Occupational Medicine & Health Affairs
ISSN: 2329-6879

Gebremichael, et al., Occup Med Health Aff 2015, 3:6
DOI: 10.4172/2329-6879.1000222

Research Article Open Access

The Prevalence and Associated Factors of Occupational Injury among Workers in Arba Minch Textile Factory, Southern Ethiopia: A Cross Sectional Study

Gebrekiros Gebremichael[1*], **Abera Kumie**[2] **and Dessalegn Ajema**[1]

[1]*College of Medicine and Health Sciences, Arba Minch University P.o,Box. 21, Arba Minch, Ethiopia*

[2]*School of Public Health, Addis Ababa University, P.O.Box: 9086, Addis Ababa, Ethiopia*

[*]**Corresponding author:** Gebremichael G, College of Medicine and Health Sciences, Arba Minch University P.o,Box. 21, Arba Minch, Ethiopia, E-mail: kirosalma@gmail.com

Rec date: Nov 2, 2015**; Acc date:** Dec 1, 2015**; Pub date:** Dec 8, 2015

Abstract

Background: Occupational accidents and work-related diseases cause over 2.3 million deaths annually; nearly 860,000 people are injured every day globally. There are limited studies that specifically determine the magnitude and associated factors of occupational injury in textile workers done in Ethiopia. Therefore, this study aimed to assess the prevalence and associated factors of occupational injury in Arba Minch Textile Factory workers.

Methods: An institution based cross-sectional study design was implemented from March 3 to March 20, 2015 among selected 433 Arba Minch Textile Factory workers. An Amharic version pre-tested questionnaire and observation checklist were used to collect the data using trained six data collectors and two supervisors. Data was entered into Epi Info version 7 templates, cleaned and analyzed using SPSS Version 21 software. Bivariate logistic regression was used to explore the relation between the dependent and independent variables using crude odds ratio with 95% C.I. Finally, to determine the independent factors associated with occupational injury, multivariate logistic regression model with hierarchical entry of variables was done. Variables with P-value <0.05 in the final model were considered statistically significant.

Results: The one year prevalence of occupational injury was 31.4%. Lower monthly salary was associated with higher odds of injury among the socio-demographic factors [AOR (95%C.I): 3.5(1.7, 7.2)]. Work environment related factors like extra hour duty, health and safety training and workplace supervision had significant association after adjusting all factors [AOR (95%C.I): 2.5 (1.2, 5.4), 0.4 (0.17, 0.97), and 0.36 (0.17, 0.75) respectively]. Among the behavioral factors, Personal Protective Equipment use and job stress showed association with injury significantly.

Conclusion: The significant prevalence and associated factors of occupational injury in the factory workers should alert the factory, governmental and non-governmental organizations working on Occupational Health and Safety.

Keywords: Occupational injury; Prevalence; Factors; Textile factory

Introduction

Occupational injury is any personal injury, disease or death resulting from an occupational accident sustained on worker in connection with the performance of his or her work. An occupational injury may be any kind of wound, and can range from a minor injury, such as a bruise, scrape or cut, to more severe injuries such as shock, concussion, loss of a limb or an eye, fractured bones, suffocation, poisoning or an illness such as cancer resulting from a single accidental exposure to radiation [1].

The International Labour Organization (ILO) estimates that over 2.3 million annual deaths occur due to occupational accidents and work-related diseases, of which over 350,000 are caused by occupational accidents. Consequently, occupational accidents take lives of nearly 1000 people daily respectively. In 2010, there were over 313 million non-fatal occupational accidents (requiring at least four days of absence from work), meaning that nearly 860,000 people are injured every day globally [2,3].

Globally, the ILO estimates that around 4 percent of the world's gross domestic product (GDP), or about US $2.8 trillion, is lost annually in direct and indirect costs owing to occupational accidents and work-related diseases [4]. According to the U.S. Bureau of Labor Statistics, the rate of nonfatal occupational injury and illness cases was 112 cases per 10,000 full-time workers in 2012, down from 117 in 2011, in which 34 percent of the injuries and illnesses were musculoskeletal [5] Textile industry was the second largest sector with a high percentage of work-related injuries, accounting for 28.7%, following the metal industry and machinery in Turkey [6].

Sub-Saharan Africa appears to have the greatest rate per worker of occupational injuries followed by Asia (excluding China and India) [7]. According to the Central Statistical Agency (CSA) reports, in Ethiopia, the textile industry accounts for 1.7%-2.13% of the major industries and 8%-12.1% of the persons engaged in work [8,9]. There are particularly serious data limitations in the area of work-related

diseases and occupational accidents, especially in developing countries. This is due to factors including long latency of many diseases before the symptoms are detected and the weakness in the national capacity for identification, diagnosis and compensation of occupational diseases [2].

