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# Prevalence of Occupational Injuries and Associated Factors among Small-Scale Industries Workers in Arba Minch Town, Southern Ethiopia, 2016

**Tanga AT[1*], Tessema F[2] and Jilo GK[1]**

[1]Department of Public Health, College Of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Epidemiology, Institute of health Jimma University, Jimma, Ethiopia

## Abstract

**Background**: Globally, poor occupational health and safety results in 271 million work related injuries, 2 million work-related deaths, and 160 million work-related diseases per year. The risk of having work-related injury is 10 to 20 times higher in developing countries including Ethiopia.

In Ethiopia, according to labor proclamation No.377/2003, the Ministry of Labor and Social Affairs of Ethiopia is the organ charged with the responsibility to inspect labor administration, labor conditions, occupational safety and health. However, information regarding the present status of occupational injuries among small scale industries is lacking.

**Objective**: To assess prevalence of occupational injury and factors associated with it among small scale industries workers in Arba Minch town, 2016.

Methods Facility based cross sectional study was conducted from March to April, 2016. 412 small scale industries workers were include using stratified random sampling method. Data were collected by face to face interview and supplemented by observational study. Bivariate logistic regression was used to identify candidate variables and Multivariable logistic regression was employed to identify independent predictors of occupational injuries and to control confounders. In multivariable analysis p value of less than 0.05 was used to declare significance.

**Results**: The annual and two weeks prevalence of occupational injuries were 808 and 206 per 1000 exposed workers respectively. Statistically significant independent predictors of occupational injuries were numbers of workers in the industries (AOR: 2.3, 95% CI: 1.24, 4.35), health and safety training (AOR: 6.4, 95% CI: 2.89, 14.15), alcohol drinking (AOR: 2.3, 95% CI: 1.19, 4.49), khat chewing (AOR: 2.3, 95% CI: 1.13, 4.83), and none-use of personal protective equipment (AOR: 2.74, 95% CI: 1.47, 5.10).

**Conclusion and Recommendation:** occupational injuries among small scale industries workers in Arbaminch town were high compared to other studies. Age of the workers, numbers of workers in industries, health and safety training, alcohol drinking, khat chewing, and non-use of personal protective equipment were significant and independent predictors for occupational injury. Some of significant factors assessed were assumed to be preventable with provisions of safety equipment and behavioral change communications programs on life style factors.

**Keywords:** Occupational injury; Small scale industries workers; Arba minch town

## Introduction

An occupational injury is any physical injury sustained on a worker in connection with the performance of his or her work in the industry [1]. The costs of occupational injuries and diseases have long been cause for concern at individual, national and international levels [2]. Globally, 2/3 of deaths from work-related diseases were 35% from cardiovascular and circulatory diseases, 29% from cancer, followed by occupational injuries 15% and infectious diseases 10% [3]. According to International Labor Organization (ILO) report, annually over 2.3 million fatal and 313 million non-fatal occupational injuries were caused by occupational accidents and work-related diseases [4].

In addition to this, fatal and non-fatal occupational injuries resulted in about 10.5 million Disability Adjusted Life Years (DALY); that is, about 3.5 years of healthy life are lost per 1,000 workers every year. Occupational risk factors are responsible for 8.8% of the global burden of mortality due to unintentional injuries and 8.1% of DALYS due to this outcome [5].

Globally, poor occupational health and safety results in 271 million work related injuries, 2 million work-related deaths, and 160 million work-related diseases per year. In developing countries including Ethiopia, the risk of having work-related injury is 10 to 20 times higher than that of developed counties [6]. Work-related injuries result from a complex interplay of multiple risk factors. The common factors in the work place were psychosocial factors, ergonomic factors, socio-demographic characteristic of workers, and environmental and social conditions [7-14]. Furthermore, different studies showed that, working at an early age [15], lack of formal education (compared to literate) [16-21], low monthly salary [9,14], smoking status [22-26], sleeping problems [25], alcohol consumption [23], extended work hours (working for more than 48 hours/week) [26], absence of health and safety training [6,8,17,25,27-29], being a metal and wood worker [24], job experience (duration) [23], not using personal protective equipment (PPEs) [19], and workers' job dissatisfaction [29] were contributing

***Corresponding author:** Abayneh Tunje Tanga, Department of Public Health, College Of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia, Tel: +251920011972; E-mail: abaynehtun@gmail.com

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factors for occupational injury. Whereas, in some studies respondent's sex, nighttime shift work [18] and, not getting occupational safety and health training/education, alcohol consumption, job dissatisfaction and not using personal protective equipment (PPEs) in the last 12 months were not significantly associated factors with occupational injury [9,16,30,31].

