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Small Scale Enterprise Workers Require Attention: What Predicts the Level of Occupational Injuries?

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ABSTRACT

BACKGROUND: Occupational injuries are among the foremost public health problems that small scale enterprise workers are encountering. Most foregoing occupational injury studies focused on construction or welding industry workers which could underestimate the real level of occupational injuries recorded in small scale enterprises. Conversely, others deal with a combined level of injuries from both small scale and large scale enterprises. Therefore, this study examined the magnitude and predictors of occupational injuries among various categories of small scale enterprise workers in Ambo town (Ethiopia).

METHODS: An institutional-based cross-sectional study was employed among 408 small scale enterprise workers from September to October 2021. A multivariable logistic regression analysis was computed to identify factors associated with occupational injuries. Variables with *P*-value less than .05 were considered as significantly associated with occupational injuries.

RESULTS: The 1-year prevalence of occupational injuries was 39.5% (95% CI: 35-44). Age greater than 40 years (AOR = 2.84, 95% CI: 1.53-5.28), working for more than 8 hours per day (AOR = 2.2, 95% CI: 1.61-4.95), working during the night time (AOR = 2.1, 95% CI: 1.22-3.47), lack of workplace supervision (AOR = 2.55, 95% CI: 1.23-5.28), alcohol use (AOR = 1.95, 95% CI: 1.24-3.06), chewing *khat* (AOR = 2.01, 95% CI: 1.27-3.2), non-utilization of personal protective equipment (AOR = 1.55, 95% CI: 1.03-2.87), and lack of health and safety training (AOR = 2.05, 95% CI: 1.26-4.37) were important predictors of occupational injuries.

CONCLUSIONS: Our findings indicated a substantial proportion of small scale enterprise workers experienced occupational injuries during the last year. Provision of health and safety training, continuous workplace supervisions, and provision and utilization of personal protective equipment are recommended.

KEYWORDS: Occupational injury, magnitude, small scale enterprise workers, workers health, Ethiopia

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Background

Occupational injuries are among the significant public health problems affecting millions of workers. The International Labor Organization (ILO) reported about 2.78 and 374 million fatal and non-fatal injuries, respectively per year globally.[1] Beyond mortality and morbidity, the global average economic loss due to occupational injuries was 4% of the Gross Domestic Product (GDP) in 2016.[2,3] The burden of occupational injuries, accidents, and diseases is high particularly among small scale enterprise workers.[4] As they may be less educated, unskilled, untrained, and inexperienced with the tools and machine, there is an increased risk of occupational injuries among small scale enterprise workers as compared with large scale enterprise workers.[4]

The prevalence of occupational injuries among small scale enterprise workers is reported to be 10 to 20 times higher in developing countries than the developed counterparts.[5] In African countries, where manufacturing is largely intense, the enforcement of occupational health and safety regulation is at its infancy which leads to greater magnitude and severity of occupational injuries.[6,7] For instance, studies conducted in Ghana[8] and Zimbabwe[9] reported prevalence of 40% and 41%, respectively. Indeed, the prevalence of occupational injuries could vary from place to place.

In Ethiopia, occupational injuries are also significant causes of mortality and morbidity among small scale enterprise workers.[4,10,11] Studies done in various parts of Ethiopia reported that the magnitudes of occupation injuries could be as high as 32.6% in Northeast Ethiopia,[10] 45.2% in Southwest Ethiopia,[12] 39% in Northwest Ethiopia,[13] and 30% in Southeast Ethiopia.[14] A systematic review and meta-analysis in Ethiopia also revealed a 44.7% prevalence of occupational injuries among small scale enterprise workers.[15]

Most of the previous studies conducted on occupational injuries emphasized on construction or welding industry workers which could underestimate the real level of occupational injuries recorded in small scale industries.[10,11,13,16-20] Conversely, others investigated the crude level of occupational injuries from both small scale and large scale industries.[21,22]

* These authors contributed equally to this work.

