Original article

Work Related Injuries and Associated Factors among Small Scale Industry Workers of Mizan-Aman Town, Bench Maji Zone, Southwest Ethiopia

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Abstract

Background: Work place is a potentially hazardous environment where millions of employees pass at least one-third of their life time. However, hundreds of millions of people throughout the world are employed today in conditions that breed ill health and/or are unsafe for life.

Objective: This study aims to assess the magnitude of work related injury and associated factors among small scale industrial workers in Mizan-Aman town, Bench Maji Zone, Southwest Ethiopia.

Method: A cross-sectional study design was conducted from February to May, 2016. Data was collected using a structured face to face interview and observational checklist. A total of 219 individuals were involved in this study. The raw data collected from the field was entered to EPI Info-version 6.04 and exported to SPSS-version 21 for analysis. A logistic regression analysis was performed to identify factors associated with work related injuries.

Result: A total of 219 employees from small scale industries were involved in the study. One hundred ninety eight (90.4%) were male. Prevalence of injury was 45.2% per year and the most common causes of injury was hit injury by manual tools (37.4%). Most of the occupational injuries sustained were on the upper and lower limbs. The multivariable analysis result reveals that cigarette smoking (AOD= 4.65: 95% CI 1.53, 14.20), alcohol consumption (AOD= 5.18: 95% CI 2.28, 11.73), working hours (AOD= 4.78: 95% CI 1.95, 11.68), working during night shift (AOD= 4.14: 95% CI 1.12, 15.25), occupational health and safety training (AOD= 0.25:95% CI 0.10, 0.63) and use of Personal Protective Equipment (AOD= 0.32: 95% CI 0.14, 0.75) were found to be significantly associated factors with occupational injury.

Conclusion: Work-related injuries were high among small scale industry workers in the studied area. Cigarette smoking, alcohol consumption, working for more than 8 hours and working at night had high odds of occupational injuries. Use of PPE and occupation health and safety training were preventive factors. Therefore, workers and industry owners need to work together to halt the problems. [*Ethiop. J. Health Dev.* 2017;31(3):208-215]

Key words: Work-related injury, Small scale industries, Mizan-Aman, Ethiopia

Introduction

The work place is a potentially hazardous environment where millions of employees pass at least one-third of their life time. However, hundreds of millions of people throughout the world are employed today in conditions that breed ill health and/or are unsafe for life. As a result of this, a number of employees working in various industries face different types of work-related injuries (1).

Work-related injuries present a major public health problem resulting in serious social and economic consequences that could be prevented if appropriate measures are taken**.** The estimated economic loss caused by work-related injuries and disease was equivalent to 4 % of the world's gross national product. The impact is 10 to 20 times higher in developing counties, where the greatest concentration of the world's workforce is located (2).

The majority of the world's workers are economically active in SSI (small-scale industries) and the informal economy. The size of the sector is estimated in some parts of Africa to constitute almost 80% of the work-force (3)**.** Currently, SSIs and the informal sector in developing countries produce 40 to 60 percent of the national income (4).

Even though development and industrialization have contributed to health it has also had adverse health consequences on work places that health and safety of workers remains a priority issue across the globe (5). By considering this the United Nations (UN) 2030 Agenda for Sustainable Development encompasses a global plan of action with specific targets to end poverty, protect the planet, and ensure prosperity for all. Target 8.8 focuses on the "protection of labor rights and promotion of safe and secure working environments for all workers (6).

However, with growing SSIs, employment in unsafe and unprotected work is becoming major phenomena affecting both industrialized and developing countries. As a result, a number of employees face different types of work-related injuries and diseases (1). This resulted in high prevalence of work related injury, especially in SSIs that are with low access of basic facilities that do not meet the required standards by WHO/ILO (World Health Organization/International Labor Organization). According to ILO 1.2 million working people's die of work related accident and diseases every year, more than 160 million workers fall ill each year due to work place hazards worldwide (7).

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UN estimates 10 million occupational injuries and disease cases occur each year globally, severity and frequency is greatest in developing countries (5). A report from Tanzania revealed that, one in seven workers had experienced work-related injuries or illnesses (8), while in Bangladesh, 16% of rural workers had suffered a work-related injury that required them to miss a week of work (9).

In developing countries including Ethiopia, the risk of having work-related injury is 10 to 20 times higher than that of developed counties. This is because in developing countries, majority of the workforce is employed in small and medium scale industries (10).