Underreporting is a major challenge typically associated with occupational accidents and diseases statistics. This causes fewer resources to be allocated to preventive work, which in turn has a negative impact on safety and welfare of the workers, the productivity of the industry and on the availability of the workforce, especially in countries with a non-favorable demographic situation [3].

In Ethiopia, the epidemiology of work related injuries is lacking due to scarce national and local data. According to labor proclamation No.377/2003, the Ministry of Labor and Social Affairs of Ethiopia is the organ charged with the responsibility to inspect labor administration, labor conditions, occupational safety and health [31].

However, information regarding the present status on the prevalence and factors affecting occupational injury is lacking for small scale industries. The main aim of this study is, therefore, to assess the prevalence of occupational injury and associated factors among small scale industry workers in Arba Minch Town, southern Ethiopia.

## Material and Methods

### Study setting

Data were collected from March to April, 2016 in Arba minch town, south west Ethiopia. Arba Minch town is located 450 Km away from Addis Ababa and 275 Km away from Hawassa. The town is bordered by wolayta zone in north; segen area people's zone in south, omo zone in south west and in east by sidama and gedio zones. The town is one of the lowland areas in the zone with an annual temperature estimated average minimum of 25°C and maximum of 30°C that can reach occasionally 35°C. The town has four sub cities and 11 kebeles. There were 345 small scale manufacturing and construction industries (SSI) and one large scale textile manufacturing industry. In the SSI, there were 1285 male and 628 female workers.

### Study design

Facility based cross sectional study was employed to assess prevalence and factors associated with occupational injury among small scale industries workers in Arba Minch town.

### Population

- Source population: All employees working in small scale industries in Arba Minch town.
- Study population: All selected small scale industry workers who fulfill the selection criteria.
- Sampling unit: Individuals who fulfill the criteria from selected small-scale industries.
- Inclusion criteria: Workers who were directly engaged in production process in the selected industries.
- Exclusion criteria: Administrative staff by virtue of their occupation they were not exposed to injuries.

### Sample size determination

Sample size was determined using both single and double population proportion formula. For the single population proportion sample size was calculated using an assumption of 95% confidence level, 5% margin of error and 58.2% occupational injury prevalence from the study done at Mekele town [17]. Sample size for the double population proportion was determined using the assumptions on EpiInfo version 6; accordingly, the sample size for double population proportion was 392 small scale industries workers. From the both sample size the maximum sample size, 392 was used by considering 5% non-response rate. The final sample size was 412.

### Sampling procedures

First small scale industries were stratified in to four strata based on the type of the industry and the product it produce. The four strata consisted of 80 Metal-works, 92 wood-works, 52 mechanical works, and 121 concrete-block manufacturing SSIs. Then, based on proportional allocation to size of the numbers of SSIs, 172 (50%) SSIs were selected from all strata by using simple random sampling (SRS) method. The calculated sample size was allocated to each SSI using proportional allocations to size. Finally, 412 workers were taken using simple random sampling based on size of the number of workers employed in each SSI (taking 2 respondents from SSIs employing <5 workers and 4 respondents from SSI employing 6-9 workers) getting 90 welding workers, 112 wood workers, 56 from garage, and 154 block manufacturing workers recruited for the study.

### Data collection procedures

Data were collected using a pre-tested structured questionnaire through face to face interview and observational checklist. Variables included and measured in this study were, sex, age, educational level, monthly salary, religion, job category, service duration, marital status, hours worked per week, workplace supervision, health and safety training, alcohol intake, chat chewing, job satisfaction, knowledge of injury & hazards, sleep disturbance, days of the week of occurrence, time of occurrence of injury, body part affected, and use of personal protective equipment.

Data on socio-demographic factors, work environment factors and behavioral factors were collected by face to face interview and observation method.

Diploma nurses and public health officers who were familiar with the study area and experienced in data collection collected the data. Before the actual data collection pretest was done on 20 small scale industries workers in Chencha woreda. Finally, data collection tool was refined based on the findings from the pre-testing. Every day, all collected data was reviewed and checked for completeness and consistency by the supervisors.