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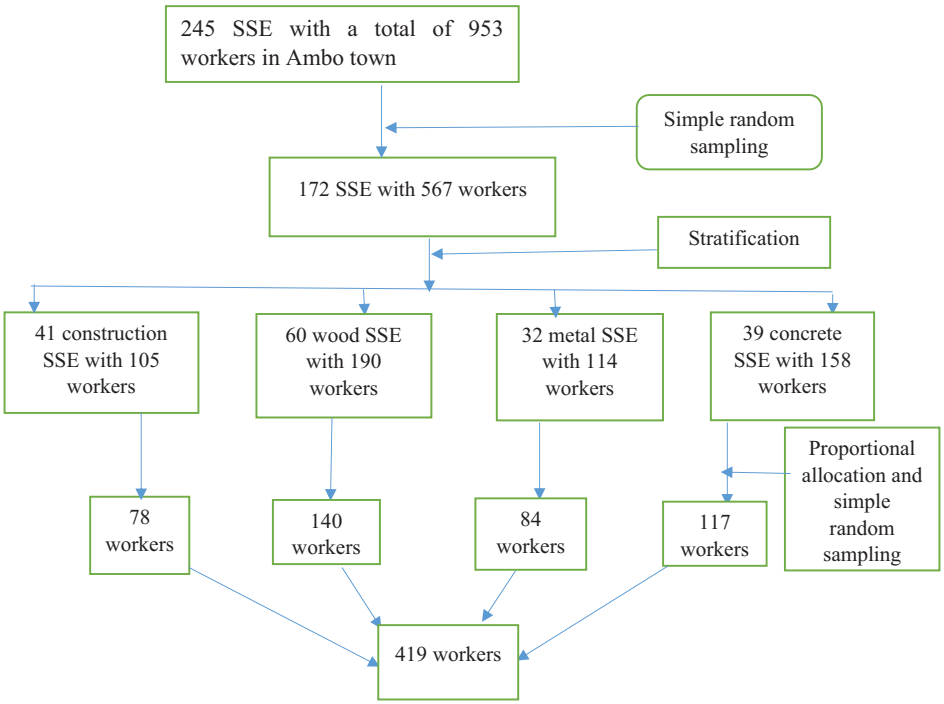

Figure 1. Sampling procedure for occupational injury and associated factors among small scale enterprise workers in Ambo town, Central Ethiopia, 2021.

Hence, considering various small scale enterprises including construction, furniture, metal workers, and concrete block construction workers will give a better estimate of occupation injuries among small scale enterprise workers. Therefore, this study aimed at determining the prevalence and predictors of occupational injuries among various small scale enterprise workers in Ambo town (Ethiopia). The findings of this study could help provide insights into possible intervention and appropriate control methods in the workplaces.

Methods and Materials

Study area

The study was conducted in Ambo town which is the capital of west showa zone of the Oromia regional state. It is located some 124 km from the Ethiopian capital (Addis Ababa) in the west direction. According to west showa zone administration office report, Ambo town has a total of 245 small scale enterprises with 953 workers. Of these small scale enterprises (SSE), 60 involve in wood industry, 32 in metal, 39 in concrete block construction, and 41 in construction activities.

Study design and period

An institutional-based cross-sectional study was conducted to assess the occupational injuries and associated factors among small scale enterprise workers in Ambo town from September to November, 2021.

Source and study population

All the 953 small scale enterprise workers in Ambo town were the source population of the study. The 567 workers employed in randomly selected 172 small scale enterprises were the study population (Figure 1). Selected workers who were directly engaged in the production process of small scale enterprises during the data collection period were the study units.

Inclusion and exclusion criteria

All workers who were directly engaged in the production process during the data collection period were included in the study, whereas newly recruited workers with less than 6 months of experience, workers who were not directly engaged in the production process (eg, administrative staff), and these absentees during the data collection were excluded from the study.

