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Magnitude of work related injury, associated factors and its disparity across selected occupations in Ethiopia: Systematic review and meta-analysis

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ABSTRACT

Background: Globally, work related injury has been continued as a major public health problem. In Ethiopia there are few fragmented empirical studies particularly among workers of fast growing sectors and there is no a national representative study on work related injury. Therefore, this study aims to determine the magnitude of work related injury associated factors and its disparity among construction, textile and municipal solid waste management workers in Ethiopia.

Objective: To determine magnitude of work related injury &associated factors and its disparity across selected occupations in Ethiopia

Method: Both published and unpublished articles conducted in Ethiopia on work related injury were searched between the periods 12 October, 2019 to 15 December, 2019. Random effect model was employed to estimate the overall magnitude of occupational injury and its predictors.

Results: The overall magnitude of work related injury was 39.35% (95% CI: 27.40, 51.30 %). Subgroup analysis revealed that there was slight disparity across occupations and regions. Drinking alcohol, smoking cigarette, khat chewing habit, work related stress, level of education and utilization of PPE were significantly associated with work related injury.

Conclusion: This study found that more than 1 in 3 workers had at least one occupational injury at work. There was slight disparity across occupations and regions. It is strongly recommend that health education programs about the risk of substance use on occupational injury and apply strict occupational safety practices regulations should be strengthened.

1. Introduction

1.1. Background

Work-related injury and illness refers an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition [1]. Furthermore an occupational injury is defined as any personal injury, disease or death resulting from an occupational accident; while an occupational disease is a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity [2].

According to International Labour Organization (ILO) estimates globally 2.3 million people are surrendered to occupational injuries and illnesses. In addition, around 340 million occupational accidents and 160 million victims of work-related illnesses are occurred annually and over 6000 deaths every single day [3].

1.2. Statement of the problem

Despite magnitude and extent disparities, occupational injury and illness is the issue of both developed and developing nations. For instance, in Canada around 951 workers died due to work related causes in 2017 [4].

Work related injury has been continued as a major public health problem and leads to devastating economic and health impact. According to World Health Organization (WHO) about 11% of the burden of disease is from work place related illnesses [5].

In Ethiopia there is high report of injuries from health facilities [6,7]. However, health facilities reports did not show how many cases of injuries were work places related and could not well address what factors were

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associated with those injuries and illness [7,8]. There are also few fragmented empirical studies on predictors or determinants of occupational injury and illness [9–11].

As to the knowledge of the authors of this study in Ethiopia there is no a national representative empirical study on the magnitude of work related injury & associated factors and its disparity among municipal solid management workers, textile and construction industry workers.

Therefore this study aims to determine magnitude of work related injury and its disparity across selected occupations in Ethiopia. The results of this study may be helpful for decision and policy makers to have a nationwide insight and to take targeted corrective measures to promote health and safety and prevent non-fatal and fatal injuries and illnesses.

1.3. Objectives

The main aim of this meta-analysis is to determine magnitude of work related injury and its disparity across selected occupations in Ethiopia.

2. Methods

2.1. Identification and study selection

Through international data bases (MEDLINE/PubMed, Science Direct, Google scholar and Cochrane Library) and national digital library repositories (Addis Ababa University's digital library repository) were searched for potentially relevant published and unpublished research articles; between the periods 12 October, 2019 to 15 December, 2019. The key terms used for the searching articles were "Magnitude", "Epidemiology", "Prevalence", "occupational injury", "Work related injury", " work places injury", "Illness", "diseases", "Municipal Solid waste management", "Textile industry", "Garment", "Construction industry", "Workers" and "Ethiopia". Boolean operators "AND" and "OR" were used as connector. The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guideline was used to undertake this study [12].

2.2. Eligibility criteria

The authors of this meta-analysis reviewed abstracts from initial search using well defined inclusion and exclusion criteria.

2.2.1. Inclusion criteria

Both peer reviewed published and unpublished observational articles written in English language and conducted in Ethiopia which reports magnitude of work related injury among workers of municipal solid waste management, textile and construction industry were included.

2.2.2. Exclusion criteria

Studies which were not fully accessed, difficult for data extraction and didn't report the outcome of interest were excluded.

