊው ማንነት በሚስጥር ይያዛል።

Annex 10.6: የተሳታፊው የፈቃደኝነት ቅጽ

ከዚህ ቀጥሎ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ተረድኻለሁ

- ይህ ጥናት በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት አስተባባሪነት ተማሪ መንግስቱ ስመኛው ለምረቃ ጽሁፍ ጥናቱን እንደሚያካሂዱ
- የጥናቱ ርዕስ በአዲስ አበባ ከተማ በሚገኙ የብርጭቆና ጠርመራ ማምረቻ ፋብሪካዎች በሚሰሩ ሰራተኞች ላይ ከሙያ ጋር በተያያዘ ሳይታሰቡ የሚከሰቱ ጉዳዮች መጠንና መንስኤ ማጥናት
- የጥናቱ ዋና አላማ በብርጭቆ ፋብሪካዎች ስራ ቦታ ሊከሰቱ የሚችሉ ጉዳዮች ማጥናት
- የምሰጣቸው መረጃዎች በሚስጥር እንደሚያዙ
- ጥናቱ ምንም ዓይነት ጉዳት እንደማያደርስብኝ
- ጥያቄወ ካልተሰማኝ ማቋረጥ ወይም ወደሌላ ጥያቄ መዘለል እንደምችልና ማንም ሰው ሊያስገድደኝ እንደማይችል
- በፋብሪካው በጤናየም ላይ ሆነ አስተዳደርን በተመለከተ ምንም ዓይነት ጉዳት ሊያደርስብኝ እንደማይችል
- ጥናቱን በተመለከተ ያልገባኝን ነገር ቀጥሎ በተሰጠኝ አድራሻ ጠይቁ መረዳት እንደምችል ተገንዝቤአለሁ።

አዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት

የአጥኝው ስም: መንግስቱ ስመኛው

የጥናቱ አማካሪ ስም: ዶ/ር ተፈሪ አበጋዝ

አቶ ይፎክር ተፈሪ

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

የተሳታፊ ስም _____ ፊርማ _____

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

የምስክር ስም _____ ፊርማ _____

ክፍል 1: ማህበራዊና ሥነ ሕዝባዊ ገጽታዎችን በተመለከተ (ጥያቄ ቁጥር 101-109)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
101	ፆታ	1. ወንድ 2. ሴት		
102	እድሜ	----- ዓመት		
103	ሀይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ኘሮቲስታንት 4. ሌላ ካለ ይጠቀስ-----		
104	የትምህርት ደረጃ	1. ማንበብና መጻፍ የማይች/ችል 2. ማንበብና መጻፍ ብቻ 3. ከ1-8ኛ ክፍል 4. 9-12ኛ ክፍል 5. 12 +		
105	የጋብቻ ሁኔታ	1. ያገባ/ች 2. ያላገባ/ች 3. የፈታ/ች 4. ሚስት የሞተበት/ባል የሞተባት		
106	የስራ ክፍል	_____		
107	በፋብሪካው ውስጥ በአጠቃላይ ያለው/ላት የስራ ልምድ	_____ ዓመት		
108	በዚህ የስራ ክፍል ውስጥ ያለው የአገልጋሎት ዘመን	_____ ወር/አመት		
109	የወር ገቢ	_____ ብር		

ክፍል 2. የስራ ላይ ጉዳትን በተመለከተ (ጥያቄ ቁጥር 201 - 214)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
201	ባለፉት አስራ ሁለት ወራት ውስጥ ከሙያ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1. አዎ 2. የለም	የለም ከሆነ ወደ ቁጥር 301	
202	ለጥያቄ ቁጥር 201 መልስዎ አዎ ከሆነ ስንት ጊዜ?	በአመት _____ ጊዜ		
203	ባለፉት ሁለት ሳምንት ውስጥ ከስራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1. አዎ 2. የለም	መልስዎ የለም ወደ ቁጥር 205 ይሂዱ	
204	ለጥያቄ ቁጥር 203 መልስዎ አዎ ከሆነ ስንት ጊዜ?	በ2 ሳምንት _____ ጊዜ		
205	ለጥያቄ ቁጥር 201 እና 203 መልሶ አዎ ከሆነ የተጎዳ የሰውነት ክፍል	<p style="text-align: center;"><u>በአመት</u> <u>በ2 ሳምንት</u></p> 1. ዐይን _____ ጊዜ 2. ጥርስ _____ ጊዜ 3. እጅ _____ ጊዜ 4. ጆሮ _____ ጊዜ 5. ጉልበት _____ ጊዜ 6. የአግር ጣት _____ ጊዜ 7. የእጅ ጣቶች _____ ጊዜ 8. ራስ _____ ጊዜ 9. የላይኛው ክንድ _____ ጊዜ		