Sample size determination

The sample size was computed using a single population proportion formula:

$$n = \left(Z_{\alpha/2}\right)^2 p\,(1\text{-}p)/d^2$$

The assumptions of 95% confidence level ($Z\alpha_{/2} = 1.96$), proportion (p) of 1-year occupational injuries (45.2%), which was taken from a study conducted in Mizan Aman town,[12] and margin of error ($d = 5.0\%$) were considered. By adding a 10% of none-response rate, the final sample size becomes 419.

Sampling technique and procedure

From 245 small scale enterprises in Ambo town, 172 were selected randomly (lottery methods). The numbers of

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participants (workers) in small scale enterprises were surveyed prior to the study, and proportional allocation into different categories (wood works, metal works, concrete block works, and construction workers) was made (Figure 1).Whenever the SSE has 3 or less workers, all were included in the study. However, simple random sampling technique was employed when the SSE has more than 3 workers.

Data collection tool and procedure

The data was collected using pre-tested structured questionnaire which was adapted from several published articles.[4,10,11,15,17,18,22,23] The questionnaire was prepared in English, translated to the local language (Afan oromo) and then translated back to English to ensure consistence. The data was collected using face to face interview and observational checklist.

Data collectors and supervisors were trained on the objective of the study and methods of data collection for 2 days. Pretest was conducted among 20 SSE workers in Gudar town and amendment on the questionnaire was made before the actual data collection. Three BSc environmental health holders and 2 BSc public health supervisors were recruited for data collection. The completeness and consistency of the data was checked daily by the supervisors. To ensure the accuracy of the encoded data, 5% of the data was double-entered.

Statistical analysis

The collected data was checked, coded, and entered into Epidata version 3.1 and exported to SPSS version 25.0 for data cleaning and analysis. In order to identify factors associated with occupational injuries, first, bivariable logistic regression analysis with $P < .25$ was performed to screen candidate variables. Then, a multivariable analysis was used to control possible confounders. Adjusted odds ratio (AOR) and their 95% CI were used to measure the association between dependent and independent variables. A significance level of $P < .05$ was used to decide the significance of statistical tests. Multi-collinearity among the independent variables was carried out using standard error. As the maximum standard error was 1.95, there was no multicollinearity. The model fitness was checked by Hosmer-Lemeshow test. As the *P*-value was .275, the model was considered as fit.

Study variables

The outcome variable for this study was occupational injury (Yes or No) and the independent variables were socio-demographic characteristic (age, sex, salary, experience, educational level, etc), working environment and behavioral factors (working hour, work place supervision, personal protective equipment (PPE) use, alcohol use, *khat* chewing, job satisfaction, etc) (Supplemental Appendix 1).

Operational definition

Occupational injuries include injuries that occurred due to incidents at the workplace during the past 1 year; and those injured workers should have been away from work at least 1 day because of the injury, in addition to the day of the incident.[24,25] Occupational injuries were considered severe when characterized by death, hospitalization for more than 24 hours, and absence from work over 3 days in the last 1 year.[26,27]

Ethical consideration

All methods, including ethical approval and research permission, were performed in accordance with national standards, guaranteeing the anonymity of the respondents. Written consents were obtained from the managers of each small scale enterprise. Besides, respondents were informed about the purpose of the study, and their informed consent was obtained.

Results

Socio-demographic characteristics of the respondents

Of 419, a total of 408 respondents have participated giving a response rate of 97.4%. More than one-third of the respondents (42.6%) were within the age group of 30 to 39 years and the great majority of the workers (97.8%) had less than 5 year experience in the same work. This study indicated that 65.4% of the workers were employed in the enterprises temporarily. Workers job category showed that 109 (26.7%) were concrete and block manufacturing workers, 91 (22.3%) were metal workers, 173 (42.4%) were wood workers, and 35 (8.6%) were construction workers (Table 1).

Working environment and behavioral factors

The current study revealed that about half of the workers were working more than 8 hours per day. From the total study participants, about two-thirds (64.9%) had not received any health and safety training and 51% of them did not use personal protective equipment while working. Similarly, 51.7% and 53.9% of the workers use alcohol and chew *Khat*, respectively (Table 2).