### Data quality management

After attending two days training on the aim of the study, content, objective, data collection and interviewing technique and, issue on confidentiality. Practical exercise was made through peer interviewer. During the data collection, regular supportive supervision and discussion with data collectors and supervisors was done. During data collection, each supervisor was supervised two data collectors. Every day, the supervisors were checked all the filled questionnaires for completion and clarity. The time of data collection through interview was done morning before beginning of the work, afternoon immediately after lunch before beginning of the work, and observation was conducted at the time of performing their work.

### Data processing and analysis

Data were checked and edited for completeness and consistency, and partially coded manually. Data were entered into Epi-Data version 3.1 and exported to SPSS version 20 for statistical analysis. Descriptive statistics were computed to explore frequency distribution, central tendency, variability (dispersion) and distribution of outcome and explanatory variables. Bivariate logistic regression was done to identify candidate variables (p value=0.25) for multivariable logistic regression analysis. To identify the independent predictors of occupational injuries, multivariable logistic regression model was fitted using backward stepwise method. In multivariable logistic regression, Adjusted Odds Ratio with its 95% Confidence Interval was computed for variables maintained in the final model and statistical significance was declared by the confidence interval.

## Ethical Consideration

Ethical clearance was obtained from Jimma University, Institutional Review Board (IRB). Permission letter to conduct the study was obtained from Arbaminch town municipality office. Prior to the interview owners of the SSIs were informed and communicated about the purpose of the study and permission was sought from them for data collection activities. Data collection was then conducted after explaining the aim of the study and its possible benefits to the study participants. Verbal and written consents were obtained after explaining their full right to refuse, withdraw any time, without any explaining or giving reasons.

The interviewers discussed the issue of confidentiality and obtained verbal consent before the actual interviews were launched. For this purpose, a one page consent form was attached as cover page to each questionnaire. In addition, any identification information including the name of the participants was not written in the questionnaire. Injured workers were linked to the nearest health facility where they can get service.

### Operational definitions and measurement

### Occupational injury

An injury sustained on worker in connection with the performance of his or her work in industry within one year. It includes all minor injuries such as scratches, cuts and severe injury (work-related disease, disabilities and death) that causes hospitalization, working days lost as reported by the worker.

### Personal protective equipment (PPE)

Cloth or equipment worn by employees designed to protect parts of the body from hazards generated from work or working environment.

### Small scale industry

Any industry that uses power driven machine and employ less than 10 workers [5].

### Work place supervision

Regular supervisions done by health and safety responsible bodies in the specific industry.

## Result

### Socio-demographic characteristics

A total of 412 workers were interviewed, with a response rate of 100%. Majority of study participants, 405 (98.3%), were male. Three hundred eighty four (93.2%) of the respondents were in the age group 18-29 and their median age was 28 years with range of (18-50 years). One hundred seventy six (42.7%) of study participants were orthodox Christian religion followers. Regarding educational status, 161(39.1%) of the respondents have attended primary school and 114 (27.7%) were graduated from technical school and above. Regarding marital status of the respondents, majority (67%) was currently not married. Regarding about employment pattern, out of 412 study participants, 208 (50.5%) were temporary employed, 89 (21.6%) were permanent employed and 115 (27.9%) were from micro and small scale enterprise. The median monthly income of respondents was 2000 birr with range of (680-4000). Workers job category showed that 154 (37%) were block manufacturing workers, 90 (21.8%) were welding, 112 (27.2%) were wood workers and, 56 (13.6%) were Mechanical garage worker. Nearly half, (48.5%) of the respondents had working experience of one to two years and 87 (21.1%) of the respondents had working experience of five years or above (Table 1).

### Occupational injury characteristics

A total of 333 respondents were reported occupational injuries during the last 12 months, giving an overall annual prevalence rate of 808 per 1000 exposed workers per years. Two hundred and fifty seven (77.2%) of the injured respondents sustained more than a one injury. Moreover, a total of 85 (20.6%) respondents had experienced occupational injuries in two weeks period prior to data collection. Of this cases 79 (92.9%) reported that they had sustained occupational injury once. According to their report hands were the body part with the highest frequency of occupational injuries 245 (59.5%), respiratory difficulty 129 (31.3%), skin burn & irritation 145 (35.2%), eye 147 (35.7%), finger 128 (31.1%) and low back pain 74 (18%) were the predominantly affected parts of the body (Table 2).

In this study, the causes for occupational injury were highly varied. One hundred twenty one (29.4%) caused by hand tools, 107 (26%) by splinting or splashing objects, 77 (18.7%) were by hot substance, machinery 94 (22.8%), and electricity related 63 (15.3%).

