

Occupational injury and associated factors among building construction workers in Addis Ababa, Ethiopia: A Cross-sectional institution based Study

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Abstract

Background: The World Health Organization describes the occupational injury as an epidemic problem in the field of public health in underdeveloped countries. Work-related injuries are significantly associated with various factors including lack of safety and health training programs, employing young workers, low literacy workers, smoking, low work experiences, and not using personal protective equipment.

Objective: This study aimed to assess the prevalence of occupational injury and its associated factors among building construction workers in Addis Ababa, Ethiopia.

Methods: Cross-sectional institution-based study was conducted on selected construction sites in Addis Ababa city, Ethiopia. Data were collected via face-to-face interviews using pretested and structured questionnaires. The collected data were entered using the epi data version 4.2.0 and exported to SPSS version 26 for further analysis and interpretation. Both bivariate and multivariate logistic regression analyses were performed to see the association between the independent and dependent variables. $P < 0.05$ was considered statistically significant.

Results: Of 220 study participants, 88(40%) workers reported occupational injury during the past 12 months, and their main causes of injury were struck by an object 24(27.2%) and falling at ground level 23(26.1%). Factors associated with occupational injuries were temporary employment (AOR = 2.7;95% CI: 1.02,7.1]), work experience(AOR =2.9;95% CI:1.5,5.7) and prolonged working hours(AOR=2.3;95% CI:1.3,4.1).

Conclusion: This study finding showed that there is high occupational injury and this is related to lack of training, less work experience, and prolonged working hours per week.

Background

The World Health Organization (WHO) describes the occupational injury as an epidemic problem in the field of public health in underdeveloped countries [1]. Occupational injury is defined as any personal damage, disease, or loss of human life due to the consequences of an occupational accident [2]. The International Labor Organization (ILO) appraisals that above 270 million occupational injuries are causing two million deaths per year [3]. Over 350,000 workers lose their lives a year as a result of occupational injuries. It has an impact on health care services including substantial expenses to employers, extra load on healthcare personnel, and long-term health and socio-economic eminence of injured employees [4].

In the area of globalization, the Construction industry is one of the world's rapidly expanding sectors and 7.5% of the global labor force is made up of construction labor [5]. Construction workers are estimated to be three times more likely to die and twice as likely to be injured as workers of any other professions [6].

The construction industry has been reflected as an accident-prone industry which is related to its working places often filled with probable hazards causing disability or fatal injury. Activities have a high-risk ranking from other industrial sectors for the harsh and changing nature of construction tasks [7]. Even though it is difficult to get the amount of deadly injuries in the construction industry as information on this problem is not accessible, it is estimated that at least 55,000 fatalities occur at construction sites around the world every year. This means globally one fatal accident occurs in this sector approximately every ten minutes [8].

Different studies showed that occupational injuries are significantly associated with various factors including shortages of health and safety training programs, engaging young workers, low literacy workers, smoking, low work experiences, and not using personal protective equipment [9].

Studies conducted in different countries suggested that injury rates and cost rates are higher for construction than for the average of all industries [9]. Injuries due to falls in construction work probably cost \$427 million once a year for medical care alone [10].

In the majority of underdeveloped countries like Ethiopia, occupational safety and health aspects have been given less attention [9]. The effects of occupational health and safety threats confronted by construction workers in underdeveloped countries are 10 to 20 times higher than those in developed countries [11]. Like many other African and low-income countries, occupational injury is high in Ethiopia. A previous study conducted in the Akaki textile factory in Addis Ababa showed that 143 accidents occurred during the study period, giving an incidence density of 200 per 1,000 persons in a year [12].

In Ethiopia including the study area, little work has been done associated with occupational injury and related factors among building construction workers. So, this study aimed to identify the types of injury and major factors that can determine occupational injuries among building construction workers. It would have a significant to get valuable information for employers, stakeholders, and policymakers to design a plan of care on how to prevent work-related injuries especially on building construction sites.

