Health Services Research and Managerial Epidemiology
Volume 10: 1-14

DOI: 10.1177/23333928231192834
journals.sagepub.com/home/hme

Occupational-Related Injuries and Associated Risk Factors Among Healthcare Workers Working in Developing Countries: A Systematic Review

Desi Debelu[1], Dechasa Adare Mengistu[1], Sina Temesgen Tolera[1], Alemayehu Aschalew[2], and Wegene Deriba[1]

Abstract

Background: Occupational-related diseases or illnesses account for an estimated 2.4 million deaths worldwide every year. Currently, occupational hazards threaten healthcare workers' (HCWs) lives, safety, and well-being. Therefore, providing the prevalence and major causes of occupational-related diseases may enable injury reduction and the creation of safer working environments, which are important for providing higher quality services. The current study aimed to determine the prevalence of occupational-related injuries and associated risk factors among HCWs, particularly in developing countries.

Methods: The articles published in English were retrieved using a combination of Boolean logic operators (AND, OR, and NOT), Medical Subject Headings (MeSH), and keywords in electronic databases (SCOPUS/Science Direct, Web of Science, DOAJ, PubMed/MEDLINE, CINAHL, and Google Scholars). Using Joanna Briggs Institute critical appraisal tools, a quality assessment was conducted to determine the articles' relevance. In addition, the relevant articles were identified through a series of assessment and evaluation stages.

Results: About 721 studies were searched using electronic databases, of which 36 articles included 139,578 HCWs. The average prevalence of occupational-related injuries among HCWs in the career and previous last year accounted for 60.17%, ranged from 32% to 87.8% and 39.16%, ranged from 1.14% to 87%, respectively. The current study found that sex and hours worked, stress at work, occupation, age, training in infection prevention, use of universal precautions, recapping needles, ward work experience, staffing and resource adequacy, awareness, outdated guidelines, and previous exposure to sharp injury were statistically associated with occupational-related injuries.

Conclusions: This study revealed that 39% and 60% of HCWs experienced occupational-related injuries in the last year and during their career, respectively. Therefore, the appropriate measures must be taken to reduce the burden of occupational-related injuries by following standard precautions or occupational health and safety measures.

Keywords

occupational injury, occupational health, health facility, workplace hazards, healthcare workers, developing country

Introduction

The healthcare sector is among the most unsafe working environments, putting many healthcare providers or workers (HCWs) and other staff members at risk of being exposed to various occupational hazards, such as various biological and nonbiological hazards.[1,2] Currently, occupational hazards threaten HCWs' lives, safety, and well-being.[1,3,4]

According to the International Labour Organization, occupational-related diseases or illnesses accounted for an

[1] School of Environmental Health, College of Health and Science, Haramaya University, Harar, Ethiopia
[2] Institutional development and facility management, College of Health and Medical Science, Haramaya University, Harar town, Ethiopia

Submitted April 1, 2023. Revised June 29, 2023. Accepted July 20, 2023.

Corresponding Author:
Dechasa Adare Mengistu, School of Environmental Health, College of Health and Medical Science, Haramaya University, Harar town, PO.Box, 235, Ethiopia.
Email: dechasa.adare@haramaya.edu.et

estimate of 2.4 million of the total estimated deaths each year.[5] The World Health Organization reported that more than 2 million HCWs are exposed to sharp injuries, including needlestick injuries (NSIs), on a yearly basis.[6]

HCWs experience more than 2 million workplace-related NSIs each year.[7] Sharp injuries to HCWs resulted in 16,000 cases of hepatitis C virus (HCV), 66,000 cases of hepatitis B virus (HBV), and 1000 cases of human immunodeficiency virus (HIV) infections in 2000.[3]

