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# Self-reported Work-related Injury among Building Construction Workers in Arba Minch town, Southern Ethiopia

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## Abstract

**Introduction:** Work-related injury is the main factor that contributes to disabilities and life threatening situations worldwide. Yet, there is a shortage of studies identifying the prevalence and its related risk factors in sub-Saharan African countries including Ethiopia, especially in the construction sector. This study assesses the prevalence of work-related injury and its associated risk factors among building construction workers in Arba Minch town, Southern Ethiopia.

**Methods:** An institution-based cross-sectional study was conducted in Arba Minch town among building construction workers from March 30 to April 20, 2020. Simple random sampling technique was used to select the study subjects. The sample size was 459. A pretested and structured questionnaire and observational checklist was used to collect data. Multivariable analysis was performed to identify independent risk factors that contribute to occurrence of work-related injury.

**Results:** The overall prevalence of work-related injury among building construction workers was 43.02% (95% CI: (38.47%, 47.69%)) in the past one year. Work experience (AOR; 2.05, 95% CI: (1.19, 3.55)), sleep quality (AOR; 2.80, 95% CI: (1.67, 4.69)), safety practice (AOR; 1.70, 95% CI: (1.09, 2.63)), work hour (AOR; 1.86, 95% CI: (1.19, 2.92)), and workplace Supervision (AOR; 2.11, 95% CI: (1.29, 3.43)) were found to be significantly associated with work-related injury.

**Conclusion:** The prevalence of work-related injury among building construction workers in Arba Minch town is higher compared to other studies. Factors like work experience, sleep quality, safety practice, work hour, and workplace supervision had influence on the occurrence of work-related injury. Therefore, promoting occupational safety practice (including safe working environment and use of personal protective equipment), increasing workplace supervision, providing safety and health training for less experienced workers, respecting employees' working hour, and improving workers sleep quality are recommended to prevent work-related injuries.

**Keywords:** Occupational injury; Construction sector; Occupational safety and health; Safety practice

## Introduction

Work-related injury is any personal injury or disease resulting from an occupational accident. It is one of the important factors that contribute to disability and life threatening situations in developed and developing countries. In 2017, the International Labor Organization estimates that 2.78 million people around the world die due to work-related accidents or diseases every year. Globally, non-fatal occupational accident was estimated to be 374 million in a year. Every single day, more than 7,500 people deaths occur in work places, and Africa had the highest fatality rate of labor force with 16.6 per 100,000 persons. Some of the consequences of work- related injuries are loss of work time, loss of productivity, disabilities, and death [1].

The construction sector has a disproportionately high rate of recorded accidents than any other sectors. It is accountable for most of work-related injuries and deaths worldwide. About 13 billion dollar is lost annually by fatal and nonfatal construction injuries. More than 1.36 billion dollars lost annually for medical expenses of nonfatal injuries alone. Moreover, workers in construction sector are subject to different kinds of hazards and are more exposed to mechanical, chemical, and ergonomic risk factors [2].

There are some risk factors that have been identified and reported in studies as they have influence on work-related injury. These factors are like age of the worker, sex of worker, educational status, work experience, working hours [3] occupational health and safety training, knowledge on occupational health and safety, work type, sleeping disturbance, khat chewing, drinking alcohol, supervision [4] work satisfaction and use of personal protective equipment were found to be factors which has significant association with work-related injury [5].

Despite the growing trend of construction sector in Ethiopia, occupational safety and health related issues has given far too little attention [6]. A review report conducted in 2016 in Ethiopia indicates that there are gaps on research in construction sector on occupational safety and health [7]. Therefore, this study aims to contribute in assessing the prevalence of work- related injury and its associated risk factors among building construction workers in Arba Minch town. The information could help in designing cost-effective interventions and prevention methods for work-related injury.

## Materials and Methods

### Study Area and Period

The study was conducted in Arba Minch town, which is the capital city of Gamo zone of the Southern Nation's Nationalities and Peoples

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Regional State (SNNPR), Ethiopia. The study was conducted starting from March 30 to April 20, 2020.

## Study Design

An institution-based cross-sectional study design was used.