Methods

Study design, Study Area and Period

An institutional-based cross-sectional study was conducted in Addis Ababa city construction sites governed under the Addis Ababa city administration construction office from March to April 2021. Of eight active construction sites in the city, four of them namely Akakie zonal stadium, Lideta secretariat, Megenagna TMC, Arada police Arada sub-city and Nefassilk secretariat were the selected for the study.

Study populations

All construction workers who were directly involved in the construction work at selected organizations were included in this study. Workers who have no direct involvement in construction work like administrative staff, supportive staff, and those workers who were absent from work for any reason during the time of data collection were excluded from this study.

Sample size, sampling procedure, and study variables

The sample size was calculated using the single population proportion formula by considering the prevalence(p) of occupational injury 38.3% from a previous study in Addis Ababa [1], 95% confidence level, and a 5% margin of error. Since the source of the population was 537 which is less than 10,000, a correction formula was used. By taking the non-response rate to be 10%, the final sample size obtained was 239. Then the number of study participants to be sampled from each construction site was determined using the proportion to size allocation formula, Akakie zonal stadium (80), Lideta secretariat (46), Arada police (33), Megenagna TMC (42), Nefassilk secretariat (38) and simple random sampling technique was used to select sampled construction workers from each construction site.

The dependent variables of this study were occupational injuries whereas Socio-demographic factors (Sex, Age, Marital status, Educational status, working experience, and employment condition), Working Environmental factors (Availability of PPE, Health and safety training, health and safety supervision, and Hours worked per week or day) and behavioral factors (smoking, chewing khat, alcohol, job satisfaction and Use of PPE) were independent variables.

Operational definitions

Occupational injury: Any physical injury resulting from an accident in the course of construction work that is reported by the respondent in the past one year.

Construction worker: worker employed in the manual labor of the physical construction of the built environment and infrastructure.

Health and safety training: Short-term training given on health and safety to construction workers.

Personal protective equipment: Specialized clothing or equipment (such as goggles, gloves, earplugs, masks, helmets, face shields, boots, protective clothing) worn by employees for protection against health-related and safety hazards at the time of working hours.

Data collection instruments

Data were collected by using pretested and structured questionnaires via face-to-face interviews that were adapted from the previously studied literature with some modifications [13]. The questionnaire was translated to the local language (Amharic) in written form and then back to the English version after data collection for its analysis and processing. A questionnaire used for data collection has five parts. Part one was demographic characteristics including, gender, age, marital status, educational status, employment, working hours, and work experience. Part two includes the utilization status of personal protective equipment(PPE) which has 8 questions focused on assessing PPE use at the worksite, availability of it, type of PPE use, and training related to PPE. Part three was about occupational injury characteristics and contained 12 questions, part four was about working environment-related factors which contains 11 questions and part five was about occupational workers' behavior and characteristics (Additional file 1).

Data collection process

Firstly, we made contact with the Addis Ababa city administration construction office to get permission with an approved ethical clearance letter obtained from the Addis Ababa University Department of emergency medicine Ethical Review Committee to conduct the study. The office accepted our request. Then, we went to each selected construction site with a permission letter and asked the managers for their cooperation to give the construction workers' lists in their unit. Workers who had no direct involvement in construction like administrative staff and support staff, and workers absent for any reason during data collection were excluded from the study. Workers from each site who fulfill the inclusion criteria were included in the study.

Three trained BSc degree nurses were responsible for the recruitment of participants and data collection and one MSc nurse for supervision. Both data collectors and supervisors were trained for one day about the study instrument and data collection procedures. Construction workers were randomly selected from their list using the lottery method until the required number of samples was obtained. Data collectors informed workers about the study verbally and distributed the participant consent form and information sheet to those who agreed and voluntarily participated in the study. Then data collectors interviewed the participants during working hours of the day.

Participants who were not volunteer for the study were permitted not to participate. The estimated time taken to complete the questionnaire was about 40 min.

Data quality management

Semi-structured Questionnaires, which fit with the context, were prepared using an expert in English. The training was given both to data collectors and supervisors. To identify potential problem areas and unanticipated interpretations, the interview questionnaires were pretested on 12 respondents at lideta police construction site two weeks before the actual data collection and based on the pretest results, the questionnaires were adjusted contextually. The validity and reliability of the instrument were evaluated by experts in the field.