The second Growth and Transformation Plan aims to place industrialization at the forefront of its development agenda. As signatory to conventions, Ethiopia is expected to integrate occupational health and safety in to its development program (11). Nonetheless, there is limitation of published evidence on the dynamics of workplace exposures to injuries (12, 13). A study from Afar region revealed that the overall occupational injury prevalence rate was 783 per 1000 exposed workers per year (14).

Different studies noted on factors associated with work related injuries. These factors could be individual factors like psychological or mental wellbeing, use of substances like alcohol and cigarette, insufficient sleep, working environment like lighting, arrangement of materials, availability of clear policy, provision of training and availability of PPE (Personal Protective Equipment) (15-19). It is obvious that majority of SSIs are not fully equipped with necessary materials and policy to prevent work related injuries.

Therefore, this study is intended to identify the magnitude of injury and its predisposing factors among workers of SSIs in Mizan-Aman town.

Method

Study area and period: This study was conducted in Mizan-Aman town. The town has two sub-cities called Mizan and Aman sub-cities. It is found in Bench Maji zone, SNNPR (Southern Nations Nationalities and Peoples' Region), Southwest Ethiopia. It is 561 kilometers far from Addis Ababa. The town has 5 Kebeles that include 82 SSIs in Mizan sub-city and 74 SSIs in Aman sub-city**.** The study was undertaken between February and May, 2016.

Study design: A cross-sectional study design was conducted to assess the prevalence of work-related injuries and factors associated with it among small scale industrial workers of Mizan-Aman town.

Source and study population: All employees working in 156 SSIs in Mizan-Aman town were source population. Employees who were on duty in SSIs during the data collection period were study population.

Sample size and sampling technique: Sample size was determined using single population proportion formula, with assumed work-related injuries prevalence rate of 58.2% (21), considering 5% margin of error, 95% confidence level and none response rate of 10%. The total sample size calculated to be 410. There were 468 workers across all SSIs. By using population correction formula the final sample size becomes 219. To identify the study participants, simple random sampling technique based on probability proportion to size (PPS) was employed in each SSI.

Data collection technique: Data was collected using a structured face to face interview questionnaire and observational checklist (to assess characteristics of work place environment and possible hazards like heat, noise etc.). Both tools were adapted and developed after reviewing the standard occupational health and safety guidelines and other relevant literatures in reference to the research question. The variables were checked for clarity and translated in to Amharic language and then translated back in to English to check consistency of thoughts of the questions.

The dependent variable for this study were work-related injuries and the independent variables constituted socio-demographic factors (sex, age, salary etc.)**,** work exposure factors (experience, training, educational status, occupation, use of personal protective device), behavioral factors (smoking, alcohol drinking etc.) and work environment/ergonomic factors (unguarded machine, poor electric installation, machinery installation, working hours).

Data analysis procedure: The raw data collected from the field was entered to EPI INFO-version 6.04 and exported to SPSS-version 21 for analysis. Descriptive analysis of the variables was conducted using frequencies and percentages. Binary logistic regression was used to assess factors associated with occupational injury. Variables with P-value less than 0.2 in bivariate analysis and other important variables were taken to multivariate analysis. The result was presented using appropriate frequencies, proportions and 95% confidence interval. P-value less than 0.05 was considered significant.

Data quality assurance: Training and supervisions was used to reinforce data quality. During the data collection, regular supportive supervision and discussion with data collectors and supervisors was done on the spot by the investigators to monitor the data collection process.

Ethical clearance: Ethical clearance was obtained from Mizan-Tepi University ethical review committee. Permission for data collection was obtained from Mizan woreda small and micro enterprises office and the municipality. Verbal and written consent from the manager of each enterprise was also taken prior to data collection. Participants were guaranteed regarding the confidentiality of the information and they have been

given the right to stop or leave the interview at any time.

Result

Characteristics of Work Environment in Small Scale Industries: A total of 142 SSIs were assessed for safety of work environment using checklist. Of 142 SSIs 59 (41.5%) were involved in wood and metal work, 42 (29.6%) were involved in only wood works, 25(17.6%) were involved in only metal related works and the other 16 (11.3%) were involved in concrete related works. Majority, 114 (80.3%), of SSIs had included less than five workers. From observed SSI about 111 (78.2%) of them do not arrange materials in a proper way. Only 8 (5.6%) and 9 (6.3%) of SSI had health personnel and work safety policies, respectively.

Socio-demographic and lifestyle characteristics of the respondents: A total of 219 SSI workers were interviewed. Male and female respondents were 198 (90.4%) and 21(9.6%) respectively. Educational status of the respondents showed that 91(41.6%) respondents completed grade 5-8. Majority, 214 (97.7%), of respondents had a work experience of less than 5 years in the same job (Table 1).