The textiles sector poses many hazards that can cause injury to workers, from transport in the workplace, exposure to excessive noise and harmful substances, dangerous large work equipment and plant, risk of slips from a wet working environment, manual handling and working with unsafe machinery, to risks of fire and explosions [10]. In Ethiopia, traditional weavers had poor working conditions and environment, and weavers and owners of the small-scale enterprises were not aware of the benefits of improving working conditions, occupational safety and occupational health [11]. A higher prevalence (36.9%) of occupational injury was observed among textile factory workers in Northern Ethiopia [12].

Occupational injuries result from interplay of complex various risk factors. The leading causes of work-related injuries globally include exposure to physical, mechanical and chemical hazards, and unsafe practices. Besides, socio-demographic characteristic of workers, work arrangements, environmental, psychosocial factors, and social conditions are other potential factors associated with occupational injuries [13-17]. Geographical differences in work injuries also suggest that wider determinants of work injuries are functioning across workplaces at a geographic level [13].

Although some studies are done on the factors like socio-demographic, work environment and behavioral, affecting occupational injuries among textile workers in few factories in Ethiopia [16,18], information on occupational health and safety in textile industry is still minimal. Furthermore, there are limited studies that specifically determine the magnitude and associated factors of the problem in textile workers. Therefore, the main aim of this study was to assess the prevalence and associated factors of occupational injury in Arba Minch Textile workers.

Methods

Study design and setting

An institution based cross-sectional study design was implemented in Arba Minch Textile Factory, which is located 450 km south West of Addis Ababa and about 275 km far from Awassa, in Arba Minch town, the capital of Gamo Gofa zone. Arba Minch Textile Factory is established in 1991 with 1500 workers, during the data collection period it is operating with about 581 workers. There is an insurance mechanism for workers that may be injured during work in the factory. The factory owns a clinic which is functional for 24 hours a day inside its compound. The factory uses cotton to manufacture towels and bed sheets for export. The factory production process flow includes: the cotton passes the blowing and feeding processes in carding section. Then proceed to drawing, roving, ring frames, and open end (winding). Finally, it is warped, sized, and checked for quality through brushing and folding in the weaving department.

Sample

The production workers involved in weaving, spinning, finishing and engineering works in Arba Minch Textile Factory were the study populations. Permanent workers in the factory who worked for at least one year in the factory were included, whereas, workers involved in office and managerial activities were excluded.

The total sample size was calculated for each specific objective by using Epi Info version 7 and considering different parameters, and the largest sample size was taken. Considering 95% confidence level, 5% margin of error and 36.7% proportion of occupational injury [12], and adding 10% non-response a sample size of 394 was calculated. Finally, since the total eligible number of workers was not much different from the calculated sample size (394), all eligible workers (441) were included.

Data collection procedures

The study used a standard structured questionnaire adapted from occupational injury statistics and different relevant literature on occupational injury [14-21] with required modifications based on the research objectives. The questionnaire was prepared in English and translated by language experts to the local language (Amharic) and then back translated to English by another person to insure its consistency. It had socio-demographic, work environment related factors, and workers behavioral factors sections. It had both open-ended questions and questions with options. Pretest was conducted prior to the actual data collection on a Small and Micro Enterprise making cultural cloths in Arba Minch town. Interview was conducted at the workplace by the data collectors.

An observational checklist for inspecting hazards in working environment, adapted from various studies, was also used. The checklist contained identification of general hazards in the working environment, presence of health and safety regulations, personnel and trainings, as well as first aid equipment in the working sections. Six trained data collectors with BSc in public health officer background, and two supervisors qualified with masters of public health was recruited to collect data and supervise the data collection process.

Data analysis procedures

Data was coded, stored in a proper area and kept confidential. Then it was entered into a prepared Epi info template. The data was exported to SPSS version 21 for cleaning and analysis. The data was cleaned by running simple frequency and cross tabulation to check for completeness and consistency, and sorting to identify outliers.

For specific objective one, descriptive statistical methods such as frequencies, percentages, proportion with 95% C.I, and mean and standard deviation were used to summarize the socio-demographic, work environment and behavioral characteristics of the workers.

For specific objective two, cross tabulation and bivariate logistic regression was used to explore the relation between occupational injury and the different independent variables using crude odds ratio (COR) with 95% C.I.

Finally, to determine the independent factors associated with occupational injury, multivariable logistic regression model with hierarchical entry of variables was done. To limit the number of variables and unstable estimates in the subsequent models, only variables with P-value <0.3 in the bivariate analysis were taken to the regression model. In the first model, the effect of socio-demographic factors on occupational injury was assessed. In the second model, work

environment related factors were included, and their effect was examined in the presence of socio-demographic factors. Finally, behavioral factors were added to explore their effect in the presence of socio-demographic and work environment related factors, in the final model.