## Population

The study was conducted in grade one to eight licensed construction companies located in Arba Minch town. The source population was all construction workers working in selected construction industry, while study participants were randomly selected workers working in the selected construction sites. All employees who were directly involved in the process of construction in the last 1 year were included in the study. Workers who had not prone to exposure to work-related injury, like office workers, were excluded from the study. Additionally, individuals who started working in the selected construction site after the data collection process already began were excluded.

## Sample Size Determination

Sample size was determined by Epi-info version 7 using both single and double population proportion formula. For our 1st objective, single population proportion formula and for our 2nd objective, double population proportion formula was used to calculate our sample size.

For single population proportion, sample size was calculated considering proportion of occupational injury of a previous study done in Dessie town, Northeast Ethiopia, which showed 32.6% prevalence of occupational injury among construction workers [8]. With 95% confidence interval certainty, 4.5% confidence limits and by anticipating a 10% nonresponse rate, the sample size for the study became 459. Sample size for the double population proportion was determined assuming 95% confidence interval and 80% power of the study (Table 1).

The sample size we calculated for our 1st objective was greater than the sample size we calculated by double population proportion. Therefore, the final sample size for the study was 459.

## Sampling Procedures

The study was carried out in five randomly selected active building construction sites, which was been constructed by grade 1-8 licensed construction firms in Arba Minch town. The sites were randomly selected by the lottery method. Thereafter, the total sample size was proportionately allocated for the 5 randomly selected construction sites based on their average number of workers they have during data collection. Using workers in the registration book as a sampling frame, the participants were drawn from the site's list of workers using simple random sampling technique by lottery method.

## Study Variables

The outcome variable of this study was a self-reported work-related injury status. The independent variables were socio-demographic variables (age, sex, marital status, educational status, religion, employment status, type of work, work experience, and monthly income), behavioral related variables (khat chewing, alcohol drinking, cigarette smoking, safety practice, job satisfaction, knowledge on OSH, sleep quality and attitude on OSH) and environmental related variables (working hours, training on OSH, availability of PPE, and workplace supervision).

## Data Collection Tools and Procedure

A structured questionnaire and observation checklist was used to collect data. The questionnaire was developed by reviewing different works of literature and it has included questions that accommodate all the required data [9-11]. The checklist is adapted from research done on safety practices in Dashen brewery Share Company, Gondar, Ethiopia [12]. The questionnaire was translated to Amharic, then back to English language to check for its accuracy.

The data collection was carried out by three health professionals (BSc). One supervisor (experienced (BSc)) was also involved for monitoring data collection and checking the completeness of the questionnaires. After getting informed consent from the study participants, background information and possible risk factors were collected in the form of a questionnaire. The collected information was reported to the supervisor every 2 days, to enable taking immediate action in case inconsistencies and problems happen on the reported data. Finally, the reviewed questionnaires were returned to the principal investigator [13].

## Data Quality Control

Training was given for data collectors and supervisors on procedures, techniques, ways of collecting the data and ethical issues. Prior to the commencement of the actual data collection process, the questionnaire was pretested on 5% of the actual sample size in building construction site workers in Mirab-Abaya, Gamo zone, Sothern Ethiopia. After the pretest the necessary modification was made and the consistence of the research tool was ascertained [14].

A clear introduction explaining the purpose and objective of the study was provided to the respondents on the first page of the questionnaire before data collection. All the questionnaires were checked daily to ensure whether they were appropriately filled or not. Any missing data was confirmed before the start of the next day's interview. In addition, qualities of data collection were ensured through close supervision of the data collectors by the principal investigator [15]. The principal investigator was responsible at all stages of the procedure.

| Variables | AOR | 95% CI | Power | Percent of Outcome in Unexposed | Ratio (Unexposed: exposed) | N | n + 10% nonresponse | Reference |
|---|---|---|---|---|---|---|---|---|
| **Worker experience** | 2.79 | 1.72-4.53 | 80% | 47% | 1 | 144 | 159 | (24) |
| **Alcohol drinking** | 3.16 | 2.09-4.79 | 80% | 50.3 | 1 | 122 | 135 | (24) |
| **Training on OHS** | 3.36 | 1.54-7.33 | 80% | 24% | 1 | 110 | 121 | (20) |
| **Working hour** | 2.02 | 1.14-3.58 | 80% | 35% | 1 | 286 | 315 | (20) |
| **Not using PPE** | 3.04 | 1.65-5.60 | 80% | 25.50% | 1 | 128 | 141 | (20) |