2.3. Data extraction

Using a Microsoft Excel two authors (WG and MA) independently extracted all the necessary data. The data extraction format for the first outcome of interest (magnitude of work related injury) consists; name of the first author, region publication year, study design, sample size, response rate, cases, total, type of occupation, data collection period). For the second outcome of interest (predictors), the data extraction format was prepared for each most frequently reported predictors by the studies included in this met-analysis. These predictors includes educational status (below high school vs high school and above high school), using PPE (Yes vs No), Age (below 30 vs 30 and above 30), safety training (Yes vs No), khat chewing (Yes vs No), smoking cigarette (Yes vs No), drinking alcohol (Yes vs No), sleeping pattern (Normal vs Not Normal), concentration (Yes vs No),sex (Male vs Female), marital status (Married vs Not Married), working hours per day (8 and below 8 hrs. vs more than 8 hours) and job related stress (Yes vs No). Variables in this meta-analysis were considered as a predictor because at least two or more studies reported them as a predictor.

2.4. Outcome measurements and Quality assessment

This study has two main outcomes. The first outcome of interest was to determine the magnitude of work related injury. The second outcome of the study was to identify the predictors of work related injury. The magnitude was calculated by dividing the number of respondents having at least 1 occupational injury within 12 months prior to the data collection period of included studies to the total number of participants who have been included in the study (number of respondents) multiplied by 100. Regarding predictor variables, the authors of this study calculated the odds ratio from the primary studies using the two by two tables. To assess the methodological qualities of the included articles, a modified version of the Newcastle-Ottawa Scale adapted for cross-sectional studies was used [13]. By taking the mean score of the two researchers, disagreements of their assessment results were resolved. Finally, articles assessed with a score of ≥ 6 out of 10 were considered as achieving high quality.

2.5. Data processing and analysis

Microsoft Excel for data extraction and STATA Version 14.0 software were used for analysis. The characteristics of included original articles were described using a table and forest plot. Statistical tests like heterogeneity $\chi 2$ test, I^2test and the p-values were done to check the presence of heterogeneity among the reported prevalence of included studies [14].Random effects meta-analysis model was used to estimate overall magnitude of work related injury. Univariate meta-regression model was conducted by taking the publication year and number of respondents. Potential publication bias was also assessed objectively by using Egger's correlation and Begg's regression intercept tests at 95% significant level respectively [15,16]. In addition, subgroup analysis was done based on region of studies and type of occupation.

3. Results

3.1. Search results

In the first step of our search, 695 articles were retrieved regarding magnitude and predictors of occupational injury among workers of municipal solid waste management, construction, and textile workers. Of these initial records, 294 articles were excluded due to duplication. From the remaining 401 articles, 307 articles were excluded after review of their titles and abstracts being assessed as non-relevant to this review. Therefore, 34 full text articles were accessed, and assessed for eligibility based on the pre-set criteria, which resulted in further exclusion of 17 articles primarily due to the study population and outcome of interest. Finally, 17 studies were eligible and included in the meta- analysis (Fig. 1).

3.2. Characteristics of original articles

In this study to estimate the pooled magnitude of work related injury a total of 8025 workers from MSWM, construction and textile industry were involved. Concerning geographical distribution of the studies, the 17 studies were obtained from the four regions of the country: six studies from Addis Ababa [10,19,21–23,30], three from Oromia [24,27,29], seven [7] from Amhara [11,17,18,20,25,26,28], and one from Southern Nations, Nationalities and Peoples' Region (SNNPR) [29]. The highest prevalence of occupational injury and illness (84.7%) was reported in Addis Ababa [10] whereas the lowest prevalence (31.4%) was reported from a study done in Arba Minch (SNNPR) [9]. In addition, the original studies included in the meta-analysis had a response rate ranging from 83% to 100% and almost all the studies had good response rate having a response rate of above 80%. Regarding the publication condition of the studies, two of the 17 studies were unpublished [29,30], and 15 of the studies were published in