		10. የታችኛው ክንድ _____ ጊዜ 11. ከጉልበት በላይ ያለው እግር _____ ጊዜ 12. ከጉልበት በታች _____ ጊዜ 13. ጀርባ _____ ጊዜ 14. ደረት _____ ጊዜ 15. ፊት _____ ጊዜ 16. ብዙ የሰውነት _____ ጊዜ ክፍል 99. ሌላ ካለ ይጠቀስ-----		
206	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ የጉዳቱ ዓይነት	1. ጭረት/መላጥ 2. መቆረጥ 3. ቃጠሎ 4. መቀጥቀጥ 5. መወጋት 6. ስብራት 7. ውልቃት 8. ወለምታ 9. በኤሌክትሪክ መያዝ 10. መታፈን 11. የጀሮ ጉዳት 12. የዓይን ጉዳት 13. የጀርባ ህመም 14. መመረዝ 99. ሌላ ካለ ይጠቀስ -----		
207	አደጋው ሲከሰት ምን እየሰሩ ነበር	_____		
208	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ የጉዳቱ መንስኤ ምን ነበር	1. ከዕቃው ጋር በመጋጨት 2. በማሸን 3. በመስታውቶች 4. በመውደቅ 5. በእጅ መሣሪያዎች 6. በእሳት 7. ከባድ ዕቃዎች በማንሳት 8. በኤሌክትሪክ 9. በተፈናጣሪ ነገሮች 99. ሌላ ካለ ይጠቀስ-----		
209	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ ለአደጋው መከሰት ምክንያቱ ምን ነበር?	1. በቅደም ተከተል ስራን አለመስራት 2. በአግባቡ የማይሰሩ መሳሪያዎች መሆኑ 3. የማሸኖች መከላከያ አለመኖርና በቂ አለመሆን 4. የደህንነትና ጥንቃቄ ትምህርት አለመሰጠት 5. የጉዳት መከላከያ ባለማድረግ ነው 6. የጉዳት መከላከያ መሳሪያዎችን		

		በአግባቡ አለመጠቀም 7. አላስታውስም 99. ሌላ ካለ ይጠቀስ -----		
210	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ አደጋው የተከሰተበት የሳምንቱ ቀን	1. ሰኞ 3. ረቡዕ 5. አርብ 7. እሁድ	2. ማክሰኞ 4. ሐሙስ 6. ቅዳሜ 22. አላስታውስም	
211	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ አደጋው የተከሰተበት ጊዜ	1. ጠዋት 3. ምሽት/ማታ 22. አላስታውስም	2. ከሰዓት በኋላ 4. ሌሊት	
212	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ የአደጋው ክብደት	1. ከባድ (ዘላቂ ወይም ለወራት የቆየ የአካል ውስንነት ያስከተለ) 2. መካከለኛ (ለሳምንታት/ ለቀናት የአካል ውስንነት ያስከተለ) 3. ዝቅተኛ (ሰራተኛው በተጎዳበት ቀን ወይም በሚቀጥለው ቀን ወደ ስራው ከተመለሰ)		
212	ለጥያቄ ቁጥር 201 መልሶም አዎ ከሆነ በአደጋው ምክንያት በሕክምና ድርጅቶች አልጋ ይዘው ያውቃሉ?	1. አዎ	2. የለም	
213	ለጥያቄ ቁ 212 መልስዎ አዎ ከሆነ ለምን ያህል ጊዜ?	_____ ቀናት		
214	ከስራ ጋር በተያያዙ ጉዳዮች ምክንያት ባለፉት አስራ ሁለት ወራት ውስጥ ከስራ የቀሩበት ቀናት ብዛት	_____ ቀናት		