Among sharp injuries, NSIs are among the most common occupational-related hazards among HCWs around the world.[7] The study conducted in 31 countries around the world reported that the last year's worldwide prevalence of NSIs among HCWs was 44.5% (95% CI: 35.7%-53.2%).[7] Another study conducted in sub-Saharan Africa also revealed that the lifetime and last 12 months prevalence ranged from 22% to 95% and 39% to 91%, respectively.[3]

Additionally, exposure to blood and other infectious materials as a result of occupational-related accidents may represent a potential threat to HCWs.[8] Accidents involving contact with blood and other body fluids are attributed to the transmission of about 60 pathogens, of which HBV, HCV, and HIV are highlighted.[9]

Furthermore, the risk of disease transmission from infected to other people as a result of exposure to an injury with sharp materials is estimated to be ranged from 6% to 30% for HBV, 5% to 10% for HCV; and 0.3% for HIV.[10] In general, occupational-related injuries among HCWs have continued to be a major health problem in healthcare facilities.[11–13] Identifying and providing the prevalence and major causes of occupational injuries may enable injury reduction, creation of safer working environments, and reduced turnover and cost, which are important for providing higher quality services.[7,14–16]

Despite the major importance of these points, and in spite of various individual studies, there is no accurate evidence on the mean prevalence of sharp injuries, including sharp injuries and other injuries among HCWs, and associated factors, particularly in developing countries. Regarding occupational injuries, existing data are focused on published articles at the national level. Some reviews addressed occupational-related NSI[3,17] but not other sharp injuries. The current study provides the prevalence of occupational-related sharp injuries, including NSI and other injuries. Therefore, the current study aims to determine the prevalence of occupational-related injuries among HCWs working in a health facility and associated risk factors in developing countries.

Materials and Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) criteria were followed for conducting the study.[18]

Eligibility Criteria

Inclusion criteria: The systematic review includes studies that met the following criteria.

Population: Healthcare workers working in the health facilities regardless of their occupation.

Outcome: Studies reported quantitative results, such as magnitude, frequency, rate, or prevalence of any occupational-related sharp injuries and/or associated risk factors were included in the current study.

Language: Articles written in English language.

Types of included articles: Published articles available in full text and were included in the study.

Location or Region: Studies conducted in developing countries.

Survey period and publication year: Not limited.

Sources of Information

SCOPUS/Science Direct, Web of Science, DOAJ, PubMed/MEDLINE, CINAHL, and Google Scholars were used for literature searches, using main keywords. The following electronic databases were used: SCOPUS/Science Direct, Web of Science, DOAJ, PubMed/MEDLINE, CINAHL, and Google Scholars. The Boolean logic operators ("AND, OR, and NOT"), medical subject headings (MeSH), and keywords were used to search the articles from the included databases.

Search Terms and Strategies

The following are the search terms we used by the authors (DD, STT, AAT, WD, and DAM) for searching articles from the electronic databases: prevalence "OR 'Magnitude' AND 'occupational' OR 'occupational related' OR 'work related' AND 'disease' OR 'injury' OR 'problem' hazards" AND "healthcare workers" OR "health professional" OR "workers." The articles were searched using Boolean logic operators (AND, OR, and NOT), Medical Subject Headings, and keywords. The search strategies used for searching the articles from PubMed are available as a supplementary file (Supplemental File I).

Furthermore, the articles were manually searched by the authors (DD, STT, AAT, WD, and DAM) to find those that were difficult to locate and missed from the included electronic databases or not indexed in the included databases. Finally, all of the identified keywords and index terms were cross-checked across the electronic databases that were included. Finally, the reference lists of the included studies were searched for further articles.

Study Selection Process

ENDNOTE software (Thomson Reuters) was used to remove duplicate articles. The PRISMA flowchart was used to guide the study selection process, displaying the publications that were included in the study and those that were excluded from the study with the reason for exclusion. The authors (DD, STT, AAT, WD, and DAM) independently selected the articles based on the titles and abstracts, applying the inclusion criteria. The articles were further read in detail and independently

evaluated by the authors (DD, STT, AAT, WD, and DAM). Any disagreements made with respect to the inclusion of studies were resolved by consensus after discussion. Finally, studies that met the criteria were included in this study.