**Table 1:** Sample size determination using variables associated with work-related injury from different studies.

### Data Management and Statistical Analyses

The collected data was coded and entered using Epi-data version 4.4.3.1, and analyzed using SPSS statistical package for windows, version 25.0. The data was cleaned by running frequency and checked for consistency. Descriptive statistics such as frequency, percentage, summary measures, tables, and graphs were used to describe the data.

Assumptions applied to binary logistic regression model including multicollinearity by variance inflation factor (VIF) and fitness of model by Hosmer and Lemeshow were checked. To assess risk factors associated with work-related injury, binary logistic regression model was fitted and variables with a p-value <0.25 in bivariable analysis was included in the multivariable analysis. The adjusted odds ratio (AOR) with a 95% confidence interval (CI) was used to test the statistical significance of variables in multivariable analysis. Only statistically significant variables were presented [16-19].

## Operational Definitions

### Work-related injury

Any physical injury resulting from an accident in the course of construction work in the past 1 year prior to this study, at least one episode of injury.

### Safety Practice

Refers to the behavior of construction workers to act safely and includes any activity enabling the prevention and control of any adverse work related hazards. This could be measured by calculating the composite scores; by adding all the questions categorized under five Likert scales and dividing by the total numbers of questions considered. Those scores greater than an average were considered as good occupational safety practices and those with composite index of less than average were considered as poor occupational safety practice in this particular study [20-22].

### Sleep quality

**S**leep is a period of inactivity and restoration of mental and physical function. To evaluate sleep quality, participants were asked using Pittsburgh Sleep Quality Index (PSQI). PSQI differentiates "poor" from "good" sleep quality by measuring seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. The composite scores obtained indicate "good" (score < 5) and "poor" (score > 5) sleepers. A score of 0 to 3 is assigned to each of the seven scales (0 meaning no problem). The sum of the global PSQI scores ranged from 0 to 21. Finally, the subject whose global PSQI score was 5 or less was considered to have good sleep quality [23-25].

### Safety supervision

Supervisions done by health and safety professionals/supervisors [26].

### Cigarette smoker

An employee who was smoking one cigarette a day for at least 1 year [27].

### Alcohol drinker

An employee who drinks at least five drinks per week for men and two drinks per week for women for at least 1 year [28].

### Khat chewer

An employee chewing khat (a mild psychoactive substance) three times a week for at least 1 year [29].

### Knowledge on OSH

knowledge of occupational health and safety is theoretical or practical understandings, and skill obtained by education or through experience, ability of sorting out different occupational exposures that potentially cause infection of disease, physical as well as other sickness of the study. And in this study it is calculated; Participants asked to answer 9 knowledge questions about safety and health. Graded as having "Good knowledge" if they had answered correctly 7–9 questions, 5–6 as "Medium level knowledge" and 0–4 as "Poor knowledge".

## Results

### Socio-Demographic Characteristics

Four hundred forty four construction workers were participated in this study, making the response rate 96.73%. Of whom 66.67% were males. The mean (±SD) age of respondents was 25.80 (±6.00) years, among which 47.97% were in 25–49 years age group. The majority of the participants, 61.04%, were singles. Among the study participants, 39.41% of them have only primary school education. 76.35% of the respondents had working experience of less than or equal to two years. The majority of respondents, 49.10%, were daily laborers. Three-fourths of the participants had a monthly salary of Birr 2000- 3999.

### Behavioral Related Characteristics

Among the study participants, 27.93% were khat chewer. 12.16% and 7.66% of the workers were alcohol drinkers and cigarette smoker, respectively. One hundred and seventy, 38.29%, of the respondents had good knowledge on occupational safety and health. Majority of them, 67.34%, had poor sleep quality. More than half, 52.70%, of them have good occupational safety practice.

