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

# Assessment of occupational injury and associated factors among Mugher cement factory workers, Mugher, Ethiopia.

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## Acronyms

OI -Occupational injuries

ILO -International Labor Organization

PPE-Personal Protective Equipment

MOLSA- Ministry of Labor and Social Affairs

# Abstract

**Back ground**-Throughout the world, occupational exposure to cement dust and noise continue to cause serious public health problems and are leading cause of disability and disease among workers. There are 2 million work-related deaths annually worldwide. Studies done in Ethiopia on textile factory, Iron and steel factory and among small and medium scale industries, occupational injury is the cause for hospitalization, disability and death of workers. There is no study done on the prevalence and associated factors of occupational injury in cement factory.

**Objectives**-this study investigated the prevalence and determinants of occupational injuries among cement factory workers in Mugher.

**Methods** -An institution based cross sectional study complemented with work place observation checklist and record review was conducted. Stratified random sampling by job category was used to get the desired sampling unit. The study participants were selected using simple random sampling technique, lottery method. Data was collected by trained data collectors using pretested Amharic version questionnaire through face to face interview of the study participants after getting ethical clearance from responsible bodies and informed verbal consent from study participants. The raw data was edited, entered in to a computer using Epi Info version 3.5.0 then exported to IBM SPSS version 21 and cleaned. Data was analyzed using IBM SPSS version 21. Bivariate analysis &multivariate analysis was done.95% confidence interval and p-value <0.05 was used.

**Results:** The prevalence of occupational injury in one year was 10.4%.There was one report with disability .In addition, 1356 working days were lost as a result of 52 work related injuries.Thirty seven (71.2%) were hospitalized, accounting for 51.4% hospitalization for more than 24 hours, 18(34.6%) were absent from work for 15-30 days .The significant contributing factor for occupational injuries was job category. Workers in the cement production were 74.7% less likely to experience occupational injury than workers in clinker production [AOR= 0.25, CI :( 0.100-0.639)], workers in the raw material production had 73.6 % less likely to experience occupational injury than workers in the clinker production [AOR= 0.26, CI :( 0.107-0.653)].

**Conclusion and recommendation:** The prevalence of occupational injury was 10.4%. Job category increased the risk of work related injuries. Preventive measures like provision of adequate and quality safety materials timely and work place supervision should get focus.

# 1. Introduction

## A. Background

According to Labor Proclamation No. 377/2003 of Ethiopia "Occupational accident" 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;

(a) any injury sustained by a worker while carrying out the employer's order, even away from the work place or outside his normal hours of work;

(b) any injury sustained by a worker before or after his work or during any interruption of work if he is present in the work place or the premises of the undertaking by reason of his duties in connection with his work;

(c) any injury sustained by a worker while he is preceding 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;

(d) any injury sustained by a worker as a result of an action of the employer or a third party during the performance of his work (1).

Occupational injuries (OI) are injuries that occur at the location of a person's employment which can include exposure to chemicals or other substances as well as accidents. Occupational accidents, Work injury, Work-related injury, Work accidents, Work-related accidents are other names for OI (2)**.** The primary cause of Occupational Injuries is the result from exposure to deleterious agents usually toxins, gases, inhalants, etc while working (3).

According to International Labor Organization (ILO) projections for the year 2000, based on 1998 statistics there were 2 million work-related deaths annually worldwide of these accidents contribute 19%. The ILO estimated that the total costs of occupational accidents and work-related diseases are 4% of the gross national product. Most of the world's work-related deaths, injuries and illnesses are preventable (4).

According to results from the Census of Fatal Occupational Injuries conducted by the U.S. Bureau of Labor Statistics, a preliminary total of 4,383 fatal work injuries were recorded in the United States in 2012(5).

According to centers for disease control and prevention, 7.9 million nonfatal injuries to younger workers were treated in U.S. hospital emergency departments in 10 years (6).

In Ethiopia in an accident report by Ministry of Labor and Social Affairs (MOLSA) taken from 66 establishments during 2008/2009, a total of 1968 work accidents were reported of which the 9 were fatal. Among the reported work accidents 56.05% occurred in the manufacturing industries. According to the same report taken from 220 establishments in 2009/2010, 29 fatal and 6127 non fatal work accidents were reported totally. Among the total 41.64% occurred in the manufacturing industries. Similarly in an accident report by MOLSA taken from 248 establishments in 2010/2011 showed that there were 16 fatal and 6990 non fatal work accidents. Among the reported 51.78% taken place in agricultural, hunting, forestry and fishing sector followed by 42.95% in the manufacturing industries (7).

OI may occur in the production process of cement factory as a result of unsafe working condition, unsafe acts, personal failure and lack of awareness on the side of both employers and employees. The failure on the part of the management in realizing and applying properly guarded machine, proper illumination and ventilation, non defective tools etc could be considered as one of the causes of work accidents. OI may result in loss of life, physical impairment, material damage and termination of work that might claim very large financial loss (7).

Sex (8),age(8),(9) &(10),Educational status(11),(12) marital status (11), job category (10), lack of experience (10), workplace supervision (10), job satisfaction (10),working hour per week (9-11) health and safety training (8), alcohol use(9, 12), sleeping disorder (9-11), manual handling of very heavy objects (>20 kg), need for visual concentration for the task, and maintenance of machine (11) ,job stress (8, 12), non PPE use (9, 12) were factors associated with occupational injury in a study done in Ethiopia.

The magnitude of occupational injuries and associated factors particularly in cement factory is not yet studied in Ethiopia.

## B. Statement of the problem

Most of the world's work-related deaths, injuries and illnesses are preventable.

Worldwide occupational exposure to cement dust and other hazards is the cause for skin allergies ,eye irritation and other work related injuries (13).Job category, work experience and use of PPE are the associated factors (14).

Different investigations in Africa reported that cement industry is responsible for many type of injuries like burn injury in different part of the body, fracture, falling and responsible for hospitalization, high cost for treatment and loss of productivity due to absence from workplace (15).

Studies done in different part of Ethiopia reported occupational injury is prevalent in different industries .Occupational injury caused many types of injuries, affect different parts of the body and it is the cause for hospitalization ,working days lost (9, 12) and death (10, 11).

Studies done in different industry sector(even though they are different sectors they use similar machineries) of Ethiopia reported that age, working hour in a week, health and safety training, alcohol consumption and sleep disorder (10) ,educational status, marital status, manual handling of heavy objects ,maintenance of machine (12),work stress (8, 12),work experience, job category, work place supervision (10) ,use of Personal protective equipment (PPE) (12)were associated factors of occupational injury. While some of them reported that sex, educational level, monthly salary, job category ,work experience, job satisfaction and use of PPE (9, 10),age, sex, employment pattern, work place supervision, health and safety training and sleep disorder (12) were not associated with occupational injury.

There is a great discrepancy in the studies explained above in relation to the associated factors of occupational injuries in different industry sectors. In addition there is no study carried out on the prevalence and associated factors of occupational injury in cement factory. So this study will try to fill the gap.

## C. Rationale of the study

The work environment may influence the person's health either positively or negatively and productivity is in turn, influenced by the worker's state of physical and mental well-being. Work, when it is well-adjusted and productive can be an important factor in health promotion, e.g. partially disabled workers may be rehabilitated by undertaking tasks suited to their physical and

mental limitations and in this way, may substantially increase their working capacity (16). So it needs to be further studied and applied to benefit worker's health.

Occupational health and safety affect not only the worker but also his/her family and significant others and his community.

There is rapid industrialization due to favorable investment policy, which may result in an increased number of industries and employment in Ethiopia, placing a greater number of people at risk from cement dust exposure and other hazards but there are no studies done on prevalence and determinants of occupational injury in cement factory. Therefore, it is important to know the prevalence and determinants of occupational injuries among cement factory workers. The main aim of this study is therefore, to assess the prevalence of occupational injuries and its determinants among cement factory workers in Mugher. The finding of this study will help for the development of effective preventive strategies and improve occupational health and safety, for any cost-benefit analysis on occupational health and safety legislation and occupational health services, will be also used as baseline information for policy makers and other researchers. The cement factory workers will be the ultimate beneficiary of interventions based on findings of the study

# 2. Literature Review

**Key words**: occupational injury in cement factory, prevalence of occupational injuries in cement factories, work related injuries in cement factory, determinants of occupational injuries in cement factory, assessment of occupational injuries and associated factors among cement factory workers.

## 2.1 Prevalence of Occupational injuries in cement factory

A quasi –experimental research design done in Cairo, Egypt shows that physical hazards like ear problems (29.2 %) are the most common physical hazard in the work area followed by high blood pressure representing 26.9 % of the workers. 23.2 % were exposed to fracture from accident followed by falling 22.9 %. Also, 19.2% were exposed to eye disorders, followed by hematological disorders, cardiovascular problems and partial or complete deafness 14.3 %, 10.3 % & 9.5 % respectively. In addition, 35.2% was exposed to eye irritation or allergy due to chemical hazard and there were highly statistical significant differences regarding to the risks of exposure to health problems and accidents (15).

A study done in Egypt revealed that exposure to clinker and cement powder was responsible for 73.5% of burn injuries, and electricity for 15.5% of burn Injuries. The remaining cases (11 %) were due to various accidental causes. The commonest sites of burn were the ankles and feet (48.4%), wrist and hands (34.2%), and head and neck (20.6%).The total number of days lost in the five years was 4776, with a mean number of days per case of 31.0 days.28 (18.1%) cases needed hospitalization and were treated as in-patients and that 81.9% of cases were treated as out-patients. The mean cost for treatment per day was £E (Egyptian pounds) 100 for each in-patient stay and £E 20 for each out-patient visit. The estimated cost for treatment of all cases over the five years was quite enormous (£E 71,100 for in-patients and £E 80,660 for out-patients, for a total of £E 151,760). The estimated cost due to absence from work for all cases over the five years of study was £E 143,280. The total cost was £E 295,040 (17).

In a study done in Afar regional state 634 (78.3%), of them had incident at job that resulted in occupational injury during the past 12 months providing an overall prevalence of 783 injuries per 1000 exposed workers per year. The frequency of injury was, 194 (30.6%) had once, 177 (27.9%) twice, 99 (15.6%) three times and 164 (25.9%) more than 3 times. Finger: 306 (32.0%),

lower leg 195 (20.4%), eyes 117 (12.2%), toes 104 (10.9%), and lower arm 100 (10.4%) were the predominantly affected parts of the body. Laceration: 370 (36.9%), cuts: 116 (11.6%), puncture: 109 (10.8%), eye injury: 109 (10.8%), crushing: 103 (10.2%) and heat strain: 60 (6.0%) were commonly seen injury types. The majority, 457 (53.6%), of injuries were caused by hand tools, 95 (11.2%) by splinting or splashing objects, 77 (9.0%) were falling accidents, 68 (8.0%) were being hit by falling objects and 44 (5.2%) were by lifting heavy objects. Out of 634 injured respondents, 70 (11.0%) were hospitalized. Regarding the length of hospitalization, 7 (10.0%) were for 1 day, 25 (35.7%) were between 24 hours and 4 days, 25 (35.7%) were 5-10 days, and 13 (18.6%) were admitted for more than 10 days. One death was also reported due to severe head injury while working in the ginning section in the past 12 months. A total of 6153 work days were lost among 634 injured respondents (9).

In a cross sectional study done in Kombolcha textile factory, 168(36.9%) had responded that they had incident at job that resulted occupational injury in the past 12 months which brings the overall prevalence rate of 36.9% . Out of the injured workers, 75 (44.6%) had experienced work-related injuries in the last two weeks period prior to data collection. Of these cases, 16(21.3%) reported that they had sustained work related injury more than once. The commonly affected parts of the body were hand 83(48.8%), toe 27(15.9%), back 25(14.7%), and eye 23(13.5%). Regarding types of injury, puncture 54(32.7%), abrasion/laceration 53(32.1%), fracture 30(18.2%), cut 28(17%) predominant types of injury. The commonest causes of injury were found to be machines 84(49.7%), lifting heavy objects 32 (18.9%), splinters 29(17.2%) and fall 22 (13%) orderly. 73(43.45%) were hospitalized where 67% of the hospitalization were for more than 24 hours.137 working days were lost as result of work related injuries in the last 12 months. There was no reported death as a result of work related injuries (18).

In a cross sectional study conducted among iron and steel industries workers in Addis Ababa, 33.3% workers had a history of work-related injuries in last one year resulted in a prevalence rate of 333/1000. Out of the total injured workers, 73.6% injured once, 18.9% twice, and 7.4% greater than 3 times in one year. Fingers (26.1%), lower arms (16%) , legs (16%) and eyes (10.9%) were the most common body parts affected .Regarding the types of injury, laceration (25.8%) and fracture (14.8%) were commonly observed. Splitting and flying objects (16.4%), hit

by falling objects (13.7%), machinery (12.6%) and hand tools and instruments (10.9%) were the most common causes of injury(12).