Data analysis

Responses in each question were coded for simplicity of data entry. The coded data were entered into Epi data 4.2.0 and exported to SPSS version 26.0 statistical software for data analysis. In the first step, the descriptive analysis like; percentages, frequency distribution, and measures of central tendency were computed. Both bivariate and multivariate logistic regression models were computed to see the association between independent versus dependent variables. Then factors with a p-value < 0.2 in bivariate analysis were entered into multivariate logistic regression models to control the effect of confounding factors and the p < 0.05 cutoff point was considered statistically significant for all the independent variables. Then the result was presented with text, graphs, figures, and tables.

Study guidelines- the study was performed in accordance with the relevant institutional guidelines and regulations[14]

Results

Socio-demographic characteristics

A total of 220 participants were interviewed for this study with a response rate of 92%. Of the total participants, 145(65.9%) were male workers and most of them 173(78.6%) were below 30 years old with a mean of 27.67(SD ± 7.488). The majority of the study participants, 122(55.5%) were unmarried and 91(41.4%) have an educational level of secondary school completion. One hundred seventy-eight (80.9%) were temporarily employed workers and 122(55.5%) below two years of work experience. The mean monthly salary of the workers was 3581.72ETB (SD ± 1533.806) (Table 1)

Table 1
Selected socio demographic determinants of occupational injury
among building construction workers in Addis Ababa city, Ethiopia,
2021

Variable	NO	Percent (%)
Sex		
Female	75	34.1
Male	145	65.9
Age		
≤30	173	78.6
>30	47	21.4
Educational status		
Illiterate	28	12.7
Read and write	25	11.4
Primary (1–8)	54	24.5
Secondary (9–12)	91	41.4
College and above	22	10
Work experience		
≤ 2 years	122	55.5
> 2 years	98	44.5
Department		
Mason	38	17.3
Carpenter and roofer	36	16.4
Plumbers and electrician /welder/	17	7.7
Workers carrying out finishing work /painters/	22	10
Plasterer	13	5.9
Daily laborer and other helpers	76	34.5
Operator /driver/	18	8.2
Employment conditions		
Temporary	178	80.9
Permanent	42	19.1
Monthly salary in ETB		
910–2000	46	20.9
2001–5000	147	66.8
>5001	27	12.3

Availability and utilization of personal protective equipment

Of the total study participants, only 79(35.9%) used personal protective equipment during their working time. Of them, 68(86.1%) used the helmet, and 48(60.8%) were not always used PPE during their working time. Most workers responded that reasons for not using PPE were no access, negligence, and low awareness to use (Figure: 1). Sixty-nine (87.3%) of PPE users were got from their institutions and the rest were bought by themselves (Table 2).

Table 2
Availability and utilizations PPE and safety training among building construction workers in Addis Ababa city, Ethiopia 2021.

Variable	Frequency	Percent (%)
PPE on duty (n = 220)		
Yes	79	35.9
No	141	64.1
PPE all the time (n = 79)		
Yes	31	39.2
No	48	60.8
From where do you get PPE (n = 79)		
Supplied by institution	69	87.3
You buy it for yourself	10	12.7
Helmet (n = 79)		
Yes	68	86.1
No	11	13.9
Glove (n = 79)		
Yes	26	32.9
No	53	67.1
Respirators (n = 79)		
Yes	63	79.7
No	16	20.3
Overalls (n = 79)		
Yes	17	21.5
No	62	78.5
Boots /shoos/ (n = 79)		
Yes	47	59.5
No	32	40.5
First training (n = 220)		
Yes	62	28.2
No	158	71.8
On job training (n = 220)		
Yes	63	28.6
No	157	71.4

Behavioral related factors

Of the total participants, 63(28.6%) smoke cigarettes, 87(39.5%) drink alcohol, 21(9.5%) chew chat, 35(15.9%) have sleeping disorders and 108(49%) respondents are not satisfied with their job.