Table 1: **Socio-demographic characteristics of workers in small scale industries of Mizan-Aman town, Bench Maji zone, Southwest Ethiopia, 2016 (N=219)**

Variable	Frequency (N=219)	Percent (%)
Sex		
Male	198	90.4
Female	21	9.6
Age		
<=30	219	100.0
>30	0	0.00
Educational status		
Grade 1-4	12	5.5
Grade 5-8	91	41.6
Grade 9-10	81	37.0
Grade 11-12	4	1.8
12 +	31	14.2
Religion		
Orthodox	144	65.8
Protestant	53	24.2
Muslim	22	10.0
Marital status		
Single	187	85.4
Married	28	12.8
Divorced	2	0.9
Widowed	2	0.9
Workers experience in the same work		
<=5 years	214	97.7
>5 years	5	2.3
Income status		
<=1000ETB	30	13.7
>1000ETB	189	86.3

Occupational and behavioral characteristics of the respondents: Those respondents who had consumed alcohol and smoke cigarette account 87 (39.7%) and 58 (26.5%), respectively. The respondents who used PPEs properly and consistently were 82 (37.4%). Only 31 (14.2%) of the respondents had occupational safety and health training. Workers job category showed that 53 (24.2%) were daily laborers, 20 (9.1%) were mechanics, 25 (11.4) were machine operator, 107(48.9) were welders and the other 14 (6.4%) were carpenters (Table-2).

Table 2: **Occupational and behavioral characteristics of the respondents in small scale industries of Mizan-Aman town, Bench Maji zone, Southwest Ethiopia, 2016**

Variable	Frequency (N=219)	Percent (%)
Consume alcohol		
Yes	87	39.7
No	132	60.3
Smoke cigarettes		
Yes	58	26.5
No	161	73.5
Sleeping disorder		
Yes	32	14.6
No	187	85.4
Number of Hours worked per day		
≤ 8 hour	150	68.5
> 8 hour	69	31.5
Work place supervision		
Yes	31	14.2
No	188	85.8
Occupational health and safety training		
Yes	31	14.2
No	188	85.8
Use PPE		
Yes	82	37.4
No	137	62.6
Workers job category		
Daily laborers	53	24.2
Mechanic	20	9.1
Machine operator	25	11.4
Welder	107	48.9
Carpenter	14	6.4
Work during the night time		
Yes	48	21.9
No	171	78.1

Magnitude and characteristics of occupational injuries: The prevalence of at least one work related injury in Mizan-Aman town in the past one year was 452/1000 (45.2%). Cuts, laceration and punctures (30.7%) were the most common type of injury occurred and multiple body part injury (3.7%) was the least one (Table- 3).

Hit by manual tools and fall from height were the two important causes of injuries (Figure 1).

Table 3: **Magnitude and characteristics of the occupational injuries among Small scale Industry Workers in Mizan-Aman town, Bench Mai zone, Southwest Ethiopia, 2016 (N=219)**

Variable	Frequency	Percent (%)
Work related injury in the past one year		
Yes	99	45.2
No	120	54.8
Types of injury		
Sprain	15	14.0
Fractures	15	14.0
Cuts, laceration or punctures	67	62.6
Multiple	8	7.5
Others	2	1.9
Source of injury		
Machinery	21	19.6
Remaining parts and materials	22	20.6
Workers motion and position	29	27.1
Hand tools	30	28.0
Others	5	4.7
Day absent due to injury		
1 day	40	37.3
2 days	42	39.3
More than 3 days	25	23.4
Frequency of injury		
Once	37	34.6
Twice	30	28.0
More than twice	40	37.4