The relationship between the observation and self-report PPE availability were tested using Chi-square test, and the result shows there is a relationship between self-reported PPE availability and observation. In addition from the observation, only 19.59% of workers use proper manual lifting technique and 55.63% of workers follow demarcated walkways (Tables 2-4).

### Environmental Related Characteristics

Out of the total respondents, 59.91% of the employees had worked for more than eight hours per day. The majority, 67.57%, of the workers revealed that workplace supervision had never been made in the past 12 months. 77.93% of the respondents did not attend any kind of workplace safety and health training. Only 27.25% of the participants had PPE. Out of personal protective equipment available, the majority, 51.98%, were gloves (Table 5 and Figure 1).

### Prevalence of Injury and Its Characteristics

Out of 444 construction workers participated in this study, the overall prevalence of injury found was 43.02% (95% C.I: 38.47%, 47.69%) during the last 12 months. 74.87% of the injured respondents encountered more than one injury. The main type of injury reported was cut/laceration 31.25% (Figure 2). The three leading causes of injury were cut by sharp objects 38.62%, followed by hit by object 22.51%, and fall from ground level 11.25% (Table 6). Most of the injuries happened in the fingers/hand 30.63% (Figure 3). The commonest agent of injury was hand tools 52.33%

| Variables | | Frequency (n) | Percent (%) |
|---|---|---|---|
| Sex | Male | 296 | 66.67 |
| | Female | 148 | 33.33 |
| Age (years) | < 18 | 19 | 4.28 |
| | 18 – 24 | 206 | 46.4 |
| | 25 – 49 | 213 | 47.97 |
| | ≥ 50 | 6 | 1.35 |
| Marital status | Single (not married) | 271 | 61.04 |
| | Married | 159 | 35.81 |
| | Divorced or Widowed or Separated | 14 | 3.15 |
| Religion | Orthodox | 199 | 44.82 |
| | Protestant | 158 | 35.59 |
| | Muslim | 33 | 7.43 |
| | Catholic | 46 | 10.36 |
| | Others* | 8 | 1.8 |
| Educational status | No formal education | 3 | 0.68 |
| | Primary school | 175 | 39.41 |
| | Secondary school | 164 | 36.94 |
| | Diploma and Above | 102 | 22.97 |
| Employment status | Temporary | 259 | 58.33 |
| | Permanent | 21 | 4.73 |
| | Micro and small scale enterprises (Contract) | 164 | 36.94 |
| Experience | ≤ 2 years | 339 | 76.35 |
| | >2 years | 105 | 23.65 |
| Type of work | Daily laborer | 218 | 49.1 |
| | Plasterer | 46 | 10.36 |
| | Carpenter | 72 | 16.22 |
| | Mason | 71 | 15.99 |
| | Welder/electrician | 13 | 2.93 |
| | Painter | 3 | 0.68 |
| | Driver/operator | 12 | 2.7 |
| | Site engineer | 9 | 2.03 |
| Monthly income (Birr) | 1000 - 1999 | 76 | 17.12 |
| | 2000 - 3999 | 332 | 74.77 |
| | ≥ 4000 | 36 | 8.11 |

**Table 2:** Socio-demographic characteristics of building construction workers in Arba Minch town, Ethiopia, 2020.

(* Jehovah's Witness and has no religion).

| Variables | | Frequency (N) | Percent (%) |
|---|---|---|---|
| Khat chewer | Yes | 124 | 27.93 |
| | No | 320 | 72.07 |
| Alcohol drinker | Yes | 54 | 12.16 |
| | No | 390 | 87.84 |
| Cigarette smoker | Yes | 34 | 7.66 |
| | No | 410 | 92.34 |
| Knowledge on OSH | Good Knowledge | 170 | 38.29 |
| | Medium level Knowledge | 114 | 25.68 |
| | Poor Knowledge | 160 | 36.04 |
| Attitude on OSH | Positive Attitude | 303 | 68.24 |
| | Negative Attitude | 141 | 31.76 |
| Sleep quality | Good Sleep Quality | 145 | 32.66 |
| | Poor sleeper quality | 299 | 67.34 |
| Job satisfaction | Yes | 212 | 47.75 |
| | No | 232 | 52.25 |
| Safety practice | Good | 234 | 52.7 |
| | Poor | 210 | 47.3 |