Model fitting was checked using log likelihood, and Hosmer-Lemeshow goodness of fit test. Finally, variables with P <0.05 in the multivariate analysis were considered significant, and presented by Adjusted Odds Ratio (AOR) with 95% C.I.

Data quality assurance

The quality of the data was maintained before, during and after the data collection. Before the data collection designing/adapting structured standard questionnaire, two days training of data collectors and supervisors about the objective, questionnaire, methodology and ethical issues of the study, and pre-testing of the questionnaire was undertaken. During the data collection period, the collected data was checked for completeness and consistencies by the supervisors and the investigator through close follow up. Missed variable/s during the first visit was filled by re-interviewing the study participants.

After the data collection, the collected data was rechecked for its completeness and consistency by the supervisors and principal investigator. Then, it was entered into Epi Info Version 7, then 5% of the data set was double entered to check the accuracy of the entered data.

Ethical consideration

An ethical clearance and official letter was obtained from the Research and Ethical Committee of School of Public Health, Addis Ababa University. Permission was asked from the Arba Minch Textile Factory. Informed verbal consent was obtained from each participant after a necessary explanation about the purpose, benefits and risks of the study and also their right on decision of participating in the study. The study participants were clearly informed that there is no any direct financial benefit and risk, but the study findings would be used to design and implement prevention control strategies in the textile factories in the future, and occupational health and safety education will be given accordingly. Workers found injured during the data collection were advised to visit health institution earlier. Finally, anonymity and confidentiality was secured by omitting participant`s name in the questionnaire and during interview.

Results

A total of 433 study participants, out of the 441 workers were involved in this study, yielding a 98% response rate.

Socio-demographic characteristics

Majority of the participants were males (57.7%), married (67.7%), with secondary educational status (56.6%) and permanently employed (84.5%). The mean ± SD age of the respondents was 37.48 ± 9.1 with 22 and 65 the minimum and maximum years respectively. The mean monthly salary of the workers was ETB 1431, and most of the workers (78.8%) had work experience of six years and above (Table 1).

Characteristics	Frequency (n=433)	Percent
Sex		
Male	250	57.7
Female	183	42.3
Age group		
22-29	118	27.3
30-44	206	47.6
45+	109	25.2
Mean ± SD	37.48 ± 9.1	
Marital status		
Not married	129	29.8
Married	293	67.7
Divorced/Widowed	11	2.5
Educational status		
Unable to read and write	4	0.9
Able to read and write	13	3
Primary Education	22	5.1
Secondary Education	245	56.6
College and above	149	34.4
Employment status		
Permanent	366	84.5
Contract	67	15.5
Monthly salary		
≤ETB 1431	287	66.3
≥ETB 1432	146	33.7
Work experience		
≤5 years	92	21.2
≥6 years	341	78.8

Table 1: Socio-demographic Characteristics of Participants Arba Minch Textile Factory, Ethiopia, March, 2015.

Characteristics of occupational injury

The one year occupational injury prevalence was 136 (31.4 percent: 95% C.I; 27, 35.8), and the two weeks prevalence was 39 (9%: 95% C.I; 6.3, 11.7).

Twenty nine percent of the injured workers sustained injury more than once, yielding a median number of injuries one times. Hand was the most affected body part 54 (39.7%) with laceration 75 (55.1%) and machinery 76 (56%) the major type and cause of injury respectively (Table 2).

Characteristics	Frequency	Percent
Body Part affected (n=136)		
Hand	54	39.7
Knee	18	13.2
Chest	14	10.3
Fingers	14	10.3
Toe	12	8.8
Eye	8	5.9
Tooth	7	5.1
Leg	5	3.7
Head	4	2.9
Type of Injury (n=136)		
Laceration	75	55.1
Cut	41	30.1
Dislocation	11	8.1
Eye injury	7	5.2
Fracture	2	1.5
Cause of Injury*		
Machinery	76	55.9
Falling Accident	26	19.1
Hit by Objects	12	8.8
Hand Tools	12	8.8
Splinting	10	7.3
Heavy Objects	8	5.9
Electricity	8	5.9
Fire	4	2.9
*The total frequency and percent exceeds 136 and 100 respectively, due to multiple responses.		

Table 2: The affected body parts, Type and Causes of Injury of Participants, Arba Minch Textile Factory, Ethiopia, March, 2015.

Regarding to the reasons of injury, absence of Personal Protective Equipment (PPE) 84 (61.8%) was the commonest reason given followed by improper hand working instruments 19 (14%), absence of safety education 14 (10.3%), disorder of normal operation 11 (8.1%), and misuse of PPE 8 (5.9%) respectively.