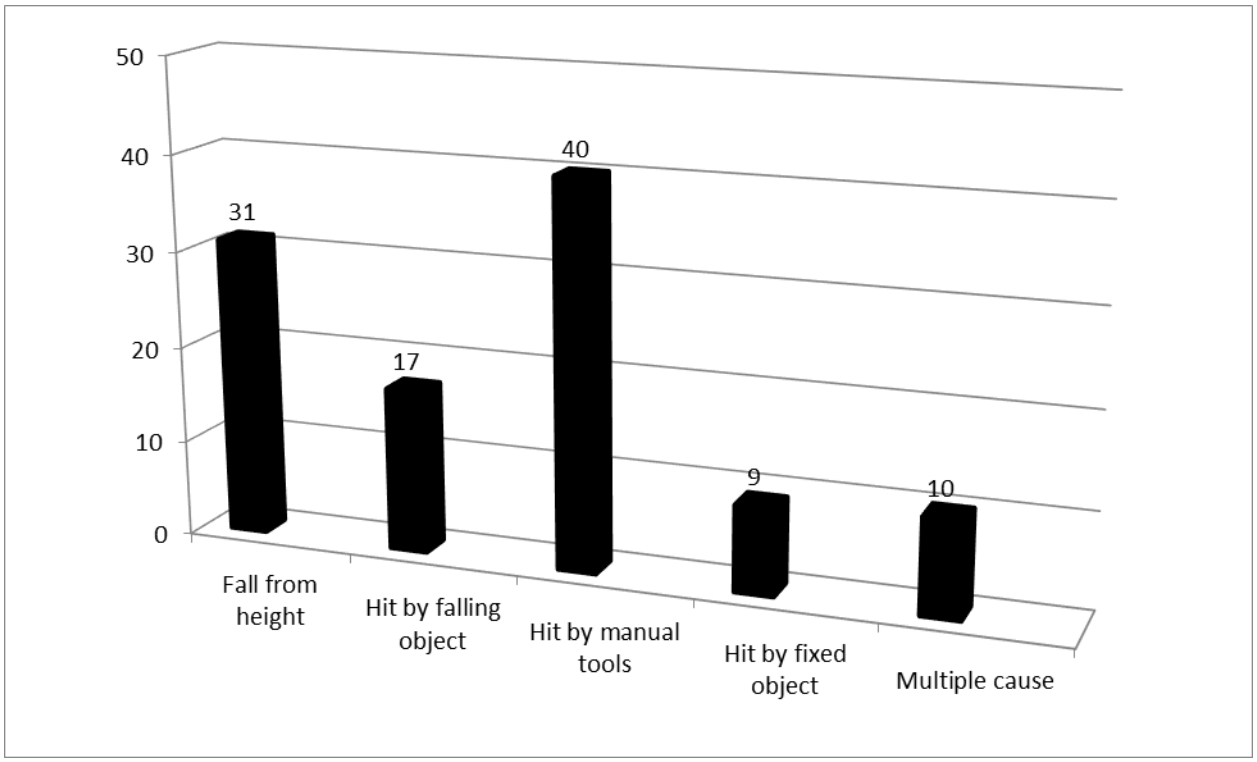

Figure 1: **Causes of work related injury among SSI workers in Mizan-Aman town, Bench Maji zone, Southwest Ethiopia, 2016**

Factors associated with work related injuries: After adjusting for potential confounding factors the odds of work related injury was higher among those who were cigarette smokers (AOD= 4.65: 95% CI 1.53,14.20), alcohol consumers (AOD= 5.18: 95% CI 2.28,11.73), working for more than 8 hours per day (AOD= 4.78: 95% CI 1.95,11.68), working in the night shift (AOD= 4.14: 95% CI 1.12,15.25) than their counter parts. The odds of work related injury was lower among those who had occupational health and safety training (AOD= 0.25: 95% CI 0.10, 0.63) and use PPE (AOD= 0.32: 95% CI 0.14, 0.75) than those who had no training and do not use PPE, respectively (Table 4).

Table 4: **Predictors of occupational injury among small scale industry workers of Mizan- Aman town, Bench Maji zone, Southwest Ethiopia, 2016**

Associated factors	COR (95% CI)	AOR (95% CI)
Smoke cigarette		
No	1.00	1.00
Yes	8.956 (4.295, 18.676)	4.654 (1.525, 14.199)
Alcohol consumption		
No	1.00	1.00
Yes	8.516 (4.576, 15.850)	5.175 (2.283, 11.732)
Number of working hours per day		
<=8 hour	1.00	1.00
>8 hour	4.918 (2.598, 9.309)	4.775 (1.951, 11.684)
Working in the night		
No	1.00	1.00
Yes	6.852 (3.193, 14.706)	4.137 (1.122, 15.249)
Occupational health and safety training		
No	1.00	1.00
Yes	0.242 (0.051, 0.163)	0.245(0.096, 0.625)
Use PPE		
No	1.00	1.00
Yes	0.373 (0.210, 0.665)	0.319 (0.136, 0.748)

PPE= Personal Protective Equipment

Discussion

This study revealed that the prevalence of work related injury was 45.2%. There was significant association between work-related injury and cigarette smoking, alcohol consumption, working hours, working at night shift, use of PPE and occupation health and safety training.