Data Extraction and Quality Assessment

The authors (DD, STT, AAT, WD, and DAM) extracted the data from the eligible articles. The data regarding author(s), year of publication, sample size, study region/country, occupation, and primary outcome (occupational-related sharp injuries, including NSIs and other sharp injuries among HCWs working in the healthcare setting) were extracted from the included studies. The data were extracted from the included articles using Microsoft Excel 2016. The Joanna Briggs Institute tool[19] was used to assess the quality and relevance of the included articles.

The evaluation tools have the following 9 evaluation criteria/parameters: appropriate sampling frame, proper sampling technique, adequate sample size, description of the study subject and setting description, sufficient data analysis, use of valid methods for identifying conditions, valid measurement for all participants, use of appropriate statistical analysis, and adequate response rate. Then, each parameter was evaluated as yes (score = 1) and no (score 0). The quality of the included articles was classified as high (85% and above), moderate (60%-85%), or low (60%). Disagreements made among the authors on what to extract were resolved by discussion after the same processes were repeated.

Results

Study Selection

A total of 721 articles were searched from the included electronic databases (SCOPUS/Science Direct, Web of Science, DOAJ, PubMed/MEDLINE, CINAHL, and Google Scholars). Then, 189 duplicated articles were excluded. Furthermore, 310 articles were removed after initial screening, and 59 articles were removed after full-text articles were assessed for eligibility. Finally, 36 articles were included in the systematic review and meta-analysis (Figure 1).