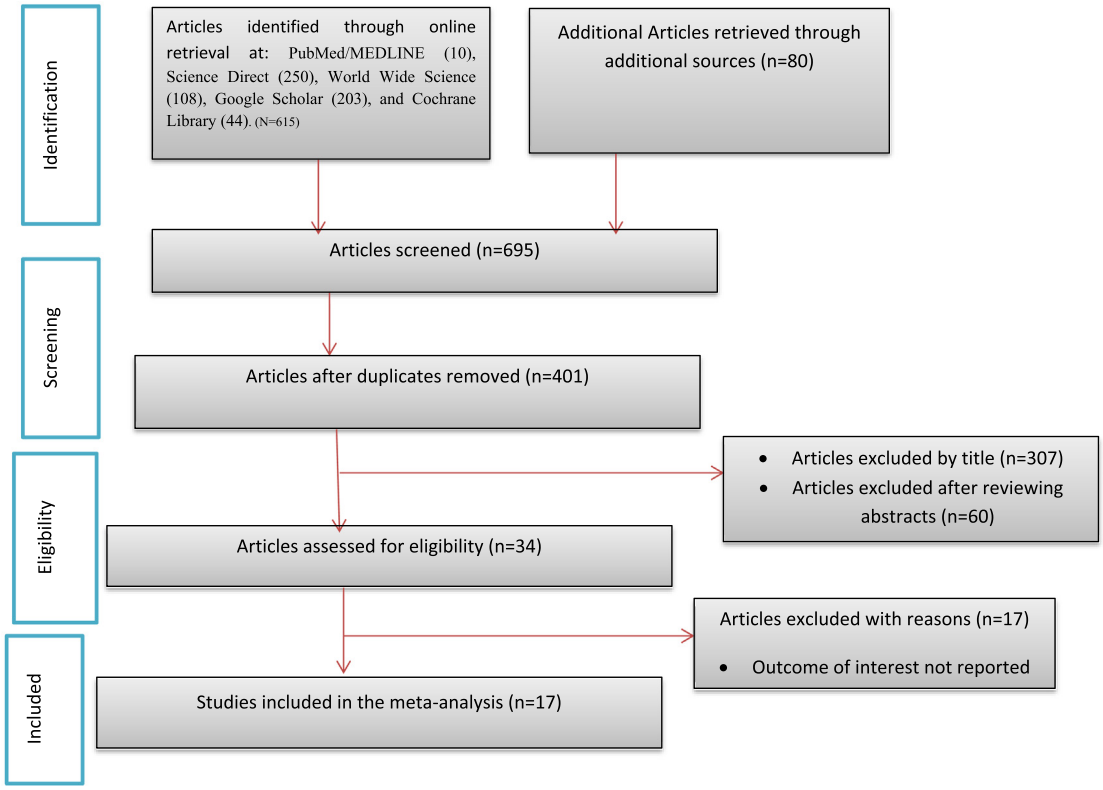

Fig 1. Flow chart describing the selection of studies for the systematic review and meta-analysis of prevalence and predictors of occupational injury among workers of MSWM, Construction and textile industry in Ethiopia, 2019 (identified screened, eligible and included studies).

reputable journals. Finally, the quality score of the studies ranges from 6-9 out of 10 points (See Table 1).

3.3. Meta-analysis

As shown in the forest plot, the result of the 17 included studies revealed that the pooled magnitude of occupational injury was 43.59% (95% CI: 34.48, 52.70%) (Fig. 2). There was high heterogeneity across the studies which was shown by I^2 statistic (I^2 = 98.7, p value = 0.000). As a result, a random effect model was employed to estimate pooled magnitude of work related injury. In addition, a univariate meta-regression model to identify the possible sources of heterogeneity, by considering factors like data collection year, number of studies per region and sample size, but none of these variables was found to be statistically significant. Eggers' test revealed the presence of statistically significant publication bias (p = 0.019). Therefore, trim and fill analysis was also done to adjust the final pooled estimate.

3.4. Subgroup analysis

Subgroup analysis was performed based on the regions where the studies were conducted and type of occupations. Accordingly, the highest regional pooled prevalence after trim and fill analysis was reported in studies done in Addis Ababa with a prevalence of 45.82% (95% CI: 21.39, 70.25) followed by Amhara region, 40.89% (95% CI: 32.44, 49.34) and lowest was from SNNPR region 31.40% (95% CI: 27.03, 35.77). With regard to occupation type, the prevalence of occupational injury and illness

Table 1
Summarizes the characteristics of the 17 original articles included in this systematic review and meta-analysis.