**Table 3:** Behavioral characteristics of building construction workers of Arba Minch town, Ethiopia, 2020.

| Personal Protective | Self-reported PPE | Observed PPE | Chi-square | | |
|---|---|---|---|---|---|
| Equipment | Available | | Usage | | P value * |
| | N | % | N | % | |
| Glove | 92 | 20.7 | 71 | 16 | p≤0.01 |
| Helmet | 14 | 3.15 | 11 | 2.48 | p≤0.01 |
| Overall | 10 | 6.94 | 8 | 1,80 | p≤0.01 |
| Goggle | 7 | 1.58 | 5 | 1.13 | p≤0.01 |
| Safety shoe | 24 | 5.4 | 23 | 5.18 | p≤0.01 |
| High visibility jacket | 30 | 6.76 | 25 | 5.63 | p≤0.01 |

**Table 4:** Comparison between self-reported PPE available and observation.

(* shows; self-report availability and observation are not independent)

| Variables | | Frequency (N) | Percent (%) |
|---|---|---|---|
| Work hour per day | ≤ 8 hr/day | 178 | 40.09 |
| | > 8 hr/day | 266 | 59.91 |
| Workplace supervision | Yes | 144 | 32.43 |
| | No | 300 | 67.57 |
| Safety and health training | Yes | 98 | 22.07 |
| | No | 346 | 77.93 |
| PPE available to workers | Yes | 121 | 27.25 |
| | No | 323 | 72.75 |

**Table 5:** Environmental characteristics of building construction workers of Arba Minch town, Ethiopia, 2020.

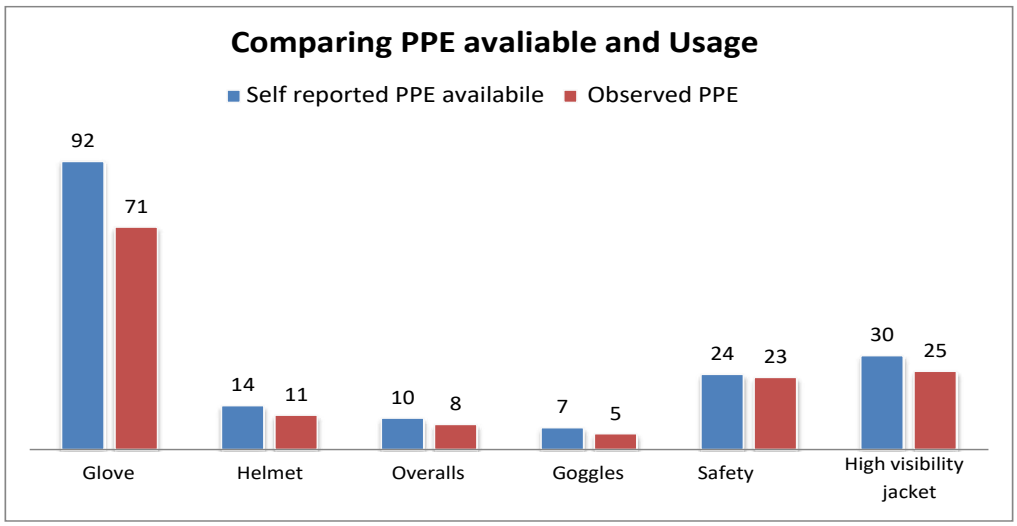


**Figure 1**: Types of PPE available and observed PPE usage among building construction workers in Arba Minch town, 2020.