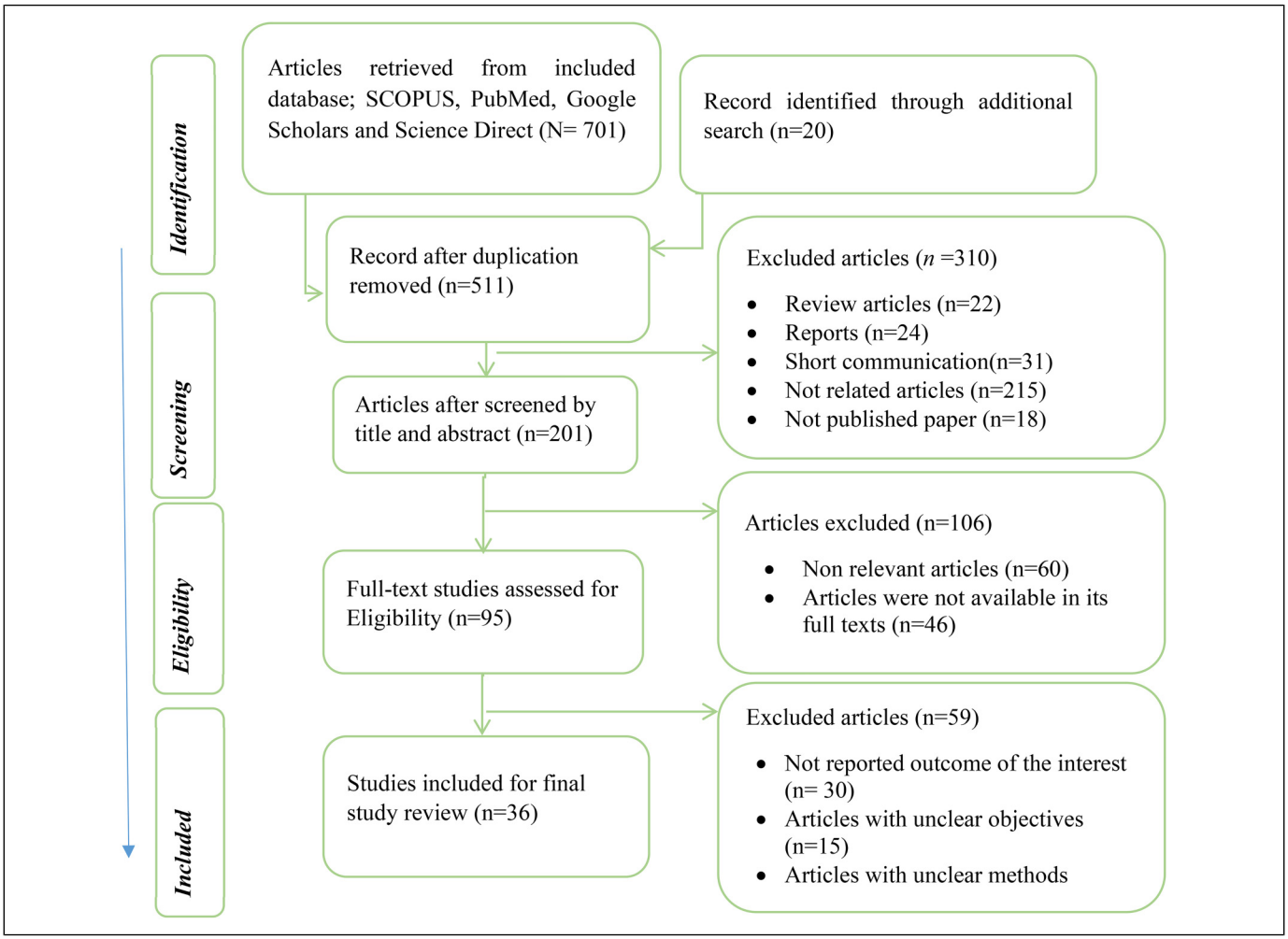

Figure 1. Study selection technique or process employed for selecting eligible articles, 2022.

Table 1. Characteristics of the Studies That Were Included in the Current Systematic Review and Meta-Analysis.

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
[27]	131	2021	• 87.8% of HCWs were exposed to sharp injuries • Nurses (74%) were the most affected HCWS category, followed by doctors (23%) and housekeeping (18%).	Nurse, Doctor, & House-keeper	Career	Sharp injury	Hospital	Saudi Arabia
[42]	240	2019	• There were 93 (38.75%) NSIs among the subjects. • NSIs were sustained in nearly two-thirds of cases (64.5%).	Medical service personnel	Career	NSIs	Hospital	South Africa
[24]	9873	2019	• About 39.1% of the nurses reported at least one NSI in the last 12 months • The incidence of NSIs was 139.5 per 1000 nurses per year.	Nurses	Past 12 months	NSIs	Hospital	China
[44]	79	2014	• 56 incidents of NSIs were reported among dentists • The incidence rate of NSI accounted for 8.19%/ person/years.	Dentists	3-year period	NSI	Hospital	Taiwan
[31]	168	2016	• The prevalence of NSIs in career and last year was 76% and 54%, respectively. • Sex with an AOR: 0.24 (0.095-0.612) and hours worked/week with AOR: 0.86 (0.812-0.925) were risk factors.	Nurses	Career and last year	NSIs	Hospital	Iran
[52]	312	2021	• In the previous 12 months, nearly 87% of nurses were exposed to NSIs at least once.	Nurses	Last 12 months.	NSIs	Hospital	India
[39]	555	2019	• About 21.6% of nurses experienced an NSSI within the last 12 months	Nurses	Last 12 months.	NSSIs	Hospital	Turkey
[28]	709	2021	• 197 (28%) HCWs had sustained percutaneous injuries in the last 12 months	Doctors, nurses, clinical officers	Last 12 months	Percutaneous injuries	Hospital & health center	Uganda
[46]	76	2020	• About 52.6% NSIs were reported among HCWs	HCWs	12 months	NSI	Hospital	Iraq
[41]	246	2021	• The 12-month prevalence of occupational injury was accounted for 29.7%. • There were 1.63 injuries per person per year. • Workplace stress (AOR: 2.68; 95% CI: 1.26-5.71) and being a laboratory worker were both associated with injury (AOR 3.26; 95% CI: 1.02-10.50).	Doctors, nurses, technician, and auxiliary staff	12-month	Occupational injury	Hospital	Ghana
[40]	249	2020	• Syringe needles were the most prevalent piece of NSI equipment (54.6%).	Doctors, nursing, laboratory, & others	Career	NSI	Hospital	Turkey
[30]	476	2020			Not specified	NSI	Hospital	India