Different studies revealed that the industrial worker today is placed in a highly complicated environment. Surveys show that the most prevalent problems in work settings involves inadequate working space, poorly designed working tools, exposure to dusts and high levels of noise (4). In this study 111(78.2%) of them had not arranged used or non-used materials appropriately. Only 8 (5.6%), 9 (6.3%) and 43 (30.3%) had health personnel, work safety policies and first aid facilities respectively. These results were similar to that of other Ethiopian industries as revealed in study done in Afar region (14).

The overall prevalence rate of occupational injury among SSI workers in this study was 45.2%. This finding was relatively higher than the studies conducted in Akaki textile factory (20), Gondar zone (21), and Egypt (22) with a prevalence of 20%, 33.5% and 18.4% respectively. These variations could most probably be due to the differences in socio-economic levels of workforce, lack of safety training and awareness; and limited occupational safety and health services and practices. Absence of workplace supervision, lack of health and safety training, limited use of PPE, prolonged duration of working hours, and being a daily laborer may contribute for occurrence of injury.

Most of the occupational injuries sustained were on the upper and lower limbs, and this finding was consistent with findings from Brazil (23), India (24), Egypt (22), Mekelle (19), and North Gondar, Ethiopia (21). Involvement of upper and lower limbs may be due to more involvement of these particular body parts and exposure to unguarded machines and tools. Human failures such as improper working style, conscious risk-taking, and lack of complying with safety rules may also result in such injuries. Further about 62.6 % of workers were found to be not using PPE which may be another reason for such injuries.

The result from this study indicated that laceration, cuts, and punctures were common injury types of the prevailing work place hazards. It was in line with different studies conducted in Mekelle (19) and Kenya (4).

According to this study, hand tools were the most common cause of injury. This result is in consistence with a study done in Afar (14) and Hong Kong, China (25). This may be happened due to the fact that majority of workers in the study area were temporary and daily laborers who were more involved in intensive manually implemented activities that expose them to injuries caused by hand tools than machinery. Similarly, it could be attributed for work place environmental conditions, workers' behavior and non-use of PPE which might expose these workers to such injuries.

The multivariate analysis result revealed that cigarette smoking, alcohol consumption, number of working hours, working in the night shift, occupational health and safety training and use of PPE were significantly associated with occupational injury.

The odds of work related injury was lower among those who used PPE than their counter parts. This result was in line with a study done in India (15) and Japan (16).

This study revealed that the risk of occupational injury was higher among employees who were working more than 8 hours than their counterparts. This study is similar with a study done in Finland (17), USA (18) and Mekelle, Ethiopia (19). This is perhaps associated with psychological well-being and mental health, insufficient sleep, and substance abuse in relation with working for a long time.

Different researches identified that workers' behavior are the determinant factors for their health status in work settings. Those behaviors which are in a concern by many industries currently are alcohol consumption and smoking cigarette (1). In this study the odds of work related injury was higher among those who consume alcohol than their counter parts. Similar results were reported among workers from Egypt (22) and Addis Ababa (12). Alcohol drinking can increase the risk of injury through engaging in risk taking behavior or reducing the perception and response to hazards.

Another behavioral variable in concern of this study was cigarette smoking. Employees who had smoke cigarette had more odds of having been injured than their counter parts. This coincides with a study done in Japan (16), in which smokers showed an increased risk of occupational injury. Smoking habits decrease alertness and thereby lead to accident at work. Moreover, smoking can lead to many other medical illnesses that also disrupt normal physical functions of the body (25).

Literatures indicated that there is a strong relationship between training on health and safety and reduced work accident rates among industrial workers. This is due to the fact that health and safety training could motivate workers to be safer and instruct them in correct safety behaviors (26). This study indicated that workers who took training on occupational health and safety were less likely to report occupational injury than their counter parts. This result was supported by studies done in Amhara regional state (27), Afar region, Tendaho (14) and Japan (16).

Working in the night shift had higher odds of occupational injury than that of day shift. This study is in line with a study done in Finland which identified

higher frequency of accidents during night shifts (17). This may be associated with minimal supervision during the night time, sleep disturbance, poor lighting in the work settings and fatigue among workers (26).

As limitation, it is important to mention lack of temporality as the design is cross-sectional and its small sample size which is revealed through relatively wide confidence interval.

Conclusions:

This study showed that the magnitude of work related injury was high. Cigarette smoking, alcohol consumption, number of working hours, working in the night shift, occupational health and safety training and use of PPE were found to be significantly associated factors with occupational injury.

According to the result most of identified factors are modifiable and preventable. Therefore, all sectors should be involved in different intervention programs to alleviate the problems. The zonal trade and industry office shall take the lion share in supervising the industries. Industries shall arrange trainings and orientation to raise safety awareness and consciousness.

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