Significant amount 29 (21.3%) of the injuries occurred in Monday, Saturday 23 (16.9%), Tuesday 20 (14.7%), Friday 19 (14%), Sunday 15 (11%) and the rest 30 (22%) did not remember the exact day of injury. Regarding the time of injury, fifty one (37.5%) happened in the afternoon, while 35 (25.7%), 23 (17%), and 9 (6.6%) injuries occurred during morning, night, and evening respectively. Whereas, 18 (13.2%) injured respondents did not remember the actual time of injury.

Thirty five (25.7%) injured respondents were hospitalized for 619 days resulting in an average of a month working days lost per worker. Likewise, a total of 2,124 working days were lost due to injuries yielding an average of 16 days lost per worker per year, as confirmed from the factory`s report of sick leaves.

Work environment and behavioral characteristics

Almost all of workers 428 (98.8%) spent more than four hours per day in their work, moreover, 395 (91.2%) and 38(8.8%) respondents work for 48 hours or less, and more than 48 hours per week respectively. Two hundred and ninety six (68.4%) participants reported that there was no regular workplace supervision, but the other 137 (31.6%) had weekly 88 (20.3%), fortnightly 14 (3.2%), monthly and more 35 (8.1%) supervision. Two hundred and sixty (60%) workers did not involve in manual handling activities, whereas, the other 173 (40%) involved in manual handling activities.

Behavioral characteristics

Three hundred and thirty four (77%) workers encountered sleeping disturbance. Working in evening shift 239 (71.6%) was the major reason of the sleeping disturbance followed by working for more than 8 hours without shifting 42 (12.6%). Respecting to PPE use, 344 (79.4%) participants did not use PPE at all, where by lack of protective equipment 287 (83.4%) was the major reason of not using PPE in the factory workers (Table 3).

Characteristics	Frequency	Percent
Reason of sleeping disturbance (n=334)		
Working more than 8 hours without shifting	42	12.6
Working in evening	239	71.6
More than one task at a time	32	9.6
Excessive heat	21	6.3
Reason for not using PPE (n=344)		
Lack of protective equipment	287	83.4
Lack of safety and health education	25	7.3
Not comfortable to use	21	6
Create safety and health hazards	6	1.8
Other	5	1.5
*other: Decrease work performance, Create safety and health hazards		

Table 3: Reasons of Sleeping Disturbance and Not Using PPE of the Participants, Arba Minch Textile Factory, Ethiopia, March, 2015.

Work environment observation

Inspection of the selected work environments of Arba Minch Textile Factory had identified variant occupational health and safety findings such as excessive dust, dust, and temperature. The observation also revealed that training needs in connection with new employment, equipment or other changes had not been taken into account. Besides, first aid equipment, warning signs and safety rules were available in none of the working sections.

Factors Associated with Occupational Injury

Bivariate analysis

Socio-demographic factors: The bivariate logistic analysis of socio-demographic characteristics with occupational injury revealed that only age category is significantly associated, while monthly salary was marginally significant. Sex, marital status, educational level, employment condition, and work experience did not show significant association with occupational injury (Table 4).

Socio-demographic Factors	Occupational Injury		COR1 (95% C.I)	P-value
	Yes	No		
Sex				
Male	74	176	0.8(0.55,1.24)	0.34
Female	62	121	1	
Age category				
≤29	25	93	0.49(0.3,0.8)*	0.006
30+	111	204		
Marital status				
Not married	90	39	0.36(0.1,1.25)	0.1
Married	91	202	0.37(0.11.26)	0.1
Divorced/widowed	6	5	1	
Educational status				
Primary	16	23	1.8(0.88,3.8)	0.1
Secondary	79	166	1.25(0.8,1.96)	0.3
College and above	41	108	1	
Monthly salary				
≤ETB 1431	99	188	1.5(0.99,2.4)	0.05
≥ETB 1432	37	109	1	
Employment condition				
Permanent	113	253	0.85(0.5,1.5)	0.58
Contract	23	44	1	
Work experience				
≤5 years	25	67	0.77(0.46,1.29)	0.33
≥6 years	111	230	1	
*-significant association; 1- Crude Odds Ratio				

Table 4: Bivariate analysis of Socio-demographic Factors of Participants Associated with Occupational Injury, Arba Minch Textile Factory, Ethiopia, March, 2015 (n=433).

Work Environment Related Factors: Out of the selected work environment related factors, working hours, extra hour duty, health and safety training, workplace supervision, and manual handling of materials, had significantly associated with occupational injury. However, working department and working shift did not show significant association (Table 5).