### Work place and behavioral characteristics

One-fourths, 25%, of the employees was worked for more than 48 hours per week. Majority (68.7%) of respondents did not have information about occupational injuries and hazards. Out of 412 respondents only 48 (11.7%) had health and safety training in connection with new employment, new equipment's or other changes. Majority of the respondents were not taken any health and safety training. Four hundred four (98.1%) of the respondents reported that their workplaces were not supervised regularly.

One hundred one (24.5%) of the respondents reported that they had over all knowledge on occupational injury and hazards. Majority (64.4%) of the respondents were satisfied by their current job. One hundred seven (26%) of the respondents were used personal protective equipment. Out of personal protective equipment users, 72 (40.4%) were used always. Overalls/aprons was used by 131 (31.8%) respondents followed by sun glass 94 (22.8%). All of the study participants were interviewed for nonuse of protective equipment and reported the most frequent reasons were lack personal protective equipment 248 (60.2%), and not comfortable to use 112 (27.2%). Regarding alcohol consumption and khat chewing, 160 (38.8%) and 142 (34.5%) of the workers were consumed alcohol and chewed khat respectively (Tables 3 and 4).

| Variables | Category | Number N(%) | Injured N(%) | Not injured N(%) | Crude odds ratio (95% CI) |
|---|---|---|---|---|---|
| Sex | male | 405(98.3) | 328(81) | 77(19) | 0.587(0.112, 3.082) |
| | female | 7(1.7) | 5(71.4) | 2(28.6) | 1 |
| Age | 18-24 | 207(50.2) | 173(83.6) | 34(16.4) | 5.371(2.557, 11.281) |
| | 25-34 | 168(40.8) | 142(84.5) | 26(15.5) | 5.765(2.674,12.431) |
| | 35-50 | 37(9) | 18(48.6) | 19(51.4) | 1 |
| Religion | Orthodox | 176(42.7) | 137(77.8) | 39(22.2) | 1 |
| | Protestant | 146(35.4) | 126(86.3) | 20(13.7) | 1.793(0.993, 3.238) |
| | Muslim | 68(16.5) | 55(80.9) | 13(19.1) | 1.204(0.597, 2.429) |
| | Catholic | 22(5.3) | 15(68.2) | 7(31.8) | 0.610 (0.232, 1.601) |
| Educational status | Illiterate | 32(7.8) | 8(25) | 0.878 | .931 (0.375, 2.311) |
| | <=grade 8 | 161(39.1) | 26(16.1) | 0.12 | 1.611 (0.882, 2.943) |
| | Grade(9-12) | 105(25.5) | 18(17.1) | 0.233 | 1.500(0.770, 2.921) |
| | Certificate & above | 114(27.7) | 27(23.7) | 0 | 1 |
| Marital status | Not married | 136(33) | 107(78.7) | 29(21.3) | 0.816 (0.489, 1.362) |
| | Married | 276(67) | 226(81.9) | 50(18.1) | - |
| Employment pattern | Temporary | 208(50.5) | 171(82.2) | 37(17.8) | 1 |
| | Permanent | 89(21.6) | 68(76.4) | 21(23.6) | 0.701(0.383, 1.283) |
| | Small scale | 115(27.9) | 94(81.7) | 21(18.3) | 0.969(0.536, 1.750) |
| Job category | Mechanic/operator | 56(13.6) | 43(76.8) | 13(23.2) | 1 |
| | Concrete manufacturing | 154(37.4) | 112(73.4) | 41(26.6) | 0.833(.407, 1.705) |
| | Welder | 90(21.8) | 77(85.6) | 13(14.4) | 1.791 (0.762, 4.209) |
| | Wood worker | 112(27.2) | 100(89.3) | 12(10.7) | 2.519(1.064, 5.967) |
| Service duration in year | 1-2 | 201(48.8) | 158(79) | 42(21) | 1.713(0.928, 3.161) |
| | 03-Apr | 124(30.1) | 107(86.3) | 17(13.7) | 0.974(0.529, 1.793) |
| | 5+ | 87(21.1) | 68(21.8) | 19(78.2) | 1 |
| Monthly salary in birr | ≤ 2000 | 229(56.6) | 191(83.4) | 38(16.6) | 0.68 (0.42, 1.13) |
| | >2000 | 183(44.4) | 142(77.6) | 41(22.4) | 1 |
| Ethnicity | Gamo | 253(57) | 185(78.7) | 50(21.3) | 0.529(0.064, 4.397) |
| | Gofa | 59(14.3) | 53(89.8) | 6(10.2) | 1.262(0.132, 12.081) |
| | Wolayta | 65(15.8) | 56(86.2) | 9(13.8) | 0.889(0.097, 8.106) |
| | Konso | 20(4.9) | 14(70) | 6(30) | 0.333(0.033, 3.335) |
| | Amahara | 25(6.1) | 18(72) | 7(28) | 0.367(0.038, 3.555) |
| | others | 8(1.9) | 7(87.5) | 1(12.5) | 1 |
| Number of worker/industry | 1-5 worker | 311(75.5) | 260(83.6) | 51(16.4) | 1.955 (1.152, 3.319) |
| | 6-10 worker | 101(24.5) | 73(72.3) | 28(27.7) | - |
| N=412 | | | | | |