In a study done among small and medium scale industrial workers in North Gondar, the overall annual prevalence rate of work related injuries was 335 per 1000 exposed workers per year. Of this cases 49.1% sustained injury more than once. The two week prevalence was 115(12%).Of this cases 63(54.8%) reported that they had sustained work related injury once. Hands were the body part with the highest frequency of work-related injuries, 126 (30%), and fingers 99 (24%) and eye 81(19%) were other sites frequently affected. Abrasions 100(23.2%), cuts 82 (19%), eye injury 81(18.8 %), puncture 61 (14.4%) and dislocation 28 (6.5%) were the main types of injuries reported. the most common cause of work related injury were machinery 88(23.9%), Splinters 80 (21.7%) and hand tools 61(16.6%). Most 94 (28.5%) of the work-related injuries occurred on Monday. The most (40.8%) common time of injury was in the morning. Of the total 322 injured respondents, 55 (17.1%) were hospitalized, accounting for 40% hospitalization more than 24 hours. One hundred and three (53.9%) were absent from work for more than 4 days. In addition, 191 working days were lost as result of 322 work related injuries. There were 2 reported deaths as result of work related injuries (10).

## 2.2 Determinants of occupational injury in cement factory

In a case study conducted in Bangladesh, it was found that arm, leg, hand finger, Eye and head covered 82.81% of total injury frequency and 76.56% of total injuries were by welding, bucket elevator, belt conveyor and weight lifting. The study reported that workers in the age group of 21-25 and 51-55 were more exposed to injuries and low experienced and high experienced workers have 84.38% of total injury frequency. Most (78.13%) of injury occurred by highly skilled and unskilled workers. Insufficient supply of Personal Protective Equipment, poorly maintained Personal Protective Equipment, discomfort when using Personal Protective Equipment and overconfidence were found to be the major causes of injury (14).

In a study done in Cairo, Egypt 65.7 % of the studied sample were not wearing PPE, but only 34.3 % of workers used PPE.34.3 % of workers studied using aprons as one of PPE followed by goggles (28.0%).Concerning availability of PPE (78.0%) reported that they are not enough in

their work area before health promotion program which they differed in post test program to be enough as reported by the majority (85.8%). There were good ventilation, sufficient light and fire extinguisher in the factory, ambulance car, and medical clinic inside the factories, pre employment examination. There were also punishment for those workers not using PPE, presence of leisure time for journeys, emergency plan in cases of emergency, application of emergency plan on real ground and presence of specific employees to identify occupational risks. In addition, there was presence of internal auditors to check safety, presence of medical records for each worker and part time during working day. However, there was no enough space between machines, no periodic medical examination, no periodic checking of PPE, no periodic workers training on occupational safety, no role of internal auditors is played and no computerizing of medical records(15).

In a cross sectional study done in Afar, Workers between 17 to 29 age, workers who used to work more than 48 hours per week , workers without health and safety training, workers addicted to alcohol and workers with sleeping disorders were associated significantly with occupational injury. Sex, educational level, monthly salary, job category, work experience, job satisfaction and use of personal protective devices did not show an association with occupational injury (9).

In a cross sectional study done in Kombolcha textile factory, educational status and marital status of workers showed statistically significant association with occupational injury. Workers who had only 1–8 years of education were more likely to report work-related injury than those with more than nine years of education. Hours worked per week, manual handling of very heavy objects (>20 kg), need for visual concentration for the task, maintenance of machine and sleep disorder also showed significant association with work-related injury. Workers who were used to work >48 hours per week were more likely to be injured than those spend 48 hours or less. Workers who had sleep disorder in their workplace were almost 3-times more likely to report work-related injuries than their counterparts. But, age, sex, employment pattern, monthly income, working experience, safety supervision, health and safety training, drinking alcohol, chewing chat, job satisfaction and using PPE did not show significant associations with occupational injuries (11).

In a cross sectional study done among iron and steel industries workers in Addis Ababa, educational level, drinking alcohol for three working days, having high work stress, working in night shift for 3 or greater days in a week, and non PPE use, were significantly associated with work-related injuries. Whereas marital status, working hours per week, chat chewing , smoking cigarette, sleep disorder and job satisfaction were not associated with occupational injury (12).

Workers who were young, less experienced, daily laborer, mechanic and welder by job category, sleep disorder, working 48 hours or below per week, job satisfaction and workplace supervision, were significantly associated with occurrence of occupational injuries. Respondents who worked 48 hours and below per week and those who supervised regularly at the time of the survey were less likely to experience work related injury than those who were worked more than 48 hours per week and not supervised. Whereas sex, educational level,marital status, monthly salary, health and safety training, alcohol consumption, chewing chat, use of PPE, were not associated with occupational injury in a study done among small and medium scale industrial workers in North Gondar (10).

A Case Control Study among textile factory workers in Amhara regional state revealed that sex, age, training on health and safety, sleeping disorder, job stress were associated with occupational injury .Workers who complained problems of sleeping disturbance were more likely to report two times excess occupational injury compared with workers who did not report problem of sleeping disturbance. Workers who were stressed due to their job were about 2 times more likely to report occupational injury compared with workers who were not stressed due to their job. However religion, ethnicity, marital status, educational level, employment condition, monthly salary, work experience, work place supervision, chat chewing, cigarette smoking, alcoholic drink consumption, job dissatisfaction and use of PPE and did not show significant association with occupational injury (8).

There are no such studies carried out in cement factory.

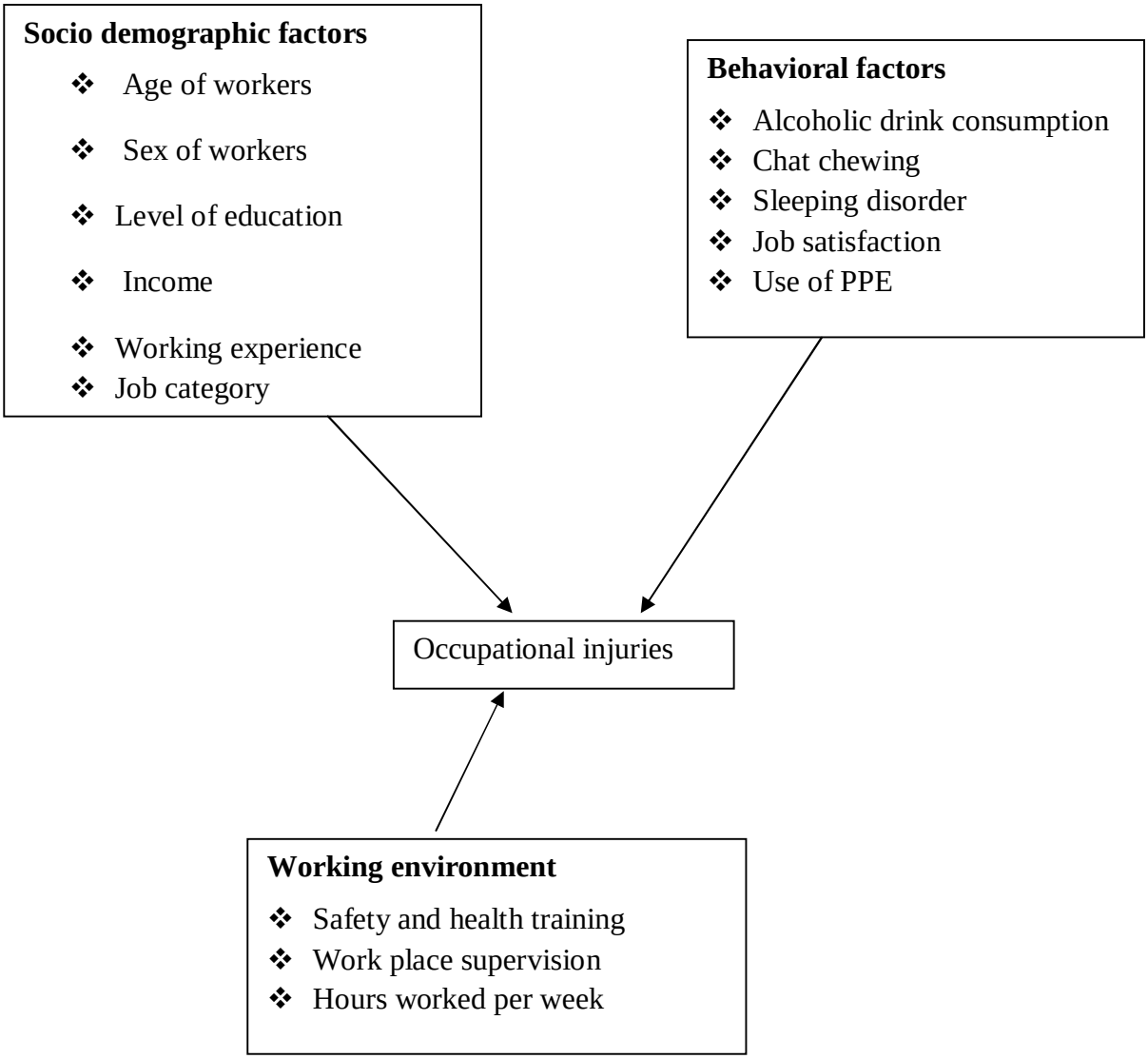


**Figure 1** .Conceptual framework for assessment of occupational injury in cement factory.

Different investigations reported that sex, age, job category, work experience, working hours per week , health and safety training, sleep disorders, job satisfaction, alcoholic drink consumption &PPE use are associated with occupational injuries.

# 3. Objectives

## 3.1General objective

To assess the prevalence and associated factors of occupational injuries among Mugher cement factory workers.

## 3.2 Specific objectives

1. To assess the prevalence of occupational injuries.
2. To describe factors associated with occupational injuries.

# 4. Methods

## 4.1 Study area

According to Ministry of Industry there are around 10 cement factories in Ethiopia. Mugher Cement Enterprise is a state owned plant constructed in 1984.Mugher Cement Enterprise's first production line was commissioned and officially inaugurated in 1984 with a capacity of 300,000 tons of clinker per annum, near Mugher River, located 90Km west of Addis Ababa. The enterprise doubled its capacity to 600,000 tons per annum of clinker production in 1990 with the construction of a second plant. The 3rd line cement expansion project was commissioned in 2011. It is the largest cement producer in Ethiopia with a production capacity of 900,000 tones and a 35% market share and has a total workforce of over 1,500.The head office is based just outside the capital and its quarrying sites are spread across the country. Mugher Enterprise produces two main products OPC (Ordinary Portland cement) and PPC (Poslana Portland cement). Sulphate resistance cement is sometimes produced on demand. The firm produces about 60 million packaging sacs for its own consumption in Addis Ababa branch. Mugher also extracts and sells natural resource minerals such as gypsum, limestone and silica to other manufacturing companies and farms. Mugher uses an outdated production technology from Germany which has high energy consumption and dust emission n(19). There were around 1488 workers in Mugher cement Enterprise in all branches (Mugher, Addis Ababa,Derba,Tatek&Nazreth).Out of the 1488 workers,955 were working on the cement production process which includes raw material, clinker production, cement production and engineering processes. There were around 690 workers with greater than one year work experience in the production process of Mugher which was selected as a study area.

## 4.2 Study design

An industry based cross sectional study complemented with observation checklist and record review was conducted.

## 4.3 Source population

All workers in the production process of the cement factory. The production process consists of four main sections clinker production, cement production, raw material production and preparation and engineering team because they are considered as exposed to occupational health and safety hazards that leads to occupational injury.

## 4.4 Study population

All workers who are randomly selected from the production process of the cement factory.

**Inclusion criteria**: All employees who were directly engaged in the production process with in the study period &who have been working at least for one year in the selected factory irrespective of sex were included in the study.

**Exclusion criteria**: Workers less than 18 years old were excluded. Workers who were absent from work for more than 3 times of visit at the time of data collection were not included.

## 4.5 Sample size Determination

### Sample size for the 1st objective

Sample size calculated using single population proportion formula.

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

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

$$n = 384$$

Where P=prevalence of occupational injury in cement factory

d=margin of error

n=sample size

p=50%

The assumption was there was no national or local data on the prevalence of occupational injuries in cement factory. Hence, prevalence of 50 % was used in order to maximize the sample size.