Work environment related Factors	Occupational Injury		COR1 (95% C.I)	P-value
	Yes	No		
Working department				
Spinning	82	154	0.76(0.37,1.6)	0.47
Weaving	40	123	0.47(0.22,1)	0.05
Engineering	14	20	1	
Working shift				
Day	13	15	1.98(0.9,4.3)	0.07
Rotating and Irregular	123	282	1	
Working Hours				
≤ 48 hours	118	277	0.47(0.24,0.93)*	0.03
>48 hours	18	20	1	
Extra Hour				
Yes	59	50	3.8(2.4,6)*	<0.0001
No	77	247	1	
Health and safety training				
Yes	63	82	2.3(1.5,3.5)*	0.0001
No	73	215	1	
Workplace supervision				
Yes	31	106	0.53(0.34,0.85)*	0.008
No	105	191	1	
Manual Handling Activities				
No	43	217	1	<0.0001
Light	8	38	1.06(0.46,2.44)	0.89
Medium	18	8	11.4(4.64,27.8)*	<0.0001
Heavy	4	17	1.2(0.38,3.7)	0.77
Very Heavy	63	17	18.7(10,35)*	<0.0001
*Significant association; 1 Crude Odds Ratio				

Table 5: Bivariate analysis of work environment related factors of participants associated with occupational injury, Arba Minch Textile Factory, Ethiopia, March, 2015 (n=433).

Behavioral Factors: Khat chewing, cigarette smoking, PPE use and job satisfaction did not show significant association, while, alcohol consumption, sleeping disturbance problem, harassment/disagreement with managers/colleagues, and job stress showed significant association, with injury (Table 6).

Behavioral Factors	Occupational Injury		COR1 (95% C.I)	P-value
	Yes	No		
Alcohol consumption				
Yes	45	59	1.99(1.26,3.15)*	0.003
No	91	238	1	
Khat chewing				
Yes	30	51	1.36(0.82,2.26)	0.23
No	106	246	1	
Cigarette smoking				
Yes	20	32	1.43(0.78,2.6)	0.25
No	116	265	1	
Sleeping disturbance				
Yes	115	219	1.95(1.15,3.3)*	0.01
No	21	78	1	
Job Satisfaction				
Yes	45	104	0.92(0.6,1.4)	0.7
No	91	193	1	
Job stress				
Yes	58	52	3.5(2.23,5.5)*	0.001
No	78	245	1	
PPE use				
Yes	31	58	1.2(0.74,2)	0.29
No	105	239	1	
Harassment/Disagreement				
Yes	51	63	2.23(1.43,3.5)*	<0.0001
No	85	234	1	
*Significant association; 1 Crude Odds Ratio				

Table 6: Bivariate analysis of behavioral factors of participants associated with occupational injury, Arba Minch Textile Factory, Ethiopia, March, 2015 (n=433).

Multivariate logistic regression

After the bivariate logistic regression was done for each variable, to limit the number of variables and unstable estimates in the subsequent models, only variables with P-value <0.3 were taken to a multivariate regression model hierarchically. In the first model, the effect of socio-demographic factors on occupational injury was assessed. In the second model, work environment related factors were included, and their effect was seen in the presence of socio-demographic factors. Finally, behavioral factors were added to explore their effect in the presence of socio-demographic and work environment related factors, in the final model.

In the final model, some socio-demographic factors (monthly salary), work environment related factors (extra hours duty, health and safety training, and regular workplace supervision and manual handling of very heavy objects), and behavioral factors (PPE use and job stress) showed significant association with occupational injury (Table 7).

Factors	**Adjusted OR with 95% C.I**		
	Model 1a	Model 2b	Final Model c
Age Group			
≤ 29: 30+#	0.2(0.09,0.5)*	0.24(0.08,1.2)	0.25(0.08,1.3)
Marital Status			
Not married	0.8(0.2,3.2)	0.6(0.1,3.4)	1.1(0.18,6.4)
Married	0.32(0.09,1.1)	0.3(0.05,1.5)	0.4(0.08,2.1)
Divorced/widowed	1	1	1
Educational Status			
Primary	1.3(0.56,2.8)	2.1(0.8,6)	2.1(0.7,6)
Secondary	0.88(0.5,1.5)	0.9(0.4,1.8)	0.9(0.4,1.9)
College and above	1	1	1
Monthly Salary			
ETB≤1431:≥1432#	1.6(0.9,2.6)	3.4(1.7,6.7)*	3.5(1.7,7.2)*
Working Department			
Spinning		8.7(0.4,182)	13(0.6,273)
Weaving		4.5(0.2,95)	3.6(0.3,126)
Engineering		1	1
Working Shift			
Day		14(0.6,352)	26(1.04,658)**
Rotating and Irregular		1	1
Working Hours			
≤ 48hours:>48hrs#		0.6(0.2,1.8)	0.77(0.25,2.3)
Extra Hour			
Yes :No#		2.5(1.2,5.4)*	4.1(1.7,9.8)*
Training			
Yes :No#		0.6(0.3,1.3)	0.4(0.17,0.97)*
Supervision			
Yes :No#		0.4(0.2,0.8)*	0.36(0.17,0.75)*
Manual Handling			
No		1	1
Light		0.67(0.2,1.9)	0.46(0.15,1.45)
Medium		5.6(1.7,19.1)	2.9(0.7,12.2)
Heavy		0.5(0.11,2.2)	0.39(0.09,1.7)
Very Heavy		19.5(9,42*)	12.4(5.4,28)*
Alcohol Drinking			