**Table 1:** Socio demographic characteristics of the respondents in the Arba Minch town among small scale industry workers, 2016.

| Body part affected | Number (%) |
|---|---|
| Hand | 245(59.5) |
| Eye | 147(35.7) |
| Skin burn/irritation | 145(35.2) |
| Respiratory difficulty | 129(31.3) |
| Finger | 128(31.1) |
| Law back pain | 74(18) |
| Too | 70(17) |
| Ear | 46(11.2) |
| Head | 34(8.3) |
| Upper arm | 25(6.1) |
| Toe | 14(3.4) |
| Lower arm | 10(2.4) |
| Hip joint | 10(2.4) |
| Knee | 8(1.9) |
| Upper leg | 7(1.7) |

**Table 2:** Distribution of occupational injury in the last 12 months by parts of body affected among respondents in small scale industry, Arba Minch Town, 2016.

| Work environment variables | Category | Number (%) | Injured (%) | Not injured (%) | Crude odds ratio (95% CI) |
|---|---|---|---|---|---|
| Working hour in a week | <=48 | 309(75) | 246(79.6) | 63(20.4) | - |
| | >48 | 103(25) | 87(84.5) | 16(15.5) | 1.393(0.764, 2.539) |
| Workplace Supervision | Yes | 8(1.9) | 6(75) | 2(25) | - |
| | No | 404(98.1) | 327(80.9) | 77(19.1) | 0.706(0.140, 3.568) |
| Safety training | Yes | 48(11.7) | 21(43.8) | 27(56.2) | - |
| | No | 364(88.3) | 312(85.7) | 52(14.3) | 0.130(0.068, 0.246 ) |
| Have information about occupational hazards, injury. | Yes | 129(31.3) | 92(71.3) | 37(28.7) | - |
| | No | 283(68.7) | 241(85.2) | 42(14.8) | 0.433 (0.262,0.717) |

**Table 3:** Work place characteristics of respondents in small scale industry at Arba Minch, 2016.

| Variables | Category | Number (%) | Injured (%) | Not injured (%) | Crude odds ratio (95% CI) |
|---|---|---|---|---|---|
| Alcohol | Yes | 160(38.8) | 139(86.9) | 21(13.1) | 1.979(1.148, 3.411) |
| | No | 252(61.2) | 194(77) | 58(23) | |
| kchat | Yes | 142(34.5) | 120(84.5) | 22(15.5) | 1.460 (.850, 2.506) |
| | No | 270(65.5) | 213(78.9) | 57(21.1) | |
| Sleeping problem | Yes | 28(6.8) | 16(51.1) | 12(42.9) | 0.282(0.127, 0.623) |
| | No | 384(93.2) | 317(82.6) | 67(17.4) | |
| Cigarette smoking | Yes | 37(9) | 19(51.4) | 18(48.6) | 0.205(0.102, 0.413) |
| | No | 375(91) | 314(83.7) | 61(16.3) | |
| Job satisfaction | No | 173(42) | 129(74.6) | 44(25.4) | 0.503(0.306, 0.826) |
| | Yes | 239(58) | 204(85.4) | 35(14.6) | |
| Use of PPE | Yes | 107(26) | 68(63.6) | 39(20.5) | - |
| | No | 305(74) | 265(86.9) | 40(13.1) | 0.263(0.157, 0.441) |