Considering 5% non-response rate, the sample size was;

**n**= 384 + (384 x 5%) = 403 respondents

## Sample size for a second objective;

Sample size for the determinant factors was calculated using double population proportion formula with the following assumptions on Epi Info version 3.5;

$$n = \frac{(Z_{\alpha/2}\sqrt{(1+1/r)p(1-p)} + z\beta\sqrt{p_1(1-p_1)+p_2(1-p_2)/r})^2}{(P_1-p_2)^2}$$

Power (1-ß) =90%

Confidence interval =95%

OR=1.9

Summarized sample size calculation

| S.no | Determinants | Prevalence | Calculated sample size |
|---|---|---|---|
| 1 | low experienced workers (20) | 56.25% | 472 |
| 2 | Unskilled workers (20) | 54.7% | 464 |
| 3 | Not wearing PPE (21) | 28.6% | 476 |

From the above, the maximum calculated sample size was 476 and by considering 5% non response rate the sample size was **500**.

### 4.6 Sampling procedures

Stratified random sampling was applied to get the desired sampling unit. It was stratified by job category. The calculated sample size was allocated to each stratum using probability proportional to size (PPS). The sampling frame was obtained from Mugher cement factory, Human resource management office. The study participants were selected using simple random sampling technique from the sampling frame. Lottery method was used.

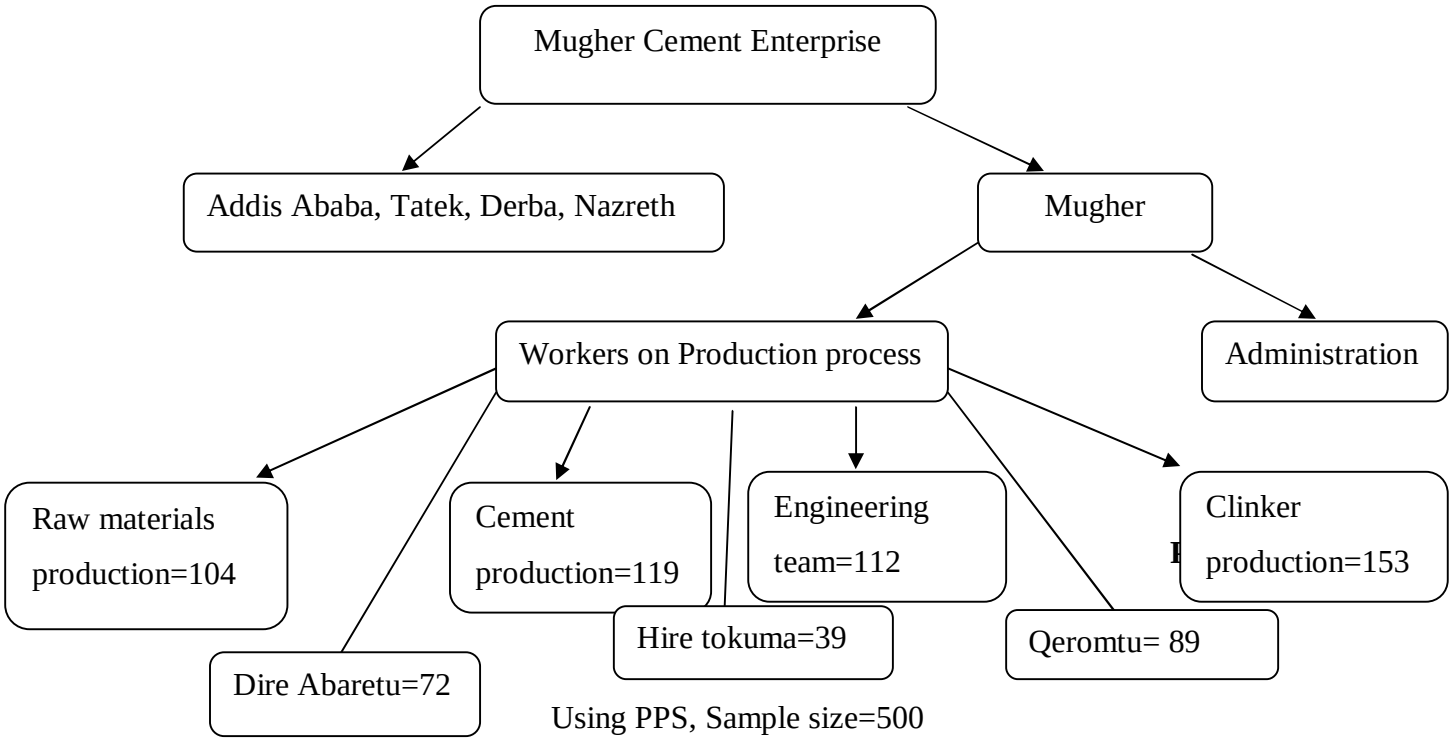


Figure 2.Schematic presentation of sampling procedure

### 4.7 Data collection procedures

Data was collected using pretested and structured Amharic version questionnaire via face to face interview of the study participants after getting ethical clearance from responsible bodies and informed verbal consent from study participants. Before the actual data collection the questionnaire was pretested in 5% (25 workers) outside the study area; in Addis Ababa (Ethiopian Iron and steel factory). Based on the pretest necessary modification was done on the questions and participants who were involved in the pretest were excluded in the actual data analysis. The questionnaire was prepared in English and translated to Amharic &later translated back to English. The questionnaire was adopted from previous researches(10).The questionnaire focused on socio demographic, behavioral, and environmental variables and occupational injury characteristics. Work place observation checklist, record reviews were done and sick leaves were checked to supplement the quantitative data.

Data collection was administered by four persons, one who have bachelor degree and the rest 10 complete and two supervisors with B.Sc degree in occupational health and MPH degree respectively after two-day training. In case the selected respondents were absent, the data collectors tried to visit three times.

## 4.8 Study variables

**Dependent variable**: occupational injuries resulted in working days lost, hospitalization or disability.

**Independent variables**:

1. Socio demographic factors: Sex, age, educational level, monthly salary, Service duration, job category.

2. Work environment factors: hours worked per week, workplace supervision, health and safety training.

3. Behavioral factors: alcohol use, chat chewing, sleep disorder, job satisfaction, and use of personal protective equipment.

## 4.9 Operational Definition

Occupational Injury-an injury sustained on worker in connection with the performance of his or her work in cement factory within one year that causes hospitalization, working days lost or disabilities and death as reported by the worker, confirming clinical records and sick leave.

## 4.10 Data management

After the completion of data collection, the raw data was edited, entered in to a computer using Epi Info version 3.5.0 then exported to IBM SPSS version 21. Data was cleaned in Epi Info version 3.5 as well as IBM SPSS version 21 by running frequencies and cross tabulations. Preliminary frequencies were run to identify missing variables. Data was backed up by saving it in different folders in the computer, removable flash disk and email. Continuous variables were coded and some coded variables were recoded.

## 4.11 Data Analysis procedures

Data was analyzed using IBM SPSS version 21and used to display percentages, graphs and tables. Descriptive statistics of the collected data was done for all variables in the study using standard statistical parameters: percentages, means and standard deviations. Bivariate analysis (Cross tabulation and chi square, Crude OR with 95 % confidence interval) were done for the independent variables with the outcome variable to select candidate variables for the multivariate analysis (Adjusted OR).Variables which showed significant association with the outcome variable on the bivariate analysis were entered in to multivariate logistic regression analysis to identify their independent effects on the outcome variable.95% confidence interval and p-value <0.05 was used. To avoid an excessive numbers of variables and unstable estimates in the multivariate analysis variables reached a p-value less than 0.2, variables which become significant and those variables that were considered as determinants were kept. The variables which showed significant association in the bivariate and continue in the multivariate were the determinants of occupational injury. The overall effect of socio demographic variables on the occurrence of occupational injury was assessed in the first step. In the second step of the analysis, the work environment variables were added, and their effect was assessed. Behavioral factors were entered in the third step. In the fourth step selected socio demographic factors, work environment and behavioral factors together was assessed to see the overall effect on the occurrence of occupational injury.

## 4.12 Data quality assurance

Training of the data collection team with pretesting in 5% of the sample size before the actual survey was conducted for two days to ensure the possible quality of the data. Based on the pre test results, the questionnaire was additionally adjusted quantitatively, contextually and terminologically, and administered on the study population.

Every day the completed questionnaires were handled to the supervisor on each day of data collection. The data collected in the cement factory was checked daily for completeness, clarity and logical consistency by the investigator and supervisor. Incorrectly filled or missed ones were sent back to data collectors for correction. Anything, which was unclear and ambiguous were corrected on the next day. Five percent of the samples were rechecked by the supervisor whether

the interviewers have done their job correctly or not. 5% of the collected data was entered twice by the principal investigator to verify whether the data was properly entered or not.

### 4.13 Ethical consideration

The study was approved by Addis Ababa University, school of Public Health ethical clearance committee. A letter obtained from Addis Ababa University, school of Public Health ethical clearance committee was submitted to the relevant and concerned bodies in the cement factory before starting the study. The information sheet and consent was provided for respondents to read for those who can read and the interviewer read the consent form for those respondents who can't read. Finally the respondents were asked the agreement to participate in the study. The respondents were informed about the objective of the study. Confidentiality was maintained by omitting their names and personal identification, never be used in connection with any information and it was not revealed to anyone except the principal investigator and assistants and was kept locked with key in the entire study period. Privacy was maintained by arranging quite place for interviewer and study participant to protect them exposing other parties according to the choice of the respondent ensuring visual and auditory privacy throughout the data collection. Study participants had the right to participate on the study or not and they can withdraw at any time of the study they wish. There was no benefit the study participants can get in terms of money or other item but they can get benefit in the future if there is a change of policy and strategies by considering this study, the benefit is to improve occupational safety, health and working environment services provided based on their answers to the questions. There was no risk to the study participants because of this study.

### 4.14 Dissemination of results

Findings of the study are submitted to school of public health, Addis Ababa University. It will also be communicated to Mugher cement factory, Ministry of Labor and social affairs, and to those organizations concerned with the promotion of Occupational health and safety at workplaces. Publication will also be considered.

# 5. Results

A total of 498(99.6%) respondents were included in the study and interviewed if they had experienced work related injury in the last 12 months.

## 5.1 Socio demographic characteristics of the respondents

The 498 respondents included 484 males. The mean age (SD) 37.36±10.32 was years. About 89(17.9%) of the respondents were in the age group 26-30 years. The majority 422 (84.7 %%) of study participants were orthodox Christian religion followers. About 189(38%) of the respondents have attended secondary school. Regarding marital status of the respondents, the majority 406 (81.5%) was married. Out of 498 study participants, 354 (71.1%) were permanent and 144 (28.9%) were from micro and small enterprise. One hundred seventy six (35.3%) of the respondents were from clinker production. 165(33.1%) of the respondents had 1727-3684 monthly salary in birr. Most 261 (52.4%) of the respondents had working experience of five years or below. The socio demographic characteristics of respondents are summarized in Table 1.

**Table 1.Socio demographic characteristics of the respondents, Mugher cement factory, Mugher, March, 2014 (n=498).**

| Variables | Frequency | Percentage |
|---|---|---|
| Sex | | |
| Female | 14 | 2.8 |
| Male | 484 | 97.2 |
| Age | | |
| <21 | 13 | 2.6 |
| 21-25 | 64 | 12.9 |
| 26-30 | 89 | 17.9 |
| 31-35 | 67 | 13.5 |
| 36-40 | 75 | 15.1 |
| 41-45 | 67 | 13.5 |
| 46-50 | 67 | 13.5 |
| 51-55 | 36 | 7.2 |
| >55 | 20 | 4.0 |
| Religion | | |
| Orthodox | 422 | 84.7 |
| Protestant | 64 | 12.9 |
| Others | 12 | 2.4 |
| Educational status | | |
| Primary school and below | 199 | 40 |
| Secondary school(9-12) | 189 | 38 |
| $12^{+}$ | 110 | 22 |
| Marital status | | |
| Married | 406 | 81.5 |
| Single | 85 | 17.1 |
| Others | 7 | 1.4 |
| Employment pattern | | |
| Permanent | 354 | 71.1 |
| Micro and small enterprise | 144 | 28.9 |
| Job category | | |
| Clinker | 176 | 35.3 |
| Cement production | 114 | 22.9 |
| Raw material | 127 | 25.5 |
| Engineering | 81 | 16.3 |
| Service duration | | |
| <5 | 261 | 52.4 |
| 5-9 | 57 | 11.4 |
| 10-14 | 28 | 5.6 |
| >=15 | 152 | 30.5 |
| Monthly salary in birr | | |
| <1050 | 155 | 31.1 |
| 1050-1726 | 94 | 18.9 |
| 1727-3684 | 165 | 33.1 |
| >3684 | 84 | 16.9 |

## 5.2. Occupational injury Characteristics

A total of 63(12.7%) respondents were reported occupational injuries during the last 12 months. Due to the definition of occupational injury in this study and after reviewing records the overall prevalence during the last 12 months was 52(10.4%) and 48 (92.3%) of the injured respondents reported they had sustained occupational injury once. The two week prevalence was 3(0.6%). Of this case all reported that they had sustained occupational injury once (Table 2).