Authors	Pub. Year	Study region	Study design	Source	Response rate	Sample	Event	Prevalence in %	Study year	Occupation type
Berhanu et al [17]	2019	Amhara	Cross-sectional	596	95%	566	221	39.00	2015	Construction
Gebremeskel and Yimer [18]	2019	Amhara	Cross-sectional	402	93.03%	374	122	32.60	2018	Construction
Emiru et al [19]	2017	Addis Ababa	Cross-sectional	548	94.50%	518	211	40.70	2016	MSWM
Eskezia et al [20]	2016	Amhara	Cross-sectional	394	96.20%	379	130	34.30	2015	MSWM
Tolera [21]	2016	Addis Ababa	Cross-sectional	100	82.70%	83	62	67.70	2014	Construction
Tadesse and Israel [22]	2016	Addis Ababa	Cross-sectional	544	92.60%	504	194	38.30	2015	Construction
Gebremichael G, et al [9]	2015	SNNPR	Cross-sectional	441	98.00%	433	136	31.40	2015	Textile Factory
Bogale et al [23]	2014	Addis Ababa	Cross-sectional	895	97.90%	876	383	43.70	2012	MSWM
Gizaw Z. et al [11]	2014	Amhara	Cross-sectional	482	100.00%	482	308	63.90	2012	MSWM
Deyyas and Tafese [24]	2014	Oromia	Cross-sectional	422	87.70%	370	148	40.00	2012	Garment Industry
Serkalem S. et al [25]	2013	Amhara	Cross-sectional	455	100%	455	168	36.90	2013	Textile Factory
Aderaw et al [26]	2011	Amhara	Case control	456	100%	456	152	33.33	2009	Textile Factory
Lette et al [27]	2018	Oromia	Cross-sectional	360	98.60%	355	147	41.40	2016	Construction
Tafese et al [28]	2018	Amhara	Cross-sectional	419	93.30%	391	180	45.80	2016	Textile (self-employed)
Mersha et al [10]	2017	Addis Ababa	Cross-sectional	809	99.63%	806	683	84.70	2015	Construction
Hussen and Kumie [29]	Unpublished	Oromia	Cross-sectional	401	100%	401	140	34.90	2016	Construction
Shine and Kumie [30]	Unpublished	Addis Ababa	Case control	576	100%	576	192	33.33	2013	Construction

was slightly higher in studies done among construction workers, 41.80% (95% CI: 19.34, 64.27) as compared to textile 37.44% (95% CI: 32.48, 42.40) and MSWM workers 45.68% (95% CI: 34.00, 57.36) (See Fig. 2).

3.5. Predictors of occupational injury among textile, MSWM and construction workers

In this meta-analysis; the pooled odds of occupational injury among workers having drinking alcohol, cigarette smoking and chewing khat habit was1.75, 2.15, and 2.03 times more than those who have not drinking alcohol, cigarette smoking and chewing khat habit 1.75 (95% CI: 1.03, 2.99); 2.15 (95% CI: 1.32, 3.50); and 2.03 (95% CI: 1.44, 2.86) respectively. Those workers who complete at least secondary education were 49% less likely to be injured or got ill (0.51(95% CI: 0.30, 0.89)) as a result of their occupation than those workers who did not complete high school education. Furthermore, those who having job-related stress was 3.85 times more likely to be injured and got ill (3.85 (95% CI: 2.66, 5.59)). Lastly the pooled odds of work related injury among those workers using PPE was 52% less than those who did not use PPE at work place (0.48 (95% CI: 0.36, 0.65)). To calculate the pooled odds ratio of alcohol drinking habit [9,11,17,18,26,28,30,31], cigarette smoking habit [18,24,26,30,31], khat chewing habit [9,22,26–28,30,31], work related stress [9,20,26,29,30], level of education [9,11,18,24,26,30,31], and use of PPE [9,11,18,19,22,26,27,29–31] reports of a minimum of 5 to 10 studies were included.

4. Discussion

In this study the overall pooled magnitude of work related injury among workers of selected occupations was *39.35% (95% CI: 27.40, 51.30)*. This prevalence is higher than the reports of previous meta-analysis done in Ethiopia which was particularly on needle stick injury among health professionals 28.8% (95% CI: 23.0, 34.5) [32] and studies done in Malaysia which was reported as 5.4% [33]. However it was lower than the which was reported at 57% [34] and the results of this meta-analysis (current) was comparable with reports of a meta-analysis done on Prevalence of needle stick and sharps injuries in healthcare workers of Iranian hospitals which was 42.5% (95% CI 37–48) [35].