**Table 4:** Behavioral characteristics of workers in small scale industry at Arba Minch, 2016.

| Variables | | Occupational injury | | COR (95%CI) | AOR (95%) |
|---|---|---|---|---|---|
| | | Yes (%) | No (%) | | |
| **Age** | 18-24 | 173(83.6) | 34(16.4) | 5.371(2.557, 11.281) | 3.600(1.448,8.952)* |
| | 25-34 | 142(84.5) | 26(15.5) | 5.765(2.674, 12.431) | 3.894(1.562,9.711)* |
| | 35-50 | 18(48.6) | 19(51.4) | 1.00 | 1.00 |
| **Educational status** | | | | | |
| Illiterate | | 24(75) | 8(25) | 0.931 (0.375, 2.311) | 0.538(0.161, 1.803) |
| <=grade 8 | | 135(83.9) | 26(16.1) | 1.611 (0.882, 2.943) | 0.871(0.353, 2.152) |
| Grade(9-12) | | 87(82.9) | 18(17.1) | 1.500(0.770, 2.921) | 0.858(0.350, 2.107) |
| Certificate and above | | 87(76.3) | 27(23.7) | 1.00 | 1.00 |
| **Employment pattern** | | | | | |
| Temporary | | 171(82.2) | 37(17.8) | 1.00 | |
| Permanent | | 68(76.4) | 21(23.6) | 0.701(0.383, 1.283) | 1.737(0.796, 3.792) |
| Micro and small scale enterprise | | 94(81.7) | 21(18.3) | 0.969(0.536, 1.750) | 1.566(0.635, 3.858) |
| **Service duration in year** | | | | | |
| 1-2 | | 158(79) | 42(21) | 1.713(0.928, 3.161) | 0.727(0.340, 1.554) |
| 3-4 | | 107(86.3) | 17(13.7) | 0.974(0.529, 1.793) | 1.142(0.485, 2.686) |
| 5+ | | 68(21.8) | 19(78.2) | 1.00 | |
| **Number of worker per industry** | | | | | |
| <=5 worker | | 260(83.6) | 51(16.4) | 1.955(1.152, 3.319) | 2.327(1.245, 4.352)* |
| 6-10 worker | | 73(72.3) | 28(27.7) | 1.00 | |
| **Workplace Supervision** | | | | | |
| Yes | | 6(75) | 2(25) | 0.706(0.140, 3.568) | 0.387(0.059, 2.537) |
| No | | 327(80.9) | 77(19.1) | | |
| **Health & Safety training** | | | | | |
| Yes | | 21(43.8) | 27(56.2) | | |
| No | | 312(85.7) | 52(14.3) | 0.130(0.068, 0.246) | 6.398(2.891,14.159)* |
| **Alcohol use** | | | | | |
| Yes | | 139(86.9) | 21(13.1) | 1.979(1.418, 3.411) | 2.313(1.191, 4.492)* |
| No | | 194(77) | 58(23) | 0.00 | 1.00 |
| **Smoke cigarette** | | | | | |
| Yes | | 19(51.4) | 18(48.6) | 0.205(0.102, 0.413) | 0.284(0.117, 0.688)* |
| No | | 314(83.7) | 61(16.3) | 0.00 | 1.00 |
| **kchat** | | | | | |
| Yes | | 120(84.5) | 22(15.5) | 1.460(0.850, 2.506) | 2.346(1.138, 4.836)* |
| No | | 213(78.9) | 57(21.1) | | 1.00 |
| **Sleeping disorder** | | | | | |
| Yes | | 16(51.1) | 12(42.9) | 0.282(0.127, 0.623) | 0.488(0.167, 1.426) |
| No | | 317(82.6) | 67(17.4) | 0.00 | 1.00 |
| **Job satisfaction** | | | | | |
| Yes | | 129(74.6) | 44(25.4) | | 1.00 |
| No | | 204(85.4) | 35(14.6) | 0.503(0.306, 0.826) | 0.498(0.275, 0.903)* |
| **Use of PPE** | | | | | |
| Yes | | 65(74.4) | 27(17.6) | | 1.00 |
| No | | 268(83.8) | 52(16.2) | 0.263(0.157, 0.441) | 2.740(1.472, 5.100)* |
| **Knowledge** | | | | | |
| Yes | | 75(74.5) | 26(25.7) | 0.00 | 1.00 |
| No | | 258(83) | 53(17) | 0.593(.347, 1.012) | 1.093(0.522, 2.289) |
| *Significant from the multivariable logistic regression (Backward LR method), COR=Crud odds ratio, AOR=Adjusted odds ratio. N=412 | | | | | |

**Table 5:** Multivariable logistic regression analysis of the relative effect of socio demographic, work environment and behavioural factors on the prevalence of occupational injuries in small scale industry, Arba Minch, 2016.