Table 2.Distribution of occupational injury in the last 12 months among respondents in Mugher cement factory, March, 2014(n=498).

| Variable | Frequency | Percentage |
|---|---|---|
| Injury in the last 2 Weeks | 3 | 0.6 |
| Injury in the last 12 Months | | |
| Yes | 52 | 10.4 |
| No | 446 | 89.6 |
| No. of occurrence(n=52) | | |
| Once | 48 | 92.3 |
| More than once | 4 | 7.7 |

Hands were the body part with the highest frequency of occupational injuries 11 (21.2%), Lower Leg 10 (19.2%), Finger 9 (17.3%) and Eye 7(13.5%) were other sites frequently affected. The main types of injuries reported were cuts 10(19.2%), burn 10(19.2%), abrasions 7(13.5%) & eye injury 7(13.5%) (Table 3).

Table 3.Distribution of occupational injury by part of the body affected and type of injury, Mugher cement factory, March, 2014 (n=52).

| Variables | Frequency | Percentage |
|---|---|---|
| Part of the body affected | | |
| Hand | 11 | 21.2 |
| Lower Leg | 10 | 19.2 |
| Finger | 9 | 17.3 |
| Eye | 7 | 13.5 |
| Back | 6 | 11.5 |
| Upper Leg | 5 | 9.6 |
| Others* | 13 | 25 |
| Type of injury | | |
| Burn | 10 | 19.2 |
| Cut | 10 | 19.2 |
| Abrasion | 7 | 13.5 |
| Puncture | 7 | 13.5 |
| Eye injury | 7 | 13.5 |
| Fracture | 6 | 11.5 |
| Others ** | 8 | 15.3 |

Others*=Tooth=2, Ear=2, Knee=2, Toe=2, Head=1, Lower arm=2, Chest=2
Others **- Dislocation=4, Ear injury=2, Amputation=2

In this study the most common agent stated as cause was machinery 25 (48.1%), Splintering objects 10 (19.2%) and Falls 10 (19.2%) followed by hot substances 9(17.3%) .Thirteen (25%) of the occupational injuries occurred on Tuesday and Wednesday 13(25%) followed by Monday 9(17.3%).The most 17(32.7%) common time of injury was in the afternoon followed by morning 16(30.8%) (Table 4).

**Table 4.Distribution of occupational injuries in the last 12 months by cause of injury, day of injury and time of injury among 52 injured respondents, Mugher cement factory, March, 2014 (n=52).**

| Variable | Frequency | Percentage |
|---|---|---|
| Cause of injury | | |
| Machinery | 25 | 48.1 |
| Splintering objects | 10 | 19.2 |
| Falls | 10 | 19.2 |
| Hot substances | 9 | 17.3 |
| Hit by falling objects | 9 | 17.3 |
| Day of injury | | |
| Monday | 9 | 17.3 |
| Tuesday | 13 | 25 |
| Wednesday | 13 | 25 |
| Thursday | 7 | 13.5 |
| Friday | 3 | 5.8 |
| Saturday | 3 | 5.8 |
| Sunday | 6 | 11.5 |
| Time of injury | | |
| Morning | 16 | 30.8 |
| Afternoon | 17 | 32.7 |
| Evening | 14 | 26.9 |
| Mid night | 5 | 9.6 |

Others*-Lifting heavy objects=4, Fire=2, Electricity=1, Hand tools=1, Collision with objects=1

## 5.3. Severity of occupational injuries

Of the total 52 injured respondents, 37(71.2%) were hospitalized, accounting for 51.4% hospitalization more than 24 hours. 18(34.6%) were absent from work for 15-30 days There was one report with disability (total disability was 10% from the whole man) resulted in lumbar contusion and mild difficulty of walking which is decided by medical board of St.Paul hospital. In addition, 1356 working days were lost as result of 52 occupational injuries (Table 5).

**Table 5.Severity of occupational injuries as reported by the respondents and confirmed by the investigator, Mugher cement factory, March, 2014(n=52).**

| Variable | Frequency | Percentage |
|---|---|---|
| Hospitalization | | |
| Yes | 37 | 71.2 |
| No | 15 | 28.8 |
| How long(n=37) | | |
| Less than 24 hours | 18 | 48.6 |
| More than 24 hours | 19 | 51.4 |
| Working days lost | | |
| <2 | 3 | 5.8 |
| 2-6 | 12 | 23.1 |
| 7-14 | 12 | 23.1 |
| 15-30 | 18 | 34.6 |
| >30 | 7 | 13.5 |

## 5.4 .Work environment characteristics

Four hundred eighty three (97 %) respondents worked more than 48 hours per week. Two hundred fifteen (43.2%) of the respondents reported that their workplaces were not supervised regularly. Majority (60.6 %) of the respondents were not taken any health and safety training (Table 6).

**Table 6.Work environment characteristics of respondents in Mugher cement factory, March, 2014(n=498).**

| Variable | Frequency | Percentage |
|---|---|---|
| Working hour in a week | | |
| <=48 | 15 | 3.0 |
| >48 | 483 | 97.0 |
| Supervision | | |
| Yes | 283 | 56.8 |
| No | 215 | 43.2 |
| Safety training | | |
| Yes | 196 | 39.4 |
| No | 302 | 60.6 |

## 5.5 Behavioral characteristics

Three hundred ten (62.2%) and 25(5%) of the respondents consumed alcohol and chewed chat respectively. Tela was consumed by majority of them, 231(46.4%).Most 298(59.8%) consumed occasionally. About 57 (11.4%) of the respondents reported that they had sleep disorder. The majority 442 (88.8%) of the respondents were satisfied by their current job. 488 (98.0%) of the respondents were used personal protective equipment at their workplace, while 10 (2.0%) were not used any type of personal of protective equipment. Glove was used by majority of the respondents ,464(93.2%).All of the study participants were interviewed for non use of protective equipment and reported the most frequent reasons were lack personal protective equipment 359 (72.1%), and not comfortable to use 53 (10.6%) (Table 7).

**Table 7.Behavioral characteristics of respondents in Mugher cement factory, March, 2014(n=498).**

| Variables | Frequency | Percentage |
|---|---|---|
| Alcohol | | |
| Yes | 310 | 62.2 |
| No | 188 | 37.8 |
| How often | | |
| 1-3 Days in a week | 12 | 2.4 |
| Occasionally | 298 | 59.8 |
| Chat | | |
| Yes | 25 | 5.0 |
| No | 473 | 95.0 |
| How often | | |
| Every day | 2 | 0.4 |
| 1-3 Days in a week | 5 | 1.0 |
| Occasionally | 18 | 3.6 |
| Sleeping disorder | | |
| Yes | 57 | 11.4 |
| No | 441 | 88.6 |
| Job satisfaction | | |
| Yes | 442 | 88.8 |
| No | 56 | 11.2 |
| Use of PPE | | |
| Yes | 488 | 98.0 |
| No | 10 | 2.0 |
| Type of PPE | | |
| Glove | 464 | 93.2 |
| Ear plug | 253 | 50.8 |
| Respirators | 270 | 54.2 |
| Helmet | 352 | 70.7 |
| Overalls | 397 | 79.7 |
| Goggles | 150 | 30.1 |
| Face shield | 69 | 13.9 |
| Boots | 304 | 61.0 |
| Reasons for not using | | |
| Lack of PPE | 359 | 72.1 |
| Lack of safety and health education | 4 | 0.8 |
| Not comfortable to use | 53 | 10.6 |
| Decrease work performance | 5 | 1.0 |
| Others | | |
| It lacks Quality | 5 | 1.0 |
| Not needed | 15 | 3.0 |
| Not timely | 4 | 0.8 |

## 5.6 .Workers health information on illness symptoms

Eighty four (16.9%) of the respondents reported that they are exposed to eye irritation 15 days prior to the data collection followed by skin allergy 51(10.2%).General weakness 34(6.8), Wheezing 18(3.6), Cough longer than 3 weeks 6(1.2) and Cough with sputum 1(0.2) were also reported.

## 5.7. Work environment observation

According to the observation workers around the kiln were exposed to heat, noise and splintering objects that pass through the conveyer belt without cover .Workers in cement packing were exposed to excessive dust, radiation and there was no adequate light. Some of the control rooms and cement packing room were not properly ventilated; some of the ventilators were not functional at the time of data collection. There was dust in the raw mill when the electro filter (conditioning tower) was not functioning. It pollutes the environment by changing its direction to different areas, sometimes it goes also to residential area of the workers that can cause many health problems and it is the cause for wastage of the raw material up to 9 tons per hour so that we can see that there is economical loss. We did not observe enough safety precautions. There were some directives and fire extinguishers in most of the work areas but the instructions are written in English that all workers may not read it. Some of the permanent workers use necessary PPE but they complained that they lack quality and were not provided timely. For example safety shoes provided cannot prevent foot where there is the risk of foot injuries from hot substances. Workers from the micro and small enterprises were not provided PPE by the organization, they bought by themselves. There was occupational health and safety officer but there was no adequate supervision from our observation. Training was given for some of the workers. There were two cafeterias near to the plant and many people were using which may cause many health hazards. First Aid facilities were available but not functional in their workplace, but there was a health center in the compound.

## 5.8. Socio demographic factors

Educational level, job category, and monthly salary were identified as the major socio demographic determinant of occupational injury .Educational level was statistically significant in this study. When we compare workers who attended primary school and those below with workers who attended higher education, the difference was statistically significant. Workers who attended primary school were 2.44 times more likely to report occupational injuries than workers who attended 12 and above [OR=2.44, CI: 1.084-5.508]**.**

Occupational injury was statistically associated with Job category. Workers who were working in cement production, raw materials preparation and production respectively were 69% and 73% less likely to report occupational injury than clinker production.

Monthly salary was also another variable that showed association with prevalence of occupational injury. Workers who were paid less than 1400 Birr during the interview were more likely to report occupational injury [OR=2.24, CI: 1.062-4.727]

However, in this study occupational injury was not associated with Sex, age, religion, marital status and service duration of the respondents.

Table 8.**Crude statistics of socio demographic factors of occupational injuries in Mugher cement factory, Mugher, March, 2014.**

| Variables | Injury | | P-value | COR(95%CI) |
|---|---|---|---|---|
| | Yes (%) | No (%) | | |
| Sex | | | | |
| Female | 2 (14.3) | 12 (85.7) | 0.635 | 1.45 (0.315-6.65) |
| Male | 50 (10.3) | 434 (89.7) | | 1.00 |
| Age | | | | |
| <=30 | 18 (10.8) | 148 (89.2) | 0.836 | 1.06 (0.582-1.951) |
| >30 | 34 (10.2) | 298 (89.8) | | 1.00 |
| Religion | | | | |
| Orthodox | 46 (89.1) | 376 (10.9) | 0.432 | 1.43 (0.587-3.469) |
| Others | 6 (92.1) | 70 (7.9) | | 1.00 |
| Educational level | | | | |
| Primary and below | 32 (16.1) | 167 (83.9) | **0.031** | **2.44 (1.084-5.508)** |
| Secondary | 12 (6.3) | 177 (93.7) | 0.758 | 0 .86 (0.342-2.185) |
| 12+ | 8 (7.3) | 102(92.7) | | 1.00 |
| Marital status | | | | |
| Married | 46 (11.3) | 360 (88.7) | 0.179 | 1.83 (0.758-4.427) |
| Others | 6 (6.5) | 86 (93.5) | | 1.00 |
| Employment pattern | | | | |
| Permanent | 32 (9.0) | 322 (91.0) | 0.111 | 0.62 (0.340-1.118) |
| Micro &small enterprise | 20 (13.9) | 124 (86.1) | | 1.00 |
| Job category | | | | |
| Clinker | 31 (17.6) | 145 (82.4) | 0.000 | 1.00 |
| Cement production | 7 (6.1) | 107 (93.9) | **0.007** | **0.30 (0.130-0.721)** |
| Raw material | 7 (5.5) | 120 (94.5) | **0.003** | **0.27 (0.116-0.642)** |
| Engineering | 7 (8.6) | 74 (91.4) | 0.065 | 0.44 (0.186-1.053) |
| Service duration | | | | |
| <=5 | 26 (10.0) | 235 (90.0) | 0.713 | 0.90 (0.505-1.595) |
| >=6 | 26 (11.0) | 211 (89.0) | 0.000 | 1.00 |
| Monthly salary in Birr | | | | |
| <1400 | 25 (15.0) | 142 (85.0) | **0.034** | **2.24 (1.062-4.727)** |
| 1400-3045 | 16 (8.9) | 164 (91.1) | 0.596 | 1.24 (0.558-2.764) |
| >3045 | 11(7.3) | 140 (92.7) | 0.000 | 1.00 |

## 5.9. Work environment factors

Hours worked per week, workplace supervision, health and safety training showed no association with the prevalence of occupational injuries.