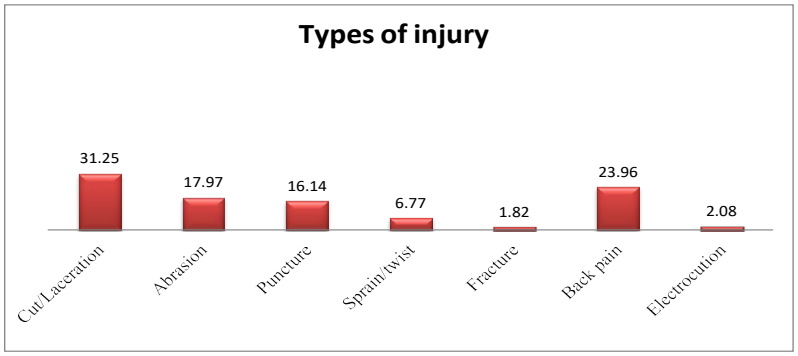


**Figure 2**: Types of injury among building construction workers in Arba Minch town, 2020.

| Cause of injury | Frequency | Percent (%) |
|---|---|---|
| Cut by sharp objects | 151 | 38.62 |
| Falling from ground level | 44 | 11.25 |
| Falling from height | 31 | 7.93 |
| Hit by object | 88 | 22.51 |
| Slipping | 23 | 5.88 |
| Contact electric line | 8 | 2.05 |
| lifting object | 42 | 10.74 |
| Others | 4 | 1.02 |

**Table 6:** Cause of injury among building construction workers, Arba Minch town, 2020.

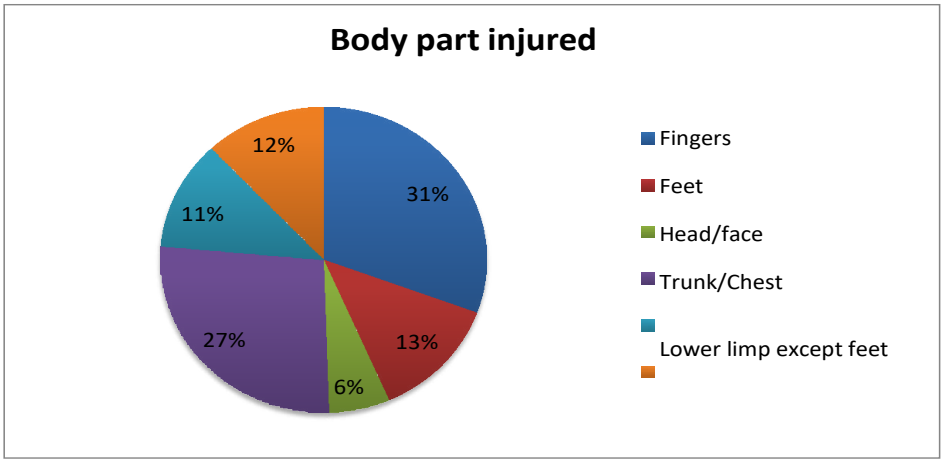


**Figure 3**: Body part injured among building construction workers, Arba Minch town, 2020.

**Table 7:** Activities during injury occur among building construction workers, Arba Minch town, 2020.

| Activities during injury occur | Frequency | Percent (%) |
|---|---|---|
| Handling material | 154 | 47.09 |
| Heavy lifting | 105 | 32.11 |
| Operating machineries | 15 | 4.59 |
| Welding | 10 | 3.09 |
| Fixing wooden objects | 26 | 7.95 |
| Laying bricks | 15 | 4.59 |
| Others | 2 | 0.61 |

**Table 8:** Injury severity among building construction workers, Arba Minch town, 2020.

| Variables | | Frequency | Percent (%) |
|---|---|---|---|
| Hospitalized (n=191) | Yes | 22 | 11.52 |
| | No | 169 | 88.48 |
| Days of hospitalization (n=22) | ≤24 hours | 15 | 68.18 |
| | >24 hours | 7 | 31.82 |
| Days of absent from work (n=191) | ≤3 days | 129 | 67.54 |
| | >3 days | 62 | 32.46 |

and fall 26.33%. The majority, 47.09%, were handling materials during injury occurred (Table 7). Among the total injured workers, 11.52% were hospitalized, of which 31.82% were hospitalized for more than 24 hours. Around 32.46% of injured worker were absent from their work for more than 3 days (Tables 6-8 and Figure 2,3).

## Factors Associated With Occupational Injury

In multivariable analysis, work experience (AOR; 2.05, 95% CI: (1.19, 3.55)), sleep quality (AOR; 2.80, 95% CI: (1.67, 4.69)), safety practice (AOR; 1.70, 95% CI: (1.09, 2.63)), work hour 9AOR; 1.86, 95% CI: (1.19, 2.92)), and workplace supervision (AOR; 2.11, 95% CI: (1.29, 3.43)) were found to be significantly associated with work-related injury. Table 9 presents factors which remained statistically significant in the invariable and multivariable logistic regression analysis.