Occupational related injuries

A total of 88(40%) occupational workers were injured in the last 12 months. Among those injured respondents, 59(67.8%) of them were injured once and 12(13.6%) were injured 3 or more times in their working time within the past one year. Among the injured respondents, the majority 49(55.7%) of them were injured in the afternoon time of the working day. Hand 21(23.9%) and toe 17(19.3%) were the most injured body parts of respondents. Construction workers were injured by struck objects 24(27.3%), falling at ground level 23(26%), and stuck against an object 18(20.5%) respectively (figure: 2). The main reason for injury occurrence was due to working behaviors of construction work 31(35.2%), not using PPE 30(34.1%), and accidents beyond their control 13(14.8%) respectively. Seventy-eight (88.6%) of respondents were injured both on the ground and in high-level workplaces. Among the total injured respondents, 75(85.2%) did not treat in health institutions, and 35(39.8%) of workers were 2–3 days absent from work because of injury (Table 3).

Table 3
Distribution of injured body parts during last 12 months
among building construction workers in Addis Ababa city,
Ethiopia 2021.

Variables	Frequency	Percent (%)
Occupational injury In the last 12 months (220)	88	40
Number of occurrence (n = 88)		
One times	59	67.1
Two times	17	19.3
≥ 3 times	12	13.6
Injured body parts (n = 88)		
Eye	7	8
Tooth	2	2.3
Hand	21	23.9
Knee	13	14.8
Toes	17	19.3
Head	9	10.2
Upper arm	8	9.1
Lower leg	14	15.9
Back	5	5.7
Chest	7	8

Working environment-related factors

Respondents were asked about working hours per week and 115(52.3%) work \geq 48 hours per week. Among the total workers, 113(51.4%) did not have safety training related to new employment, equipment, or work process, and also all 220(100%) involved manual handling activities like pulling, pushing, caring, and lifting. Among those, 134(60.9%) were carrying very heavy objects(more than 50kg) and 182(82.7%) of workers spent more time working at their workplace per day.

Bivariate and Multivariate analysis

In the bivariate analysis, 28 explanatory variables were considered for analysis, but 4 explanatory variables (educational status, employment conditions, working experiences, and working hours per week) showed significant association with occupational injury at $p < 0.05$.

Variables with p-values less than 0.20 during the bivariate analysis were included in the multivariate logistic regression. Among them, educational status, employment condition, working experiences, and working hours greater than 48 hours per week were showed association with occupational injury.

Those workers who had only read and written were about 6.4 times more injured than workers who had college and above construction workers (AOR [95%] = 6.435[1.373,30.157]) and also workers who had been employed temporarily 2.6 times higher associated with occupational injury than those of workers who had employed permanently (AOR [95%] = 2.694[1.021, 7.104]). Workers who have less than two years' experience were 2.8 times more likely injured than those workers who have greater than two years of working experience (AOR [95%] = 2.892[1.468,5.697]). Workers who work greater than 48 hours per week are 2.3 times more injured than workers who work less or equal to 48 hours per week (AOR [95%] = 2.346[1.345,4.092]) (Table 4).

Table 4

Summary of logistic regression analysis of factors on occupational injury among building construction workers in Addis Ababa city, Ethiopia, 2021.