Table 9.**Crude statistics work environment factors of occupational injuries in Mugher cement factory, Mugher, March, 2014.**

| Variables | Injury | | P-value | COR(95%CI) |
|---|---|---|---|---|
| | Yes (%) | No (%) | | |
| Working hour in a week | | | | |
| <=48 | 1 (6.7) | 14 (93.3) | 0.631 | 0.60 (0.078-4.697) |
| >48 | 51 (10.6) | 432 (89.4) | | 1.00 |
| Supervision | | | | |
| Yes | 34 (12.0) | 249 (88.0) | 0.190 | 1.49 (0.819- 2.726) |
| No | 18 (8.4) | 197 (91.6) | | 1.00 |
| Safety training | | | | |
| Yes | 17 (8.7) | 179 (91.3) | 0.300 | 0.73 (0.394-1.333) |
| No | 35 (11.6) | 267 (88.4) | | 1.00 |

## 5.10. Behavioral factors

Alcohol use, chat chewing, sleeping disorder, Job satisfaction and use of PPE did not show association.

Table 10.**Crude statistics of behavioral factors of occupational injuries in Mugher cement factory, Mugher, 2014.**

| Variables | Injury | | P-value | COR(95%CI) |
|---|---|---|---|---|
| | Yes (%) | No (%) | | |
| Alcohol use | | | | |
| Yes | 33 (10.6) | 277 (89.4) | 0.849 | 1.06 (0.584-1.923) |
| No | 19 (10.1) | 169 (89.9) | | 1.00 |
| Chat | | | | |
| Yes | 1 (4.0) | 24 (96.0) | 0.302 | 0.35 (0.046-2.603) |
| No | 51 (10.8) | 422 (89.2) | | 1.00 |
| Sleeping disorder | | | | |
| Yes | 8 (14.0) | 49 (86.0) | 0.348 | 1.47 (0.656-3.310) |
| No | 44 (10.0) | 397 (90.0) | | 1.00 |
| Job satisfaction | | | | |
| Yes | 47 (10.6) | 395 (89.4) | 0.695 | 1.21 (0.461-3.192) |
| No | 5 (8.9) | 51 (91.1) | | 1.00 |
| Use of PPE | | | | |
| Yes | 49 (10.0) | 439 (90.0) | 0.057 | 0.26 (0.065-1.040) |
| No | 3 (30.0) | 7 (70.0) | | 1.00 |

## 5.11. Multivariate Logistic regression analysis

The overall effect of socio demographic variables on the occurrence of occupational injury was assessed in the first step. In the second step of the analysis, the work environment variables were added, and their effect was assessed. Behavioral factors were entered in the third step. In the fourth step selected socio demographic factors, work environment and behavioral factors together was assessed to see the overall effect on the occurrence of occupational injury.

Among the mentioned socio demographic variables computed in the first step, job categories in cement production and raw material remained significant. Workers in the cement production were 74.3% less likely to experience occupational injury than workers in clinker production [OR=0. 26,CI: 0.105-0.628], Workers in the raw material production had 75.2% less than lower odds of having occupational injury than workers in the clinker production[OR=0.25 ,CI:0.102-0.607] .

From work environment variables analyzed hours worked per week, supervision of workplace and health and safety training were not statistically significant.

From the behavioral factors use of PPE was found to be significant. Workers who used PPE were 0.24 less likely to experience occupational injury than who did not use PPE [OR=0.24, CI ;( 0.058-0.973)].

From the variables computed in the fourth step only job category was found to be significant. Workers in the cement production were 74.7% less likely to experience occupational injury than workers in clinker production [OR= 0.25, CI :( 0.100-0.639)], Workers in the raw material production had 73.6 % less likely to experience occupational injury than workers in the clinker production [OR= 0.26, CI :( 0.107-0.653)] (Table 8).

**Table 11.Multivariate logistic regression analysis of the relative effect of socio demographic, work environment and behavioral factors on the prevalence of occupational injuries in Mugher cement factory, Mugher, March, 2014.**

| Variables | Injury | | COR(95%CI) | AOR(95%CI) |
|---|---|---|---|---|
| | Yes | No | | |
| Educational level | | | | |
| Primary and below | 32 | 167 | **2.44 (1.084-5.508)** | 3.03 (0.754-12.152) |
| Secondary | 12 | 177 | 0 .86(0.342-2.185) | 1.10 (0.317-3.838) |
| 12+ | 8 | 102 | 1.00 | 1.00 |
| Marital status | | | | |
| Married | 46 | 360 | 1.83 (0.758-4.427) | 1.80 (0.686-4.739) |
| Others | 6 | 86 | 1.00 | 1.00 |
| Employment pattern | | | | |
| Permanent | 32 | 322 | 0.62 (0.340-1.118) | 0.63 (0.143-2.778) |
| Micro&small enterprise | 20 | 124 | 1.00 | 1.00 |
| Job category | | | | |
| Clinker | 31 | 145 | 1.00 | 1.00 |
| Cement production | 7 | 107 | **0.30 (0.130-0.721)** | **0.25(0.100-0.639)** |
| Raw material | 7 | 120 | **0.27 (0.116-0.642)** | **0.26(0.107-0.653)** |
| Engineering | 7 | 74 | 0.44 (0.186-1.053) | 0.80 (0.247-2.639 |
| Service duration | | | | |
| <=5 | 26 | 235 | 0.90 (0.505-1.595) | 0.47(0.183-1.204) |
| >=6 | 26 | 211 | 1.00 | 1.00 |
| Monthly salary in Birr | | | | |
| <1400 | 25 | 142 | **2.24 (1.062-4.727)** | 1.17 (0.248-5.483) |
| 1400-3045 | 16 | 164 | 1.24(0.558-2.764) | 0.87 (0.305-2.457) |
| >3045 | 11 | 140 | 1.00 | 1.00 |
| Working hour in a week | | | | |
| <=48 | 1 | 14 | 0.60 (0.078-4.697) | 0.91(0.102-8.225) |
| >48 | 51 | 432 | 1.00 | 1.00 |
| Supervision | | | | |
| Yes | 34 | 249 | 1.49 (0.819- 2.726) | 1.27 (0.649-2.484) |
| No | 18 | 197 | 1.00 | 1.00 |
| Safety training | | | | |
| Yes | 17 | 179 | 0.73 (0.394-1.333) | 0.97(0.451-2.088) |
| No | 35 | 267 | 1.00 | 1.00 |
| Alcohol use | | | | |
| Yes | 33 | 277 | 1.06 (0.584-1.923) | 0.90 (0.471-1.736) |
| No | 19 | 169 | 1.00 | 1.00 |
| Chat | | | | |
| Yes | 1 | 24 | 0.35 (0.046-2.603) | 0.36 (0.042-3.042) |
| No | 51 | 422 | 1.00 | 1.00 |
| Sleeping disorder | | | | |
| Yes | 8 | 49 | 1.47 (0.656-3.310) | |

| | | | | |
|---|---|---|---|---|
| No | 44 | 397 | 1.00 | 1.98 (0.813-4.828) |
| | | | | 1.00 |
| Job satisfaction | | | | |
| Yes | 47 | 395 | 1.21 (0.461-3.192) | 0.76 (0.262-2.223) |
| No | 5 | 51 | 1.00 | 1.00 |
| Use of PPE | | | | |
| Yes | 49 | 439 | 0.26 (0.065-1.040) | 0.44 (0.092-2.086) |
| No | 3 | 7 | 1.00 | 1.00 |

# 6. Discussion

The 12 months prevalence was 52(10.4%) and 48 (92.3%) of the injured respondents reported they had sustained occupational injury once. The two week prevalence was 3(0.6%). Of this case all reported that they had sustained occupational injury once. The overall prevalence was relatively low compared with other studies (9,10, 12,18). Of the total 52 injured respondents, 37(71.2%) were hospitalized, accounting for 51.4% hospitalization more than 24 hours. 18(34.6%) were absent from work for 15-30 days There was one report with disability (total disability was 10% from the whole man) resulted in lumbar contusion and mild difficulty of walking which is decided by medical board of St.Paul hospital. In addition, 1356 working days were lost as result of 52 occupational injuries. Hospitalization and working days lost can result to increase in medical cost, compensation cost, absenteeism and loss of working capacity which adversely affects productivity of the employees as well as the employer so we can see it economically. Work that resulted in production loss and disregard the safety and health of workers cannot be the basis of a sustainable development. In a study done in Afar, 70 (11.0%) were hospitalized. Regarding the length of hospitalization, 7 (10.0%) were for 1 day, 25 (35.7%) were between 24 hours and 4 days, 25 (35.7%) were 5-10 days, and 13 (18.6%) were admitted for more than 10 days. One death was also reported due to severe head injury while working in the ginning section in the past 12 months. A total of 6153 work days were lost among 634 injured respondents (9).A study done in Kombolcha textile factory revealed that 73(43.45%) were hospitalized where 67% of the hospitalization were for more than 24 hours.137 working days were lost as result of work related injuries in the last 12 months (18).

Fifty five (17.1%) were hospitalized, accounting for 40% hospitalization more than 24 hours. One hundred and three (53.9%) were absent from work for more than 4 days. In addition, 191 working days were lost as result of 322 work related injuries. There were 2 reported deaths as result of work related injuries in a study done in North Gondar (10).

Hands were the body part with the highest frequency of occupational injuries 11 (21.2%), Lower Leg 10 (19.2%), Finger 9 (17.3%) and Eye 7(13.5%) were other sites frequently affected**.** The possible explanation is due to more involvement in work which has direct exposure to machines, hot materials and can be affected more by injuries. Non use of PPE can also be the reason. This is consistent with a study done in Kombolcha (18) and North Gondar (10) and inconsistent with a

study done in Bangladesh (14),Afar (9) and Addis Ababa (12) this might be due to use of adequate PPE in this studies.

The main types of injuries reported were cuts 10(19.2%), burn 10(19.2%), abrasions 7(13.5%) & eye injury 7(13.5%).This is inconsistent with findings in Ethiopia (9, 10, 12, 18) this could be due to the difference in the nature of the work ,the type of machineries used in this different industries are not similar.

In this study the most common agent stated as cause was machinery 25 (48.1%), Splintering objects 10 (19.2%) and Falls 10 (19.2%) followed by hot substances 9(17.3%). This could be due to presence of unguarded machine parts and non use of PPE. This is in agreement with (10, 18) and inconsistent with (9) and can be explained by the difference in materials they used for work. Thirteen (25%) of the occupational injuries occurred on Tuesday and Wednesday 13(25%) followed by Monday 9(17.3%).The most 17(32.7%) common time of injury was in the afternoon followed by morning 16(30.8%).This is inconsistent with (10) the reason could be the difference of work shifts. There are three working shifts with 8 working hour interval in the cement factory. The possible explanation for the high frequency of injury in the afternoon could be due to speeding up of the production by the second round shift workers to meet the target before it becomes dark.

In this study Eighty four (16.9%) of the respondents reported that they are exposed to eye irritation 15 days prior to the data collection followed by skin allergy 51(10.2%). Findings from India (13) and Cairo (15)reported similarly.

Use of PPE was found to be significant when the effect of behavioral factors on occupational injury detected alone. Workers who used PPE were 0.238 less likely to experience occupational injury than who did not use PPE [AOR=0.24, CI ;( 0.058-0.973)], but did not show significant association when socio demographic and work environment factors were added. Even though use of PPE did not show in the bivariate and multivariate analysis when added with the other factors in this study 72.1% of the workers reported there was lack of PPE and it was not provided timely and did not have quality. The workers who reported as they use PPE did not use all types of PPE, only use of some types PPE cannot prevent from occupational injury.

From the variables computed in the multivariate analysis job category was found to be significant which is consistent with a study done in North Gondar (10). This can be explained by the work environment in clinker production is very hazardous, most of the workers in clinker production are from micro and small enterprises from which they are not provided adequate and quality PPE, lack of safety and health training and lack of regular workplace supervision.

Some studies revealed that increasing educational levels have been associated with decreasing work related injuries. This may be explained that education is likely to enhance workers health and safety practice that prevent them from work-related injuries. However, in our study educational level was not associated with occurrence of work-related injuries. This could be explained education only cannot eliminate injury when the level of hazards is high and when the use of adequate PPE and safe work organization are limited.