ክፍል 3. የሥራ ቦታን በተመለከተ (ጥያቄ ቁጥር 301-308)

ተ.ቁ	ጥያቄ	የሚጠበቅ መልስ	የሚዘለል	ኮድ
301	በሳምንት ምን ያህል ሰዓት ይሰራሉ?	_____		
302	በመደበኛ የስራ ቦታዎ የጤና እና ሙያ ደህንነት ቁጥጥር በየጊዜው ተደርጎ ያውቃል?	1. አዎ	2. የለም	
303	በስራ ላይ ደህንነት ጋር በተያያዘ ትምህርት ወይም ስልጠና ወስደው ያቃውሉ?	1. አዎ	2. የለም	
304	ለመጨረሻ ጊዜ ስልጠና ከወሰዱ ምን ያህል ጊዜ ሆነዎት?	_____ ወራት		
305	ባለፉት 12 ወራት ውስጥ የስራ ፈረቃ መቀያየር አድርገው ውቃሉ?	1. አዎ	2. የለም	የለም ካሉ ወደ ጥያቄ ቁ.307 ይለፉ
306	ለተ.ቁ. 305 መልስዎ አዎ ከሆነ በምን ያህል ጊዜ የስራ ፈረቃ መቀያየር ያደርጋሉ?	1. በየ ሃያ አራት ሰዓት 2. በየአርባ ስምንት ሰዓት 3. በየ ወሩ		

409	በሚሰሩበት ቦታ ጭንቀት ይሰማዎታል?	1. አዎ 2. የለም	የለም ካሉ ወደ ቁ.411 ይለፉ	
410	ለጥያቄ ቁ.409 መልሶ አዎ ከሆነ ምክንያቱ ምንድነው ይላሉ?	_____		
411	በተመደቡት ስራ መደብ ደስተኛ ነዎት?	1. አዎ 2. የለም		
412	ለጥያቄ ቁ.411 መልሶ አይደለም ከሆነ ምክንያቱ ምንድነው ይላሉ?	-----		
413	ባለፉት 12 ወራት ውስጥ ሥራ ላይ በሚሆኑበት ጊዜ የአካል ጉዳት መከላከያ መሳሪያዎችን /ቁሳቁስ/ ይጠቀሙ ነበር	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ ቁ.415 ይለፉ	
414	ለጥያቄ ቁ. 413 መልስዎ አዎ ከሆነ ምን አይነት መከላከያ ልብስ /ቁሳቁስ/ ተጠቅመዋል?	1. ጓንት/ግላቭ 2. ማስክ / የአፍንፍ የአፍ መሸፈኛ/ 3. የጨረር መከላከያ መነጽር 4. የፊት መሸፈኛ (Face Shield) 5. ቡት ጫማ 6. የጆሮ መከላከያ ኘላግ 7. ሂሊሜንት /የጭንቅላት መከላከያ/ 99. ሌላ ካለ ይግለጹ		
415	ጥያቄ ቁ.413 መልስዎ የለም ከሆነ ከአደጋ ወይም ከጉዳት ወዘተ ለመከላከል የማይጠቀሙበት ምክንትያት ምንድነው?	1. መከላከያ ቁሳቁስ /መሳሪያዎች ስለሌሉ 2. ለአጠቃቀም ምቹ ስላልሆነ 3. ስለ ሙያ ደህንነትና ጤንነት ግንዛቤ ስለሌለኝ 4. የሥራ ውጤታማነት ስለሚቀንስ 5. ለደህንነትና ለጤና ጠንቅ ሊያስከትል ስለሚችል 99. ሌላ-----		