Variable	Occupational injury		COR(95%)CI	AOR(95%)CI	p-value	
	Yes	No				
Age	≤ 30	75(43.4%)	98(56.6%)	2.002(0.988,4.056)	1.975(0.824,4.736)	0.127
	> 30	13(27.7%)	34(72.3%)	1.00	1.00	
Educational Status	Illiterate	17(60.7%)	11(39.3%)	4.121(1.233,13.771)	2.052(0.527,7.992)	0.000*
	Read and write	21(84%)	4(16%)	14.000(3.375,58.067)	6.435(1.373,30.157)	
	1–8	21(38.9%)	33(61.1%)	1.697(0.573,5.028)	0.712(0.202,2.505)	
	9–12	23(74.7%)	68(25.3%)	0.902(0.315,2.579)	0.424(0.125,1.437)	
Employment condition	College & above	6(27.3%)	16(72.7%)	1.00	1.00	0.045*
	Temporary	78(43.8%)	100(56.2%)	2.496(1.156,5.387)	2.694(1.021,7.104)	
Work experience	Permanent	10(23.8%)	32(76.2%)	1.00	1.00	0.002*
	≤ 2 years	65(53.3%)	57(46.7%)	3.719(2.067,6.689)	2.892(1.468,5.697)	
PPE use on duty	> 2 years	23(23.5%)	75(76.5%)	1.00	1.00	0.978
	Yes	26(32.9%)	53(67.1%)	1.00	0.990(0.497,1.973)	
Working hours per week	No	62(44%)	79(56%)	0.625(0.352,1.111)	1.00	0.001*
	≤ 48 hrs	31(29.5%)	74(70.5%)	1.00	1.00	
	> 48	57(49.6%)	58(50.4%)	2.346(1.345,4.092)	2.952(1.520,5.735)	

Note *, significant at $p < 0.05$.

Discussion

This study is aimed to assess the prevalence of occupational injury and associated factors in the last 12 months among building construction workers in Addis Ababa city. The study finding is used to determine and understand the work-life of occupational workers in the construction industry. It is an important topic that guides an organization to manage problems related to occupational injury and factors related to it. Our study result showed that the overall prevalence of occupational injury in the last 12 months in the study area was 88(40%). This study is higher compared with the previous studies conducted in different countries. Studies done in Japan, Iran, Egypt and Uganda were 35.6%,30%,18.4% and 32.4% respectively [9, 17–19]. It is also higher than the previous studies conducted in different parts of Ethiopia including Gondar 38.7% [8], Dessie town 32.6% [13], and Addis Ababa 38.3% [1]. This difference might be due to poor personal protective equipment utilization, working conditions and long working hours per week in our current study sites. This gap may be also low educational status, low PPE utilization, and lack of awareness of occupational injury in our study sites compared with other countries. But it is lower compared with a study done in Ghana, 57.9% [2].

This study depicted that the most frequent causes of occupational injury were struck by an object 27.3% followed by falling at ground level 26%. This result is similar to the study done in Iran and Egypt where accidents related to falling to a ground-level were a significant portion of occupational injury for building construction workers [13, 15].

In this study, the most commonly injured body parts were upper extremities(23.9%) which are in line with studies done in Iran and USA [16, 17]. But a study done in Egypt showed that lower extremities were primarily affected by body parts of building construction workers [15]. This discrepancy may be lack of personal protective equipment, mainly hand gloves.

Different studies showed that illiterate workers were significantly associated with occupational injury [3, 18] which is in line with this study which showed that workers who can only read and write were 6.4 times more likely injured compared with workers who have an educational level of college diploma and above. This might be related to increased awareness of occupational injury as they advanced in educational status. The high risk of occupational injury among construction workers with low literacy might be due to a lack of awareness and low level of knowledge about unsafe actions. This group of occupational workers was mostly exposed to injury risk works like lifting and carrying heavy objects.

This study findings showed that temporary workers were 2.6 times more likely injured than those permanent construction workers. This is in line with another study conducted in Iran [19]. This might be related to the experience and training of permanent workers. Another important finding of this study was years of experience. Construction workers who served for less than 2 years were at 2.8 times higher risk of injury compared with workers who served for more than 2 years. This finding was contrary to previous studies done in Gondar and Addis Ababa [1, 7]. This might be associated with less experience and less awareness about workplace hazards.

According to this study, the result showed that workers who work greater than 48 hours per week were 2.9 times more likely injured than workers who work less than 48 hours per week. This result is similar to studies done in Egypt and Addis Ababa [4, 15]. This is justified that excessive workload that enhances fatigue results in falling and unsafe acts.

The strength of this study is; that it can be generalizable to occupational workers in building construction in Addis Ababa city, Ethiopia. In addition, it is the study on building construction workers who are at high risk for life. The study finding will serve as a baseline for policymakers and further studies. It has also very little possibility of non-response bias as the response rate is high (92%).