The subgroup analysis of this study revealed that the magnitude of work related injury was significantly varied across regions. The highest prevalence of occupational injury was observed in Addis Ababa with a prevalence of 45.82% (95% CI: 21.39, 70.25) followed by Amhara region, 40.89% (95% CI: 32.44, 49.34) and lowest was from SNNPR region 31.40% (95% CI: 27.03, 35.77). The possible justifications for this variation could be due to socio-cultural differences across the regions. The other possible reason for the higher prevalence of occupational injury in Addis Ababa could be in the fact that Addis Ababa (the capital) is the center of both politics and economy as a result there is high expansion of textile, construction and solid waste management activities. In spite of the emphasis given to expansion of these sectors, occupational and safety practice among workers and concerned bodies emphasis give to occupational safety may be minimal. With regard to type of occupation, the magnitude of work related injury was slightly higher in those studies done among MSWM workers 45.68% (95% CI: 34.00, 57.36).This difference may be due to MSWM sector is more risky than the rest in that the occupation is linked with wastes and it worsen by poor handling of wastes at home level.

The predictors of work related injury was identified based on the reports of included empirical primary studies. Hence in this study, drinking alcohol, and smoking cigarette and khat chewing habit and having work related stress were found to be predictors of work related injury. In addition, in this study chance of occupational injury was significantly lower among those workers who were using PPE at work places compared to their counterparts. This finding is consistent with studies conducted in sub-Saharan

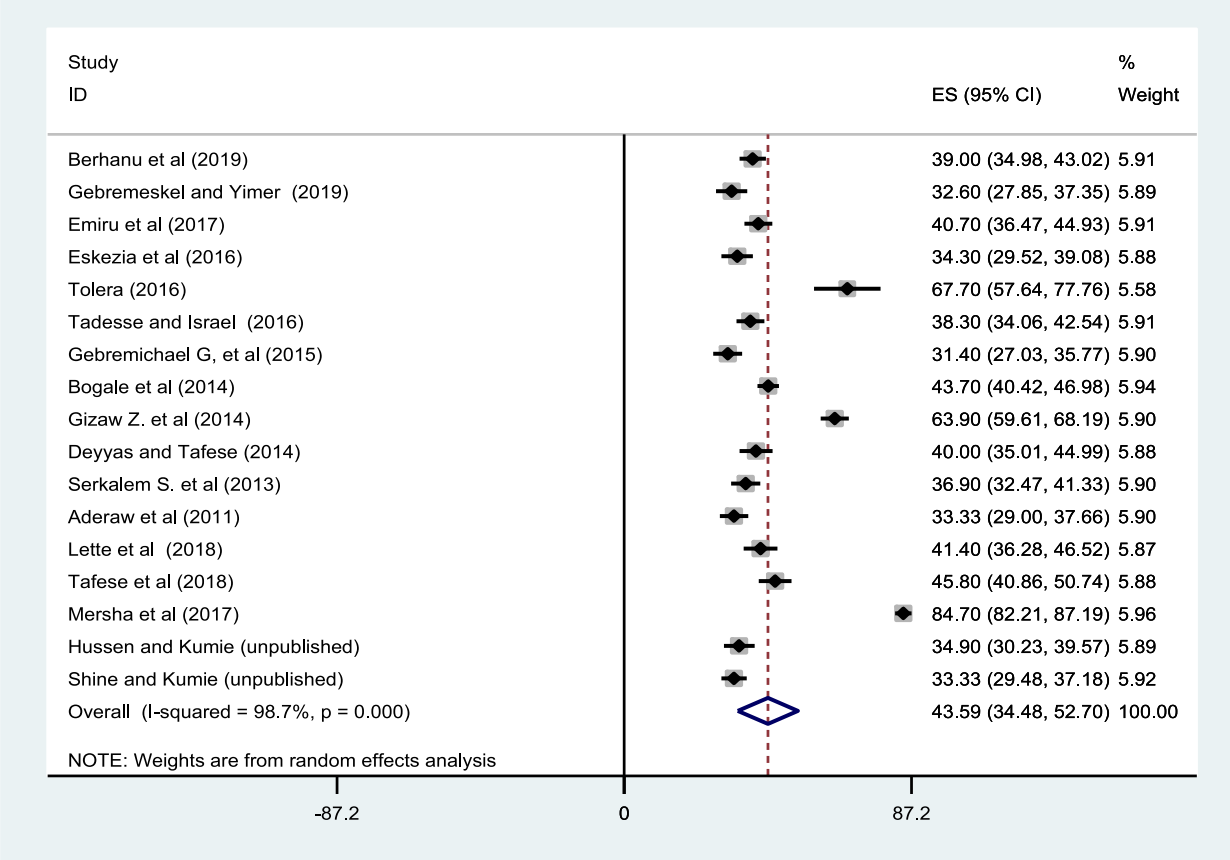

Fig. 2. Forest plot of the pooled prevalence of occupational injury and illness among workers of MSWM, construction and textile industry in Ethiopia before trim and fill analysis, 2019.