### Multivariable logistic regressions

Multivariable logistic regression was fitted in order to identify the independent predictors of occupational injury. Accordingly, age of workers, number of workers in each industry, training on health and safety measures, drinking of alcohol, khat chewing, and non-use of personal protective equipment were independent predictors of occupational injury. The odds of having occupational injury among workers who did not get health and safety training were 6.3 times higher than those who trained AOR: 6.3. The odds of having occupational injuries among workers who did not use personal protective equipment were 2.7 times higher than those who use it AOR: 2.7. The odds of having occupational injuries in workers who drunken alcohols were 2.3 times higher when compared with non-drinker AOR: 2.3 (Table 5).

## Discussion

This facility-based cross-sectional study showed that one-year prevalence of occupational injury among the SSI workers was 80.8%. The two-week period incidence rate, on the other hand, was 20.6%. This finding was relatively higher than the studies conducted in Yashio city, Japan 60.9% [8], in Mekelle city, Ethiopia 58.2% [16], in north Gondar, Ethiopia 33.5% [14]. The high prevalence of occupational injury reported in this study could possibly be due to inclusion of minor injuries such as scratches, cuts and splinting objectives, especially in welding and wood working sectors. In addition to this, it could probably be due to unfamiliarity with work processes and exposures, lack of safety training and knowledge levels; and non-availability and non-practice of Safety measures [17,32-45].

Respiratory difficulty and finger injury were consistent with finding from Small-Scale Welding Industries in Delhi 31.7%, afar regional state 32% whereas, eye injury was inconsistent with study findings at similar industry in Uganda 6%, in north Nigeria 17%, in Delhi 26.8 and in Tendaho Agricultural Development S.C, Afar Regional State 12.2% [7,19,29,37,45]. On the other hand eye injury in this study was lower compared with the study conducted among welders in Benin City, Nigeria 75.7%. In their studies the reason for high proportion of eye injury was that 80% of workers use protective devices improperly and these devices may have been of sub- standard quality and so lacked protective properties [46,47]. The difference in eye injury findings might be work environment/organizational factor and behavioral factors. In Delhi 91.8% workers had precaution for eyes, namely goggles or hand held shield, in Uganda 78% of workers were trained in metal work through apprenticeship, and in Nigeria, 91.5% of welders received their training through hands-on apprenticeship training and the rest 28.5% attended a formal welding school. But in this study, the observation of working environment of the 172 industries surveyed revealed that only 3 (1.7%) industries had health and safety instructions/precautions, 77.7% of workers were lack personal protective equipment to use and even educational back ground affects to read and understand safety precautions on the materials/tools.

The types of injuries reported were abrasions 163 (39.6%), this is consistent with the study in Bahir Dar Town, north west Ethiopia 42.6% [48], but cuts 92 (22.3%), burn 87 (21.1%), & eye injury 83 (20.1%) were inconsistently lower when compared with findings in India 60% [46], in Uganda 73% [19]. The most frequent causes of occupational injury were hand tools 121 (29.4%), splinters 107 (26%), Machinery 94 (22.8%) and Acid and hot substances 77 (18.7%). This could be due to unguarded machine parts, defective tools and non-use of personal protective equipment by workers. The finding of hand tool was somewhat consistent with findings done in Egypt 23.8% [20]. According to this study the most common time of injury was in the afternoon 122 (29.6%) followed by morning 46 (11.2%). It was probably due to weather condition since the study area/setup was lowland and in the afternoon the weather condition humid/warm air. So that, this might make them easily tired and stressed. The other possible reason was workers who were addicted for substance mainly took those substances in the afternoon. But the working condition was not suitable so that majority were non-moody condition.

The present study showed that, from the socio-demographic variables computed in the multivariable analysis number of workers in specific industry, and their age were found to be statistically significant. The odds of having occupational injury in workers who were working in the industry which contains five workers and below was more than 2.3 times higher risk than industry with six and above worker AOR=2.3. The possible reason behind this may, due to work load. For example during study survey, single worker engaged in mechanical workshop (garage) was performing mechanical repair, battery charging, welding, and painting sections. This finding was similarly observed in other part of Ethiopia, Eritrea, and Nigeria [15]. On the other hand the age of the workers had statistically significant association with occupational injury. The odds of having occupational injury in age group 18-24 were 3.6 times AOR: 3.6 and age group 25-35 were 4.3 times AOR: 3.8 were more likely to experience the occupational injury than age group 35-50. This finding was consistently found in south India [23] and north Gondar [15]. This could be due to, less work experience, easily exposed for life style factors associated with occupational injury.