However, in this study occupational injury was not associated with marital status, employment pattern, service duration, monthly salary, hours worked per week, workplace supervision, health and safety training, alcohol use, chat chewing, sleeping disorder, Job satisfaction and use of PPE of the respondents.

## Strengths and limitations of the study

### Strengths

1. As there is no published data on the prevalence and associated factors of occupational injuries in cement factory in Ethiopia context, the results of this study can provide some information.
2. Use of multiple methods of data collection like record review, sick leaves were checked and work place observation checklist to confirm the self -reported information regarding occupational injuries and their associated factors.

### Limitations

1. Since the study was a one year cross sectional study. The possibility of recall bias may result in under reporting and misreporting of events.
2. Lack of studies with similar methodology and similar topic particularly in Ethiopia context made difficult in comparing results.

# 7. Conclusions and recommendations

The prevalence of occupational injuries was 10.4%. Job category increased the risk of work related injuries. Taking modifiable and preventable factors that affect occupational injury occurrence into consideration, the following recommendations are forwarded to Mugher cement factory based on the findings of the study.

1. Provide adequate and quality safety materials timely and supervise their appropriate use.
2. Work place supervision should get focus.

# References


1. Labour Proclamation No. 377/2003,Ethiopia, (February26, 2004).
2. <http://www.rightdiagnosis.com/o/occupational_injuries/intro.htm>
3. Sixteenth International Conference of Labour Statisticians (ICLS). Geneva,1998.
4. International Labour Organization. Safety in numbers. Geneva,: 2003.
5. National Census of Fatal Occupational injuries in 2012 (Preliminary Results). Bureau of Labor statistics,U.S deapartment of Labor,, August 22, 2013
6. Occupational Injuries and Deaths Among Younger Workers -1998-2007. United States: Centers for Disease Control and Prevention,, April 23, 2010 15.
7. Ministry of Labour and social Affairs,. 2008-2011.
8. Aderaw Z, Engdaw D, Tadesse T. Determinants of Occupational Injury: A Case Control Study among Textile Factory Workers in Amhara Regional State, Ethiopia. J Trop Med. 2011.
9. Osman Y, Kumie A. Assessment of occupational injuries in Tendaho Agricultural Development S.C, Afar Regional State. Ethiopian Journal of Health Development,. 2010;24(3):167-74.
10. Tadesse T, Kumie A. Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-scale industries in Gondar wereda, North Gondor zone, Amhara Regional State, Ethiopia. Ethiopian Journal of Health Development. 2007;21(1):25-34.
11. Yessuf Serkalem S, Moges Haimanot G, Ahmed Ansha N. Determinants of Occupational Injury in Kombolcha Textile Factory, North-East Ethiopia. International Journal of Occupational and Environmental Medcine,. April, 2014;5(2):84-93.
12. Manay Kifle, Dagnew Engdaw, Kassahun Alemu, Hardeep Rai Sharma , Senafikish Amsalu, Amsalu Feleke, et al. Work related injuries and associated risk factors among iron and steel industries workers in Addis Ababa, Ethiopia. Safety Science,. 2014;63:211-6.
13. Sana S, Bhat G, Balkhi HM. Health Risks Associated With Workers in Cement Factories. International Journal of Scientific and Research Publications,. May 2013;3(5).
14. Iqbal SA, Iqbal M, Taufiq MZ, Ahmed MS. Identification of Occupational Injury among the Workers of Selected Cement Industries in Bangladesh-A Case Study. Journal of Chemical Engineering. December 2010;25(1):22-8.
15. Shafik SA, El-Mohsen ASA. Occupational health: Health Promotion Program to Improve Health Workers in Tourah Cement Factory. Journal of American Science. 2012;8(3):486-96.
16. Occupational health,A manual for primary health care workers. World Health Organization Regional Office for the Eastern Mediterranean,Cairo, 2001.
17. EI-Megeed H, EI-Din S, Kotb S, EI-Oteify M. A Study of burns among workers in Assiut Cement factory EGYPT,1998. Hand(S). March 1999;10(1).
18. Yessuf Serkalem S, Moges Haimanot G, Ahmed Ansha N. Magnitude and characteristics of occupational injury in Kombolcha textile factory,North East Ethiopia. International Journal of Occupational Safety and Health. 2013;3(2):25-9.
19. Sutton J, Kellow N. An enterprise map of Ethiopia,2010.
20. Iqbal SA, Iqbal M, Taufiq MZ, Ahmed MS. Identification of occupational injury among the workers of selected cement industries in Bangladesh-a case study. Journal of Chemical Engineering,. December 2010;25(1):22-8.
21. Shafik SA, El-Mohsen ASA. Occupational health: Health Promotion Program to Improve Health Workers in Tourah Cement Factory. Journal of American Science,. 2012;8(3):486-96.

## Annex 1: Participant's Information Sheet

Title of the project: Assessment of occupational injuries among cement factory workers in Addis Ababa, Ethiopia.

**Principal Investigator**: Mulu Gebretsadik

**Advisor**: Dr. Abera Kumie

**Coordinating office**: Addis Ababa University School of Public Health

**Purpose**: The Objective of this research is to assess the prevalence and determinants of occupational injuries among cement factory workers in Mugher. This research undertaking is a postgraduate Masters of Public Health partial fulfillment research thesis.

**Procedure and Participation**: The method of the research is a cross sectional study. The expected duration of the participant's contact with the interviewer will be not more than thirty minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter. Moreover, your particular participation is affirmed by the sampling frame through the procedure of probability sampling technique which provides equal chance of selection. You will be asked about your socio-demographic, occupational injury characteristics, Work environment, Information on your worker behaviors.

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

**Benefit**: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design of occupational health programs based on the recommendations and the findings. Moreover the research work will help as a base line data in the field.

**Risk**: The proposed research does not have any inhuman treatment of research participants and any physical harm, social discrimination, psychological trauma and economic loss.

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

**Results Dissemination**: The researcher is responsible for dissemination of findings moreover fully accountable to provide feedback to the cement factory administration and to the policy makers. Maximum effort will be done to publish the finding in scientific reputable journal.

**Freedom to withdraw**: If you want to participate in the study, you have full right to with draw from the study any time you wish. This would have no effect at all on your health benefit or other administrative effect that you get from the cement factory as routine moreover nobody will enforce you to explain the reason of withdrawal.

**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 her advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa University College of Health Sciences IRB. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm. If you want more information and check about this project you can contact the following people

Addis Ababa University College of Health Sciences IRB Secretary Office Tel. 0115157701

Principal Investigator: Mulu Gebretsadik Tel: 0913941234 (Mobile)

Advisor: Dr. Abera Kumie, School of Public Health, College of Health Science, Addis Ababa University; Mobile: 0911882912; Office: 011-5157701

## Annex 2: Informed consent form

Title of the project: Assessment of occupational injuries and its determinants among cement factory workers in Mugher, Ethiopia. I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate principal investigator is Mulu Gebretsadik. I have been fully informed in the language I understand about the research project objectives that are to assess the prevalence and determinants of occupational injuries among cement factory workers in Addis Ababa.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk and no compensation. 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 of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the cement 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 College of Health Sciences IRB Secretary Office Tel. 0115157701

Principal Investigator: Mulu Gebretsadik Tel: 0913941234 (Mobile)

Advisor: Dr. Abera Kumie, School of Public Health, Addis Ababa University Mobile: 0911882912;

Office: 011-5157701

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.

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

Signature _____ (if written consent)

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

Signature _____

Date _____

## Annex 3: English version questionnaire

Addis Ababa University, College of Health Science, School of public Health

Title- Assessment of occupational injuries and associated factors among cement factory workers in Mugher, Ethiopia.

Section one: Socio demographic information.

| NO. | QUESTIONS | RESPONSES | Skip |
|---|---|---|---|
| Q101 | Sex | 1.Female<br>2.Male | |
| Q102 | Age (If he or she does not know ask before and after event significant) | ------Years | |
| Q103 | Religion. | 1.Orthodox<br>2.Catholic<br>3. Protestant<br>4.Muslim<br>5.Others specify | |
| Q104 | Educational level | 1. Cannot read and write<br>2. Can read and write<br>3. Primary school (1-8)<br>4. Secondary school (9-12)<br>5. Graduated from Technical and Vocational school<br>6. Diploma<br>7. First degree<br>8. Second degree | |

| | | | |
|---|---|---|---|
| Q105 | Marital status: | 1.Married<br>2.Single<br>3.Divorced<br>4.Widowed<br>5.Separated | |
| Q106 | Employment pattern | 1.Permanent<br>2.Temporary<br>3.Micro and small enterprises | |
| Q107 | Job category | ___ | |
| Q108 | Service duration in month or year in the same workplace | _____ | |
| Q109 | Monthly salary in birr | | |

Section Two: occupational injury characteristics

| | | | |
|---|---|---|---|
| Q201 | Have you had an incident at job that resulted in an injury to you in the last two weeks? | 1.Yes<br>2.No | |
| Q202 | If yes to Q201 how many times? | 1. Once<br>2. More than once | |
| Q203 | Have you had an incident at job that resulted in an injury to you in the last 12 months? | 1.Yes<br>2.No | If no, Skip to Q 301 |
| Q204 | If yes to Q202, how many times? | 1. Once<br>2. More than once | |
| Q205 | Part of the body affected | | |
| | 1. Eye | 1.Yes 2.No | |
| | 2. Tooth | 1.Yes 2.No | |
| | 3. Hand | 1.Yes 2.No | |
| | 4. Ear | 1.Yes 2.No | |
| | 5. Knee | 1.Yes 2.No | |
| | 6. Toe | 1.Yes 2.No | |

| | | | |
|---|---|---|---|
| | 7. Finger | 1.Yes 2.No | |
| | 8. Head | 1.Yes 2.No | |
| | 9. Upper Arm | 1.Yes 2.No | |
| | 10. Lower Arm | 1.Yes 2.No | |
| | 11.Hip | 1.Yes 2.No | |
| | 12. Upper Leg | 1.Yes 2.No | |
| | 13. Lower Leg | 1.Yes 2.No | |
| | 14. Back | 1.Yes 2.No | |
| | 15. Chest | 1.Yes 2.No | |
| | 16. Multilocation | 1.Yes 2.No | |
| | 17.Other specify | ____ | |
| Q206 | Type of injury | | |
| | 1. Abrasion | 1.Yes 2.No | |
| | 2. Cut | 1.Yes 2.No | |
| | 3. Burn | 1.Yes 2.No | |
| | 4. Puncture | 1.Yes 2.No | |
| | 5. Fracture | 1.Yes 2.No | |
| | 6. Dislocation | 1.Yes 2.No | |
| | 7. Eye injury | 1.Yes 2.No | |
| | 8. Ear injury | 1.Yes 2.No | |
| | 9. Suffocation | 1.Yes 2.No | |
| | 10. Electrocutions | 1.Yes 2.No | |
| | 11. Amputation | 1.Yes 2.No | |
| | 12. Poisoning | 1.Yes 2.No | |
| | 13. Other, specify | _____ | |
| Q207 | What were you doing at the time of injury | | |
| Q208 | Causes of injury | | |
| | 1. Machinery | 1.Yes 2.No | |
| | 2. Hit by Falling objects | 1. Yes 2.No | |
| | 3. Hit | | |
| | 4. Electricity | 1.Yes 2.No | |
| | 5. Splintering objects | 1. Yes 2.No | |
| | 6. Hand tools | 1.Yes 2.No | |
| | 7. Fire | 1.Yes 2.No | |
| | 8. Hot substances | 1.Yes 2.No | |
| | 9. Falls | 1.Yes 2.No | |
| | 10. Collision with objects | 1.Yes 2.No | |
| | 11. Lifting heavy objects | 1.Yes 2.No | |
| | 12. Other, specify | _____ | |
| Q209 | Day of injury: | | |

| | | | |
|---|---|---|---|
| | 1.Monday | 1.Yes 2.No | |
| | 2.Tuesday | 1.Yes 2.No | |
| | 3.Wednesday | 1.Yes 2.No | |
| | 4.Thursday | 1.Yes 2.No | |
| | 5.Friday | 1.Yes 2.No | |
| | 6.Saturday | 1.Yes 2.No | |
| | 7.Sunday | 1.Yes 2.No | |
| Q210 | Time of injury | | |
| | 1.In the morning | 1.Yes 2.No | |
| | 2.In the Afternoon | 1.Yes 2.No | |
| | 3.In the evening | 1.Yes 2.No | |
| | 4. In the midnight | 1.Yes 2.No | |
| Q211 | Were you hospitalized as result of injury in the last 12 month | 1. Yes 2. No | |
| Q212 | If Yes Q. 210, for how long | 1. less than 24 hrs<br>2. more than 24 hrs | |
| Q213 | If Yes Q. 210 where was the place | | |
| Q214 | Cost | | |
| Q215 | Number of days lost due to injury at work last one year(in days) | | |