Africa which was reporting not using PPE (OR 1.91, 95% CI 1.10–3.32) exposed nurses to injury [34]. This could be explained by the fact that using protective devices highly reduces chance of injury occurrence.

The magnitude of occupational injury was highly associated with workers level of education. Those workers who complete high school education had lower risk of injury at workplaces. This finding is in line with different studies carried out so far. The possible reason for the association may be, as anyone becomes more educated he/she is become aware of occupational health and safety issues. Furthermore, in this meta-analysis it was observed that those workers who had drinking alcohol, smoking cigarette and chewing khat habit and having work related stress had higher work related injury as compared to their counterparts. This finding is supported by previous studies conducted so far [32,34,35]. The possible explanation could be because of a worker's substance use habit and work related stress reduces his/her concentration at work and use of PPE habit during work.

5. Limitations of the study

Majority of the studies included in this review were cross-sectional in nature as a result; the outcome variable might be affected by other confounding variables. Therefore, this factor could affect the estimated report. In addition this meta-analysis was considering only English articles or reports. Lastly, this meta-analysis represented only studies reported from four larger regions of Ethiopia. Even though these regions covers majority of the country geographically, population and economic activity, still the rest regions may be under-represented.

6. Conclusions and recommendations

6.1. Conclusions

The study found that magnitude of work related injury among workers of textile, construction and MSWM was quite common. Drinking alcohol, smoking cigarette chewing khat practice, having work related stress, level education and utilization of PPE were found to be predictors of work related injury.

6.2. Recommendations

Hence, it is strongly recommend that concerned stakeholders should launch health education programs about the risk of substance use on occupational injury and apply strict occupational safety practices regulations at such rapidly growing sectors.

Declaration of Competing Interest

The authors declare that they have no any conflict of interest.

References

[1] US,Bureau of labour. Occupational Safety and Health Definitions [Internet]. Available from: https://www.bls.gov/iif/oshdef.htm.

[2] ILO. Occupational injuries [Internet]. [cited November,14,2019]. Available from: https://www.ilo.org/ilostat-files/Documents/description_INJ_EN.pdf; 2019.

[3] ILO. World Statistics: Occupational Safety and Health (OSH) [Internet]. [cited November,14,2019]. Available from: https://www.ilo.org/moscow/areas-of-work/occupational-safety-and-health/WCMS_249278/lang–en/index.htm.

[4] 2019 Report on Work Fatality and Injury Rates in Canada [Internet]. [cited November,14, 2019]. Available from: https://www.uregina.ca/business/faculty-staff/faculty/file_download/2019-Report-on-Workplace-Fatalities-and-Injuries.pdf; April 25, 2019.

[5] Prüss-Üstün Annette Wolf J, CC F, Bos R, Purificación NM. Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks. Organization WH; 2016.

[6] Negussie A, Getie A, Manaye E, Tekle T. Prevalence and outcome of injury in patients visiting the emergency Department of Yirgalem General Hospital, Southern Ethiopia. BMC Emerg Med. 2018;18(14).

[7] Bashah DT, Dachew BA, Tiruneh BT. Prevalence of injury and associated factors among patients visiting the Emergency Departments of Amhara Regional State Referral Hospitals, Ethiopia: a cross-sectional study. BMC Emerg Med. 2015;15(1):20.

[8] Gebru AA, Mosadeghrad AM, Sari AA, Tafesse TB, Kahsay WG. Prevalence, pattern, magnitude and associated factors of trauma in the Emergency Department at Health Institutes in Ethiopia: A systematic review. Human Antibod. 2019;27(s1):1–10.

[9] Gebremichael G, Kumie A. The prevalence and associated factors of occupational injury among workers in Arba Minch textile factory, southern Ethiopia: a cross sectional study. Occupat Med Health Affairs. 2015;3(6):e1000222.

[10] 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):1–8.