Limitation of the study: It is a cross-sectional study done on workers working actively at construction during their working time. It was unable to determine severely injured victims and absents related to an injury. So, further studies can be carried out with more objective instruments. It is better to conduct longitudinal studies to assess the cause and effect of occupational injury on construction workers.

Conclusions And Recommendations

This study finding indicated that there is a relatively higher prevalence of occupational injury among building construction employees compared to previous studies conducted in Ethiopia. Struck by an object and falling at ground level were the leading causes of occupational injury. Factors like low work experience, illiteracy, working hours more than 48 hours per week and temporary workers in the construction industry have significantly associated with occupational injury.

Implementations of basic occupational health and safety services with the provisions of personal protective devices, limiting working hours to not more than 48 hours per week, and training on occupational health and safety to all categories of workers are recommended activities for responsible stack holders to decrease occupational injury for construction workers.

List Of Abbreviations /acronyms

Addis Ababa (AA), adjusted odds ratio (AOR), confidence interval (CI), Ethiopian Birr(ETB), International labor organization (ILO), personal protective equipment (PPE), a software package for statistical analysis (SPSS), transport management center (TMC).

Declarations

Ethics approval and consent to participate

Ethical clearance was taken from the emergency departments of the research ethics review committee of Addis Ababa University on 20/03/2021. (Ref.No:-EM/SM/203/2021). A formal permission letter was obtained from the city government of the Addis Ababa Construction office before data collection for each study site. Informed written consent was obtained from participants who signed or gave written consent to be interviewed for the study and were allowed to do so. For participants who cant read and write, we used their finger print on written consent form which taken as written informed consent. It is done after informing the participant by reading the consent agreement form approved which was proved by the research ethics review committee of the department.

Consent for publication

Not applicable

Availability of data and materials

All the data supporting the study findings are within the manuscript. Additional detailed information and raw data are available from the corresponding author on reasonable request.

Competing interests

We have no competing interest

Funding

No funding for this study.

Authors' contributions

FW and AW designed the study. FW and AW contributed to data collection, analysis, and interpretation, and wrote the manuscript. TJ critically revised the draft manuscript and all authors read and approved the final manuscript.