The VIF (variance inflation factor) test suggests that multi collinearity is not a problem for the data. Moreover, The Hosmer & Lemeshow test of the goodness of fit (p=0.727) suggests the model is a good fit to the data (Table 9).

**Table 9:** Factors associated with work-related injury among building construction workers in Arba Minch town, Ethiopia, 2020.

| Variables | | Injured | | COR (95% CI) | AORa (95% CI) |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Work experience | ≤ 2 years | 167 | 172 | 3.28 (1.98, 5.42) | 2.05 (1.19, 3.55) |
| | >2 years | 24 | 81 | 1 | 1 |
| Sleep quality | Good sleep quality | 28 | 117 | 1 | 1 |
| | Poor sleep quality | 163 | 136 | 5.01 (3.13, 8.02) | 2.80 (1.67, 4.69) |
| Safety practice | Good | 71 | 163 | 1 | 1 |
| | Poor | 120 | 90 | 3.06 (2.07, 4.52) | 1.70 (1.09, 2.63) |
| Work hour | ≤ 8 hrs/day | 50 | 128 | 1 | 1 |
| | > 8 hrs/day | 141 | 125 | 2.89 (1.92, 4.33) | 1.86 (1.19, 2.92) |
| Workplace supervision | Yes | 35 | 109 | 1 | 1 |
| | No | 156 | 144 | 3.37 (2.17, 5.26) | 2.11 (1.29, 3.43) |

At The multivariable model was adjusted for educational status, employment status, work type, knowledge on OSH, attitude on OSH, job satisfaction, safety and health training and PPE availability

## Discussion

Currently, Ethiopia has a relatively strong growth in construction sector and this is attracting thousands of laborers. However, occupational health and safety service is not strongly established to handle workers' health and safety demands.

The prevalence of work-related injury among building construction workers in this particular study is 43.02% (95% C.I: (38.47%, 47.69%)). This prevalence of injury is in-line with studies conducted in Gondar, Ethiopia, (39%) (12) and in Mit-Ghamr city, Egypt (46.2%) (22). However, studies conducted in China (69.82%) (23), and Ilam, West Iran, (82%) (24) has higher prevalence of injury than this study. Moreover, studies conducted in Kampala city, Uganda, (32.4%) (25), Norway (27.5%) (26), Dessie, Ethiopia, (32.6%) (10), and Addis Ababa, Ethiopia, (38.3%) (11) has lower prevalence of injury than this study. This prevalence discrepancy between studies might occurred due to the difference in working environment, difference in socio-demographic, economic development of the countries or difference in level of accident prevention strategies. Working on preventive measures could decrease the prevalence of work- related injuries.

Sleep quality is one of the identified risk factor for work-related injury in this particular study. The odds of injury among building construction workers who had poor sleep quality were 2.8 times more compared to workers who had good sleep quality (AOR; 2.80, 95% CI: (1.67, 4.69)). This finding is similarly found in studies done in Addis Ababa, Ethiopia (15) and Mumbai, India (27). The possible explanation for why poor sleep quality is a risk factor for work related injury could be; Poor sleep quality affects the human body not to concentrate and maintain wakefulness during work hour. Moreover, it distorts the ability to assess the work environment and working conditions from danger.

Another identified risk factor for work-related injury is work experience. The odds of injuries among workers who served for less than or equal to 2 years were about two times more compared to those who served for more than 2 years (AOR; 2.05, 95% CI: (1.19, 3.55)). This finding is inconsistent with a study done in Addis Ababa, Ethiopia (11). The possible reason why less experienced workers injured more could be; workers who served for more than 2 years are accustomed to the workplace environment and they comply with safety precautions and instructions. Therefore, they could be less vulnerable to work-related injuries.