Yes :No#			2.3(0.9,6)
Khat Chewing			
Yes :No#			0.28(0.07,1.1)
Cigarette Smoking			
Yes :No#			2.7(0.7,10.8)
Sleeping disturbance			
Yes :No#			1.8(0.9,6)
Job stress			
Yes :No#			2.4(1.1,5.4)*
PPE Use			
Yes :No#			0.4(0.15,0.9)*
Harassment			
Yes :No#			1.2(0.6,2.3)
#Reference category; *Significant at P-value <0.05; **P-value=0.05;			
a: only socio-demographic factors; b: socio-demographic and work environment related factors only; c: socio-demographic, work environment related and behavioral factors			

Table 7: The Adjusted Effect of Selected Socio-demographic, Work Environment Related and Behavioral Factors of Participants Associated with Occupational Injury, Arba Minch Textile Factory, Ethiopia, March, 2015 (n=433).

From the socio-demographic factors, salary becomes significant in the second and final models. Workers earning monthly salary of ETB 1431 and less were 3.5 times more likely to be injured compared to those earning ETB 1432 and more, in both the second and final models[AOR (95% C.I): 3.5 (1.7,7.2)] (Table 8).

Factors#	Occupational Injury		COR(95%C.I)	AOR(95% C.I)
s	Yes	No		
Monthly Salary				
ETB ≤1431	99	188	1.5(0.99,2.4)	3.5(1.7,7.2)***
ETB ≥1432	37	109	1	1
Extra Hour				
Yes	59	50	3.8(2.4,6)*	4.1(1.7,9.8)*
No	77	247	1	1
Working Shift				
Day	13	15	1.98(0.9,4.3)	26(1.04,658)**
Rotating and Irregular	123	282	1	1
Health Safety Training				
Yes	63	82	2.3(1.5,3.5)*	0.4(0.17,0.97)*
No	73	215	1	1
Workplace Supervision				
Yes	31	106	0.53(0.34,0.85)*	0.36(0.17,0.75)*

No	105	191	1	1
Manual Handling				
No	43	217	1	1
Light	8	38	1.06(0.46,2.44)	0.46(0.15,1.45)
Medium	18	8	11.4(4.64,27.8)*	2.9(0.7,12.2)
Heavy	4	17	1.2(0.38,3.7)	0.39(0.09,1.7)
Very Heavy	63	17	18.7(10,35)*	12.4(5.4,28)***
Job Stress				
Yes	58	52	3.5(2.23,5.5)*	2.4(1.1,5.4)*
No	78	245	1	1
PPE Use				
Yes	31	58	1.2(0.74,2)	0.4(0.15,0.9)*
No	105	239	1	1

#Variables which showed significant association in the final model are only displayed in the table; *Significant at P-value <0.05; **P-value=0.05(marginally significant); ***Significant at P-value<0.001

Table 8: The Relative Effect of Selected Socio-demographic, Work Environment Related and Behavioral Factors of Participants Associated with Occupational Injury, Arba Minch Textile Factory, Ethiopia, March, 2015: Condensed Model (n=433).

The odds of having injury in workers with extra hour duty was 4 times more after adjusting all factors [AOR (95% C.I): 4.1 (1.7,9.8)]. Having health and safety training, and regular workplace supervision were associated with 60% and 64% times decreased odds of injury, respectively [AOR (95% C.I): 0.4 (0.17,0.97), 0.36 (0.17,0.75)]. Furthermore, manual handling of very heavy objects was significantly associated with injury [AOR (95% C.I): 12.4 (5.4, 28)]. On the other hand, participants working in day shift had only marginally significant (P-value=0.05) higher odds of injury compared to those working at rotating and irregular shifts [AOR (95% C.I): 26 (1.04, 658)].

Among the behavioral factors, PPE use and job stress showed association with injury significantly. Workers who use PPE had 2.5 times lower probability of injury than those who do not use [AOR (95%C.I): 0.4(0.15, 0.9)]. Moreover, the odds of injury among job stressed was 2.4 more than among the non-stressed [AOR (95% C.I): 2.4 (1.1, 5.4)]. Sleeping disturbance and alcohol consumption lost statistical significance in the final model.

Discussion

In this study, the one year occupational injury prevalence was 31.4 percent [95% C.I: (27, 35.8)], and the two weeks prevalence was 9% [95% C.I: (6.3, 11.7)]. The annual prevalence is comparable with studies done at Turkey, Gonder, and Addis Ababa factories workers [6,12,15,22]. But, is lower relative to studies done at Egypt, and different factories in Ethiopia [17,19,23,24], unlike the two week prevalence which is comparable. The disparity in the annual prevalence may be due to smaller sample size, different study area, definitions and factory settings.