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References

1. Tadesse S, Israel D. Occupational injuries among building construction workers in Addis Ababa, Ethiopia. *J Occup Med Toxicol Lond Engl*. 2016;11.
2. Amissah J, Badu E, Agyei-Baffour P, Nakua EK, Mensah I. Predisposing factors influencing occupational injury among frontline building construction workers in Ghana. *BMC Res Notes*. 2019;12.
3. Yiha O, Kumie A. Assessment of occupational injuries in Tendaho Agricultural Development S.C, Afar Regional State. *Ethiop J Health Dev*. 2010;24.
4. Mersha H, Mereta ST, Dube L. Prevalence of occupational injuries and associated factors among construction workers in Addis Ababa, Ethiopia. *J Public Health Epidemiol*. 2017;9:1–8.
5. Jayakrishnan T, Thomas B, Rao B, George B. Occupational health problems of construction workers in India. *Int J Med Public Health*. 2013;3.
6. Sharma HR, Appadurai S, Wubshet M, Tadesse T. Occupational exposures and related health effects among construction workers. *Ethiop J Health Biomed Sci*. 2008;1 1:7–7.
7. Berhanu F, Gebrehiwot M, Gizaw Z. Workplace injury and associated factors among construction workers in Gondar town, Northwest Ethiopia. *BMC Musculoskelet Disord*. 2019;20.
8. Derakhshan Jazari M, Jahangiri M, Khaleghi H, Abbasi N, Hassanipour S, Shakerian M, et al. Prevalence of self-reported work-related illness and injuries among building construction workers, Shiraz, Iran. *EXCLI J* 17Doc724 ISSN 1611–2156. 2018. <https://doi.org/10.17179/EXCLI2018-1459>.
9. Waehrer GM, Dong XS, Miller T, Haile E, Men Y. Costs of Occupational Injuries in Construction in the United States. *Accid Anal Prev*. 2007;39:1258.
10. Dong XS, Wang X, Largay JA. Occupational and non-occupational factors associated with work-related injuries among construction workers in the USA. *Int J Occup Environ Health*. 2015;21:142–50.
11. Gebremeskel TG, Yimer T. Prevalence of occupational injury and associated factors among building construction workers in Dessie town, Northeast Ethiopia; 2018. *BMC Res Notes*. 2019;12:481.
12. Benti A, Kumie A, Wakuma S. Prevalence of occupational injury and associated factors among workers in large-scale metal manufacturing factories in Addis Ababa, Ethiopia. *Ethiop J Health Dev*. 2019;33.
13. Moradinazar M, Kurd N, Farhadi R, Ameer V, Najafi F. Epidemiology of Work-Related Injuries Among Construction Workers of Ilam (Western Iran) During 2006–2009. *Iran Red Crescent Med J*. 2013;15.
14. BMC Public Health. BioMed Central. <https://bmcpublichealth.biomedcentral.com/submission-guidelines>. Accessed 17 May 2022.
15. Abbas RA, Zalat MM, Ghareeb NSE. Non-Fatal Occupational Injuries and Safety Climate: A Cross-Sectional Study of Construction Building Workers in Mit-Ghamr City, Dakahlia Governorate, Egypt. *Open J Saf Sci Technol*. 2013;2013.
16. Arcury TA, Summers P, Rushing J, Grzywacz JG, Mora DC, Quandt SA, et al. Work safety climate, personal protection use, and injuries among Latino residential roofers. *Am J Ind Med*. 2015;58:69–76.
17. Moradinazar M, Kurd N, Farhadi R, Ameer V, Najafi F. Epidemiology of work-related injuries among construction workers of Ilam (Western Iran) during 2006–2009. *Iran Red Crescent Med J*. 2013;15.
18. Eskezia D, Aderaw Z, Ahmed KY, Tadese F. Prevalence and associated factors of occupational injuries among municipal solid waste collectors in four zones of Amhara region, Northwest Ethiopia. *BMC Public Health*. 2016;16:862.

19. Rahmani A, Khadem M, Madreseh E, Aghaei H-A, Raei M, Karchani M. Descriptive study of occupational accidents and their causes among electricity distribution company workers at an eight-year period in Iran. *Saf Health Work.* 2013;4:160–5.