Section three: Work environment information

| | | | |
|---|---|---|---|
| Q301 | Hours worked per week | | |
| Q302 | Workplace regularly supervised | 1.Yes 2.No | |
| Q303 | Have you had any safety training in connection with new employment, new equipment or other Changes? | 1.Yes<br>2.No | |

Section four: Information on workers behavior

| | | | |
|---|---|---|---|
| Q401 | Do you drink alcohol?<br><br>1. Beer<br>2. Tej<br>3. Tela<br>4. Whisky<br>5. Other specify | 1. Yes 2. No | |
| Q402 | If yes to 401, how often? | 1. Every day<br><br>2. 1-3 days/wk<br><br>3.Occasionally | |
| Q403 | Do you chew chat? | 1. Yes 2. No | |
| Q404 | If yes to Q403, how often? | 1. Every day<br><br>2. 1-3 days/wk<br><br>3.Occasionally | |
| Q405 | Do you have any sleeping disorders | 1. Yes 2. No | |
| Q406 | Are you satisfied with the job or task required to do | 1.Yes 2.No | |
| Q407 | Do you use any personal protective equipment? | 1.Yes<br><br>2.No | If no skip to Q 409 |
| Q408 | If yes to Q407, what type? | | |

| | | | |
|---|---|---|---|
| | 1.Gloves | 1.Yes 2.No | |
| | 2.Ear plug | 1.Yes 2.No | |
| | 3.Respirators | 1.Yes 2.No | |
| | 4.Helmet | 1.Yes 2.No | |
| | 5.Overalls | 1.Yes 2.No | |
| | 6.Goggles | 1.Yes 2.No | |
| | 7. Face shield | 1.Yes 2.No | |
| | 8. Boots/safety shoes | 1.Yes 2.No | |
| | 9.Others, specify | ____ | |
| Q409 | What are your reasons for not using personal protective | 1. Lack of protective equipment<br>2. Lack of safety and health education.<br>3.Not comfortable to use<br>4.Decrease work performance<br>5.Create safety and health hazards<br>6.Other, specify_____ | |

Part five: workers health information

| | | | |
|---|---|---|---|
| Q501 | Have you had any of these symptoms during the last two weeks? | | |
| | a. Eye irritation | | |
| | b. Skin allergies or rashes | | |
| | c. General weakness or fatigue | | |
| | d. Cough that produces thick sputum or blood | | |
| | e. Cough lasting longer than 3 weeks | | |
| | f. Others /specify | | |
| Q502 | Did you visit health facility | | |
| Q503 | If Q502 yes where was the place? | | |

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

## Annex 4: Amharic Version questionnaire

አዲስ አበባ ዩኒቨርሲቲ፣ጤና ሳይንስ ኮሌጅ ፣የሕብረተሰብ ጤና ትምህርት ክፍል
ይህ መጠይቅ በሙገር በሚገኘው የሙገር ሲሚንቶ ፋብሪካ ሰራተኞች መካከል ከሥራ ጋር በተያያዘ የደረሱ ጉዳቶችን እና ምክንያቶች ለማጥናት የተዘጋጀ ነው።

የመጠያቂያ ቅጽ መለያ ቁጥር ----------

**1.የተሳታፊዎች የመረጃ ቅጽ**

**የፕሮጀክቱ ርዕስ፡** በሲሚንቶ ፋብሪካ ሰራተኞች መካከል ከሥራ ጋር በተያያዘ የደረሱ ጉዳቶች እና ምክንያቶች ዳሰሳ

**ጥናቱን የሚያካሂደው ግለሰብ፡** ሙሉ ገ/ጻዲቅ

**አማካሪ፡** ዶ/ር አበራ ቁሜ

**ማስተባበሪያ ቢሮ፡** በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ት/ቤት

**ዓላማ፡** በሲሚንቶ ፋብሪካ ሰራተኞች መካከል ያለውን የሥራ ላይ አደጋ መጠንና አጋላጮችን በማጥናት ለድህረ-ምረቃ ትምህርት ማሟያነት ለመጠቀም ነው።

**አካሄድና ተሳትፎ፡** ከዚህ በመቀጠል ከሥራ ጋር በተያያዘ ባለፉት 12 ወራት ውስጥ የደረሰበዎት ጉዳቶችን በተመለከተ የተወሰኑ ጥያቄዎችን ልጠይቅዎት እወዳለሁ። ከእርሶ የሚገኘው መልስ በሀገራችን ለሚከናወነው የሙያ ደህንነት፣ ጤንነትና የስራ አካባቢ አገልግሎትን ለማሻሻል ከፍተኛ እገዛ ይኖረዋል።ይረዳቸዋል።ጥናቱ ውጤታማ ሊሆን የሚችለው እርስዎ በሚሰጡት ትክክለኛ መልስ በመሆኑ ጥያቄዎቹን በጥንቃቄ እንዲመልሱልኝ ፍቃደኛነትዎን በትህትና እጠይቃለሁ።።

**ሚስጥራዊነት፡** ከእርስዎ የምናገኛቸውን ማንኛውንም መልሶች በሚስጥር እንጠብቃለን። ከዚህ ጥናት ጋር በተያያዘ በማናቸውም ቦታና ጊዜ ስምዎ እንዳይፃፍና እንደማይጠቀስ ልንገልጽለዎ እነቀዳለን።

**ጥቅም፡** ይህ ጥናት የአጭር ጊዜ የገንዘብ፣ የጤና እንክብካቤ እና የአቅም ግንባታ ጥቅማ ጥቅሞች ለተሳታፊዎች የሉትም። ነገር ግን በሂደት የጥናቱ ውጤት ለሚመለከተው አካልና ፖሊሲ አውጪዎች ለፖሊሲ ግብአትነት፣ አቅጣጫ እና ስትራቴጂ ቀረፃ ይረዳል። በይበልጥ ጥናቱ በመስኩ እንደ መነሻ መረጃ ሆኖ ያገለግላል።

**ጉዳት፡** ሊካሄድ የታሰበው ጥናት በተሳታፊዎች ላይ ኢሰብአዊ የሆነ አቀራረብ፣ አካላዊ ጉዳት፣ ማህበራዊ አድሎ፣ ስነልቦናዊ ጉዳትና የኢኮኖሚ ድቀትን አያስከትልም።

**ጉቦ፣ ማበረታቻ እና ካሣ፡** ይህ ጥናት ምንም አይነት ማበረታቻና ካሣ የለውም። በተጨማሪም ምንም አይነት ካሣ የሚያስከፍል ጉዳት አያመጣም።

**የውጤት ስርጭት፡** አጥኚው የጥናቱን ውጤት ሙሉ በሙሉ ለሲሚንቶ ፋብሪካው አስተዳደሮች እና ፖሊሲ አውጪዎች የመስጠት ኃላፊነት አለበት። በተጨማሪም ታማኝ የሆኑ ሳይንሳዊ ጆርናሎች ላይ ለማሳተም ከፍተኛ ጥረት ያደርጋል።

**የማቋረጥ ነፃነት፡** በጥናቱ ለመሳተፍ ፍቃደኛ ሆነው ከጀመሩ በኋላ በማናቸውም ሰዓት ጥናቱን ሊያቋርጡ ይችላሉ። ለዚህም ማንም ሰው ያቋረጡበትን ምክንያት እንዲያብራሩ ሊያስገድድዎ አይችለም።

**መገናኘት የሚችሉት ሰው አድራሻ፡** የጥናቱ ተሳታፊ ስለጥናቱ ሁኔታ እና ይዘት ግልጽ ካልሆነለት በማናቸውም ሰዓት መረጃ የመጠየቅ መብት አለው። ዋና አጥኚዋን እና አማካሪዋን ማግኘት ይችላሉ። ለበለጠ መረጃ እና ስለፕሮጀክቱ ማረጋገጥ የሚፈልጉት ነገር ካለ በሚከተለው አድራሻ መጠቀም ይችላሉ።

**ዋና አጥኚ፡** ሙሉ ገ/ጻዲቅ ስልክ፡ 0913941234

**አማካሪ፡** ዶ/ር አበራ ቁሜ አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ት/ቤት ሞባይል፡ 0911882912፣ የቢሮ 011-5157701

2 .የፍቃደኝነት መጠየቂያ ፎርም

**የፕሮጀክቱ ርዕስ፡** በሲሚንቶ ፋብሪካ ሰራተኞች መካከል ከሥራ ጋር በተያያዘ የደረሱ ጉዳቶች እና ምክንያቶች ዳሰሳ

ይህ ጥናት በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ት/ቤት አስተባባሪነትና ድጋፍ በተማሪ ሙሉ ገ/ጻዲቅ ለድህረ-ምረቃ ፕሮግራን ማሟያነት እንደሚካሄድ አውቃለሁ። በሚገባኝና በማውቀው ቋንቋ ስለፕሮጀክቱ ዓላማ በአግባቡ ተገልፆልኛል።

**ዋና አጥኚ፡** ሙሉ ገ/ጻዲቅ ስልክ፡ 0913941234

**አማካሪ፡** ዶ/ር አበራ ቁሜ አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ት/ቤት ሞባይል፡ 0911882912፣ የቢሮ 011-5157701

እኔ ለጠያቂው የምሰጣቸው መረጃዎች ሚስጥራዊነት እንደሚጠበቅ፣ በማናቸውም ሰዓት ቃለ መጠይቁን ማቋረጥ፣ ጥያቄዎችን መዝለል እንደምችል እና ጥናቱም ምንም ዓይነት ጉዳት እንደማያስከትል፣ ጥቅማ ጥቅምም ሆነ ካሣ እንደሌለው ተረድቻለሁ። በተጨማሪም በማናቸውም ሰዓት በጥናቱ ዙሪያ ግልጽ ያልሆኑልኝ ነገሮችን የመጠየቅ ሙሉ መብቱ እንዳለኝ ተረጋግጦልኛል።

ይህ የፍቃደኝነት መጠየቂያ ቅጽ ከላይ በውስጡ ስለያዛቸው ጉዳዮች በማውቀው/በምረዳው ቋንቋ አንብቤ/ተነቦልኝ በጥናቱ ለመሳተፍ ፍቃደኝነቴን በቅጹ ላይ በመፈረም ተስማምቼያለሁ።

በጥናቱ ለመሳተፍ ተስማምቻለሁ፡ አዎ ☐ ( ☐ ለመስማማት በመረጡት ላይ ምልክት ያድርጉ)

ፊርማ ----------( የጽሁፍ ፍቃደኝነት መግለጫ ከሆነ)

የእማኝ ሥም ---------- ( መረጃ ሰብሳቢ፣ ተቆጣጣሪ፣ ወይም ማንኛውም ሦስተኛ ሰው)

ፊርማ ----------

ቀን ----------

የጠያቂው መለያ ቁጥር ----------

ስምና ፊርማ ----------

ቀን ----------

የተጀመረበት ሰዓት ---------- የተጠናቀቀበት ሰዓት ----------

**ውጤት፡**

ተጠቃሏል ☐

ተጠያቂው አልተገኙም ☐

ተጠያቂው ተቃውመዋል ☐

በከፊል ተጠናቋል ☐

**ክፍል አንድ፡ ማህበራዊና ስነ ህዝባዊ ገፅታዎችን በሚመለከት**

| ተ.ቁ | ጥያቄዎችና ማጣሪያዎች | አማራጭ መልሶች | ይሻገሩ |
|---|---|---|---|
| ቁ 101 | ፆታ | 1. ሴት<br>2. ወንድ | |
| ቁ 102 | እድሜ በአመት | ---------- | |
| ቁ 103 | ሀይማኖት | 1. ኦርቶዶክስ<br>2. ካቶሊክ<br>3. ፕሮቴስታንት<br>4. ሙስሊም<br>5. ሌላኛ ይጠቀስ | |
| ቁ 104 | የትምህርት ደረጃ | 1. መፃፍና ማንበብ የማይችል/የማትችል<br>2. መፃፍና ማንበብ የሚችል/የምትችል<br>3. የመጀመሪያ ደረጃ ት/ት (1-8) ያጠናቀቀ/ች<br>4. ሁለተኛ ደረጃ ት/ት (9-12) ያጠናቀቀ/ች<br>5. ከቴክኒክና ሙያ ትምህርት ቤት የተመረቀ/ች<br>6. ዲፕሎማ<br>7. የመጀመርያ ዲግሪ<br>8. ሁለተኛ ዲግሪ | |
| ቁ 105 | የጋብቻ ሁኔታ | 1. ያገባ/ች<br>2. ያላገባ/ች<br>3. የፈታ/ች<br>4. የሞተበት/ባት<br>5. ተለያይተው የሚኖሩ አግብቶ/ታ | |
| ቁ 106 | የቅጥር ሁኔታ | 1. ቋሚ<br>2. ጊዜያዊ<br>3. ጥቃቅንና አነስተኛ | |
| ቁ 107 | የሙያው አይነት | ---------- | |
| ቁ 108 | በሥራ ቦታዎ ስንት ቀን ወይም ወር ወይም አመት አገለግሉ? | ---------- | |
| ቁ 109 | የወር ደመወዝ | ---------- | |