The odds of injury among workers who had poor safety practice were 1.7 times more compared to those who had good safety practice (AOR; 1.70, 95% CI: (1.09, 2.63)). This finding was similar with studies done in Australia (28) and Mit-Ghamr city, Egypt (22). Lack of workers' compliance with safe work practices, not obeying safe work procedure and neglecting instruction might be some of the reason why poor safety practice could be a risk factor for work- related injuries. In this study more than two third of the employees had no PPE. This may show that there was poor provision of PPE from employers, and lack of awareness about PPE importance by employees.

In addition, work hour showed statistically significant association with work-related injury. The odds of injuries among respondents who works for more than 8 hours per day were 1.86 times more compared to respondents who works for only 8 hours or less per day (AOR; 1.86, 95% CI: (1.19, 2.92)). Studies conducted in Gondar and Jimma, Ethiopia has similar finding with this study. With long hours of work, there is a chance of developing fatigue and this increases the likelihood of mistakes, poor decision making and errors in judgment. In addition, daily occupational exposure level to accident and injury increases as work hours increases.

The odds of injuries among workers who hadn't workplace supervision were about two times more compared to workers who had workplace supervision (AOR; 2.11, 95% CI: (1.29, 3.43)). This result is similar with studies conducted in Robe, Ethiopia, and Ilam, Iran. The possible reason for this might be absence of supervision and instruction on the safe handling of tools, operation of machinery, and process may lead to work-related injury.

This study has limitations that should be noted. Since interviewer administered questionnaire was used to collect data, it might be prone to social desirability bias; in that workers might report more socially acceptable responses than their actual day to day practice. It is also prone to recall bias due to 12 months recall period. Severely injured workers might not be at work during this study time. This may lead the study to be vulnerable to healthy worker bias. Moreover, inclusion of minor injuries in study may result in under or over-estimation of injuries.

## Conclusions and Recommendations

The prevalence of work-related injury among building construction workers in Arba Minch town is higher compared to other studies. Cut/laceration was the main type of injury. Fingers/hand was the most injured part of the body; this indicates that PPE targeting extremities might reduce occurrence of injury among workers. One-third of injured workers were absent from their work for more than 3 days, this

poses a big burden on both the health system and workers' families in economy perspective.

Factors like work experience, sleep quality, safety practice, work hour and workplace supervision was a risk factor on occurrence of work-related injury among building construction workers according to this study. Therefore, to alleviate loss of life, productive time and money; promoting safety practice (including use of personal protective equipment and safe working environment), promoting workplace supervision, providing OSH training for less experienced workers, respecting employees working hour and improving workers sleep quality are recommended for better occupational health.

### Relevance of the findings to public health

The findings of this study will serve as key for intervention against work-related injuries in building construction sector, particularly in Ethiopia context. It will also play a role in minimizing the social-demographic, economic, behavioral and work related problems of the workers.

## Abbreviations

AOR: adjusted odds ratio; CI: confidence interval; COR: crude odds ratio; ILO: international labor organization; IRB: institutional review board; OSH: occupational safety and health; PPE: personal protective equipment; SNNPR: southern nation's nationalities and peoples region

## Declarations

### Ethics Approval and Consent to Participate

Before data collection, ethical clearance was obtained from Institutional Review Board (IRB) of Arba Minch University, College of Medicine and Health Sciences. Official support letter was obtained from Arba Minch University and Gamo zone urban development and construction office. Permission was also obtained from each building construction industry site manager. The selected building construction workers were informed about the purpose of the study, the importance of their participation. Informed consent were obtained after explaining their full right to refuse, withdraw any time, without any explaining or giving reasons. Information's obtained from individuals participants were kept secure and confidential. Names and other identifying data of respondents were made by using code throughout the study process to obtain confidentiality. Also safe approaches like using glove, masks, hand sanitizer and keeping distance were applied to prevent corona virus transmission during data collection. Finally, safety education was given to workers. They were told to avoid unsafe acts, to use PPE and to follow safety rules.

### Consent for Publication

Not applicable.

### Availability of Data and Materials

The datasets used during the current study are available from the corresponding author on reasonable request.

### Competing Interests

The authors declare that they have no competing interests.

### Funding

Not applicable

### Author's Contributions

DE- designed the study, developed data collection instruments and supervised data collection, analyzed and interpreted the data, and also drafted the manuscript.

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