Hand was the most affected body part 54 (39.7%) with laceration 75 (55.1%) and machinery 76 (56%) the major type and cause of injury respectively, in this study. This was consistent with studies conducted in Egypt, Tendaho, Addis Ababa, Kombolcha, and other areas [12,17,19,23-25]. This finding may be attributed to the low availability and utilization of Personal Protective Equipment, absence of regular training regarding safety and machine safeguards. Besides, great concern may not be given by both the workers and the managers, assuming lacerations are minor injuries.

This study found out that workers paid below the mean had about 3.5 times more likelihood of being injured compared to those earning higher salary. This is supported by studies conducted in Thailand and Oromia, Ethiopia [14,25], and may be explained as higher payment is related with high experience, and higher educational level, although this factors were not significant in this study. Likewise, workers with lower experience and educational status are usually placed in working sections involving manual contact with machines and others. On the contrary, there was no significant difference in occupational injury by monthly salary, according to various literatures conducted in Ethiopian factories [15,16,18,19].

Extra hour duty, health and safety training, regular workplace supervision, and manual handling of very heavy objects were significant work environment related determinants of occupational injuries in this survey. On the other hand working shift was only marginally significant (P-value=0.05) work environment related factor.

Studies conducted in several factories across the world, showed that various work environment related factors bear on workers towards occupational injuries in different extents. Studies done at different parts of Ethiopia, Japan and Thailand reported that hours worked per week significantly affect the likelihood of injury [14-17,19,26]. But, in this study there is no significant difference in injury by hours worked per week, which may be attributed due to the small number of workers passing more than 48 hours per week, in this study. This finding is

supported by another similar literature done at Northern Ethiopia by Aderaw, et al. [1].

On the other hand, participants working in day shift had only marginally significant (P-value=0.05) higher odds of injury compared to those working with rotating and irregular shifts. This finding is not in line with various studies conducted, where working shift was not significant associated factor with occupational injury. This may be attributed because of the majority (63%) of the injuries in this study occurred during day time.

A strong association exists between health and safety training, and work-related injuries, as agreed upon by many scholars [17-20]. Consistent with these literatures, this study revealed that having health and safety training is statistically related with significant decrease in injury. Health and safety training refreshes and motivates workers about occupational health, safety, standards and practices, which in turn may be associated with decreased injuries.

Regular workplace supervision came about lowering occupational injury by about 3 times odds, in this study, independently. This finding is similar with a study done by Tadesse and Kumie [15]. On the other hand, other scholars disclosed that regular workplace supervision had no significant association with occupational injury [17,18,20]. This could possibly explained by regular workplace supervisions which could inform workers about health and safety, and help easily identify workplace hazards.

Evidences from literatures dictating the work environment determinants of occupational injury evinced, involving in activities requiring manual handling exposes workers to injury considerably [13,16]. Comparably, this survey indicated that manual handling of very heavy objects was significantly associated with prominent injury presence.

Among the behavioral factors of the study participants, Personal Protective Equipment use and job stress appeared with significant association with injury. Having harassment/disagreement with managers or colleagues in the work place and sleeping disturbance lost significance in the final model.

Workers who use Personal Protective Equipment had 2.5 times lower odds of injury than those workers who do not use. This is substantiated with the findings of studies done before in different areas [19,23,27]. Furthermore, job stress is significantly related with elevated work related injury in this survey. In line with this finding, several scholars from Ethiopia and other nations had strongly agreed upon in their articles [13,18,20,23].

Conclusions

The one year occupational injury prevalence in the factory was high. The study showed that the independent factors associated with occupational injury were, monthly salary, extra hour duty, health and safety training, regular workplace supervision, Personal Protective Equipment use and job stress. Based on the findings from this study, provision of sustainable and proper health and safety training for workers, regular and continuous workplace supervisions, and standard quality personal protective equipment for all workers with strict follow up of proper utilization, should be encouraged. This study was not without limitations. The one year injury prevalence may be under or over-estimated due to recall bias. Social desirability bias might be also introduced, although much effort is done to minimize it.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

GG was the principal investigator of the study leading from the conception, design and supervising data collection process to the final analysis and preparation of the manuscript. AK participated in the design of the study, reviewing and criticizing the whole document especially on the method and analysis part. DA participated in reviewing the document and provided critical comments. All authors read and approved the final manuscript.

Acknowledgments

We are grateful to the School of Public Health of Addis Ababa University and the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED) for funding this study. We extend our heartfelt thanks to the study participants, supervisors, and data collectors, where, without their participation this will not be realized. The members of Arba Minch Textile Factory Share Company, especially Ato Anwar Sadik, Head of Human Resource Administration, are deeply acknowledged for their willingness and collaboration.