The occurrence of occupational injury was significantly associated to health and safety training in the work place. In this study, majority of the workers, 364 (88.3%), did not take health and safety training. The respondents who did not get health and safety training were more than 6.3 times more likely to sustain occupational injury compared with respondents who trained AOR=6.3. This finding was similarly observed in Affar regional state 97.4% [29], but inconsistent with findings of Nigeria 91.5% [37] workers were trained. This difference between two findings was, in Nigeria 77.9% of workers were aware that their jobs were hazardous to their health and so that, they exercised the safety culture, whereas in this study there was no occupational health and safety services in the industries. From behavioral factors this study highlighted the fact that, alcohol use, smoking cigarette, khat chewing, job satisfaction, and personal protective devices (PPE) were found to be statistically significantly associated. Non-smokers were 71.6% less likely to get occupational injury than Smokers AOR: 0.284. This finding is consistent with findings in western India [46] but inconsistent with findings in Japan and south India [23]. The difference between these findings were, smokers use cigarette to avoid sleepiness and to be alert during work but work place smoking restriction may leads already addicted smokers to get injury. Regarding satisfaction levels of workers, workers who had current job satisfaction were 50.2% less likely to report occupational injury than who did not satisfied AOR: 0.498. This finding is consistent with findings in western India, north Gondar and [14,46] but inconsistent with findings in Tendaho, Afar regional state [29]. The result of this study revealed that risk of work-related injury decreased with job satisfaction. The odds of having occupational injuries in workers who drunken alcohols were 2.3 times higher when compared with non-drinker AOR: 2.313. This is consistent with the study in south India [23], in yashio city, Japan [4]. This could be possibly due to alcohols intake may impair workers concentration and increase the work speed unsafely.

The odds of occupational injuries among employees who chewed

khat were 2.3 times higher compared to non-chewer AOR: 2.3. This finding is consistent with findings in Addis Ababa, Ethiopia [49,50]. This might be due to the fact that substances, like khat are likely to cause a change in the behavior of the workers and impair workers concentration and performance. The odds of having occupational injuries among workers who did not use personal protective equipment were 2.7 times higher than those who use it AOR: 2.7. This may be due to poor knowledge of workers on adverse effects of occupational hazards (physical hazards like noise from machines, radiation from welding process, chemical hazards like dust from wood work, cement dust, fumes, gases and vapors from garages), they did not use protective. The other possible reason might be due to personal protective equipment was not always available, accessible because of the cost implications, and uncomfortable with weather conditions. This finding is consistent with others findings [8,14,17,19,20,35,37,45-47,50].

In this study a worker with sleeping disturbance problem while working was not statistically significantly associated AOR: 0.48. This finding was similarly observed in in Mit-Ghamr City, Egypt [20] but inconsistent with the study finding in north Gondar, Ethiopia [14], and Japan [8]. This difference might be due to taking of alerting substances.

The occurrences of occupational injury were not statistically significantly associated to service duration in the same job 1-2 year AOR: 727 and 3-4 years AOR: 1.14. This finding is inconsistent with finding in Mekele [16], in north Gondar [14]. The contrast between the present results and others study's findings might be due to knowledge of machines and tools in use and their defects, and none-use of personal protective equipment was seen in both new and experienced workers.

## Conclusion

Injury among small scale is very high with overall annual prevalence rate of 808 per 1000 exposed workers per years. Majority (77.2%) of the injured respondents sustained more than one injury. Age of the workers, number of workers in industry, health and safety training, alcohol drinking, kchat chewing, and non-use of personal protective equipment were significant and independent predictors for occupational injury.

## Limitations of the Study

The level of noise, dust particles and other chemicals were not objectively measured.

## Recommendations

In view of the above finding, and conclusions it is recommended that; the owners/unions of small scale industries need to focus establishing active and functional occupational health and safety committee, creating conducive &safer work environment, avail first aid services, provide qualified individual protection devices and other safety materials timely, put fire extinguishers and ventilations.

Small scale industry coordination office need to Provide/facilitate awareness creation health and safety training for workers, beginning with the first day of their employment on type of occupational injury, causes for injury, human health and economic impact of injury and prevention/reduction methods. Organize for the availability and accessibility of qualified individual protection devices and other safety materials.

Establish regular supervision program for availability of qualified individual protection devices and their appropriate use, and working conditions.

Organize injury recording and reporting system in all industry. Establish active and functional health and safety committee at each industry and conduct regular review meeting on occupational health & safety programs.

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