Prevalence of occupational injuries

In the current study, the prevalence of occupational injuries in the last 12 months was 39.5% (95% CI: 35-44). Of these, 71 (44.1%) of them were injured more than once. The prevalence of occupational injuries varied among the different categories of small scale enterprises; being 53.3% (wood), 39.4% (concert and block), 33.3% (metal), and 21.8% (construction). In relation to types of occupational injuries, more than half (52.2%) of the workers experienced laceration or punctures followed by eye injury (16.1%) and electrocution (14.3%). Among the 161

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Table 1. Socio-demographics characteristics of small scale industry workers (n = 408) in Ambo town, Central Ethiopia, 2021.

VARIABLES	FREQUENCY (N)	PERCENTAGE (%)
Age (years)		
20-29	152	37.2
30-39	174	42.6
⩾40	82	20.2
Sex		
Female	198	48.5
Male	210	51.5
Experience in the same work (year)		
⩽5	399	97.8
>5	9	2.2
Type of SSE		
Concrete and block	109	26.7
Wood	137	33.6
Metal	84	20.6
Construction	78	19.1
Marital status		
Single	134	32.8
Married	235	57.6
Educational status		
Cannot read and write	205	50.2
Elementary (1-8 grade)	118	28.9
High school (9-12 grade)	77	18.9
Diploma and above	8	2
Type of employment		
Permanent	141	34.6
Temporary	267	65.4
Monthly income		
<1000 ETBr	114	27.9
⩾1001 ETBr	294	72.1

Table 2. Working environment and behavioral factors among small scale enterprise workers (n = 408) in Ambo town, Central Ethiopia, 2021.

VARIABLES	FREQUENCY (N)	PERCENTAGE (%)
Working per day (hour)		
>8	208	50.9
⩽8	200	49.1
Workplace supervision		
Yes	58	14.2
No	350	85.8
Alcohol user		
Yes	211	51.7
No	197	48.3
Khat chewing		
Yes	220	53.9
No	188	46.1
Smoking cigarette		
Yes	2	0.5
No	406	99.5
Use PPE*		
Yes	200	49
No	208	51
Work during night time		
Yes	93	22.8
No	315	77.2
Health and safety training		
Yes	143	35.1
No	265	64.9
Job satisfaction		
Yes	198	48.5
No	210	51.5

*PPE represents personal protective equipment (glove, safety shoes, goggle, and uniform).

workers who experienced injury, 72 (44.7%) suffered severe injury (Table 3).

Factors associated with occupational injuries

In the multivariable logistic regression analysis, age of the participants, absence of workplace supervision, working hour per day, working during the night shift, alcohol user, *khat* chewing, non-utilization of PPE, and lack of health and safety training were significantly associated with the occurrence of occupational injuries (Table 4). The odds of occupational injuries were 2.2 times higher among those who had a history of work engagement for more than 8 hours per day than others (AOR = 2.2, 95% CI: 1.61-4.95). Similarly, workers who had no workplace supervision were 2.5 times more likely to experience occupational injury than workers who

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Table 3. Prevalence and types of occupational injuries among small scale enterprise workers in Ambo town, Central Ethiopia, 2021.

VARIABLES	FREQUENCY	PERCENTAGE (%)
Injury experience in last 12 months		
Yes	161	39.5
No	247	60.5
Frequency of injuries		
Once	90	55.9
Twice or more	71	44.1
Types of injuries (n = 161)		
Laceration or punctures	84	52.2
Eye injury	26	16.1
Electrocution	23	14.3
Cut	16	9.9
Fractures	7	4.4
Dislocation	5	3.1
Severity of injuries		
Mild	89	55.3
Severe	72	44.7

had workplace supervision (AOR = 2.55, 95% CI: 1.23-5.28). Workers who had no health and safety training were also 2 times more likely to be occupationally injured than workers who attended training (AOR = 2.05, 95% CI: 1.26-4.37).