[11] Gizaw Z, Gebrehiwot M, Teka Z, Molla M. Assessment of occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahir Dar City, Northwest Ethiopia, 2012. J Med Med Sci. 2014;5(9):181–92.

[12] Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. PLoS Med. 2009;6(7):e1000100.

[13] Madhavan A, LaGorio L, Crary M, Dahl W, Carnaby G. Prevalence of and risk factors for dysphagia in the community dwelling elderly: a systematic review. J Nutr Health Aging. 2016;20(8):806–15.

[14] Rücker G, Schwarzer G, Carpenter JR, Schumacher M. Undue reliance on I 2 in assessing heterogeneity may mislead. BMC Med Res Methodol. 2008;8(1):79.

[15] Sterne JA, Egger M. Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. J Clin Epidemiol. 2001;54(10):1046–55.

[16] Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. Bmj. 1997;315(7109):629–34.

[17] Berhanu F, Gebrehiwot M, Gizaw Z. Workplace injury and associated factors among construction workers in Gondar town, Northwest Ethiopia. BMC Musculoskelet Disord. 2019;20(1):523.

[18] 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(1):481.

[19] Emiru Z, Gezu M, Chichiabellu TY, Dessalegn L, Anjulo AA. Assessment of respiratory symptoms and associated factors among solid waste collectors in Yeka Sub City, Addis Ababa, Ethiopia. J Public Health Epidemiol. 2017;9(6):189–97.

[20] 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(1):862.

[21] Tolera TB. Occupational hazards in construction industry: case studies from housing and construction workers at Addis Ababa. Ethiopia Int J Res Granthaalayah. 2016;4(9):84–96.

[22] Tadesse S, Israel D. Occupational injuries among building construction workers in Addis Ababa, Ethiopia. J Occupat Med Toxicol. 2016;11(1):16.

[23] Bogale D, Tefera W. Assessment of occupational injuries among Addis Ababa city municipal solid waste collectors: a cross-sectional study. BMC Public Health. 2014;14(1):169.

[24] Kebede Deyyas W, Tafese A. Environmental and organizational factors associated with elbow/forearm and hand/wrist disorder among sewing machine operators of garment industry in Ethiopia. J Environ Public Health. 2014:2014.

[25] Yessuf SS, Moges HG, Ahmed AN. Magnitude and characteristics of occupational injury in Kombolcha textile factory, North East Ethiopia. Int J Occupat Saf Health. 2013;3(2):25–9.

[26] Aderaw Z, Engdaw D, Tadesse T. Determinants of occupational injury: a case control study among textile factory workers in Amhara Regional State, Ethiopia. J Trop Med. 2011:2011.

[27] Lette A, Ambelu A, Getahun T, Mekonen S. A survey of work-related injuries among building construction workers in southwestern Ethiopia. Int J Ind Ergon. 2018;68:57–64.

[28] Tafese A, Kebede G, Medhin G, Mariam T, Kindu M. Prevalence of neck pain among self employed sewing machine workers in Northern Gondar, Amhara Region, Ethiopia. J Community Med Health Educ. 2018;8(610) 2161-0711.1000610.

[29] Kume AP. Assessment of non-fatal occupational injuries and associated factors in building construction sector of adama science and Technology University. Adama, Ethiopia: Research Park Construction Site; 2016.

[30] Shine S. Determinants of Occupational Injury among the condominium house construction workers of Addis Ababa city, Ethiopia. Unmatched case control study. Addis Abeba Universty; 2013.

[31] Serkalem SY, Haimanot GM, Ansha NA. Determinants of occupational injury in kombolcha textile factory, North-East Ethiopia. Int J Occup Environ Med (The IJOEM). 2014;5(2 April) 327-84-93.

[32] Yazie TD, Chufa KA, Tebeje MG. Prevalence of needlestick injury among healthcare workers in Ethiopia: a systematic review and meta-analysis. Environ Health Prev Med. 2019;24(1):52.

[33] Ahmed SF. Work-Related Injuries and Its Associated Risk among Staff in a Malaysian Public University; 2016.

[34] Nsubuga FM, Jaakkola MS. Needle stick injuries among nurses in sub-Saharan Africa. Tropical Med Int Health. 2005;10(8):773–81.

[35] Gheshlagh RG, Aslani M, Shabani F, Dalvand S, Parizad N. Prevalence of needlestick and sharps injuries in the healthcare workers of Iranian hospitals: an updated meta-analysis. Environ Health Prev Med. 2018;23(44).