References

1. Taswell K, Wingfield-Digby P (2008) Occupational injuries statistics from household surveys and establishment surveys: An ILO manual on methods. Geneva: ILO.
2. ILO (2014) Creating Safe and Healthy Workplaces for All.
3. ILO (2014) Safety and Health at Work: A Vision for Sustainable Prevention, Geneva.
4. ILO (2013) Safety and Health in the Use of Chemicals at Work.
5. U.S.Bureau of Labor Statistics (2013) Nonfatal occupational injuries and illnesses.
6. SerİnkenM, Türkçüer I, DağlI B, Karcioğlu Ö, ZencİrM, et al. (2012) Work-related injuries in textile industry workers in Turkey. Turkish Journal of Trauma & Emergency Surgery 18: 31-36.
7. Lund F, Marriott A (2011) Research Report on Occupational Health and Safety and the Poorest. School of Development Studies.
8. CSA (2010) Report on large and medium scale manufacturing and electricity industry survey. Addis Ababa: Central Statistical Agency.
9. CSA (2012) Report on Large and Medium Scale Manufacturing and Electricity Industries Survey. Addis Ababa: Central Statistical Agency.
10. E-Facts (2004) Occupational safety and health in the textiles sector. European Agency for Safety and Health at Work.
11. Muchiri F, Seblework D (2012) African Newsletter on occupational health and safety. Finland: Finnish Institute of Occupational Health.
12. Yessuf Serkalem S, Moges Haimanot G, Ahmed Ansha N (2013) Magnitude and Characteristics of Occupational injury in Kombolcha textile factory, North East Ethiopia. International Journal of Occupational Safety and Health 3: 25-29.
13. Morassaei S, Breslin FC, Ibrahim SA, Smith PM and Mustard CA, et al. (2013) Geographic variation in work injuries: a multilevel analysis of individual-level data and area-level factors within Canada. Annals of Epidemiology 23: 260-266.
14. Berecki-Gisolf J, Tawatsupa B, McClure R, Seubsman S and Sleigh A (2013) Determinants of workplace injury among Thai Cohort Study participants. BMJ Open: 3: e003079.
15. Tadesse T, Kumie A (2007) Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-Scale Industries in

Gondar wereda, north Gondar zone, Amhara Regional State, Ethiopia. Ethiop J Health Dev 21: 25-34.

16. Yessuf Serkalem S, Moges Haimanot G, Ahmed Ansha N (2014) Determinants of occupational injury in Kombolcha textile factory, North-East Ethiopia. Int J Occup Environ Med 5: 84-93.
17. Yiha O, Kumie A (2010). Assessment of occupational injuries in tendaho agricultural development SC, afar regional state. Ethiop J Health Dev: 24.
18. Aderaw Z, Engidaw D, Tadesse T (2011) Determinants of Occupational Injury: A Case Control Study among Textile Factory Workers in Amhara Regional State, Ethiopia. Journal of Tropical Medicine.
19. Bogale D, Kumie A, Tefera W (2014) Assessment of occupational injuries among Addis Ababa city municipal solid waste collectors: a cross-sectional study. BMC Public Health 14: 169.
20. Jaiswal A (2012) A Case Control Study Among Carpet Thread Factory Workers in Uttar Pradesh, India: Occupational Injury and its Deteriorating Factors. Global Journal of Human Social Science History & Anthropology: 12.
21. Marlin Company and the American Institute of Stress (2009) The Workplace Stress Scale: Attitudes in the American Workplace VII.
22. MOLSA, Ministry of Labor and Social Affairs proclamation No.377/2003 (2004) Federal Negarit Gazeta No. 12, Addis Ababa, Ethiopia.
23. Kifle M, Engdaw D, Alemu K, Rai Sharmab H and Amsalu S, et al. (2013) Work related injuries and associated risk factors among iron and steel industries workers in Addis Ababa, Ethiopia. Safety Science 63: 211–216.
24. Abbas R, Zalat M, Ghareeb N (2013) Non-Fatal Occupational Injuries and Safety Climate: A Cross-Sectional Study of Construction Building Workers in Mit-Ghamr City, Dakahlia Governorate, Egypt. Open Journal of Safety Science and Technology 3: 69-79.
25. Kebede W, Tafese A (2014) Environmental and Organizational Factors Associated with Elbow/Forearm and Hand/Wrist Disorder among Sewing Machine Operators of Garment Industry in Ethiopia. Journal of Environmental and Public Health.
26. Nakata A (2011) Effects of long work hours and poor sleep characteristics on workplace injury among full-time male employees of small- and medium-scale businesses. J Sleep Res 20: 576-584.
27. Howyida S. Abd EL Hameed, Heba AALY, El Latif OAA (2012) An intervention study to evaluate compliance with personal protective equipment among workers at Textile industry. Journal of American Science: 8.