The likelihood of occupational injuries was almost 2 times higher among workers who consumed alcohol than workers who did not consume alcohol (AOR = 1.95, 95% CI: 1.24-3.06). Once more, workers who did not use personal protective equipment were 1.5 times more likely to face occupational injuries than their counterparts (Table 4).

Discussion

The aim of this study was to assess the prevalence of occupational injuries and associated factors among small scale enterprise workers in Ambo town, Central Ethiopia. In the present study, the prevalence of occupational injuries in the last 12 months was 39.5% (95% CI: 35-44) which was comparable with the findings of other previous studies done in Ghana (40%),[8] Zimbabwe (41%),[9] Southeast Ethiopia (43.2%),[14] Ethiopia (44.7%),[15] Egypt (46.2%),[20] Japan (44.2%),[28] and Colombo (43.7%).[29] On the other hand, our finding was greater than these reported in Northeast Ethiopia (32.6%),[10] Addis Ababa (14.7%),[22] Southern Ethiopia (31.4%),[23] Norway (31.7%),[30] Nigeria (13.5%),[31] and Brazil (5.6%).[32] However, the figure reported in the present study was lower than the study findings in Uganda (87.9%),[16] India (49.7%),[33] and Iran (75.4%).[34] These disparities might be subjected to variations in socio-economic, demographic, and behavioral characteristics of the study participants, and institutional (enterprises) setups.

The burden of occupational injuries varied among small scale enterprises. These in the wood industry were most exposed, which is congruous with other finding reported in Northern Ethiopia.[4] Once more, nearly half of the small scale enterprise workers had experienced occupational injuries 2 and more times. Our finding is far greater than the report from Addis Ababa, which found that only 3.2% of workers got injured twice or more.[22] This difference might be associated with the fact that the present study included various small scale enterprises and the location of our study area, which is a small town compared to Addis Ababa.

The present study indicated that the risk of occupational injury increases with age of the workers. Another study conducted in Gondar (Ethiopia) also reported that older workers, compared with the youngsters, are more susceptible to occupational injury.[18] Aging process encompasses series of physiological changes to the body that could make construction, wood, cement, and metal tasks very difficult for older people. The strength of a person to carry out physically demanding tasks effectively reduce as one gets older.

Furthermore, this study indicated that the odds of experiencing occupational injury were almost 2 times higher among those who work for more than 8 hours per day than those who work for less than or equal to 8 hours per day. This is consistent with other findings reported in Northern Ethiopia,[4] Southwest Ethiopia,[12] USA,[35] Bangladesh,[36] and Nigeria.[37] The possible explanations include stress, loss of attention, and drowsiness, which could increase the chance of errors, risky behaviors, and hence poor compliance with the safety procedures.

Workplace supervision was also identified as an important predictor of occupational injury. In our study, those workers who did not follow any supervision were 2.55 times more likely to be occupationally injured than others. This finding is similar with studies done in Southwest Ethiopia,[12] Northern Ethiopia,[21] and Southern Ethiopia.[23] This could be related with the fact that regular workplace supervisions could inform workers about health and safety, and help easily identify workplace hazards.[23]

The occurrence of occupational injury was significantly associated with occupational health and safety training. The odds of occupational injury were 2 times higher among workers who had no training about occupational health and safety than workers who attended training. This is really alarming as 64.9% of the workers in this study reported the absence of occupational health and safety trainings. This result was consistence with other studies done in Dessie,[10] Gondar,[13] Kenya,[38] and Iran.[39] The findings generally suggest the importance of regular trainings in enhancing the skills of industry workers, and hence potentially reducing occupational risks.

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Table 4. Factors associated with occupational injuries among small scale enterprise workers (n = 408) in Ambo town, Central Ethiopia, 2021.