Figures

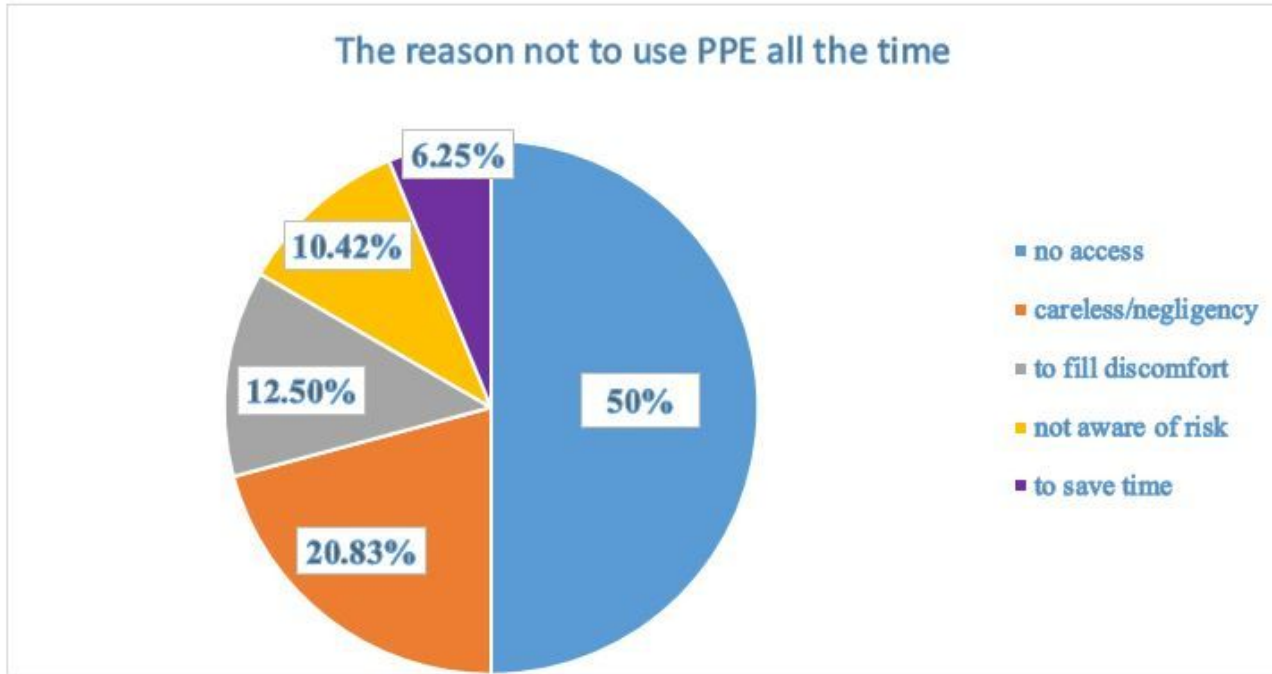


Figure 1

the reason of respondents not use PPE all the time among building construction workers in Addis Ababa city, Ethiopia, 2021.

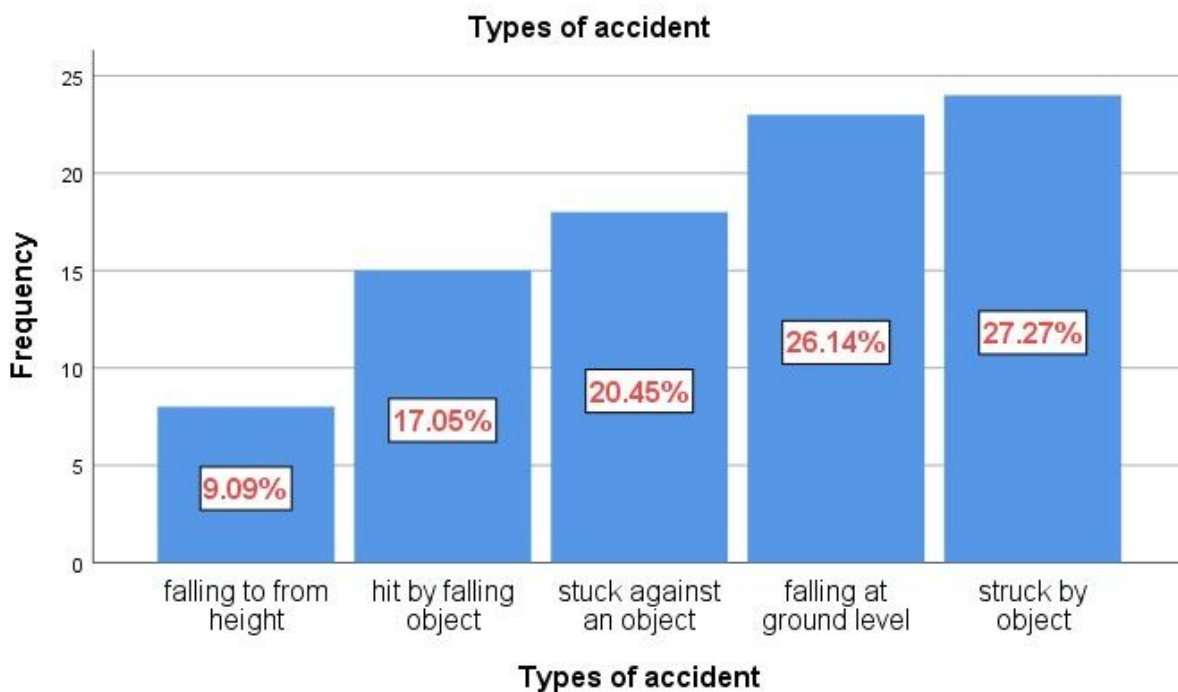


Figure 2

Types of accident that occurs among building construction workers in Addis Ababa city, Ethiopia 2021.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Questionnaire.docx](#)