አመሰግናለሁ።

መረጃውን የሞላው ስምና ፊርማ _____ ቀን _____

መረጃውን ያረጋገጠው ስምና ፊርማ _____ ቀን _____

Annex 10.8: ምልክታ መጠይቅ ለሥራ አካባቢ

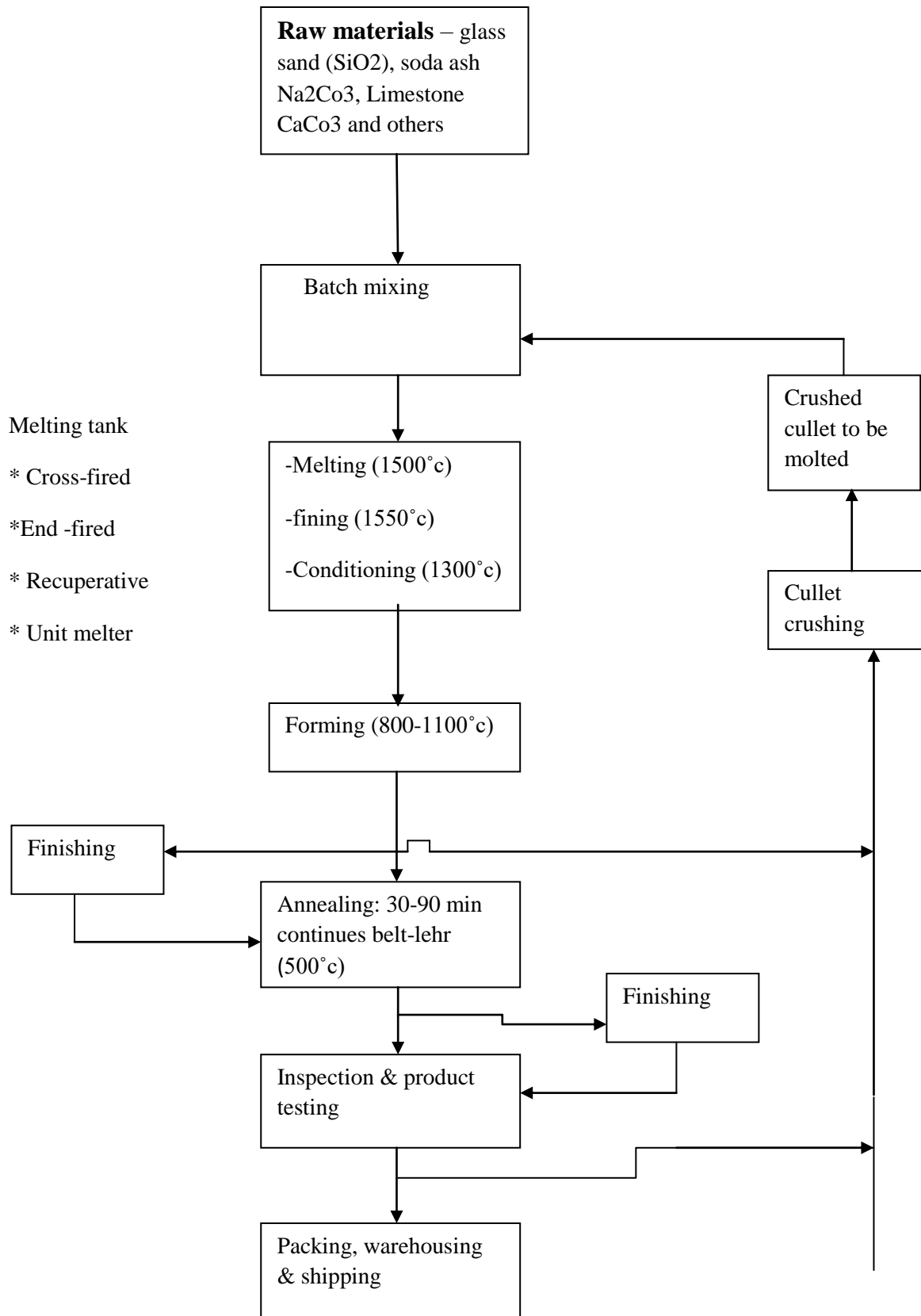
የፋብሪካው ስም -----

የሥራ-ክፍሉ መለያ ቁጥር -----

ክፍል 5. በሥራ አካባቢ ሊደርሱ የምችሉ ጉዳዮች በተመለከተ:

1. በስራ ክፍሉ ውስጥ ከፍተኛ የሆነ የሙቀት መጠን አለ? 1. አለ 2. የለም
 (መልሱ አለ ከሆነ ሰራተኞች ያለባቸውና ነጭ ኳሌታ ላይ የሚታይ ከሆነ ወይም ከውጭ ወደ ክፍሉ ሲገባ የሙቀት ሞገድ የሚሰማ ከሆነ)
2. መደበኛ ሱኻር ቪሻርን ኻርግራም በየሥራ ክፍሉ አለ? ሱኻር ቪሻርን በኻርግራሙ መሠረት ሳይቋረጥ ይደረጋል? (ኻርግራሙ ቢታይ) 1. አለ 2. የለም
3. በፋብሪካው ክለኒክ ሕክምና መዝገብ አለ? 1. አለ 2. የለም
 (መዝገብ ይታይ የአካል ጉዳት ወይም አደጋ ደርሶባቸው የታከሙ ሠራተኞች ብዛት ተመዝግቦ ይያዝ)
4. በየስራ ክፍሉ የአደጋ ማስጠንቀቂያ ምልክቶች ወይም የአደጋ መከላከያ ደንቦች ተሰቅለዋል?
 1. አዎ 2. የለም
 /መልሱ አዎ ከሆነ የአደጋ ማስጠንቀቂያ ምልክቶችና የአደጋ መከላከያ ደንቦች ጉብኝቱ
5. የአደጋ ወይም የአካል ጉዳት መከላከያ ልብሶች /ቁሳቁሶች/ ለሰራተኛው በበቂ ሁኔታ አሉ?
 1. አዎ 2. የለም
 /በጉብኝት ወቅት የመከላከያ ቁሳቁስ እጥረት ያለመኖር መታየት አለበት /
6. ሠራተኞች በሥራ ክፍሎቻቸው አስፈላጊውን መከላከያ ቁሳቁስ እየተጠቀሙ ነው?
 1. አዎ 2. የለም
 /በጉብኝቱ ወቅት ሁሉም ሠራተኛ መከላከያ ቁሳቁሶችን ሲጠቀም መታየት አለበት/
7. ፋብሪካው የሥራ ቦታ ደህንነትና ጤንነት መቆጣጠሪያ ደንቦች አሉት? 1. አዎ 2. የለም
 /ካለ የደንቦች ኮፒ ይታይ/
8. ፋብሪካው በሙያ ደህንነትና ጤንነት መስክ የሰለጠነ ባለሙያ አለው? 1. አዎ 2. የለም
 /መልሱ አዎ ከሆነ ከባለሙያው ጋር የተፈራረሙበት የሥራ ዝርዝር ይታይ/
9. በስራ ክፍሎች የመጀመሪያ ሕክምና ዕርዳታ መስጫ ኪት አለ? 1. አዎ 2. የለም
 /መልሱ አዎ ከሆነ የዕርዳታ መስጫ ኪት መኖሩ በጉብኝት ወቅት መታየት አለበት/
10. በፋብሪካው የሙያ ደህንነትና ጤንነት ኮሚቴ አለ? 1. አዎ 2. የለም
 /መልሱ አዎ ከሆነ የሥራ ኃላፊነታቸው ይገለጻ? በጉብኝት ወቅት የሥራ ዕቅዳቸው ይታይ/

Annex 10.9: Overview of the glass manufacturing process (35)



Annex 10.10: ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned investigator agrees to accept responsibility for the scientific, ethical and technical conduct of the research project and the provision of required progress reports and conditions of the research and Institutional Review Ethical Board of Addis Ababa University.

Name of the Investigator: Mengistie Simegnew

Signature: _____

Date: _____

Approval of the advisors

Advisors: Name	Signature	Date
1. Dr. Teferi Abegaz	_____	_____
2. Mr. Yifokire Tefera	_____	_____