VARIABLE	OCCUPATIONAL INJURIES		COR (95% CI)	AOR (95% CI)	*P*-VALUE
	YES (N)	NO (N)			
Age (years)					
⩾40 and above	48	34	2.32 (1.33-4.02)	2.84 (1.53-5.28)	<.0001
30-39	58	116	0.84 (0.53-1.32)	0.8 (0.48-1.32)	.38
20-29	58	94	1	1	
Working hour per day					
>8	78	130	1.9 (1.44-3.98)	2.2 (1.61-4.95)	.03
⩽8	95	105	1	1	
Work during night time					
Yes	46	47	1.7 (1.06-2.71)	2.1 (1.22-3.47)	.006
No	115	200	1	1	
Workplace supervision					
Yes	14	44	1	1	.01
No	147	203	2.27 (1.2-4.3)	2.55 (1.23-5.28)	
Alcohol user					
Yes	98	113	1.84 (1.23-2.76)	1.95 (1.24-3.06)	.003
No	63	134	1	1	
Chewing *Khat*					
Yes	76	144	1.56 (1.04-2.33)	2.01 (1.27-3.2)	.003
No	85	103	1	1	
PPE use					
Yes	89	111	1	1	.01
No	72	136	0.65 (0.43-0.98)	1.55 (1.03-2.87)	
Health and safety training					
No	92	173	1.74 (1.15-2.63)	2.05 (1.26-4.37)	.004
Yes	69	74	1	1	

1, reference category, COR, crude odds ratio; AOR, adjusted odds ratio; PPE, personal protective equipment.

Once more, workers who consume alcohol and chew *khat* were about 2 times more likely to be occupationally injured as compared to their counterparts. This is possibly associated with the effects of addiction-associated negligence and carelessness to avoid injuries. Similar findings were also reported in southern Ethiopia[40] and northwest Ethiopia.[41]

Our results revealed that workers who did not use personal protective equipment were 1.5 times more likely to experience occupational injury as compared to their counterparts. Other studies conducted in northern Ethiopia,[4] Dessie (Ethiopia),[10] Addis Ababa,[11] Southeast Ethiopia,[14] Kenya,[38] and Pakistan[42] also reported the importance of PPE in reducing occupational exposures. This is associated with the fact that whenever workers do not use PPE due to absence of supply or discomfort, they will become more prone to occupational exposures and injuries.

Limitations of the Study

As this cross-sectional study was based on self-reported occupational injuries, the results were possibly liable to social desirability and recall biases. Detailed analysis of ergonomic injuries is also not included. In addition, as ordinary logistic regression

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might have overestimated the association, generalized linear modeling with modified Poisson regression and robust variance would have been the most appropriate analysis.

Conclusions

More than one-third of the small scale enterprise workers experienced occupational injuries during the last year. The highest prevalence of occupational injuries was observed among wood workers. Being aged (older than 40 years), working for more than 8 hours per day, working during the night time, lack of workplace supervision, addiction (alcohol use and *khat* chewing), non-utilization of PPE, and lack of health and safety training were found to significantly increase the likelihood of occupational injuries. Therefore, the enterprise owners and other stakeholders should provide continuous health and safety training and personal protective equipment for workers with regular workplace supervision. Working load should also be considered to reduce the risk of occupational injuries. Workers should also properly utilize personal protective equipment and keep themselves away from alcohol and *Khat* addictions. In a wider context, labor policies – including regulatory frameworks to inspect working conditions – and social dialogs among small scale enterprises and employees are recommended.

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Author Contributions

CD and MG developed the proposal, analyzed data, designed the methods, and prepared the first draft of the manuscript. AA involved in conceptualization and manuscript editing. All authors read and approved the final version of the manuscript.

Data Availability Statement

Datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Ethical Approval and Consent to Participate

All methods, including ethical approval and research permission, were performed in accordance with national standards, guaranteeing the anonymity of the respondents. Written consents were obtained from the managers of each small scale enterprises. Besides, respondents were informed about the purpose of the study, and their informed consent was obtained.

Supplemental Material

Supplemental material for this article is available online.

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