**ክፍል ሁለት፡ የሥራ ቦታ ጉዳትን በተመለከተ**

| | | | |
|---|---|---|---|
| ቁ 201 | ባለፉት ሁለት ሳምንታት ውስጥ ከሥራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ? | 1. አዎን<br>2. የለም | |
| ቁ 202 | 201 አዎን ከሆነ ስንት ጊዜ? | 1. አንድ ጊዜ ብቻ 2. ከአንድ ጊዜ በላይ | |
| ቁ 203 | ባለፉት አስራ ሁለት ወራት ውስጥ ከሥራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ? | 1. አዎን<br>2. የለም | የለም ካሉ ወደ ተ.ቁ 301 ይሻገሩ |
| ቁ 204 | 203 አዎን ከሆነ ስንት ጊዜ? | 1. አንድ ጊዜ ብቻ<br>2. ከአንድ ጊዜ በላይ | |
| ቁ 205 | በጉዳቱ የተጎዳው የሰውነት ክፍል | | |
| | አይን | 1. አዎን 2. የለም | |
| | ጥርስ | 1. አዎን 2. የለም | |
| | እጅ | 1. አዎን 2. የለም | |
| | ጆሮ | 1. አዎን 2. የለም | |
| | ጉልበት | 1. አዎን 2. የለም | |
| | የእግር ጣት | 1. አዎን 2. የለም | |
| | እጅ ጣት | 1. አዎን 2. የለም | |
| | ራስ | 1. አዎን 2. የለም | |
| | የላይኛው ክንድ | 1. አዎን 2. የለም | |
| | የታችኛው ክንድ | 1. አዎን 2. የለም | |
| | ጭን | 1. አዎን 2. የለም | |
| | ከጉልበት በታች ያለው | 1. አዎን 2. የለም | |
| | እግር | 1. አዎን 2. የለም | |
| | ጀርባ | 1. አዎን 2. የለም | |
| | ደረት | 1. አዎን 2. የለም | |
| | በተለያዩ የሰውነት ክፍሎች | 1. አዎን 2. የለም | |
| | ሌላ ካለ ይጠቀስ | ---------- | |
| ቁ 206 | የጉዳቱ አይነት | | |
| | ጭረት | 1. አዎን 2. የለም | |
| | መቆረጥ | 1. አዎን 2. የለም | |
| | ቃጠሎ | 1. አዎን 2. የለም | |
| | መወጋት | 1. አዎን 2. የለም | |
| | ስብራት | 1. አዎን 2. የለም | |
| | ወለምታ | 1. አዎን 2. የለም | |
| | አይን ላይ የደረሰ ጉዳት | 1. አዎን 2. የለም | |
| | ጆሮ ላይ የደረሰ ጉዳት | 1. አዎን 2. የለም | |
| | መታፈን | 1. አዎን 2. የለም | |
| | በኤሌክትሪክ መያዝ | 1. አዎን 2. የለም | |
| | የአካል መጉደል | 1. አዎን 2. የለም | |
| | መመረዝ | 1. አዎን 2. የለም | |
| | ሌላ ካለ ይጠቀስ | ---------- | |
| ቁ 207 | ጉዳቱ በደረሰበት ወቅት ምን ሲሰሩ ነበር | ---------- | |
| ቁ 208 | የጉዳቱ ምክንያት | | |
| | ማሽኖች | 1. አዎን 2. የለም | |
| | በሚወድቁ እቃዎች | 1. አዎን 2. የለም | |
| | በመመታት | 1. አዎን 2. የለም | |
| | ኤሌክትሪክ | 1. አዎን 2. የለም | |
| | በተፈናጣሪ ነገሮች | 1. አዎን 2. የለም | |

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| | የእጅ መሣሪያዎች | 1. አዎን 2. የለም | |
| | እሳት | 1. አዎን 2. የለም | |
| | ትኩስ ነገሮች | 1. አዎን 2. የለም | |
| | መውድቅ | 1. አዎን 2. የለም | |
| | ግጭት | 1. አዎን 2. የለም | |
| | ከባድ እቃዎችን በማንሳት | 1. አዎን 2. የለም | |
| | ሌላ ካለ ይጠቀስ | | |
| ቁ 209 | ጉዳቱ የደረሰበት ቀን | | |
| | ሰኞ | 1. አዎን 2. የለም | |
| | ማክሰኞ | 1. አዎን 2. የለም | |
| | እሮብ | 1. አዎን 2. የለም | |
| | ሐሙስ | 1. አዎን 2. የለም | |
| | አርብ | 1. አዎን 2. የለም | |
| | ቅዳሜ | 1. አዎን 2. የለም | |
| | እሁድ | 1. አዎን 2. የለም | |
| ቁ 210 | ጉዳቱ የደረሰበት ሰዓት | | |
| | ጧት | 1. አዎን 2. የለም | |
| | ከሰዓት | 1. አዎን 2. የለም | |
| | ማታ | 1. አዎን 2. የለም | |
| | ለሊት | 1. አዎን 2. የለም | |
| ቁ 211 | በደረሰብዎት ጉዳት ምክንያት በጤና ተቋም ተኝተው ያውቃሉ? | 1. አዎን 2. የለም | |
| ቁ 212 | 211 አዎን ከሆነ ለስንት ሰዓት | 1. 24 ሰዓትና ከዚያ በታች<br>2. ከ 24 ሰዓት በላይ | |
| ቁ 213 | 211 አዎን ከሆነ የት ነበር የተኙት | | |
| ቁ 214 | ለህክምና ያወጡት ወጪ ም ያህል ነበር? | | |
| ቁ 215 | ከሥራ ጋር በተያያዘ ጉዳቶች ምክንያት ባለፉት አስራ ሁለት ወራት ውስጥ ከሥራ የቀሩበት ቀናት ብዛት | | |

**ክፍል ሦስት፡ የስራ ቦታን በተመለከተ**

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| ቁ301 | በሳምንት ምን ያህል ሰዓት ይሰራሉ? | ---------- | |
| ቁ302 | የሥራ ቦታ ደህንነትን በተመለከተ ቁጥጥር ይደረጋል? | 1. አዎን 2. የለም | |
| ቁ303 | የሥራ ቦታ ደህንነትን በተመለከተ አዲስ ሆነው ሲቀጠሩ ወይም በአዳዲስ አሰራሮች ወይም በሌሎች ለውጦች ምክንያት ሥልጠና ወስደው ያውቃሉ ? | 1. አዎን 2. የለም | |

**ክፍል አራት፡ የሠራተኛውን ባህሪ በተመለከተ**

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| ቁ401 | አልኮል መጠጥ ጠጥተው ያውቃሉ? | 1. አዎን 2. የለም | |
| ቁ402 | የሚጠጡ ከሆነ ስንት ጊዜ ? | 1. በየቀኑ<br>2. ከ 1-3 ቀን በሳምንት<br>3. አልፎ አልፎ | |
| ቁ403 | ጫት ቅመው ያውቃሉ ? | 1. አዎን 2. የለም | |
| ቁ404 | የሚቅሙ ከሆነ ስንት ጊዜ | 1. በየቀኑ<br>2. ከ 1-3 ቀን በሣምንት<br>3. አልፎ አልፎ | |
| ቁ405 | የእንቅልፍ ችግር አለብዎት ? | 1. አዎን 2. የለም | |
| ቁ406 | በሚሰሩት ስራ ደስተኛ ነዎት | 1. አዎን 2. የለም | |
| ቁ407 | በስራ ቦታዎ የጉዳት መከላከያ መሣሪያዎችን ተጠቅመው ያውቃሉ ? | 1. አዎን 2. የለም | የለም ካሉ ወደ ተ.ቁ 409 ይሻገሩ |
| ቁ408 | የሚጠቀሙ ከሆነ ምን አይነት ? | | |
| | ጓንት | 1. አዎን 2. የለም | |
| | የጆሮ መከላከያ | 1. አዎን 2. የለም | |
| | የአፍንጫና አፍ መከላከያ | 1. አዎን 2. የለም | |
| | የጭንቅላት መከላከያ | 1. አዎን 2. የለም | |
| | የሥራ ልብስ | 1. አዎን 2. የለም | |
| | የብየዳ መነጽር /የሴፍቲ መነጽር | 1. አዎን 2. የለም | |
| | የፊት መከላከያ | 1. አዎን 2. የለም | |
| | ቦቲ ጫማ/የሴፍቲ ጫማ | 1. አዎን 2. የለም | |
| | ሌላ ካለ ይጠቀስ | ---------- | |
| ቁ409 | የማይጠቀሙ ከሆነ ምክንያትዎ ምንድን ነው ? | 1. የመከላከያ መሣሪያዎች ባለመኖራቸው<br>2. የደህንነትና ጤንነት ትምህርት ስለማይሰጥ<br>3. ለአጠቃቀም ምቹ ስላልሆነ<br>4. የስራ አፈፃፀምን ስለሚቀንስ<br>5. የደህንነትና የጤና ጠንቅ ሊያስከትል ስለሚችል<br>6. ሌላ ካለ ይጠቀስ---------- | |

## ክፍል አምስት የሰራተኞች ጤንነትን በተመለከተ

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| ቁ501 | ባለፉት 15 ቀናት ውስጥ ከሚከተሉት የጤና ችግሮች የትኛው ኢጋጥሞታል? | | |
| 1 | የዓይን ማቃጠል | 1.አዎን 2. የለም | |
| 2 | የቆዳ ማሳከክ ወይም አለርጂ | 1.አዎን 2. የለም | |
| 3 | ቶሎቶሎ የመድከም ስሜት | 1.አዎን 2. የለም | |
| 4 | አከታ እና ደም የተቀላቀለበት ሳል | 1.አዎን 2. የለም | |
| 5 | ከሶስት ሳምንታት በላይ የቆየ ሳል | 1.አዎን 2. የለም | |
| 6 | ሌላ ካለ ይጠቀስ | | |
| ቁ502 | በደረሰብዎት ችግር ምክንያት ወደ ህክምና ተቋም ሄደው ነበር | 1. አዎን 2. የለም | |
| ቁ503 | ቁ502 አዎን ከሆነ የት ነበር የሄዱት? | | |

**ይህ የጥያቄያችን መጨረሻ ነው። እነዚህን ጥያቄዎች ጊዜ ወስደው በመመለስ ላደረጉልን ትብብር በጣም እናመሰግናለን።**

## Annex 5: Observation checklist

1. Are all work areas adequately illuminated? 1. Yes 2. No. A yes requires if there is no difficulty of reading a paper written by a pencil.
2. Is the work area's ventilation system appropriate for the work being performed? 1. Yes 2. No. A yes requires if there is good ventilation.
3. Is there warning signs or safety rules? 1. Yes 2. No. A yes requires no lack of such arrangement at inspection around.
4. Do the employees use the necessary personal protective equipment? 1. Yes 2. No. A yes requires no lack in use of safety devices seen at inspection around.
5. Does the industry have of health and safety personnel? 1. Yes 2.No. Attainment of yes requires either implementation as result of initiative from health and safety personnel or written programme for action worked out with them.
6. Is there adequate supervision to ensure that employees are following safe machine operating procedures? 1. Yes 2. No
7. Are training needs considered in connection with new employment, equipment or other changes? 1. Yes 2.No. A yes requires an example of training given as a consequence of a change.
8. Does the industry have first aid equipment? 1. Yes 2.No. A yes requires that first –aid equipment be available in the production area and that content be as prescribed
9. When lunches are eaten on the premises, are they eaten in areas where there is no exposure to toxic materials or other health hazards? 1. Yes 2. No
10. Are hazardous substances identified which may cause harm by inhalation, ingestion, skin absorption or contact? 1. Yes 2. No

## Annex 6: Pictures of Mugher cement factory

**Assessment of occupational injury and associated factors among Mugher cement factory workers, Mugher, Ethiopia.**

By: Mulu Gebretsadik (B.Sc)

**Approved by the examining board** **Signature**

Chair man, Department of Graduating Committee

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