(continued)

Table 1. (continued)

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
			• A total of 476 injuries were reported by the HCWs who were included in the study. • The highest exposure rate (73.7%) was reported in doctors, followed by nurses (19.1%).	Physicians, nurses, Laboratory staff, & others				
[48]	305	2013	• Percutaneous injuries were reported by 19% (n = 305) HCWs. • Higher rates of percutaneous injuries were observed among nurses (n = 50) • HCWs aged below 40 years were more likely to experience percutaneous injuries (OR = 3.7; 95% CI = 1.08-9.13) while previous training in infection prevention was protective (OR = 0.52; 95% CI = 0.03-0.90).	Doctors, clinical officers, nurses, laboratory, mortuary, housekeeper, and students	Last 12 months	Percutaneous injuries	Hospital	Kenya
[49]	436	2015	• NSIs were reported by 65.1% (n = 138) of the participants. • High rates of NSIs were observed among nurses (71.0%) during procedures (53.6%)	Doctors, nurses, laboratory, and others	12 months	NSI	Hospital	Tanzania
[53]	193	2017	• About 18.7% of the respondents' encountered needlesticks and sharp injuries in the last year. • HCWs who use universal precautions were 99% times less likely to face NSI [AOR = 0.01 (0.002, 0.1)] compared to those who did not use them. • HCWs who had acquired the required skill were 96% times less likely to encounter NSI [AOR = 0.04 (0.003-0.57)] than those who did not have. • HCWs who had job-related stress were 7.3 times more likely to face NSI [AOR = 7.3 (1.6, 33.2)] than those who did not have job-related stress. • HCWs who recap needles were 21.3 times more likely to encounter NSI [AOR = 21.3 (4.4-23)] than those who did not.	Nursing, public health, midwifery, laboratory, & physician	12-month	NSSIs	Hospital and health center	Ethiopia
[25]	48165	2021	• A total of 549 cases of sharp injuries occurred among participants. • The incidence of sharp injuries was 1.14% among the participants	Nurse, doctor, Intern, technician, cleaning	12 months	Sharp Injuries	Hospital	China
[20]	402	2015	• A total of 261 (64.9%) nurses reported needlestick or sharp injuries. • Syringe needles accounted for the highest	Nurses	Last year	NSSIs	Hospital	China

(continued)

Table 1. (continued)

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
			proportion of all NSIs (59%), followed by glass items (22%), and trocar core/catheter wires (4%). • The prevalence of NSIs was higher for nurses who worked in surgery than for those working in other departments (OR:4.43, 95% CI: 2.30-8.50).					
[32]	3806	2017	• 608 (15.97%) had NSIs over a 5-year period • Most of the NSIs were observed in enrolled nurse nursing sisters and midwife group (50.7%) followed by servants (20.1%) and the lowest was found in laboratory staff (2.3%). • 72 (11.8%) working in emergency ward and 58 (9.5%) in intensive care unit had NSIs.	Nurse, midwife, anesthesia, physicians, laboratory servants, radiology, secretary, and guard	5 years	NSI	Hospital	Iran
[33]	438	2020	• The magnitude of NSSIs in the last 12 months was 124 (28.3%) among the study participants. • Being male [AOR: 4.25: 95% CI: (2.43-7.41)], having no safety instructions in the work area [AOR:2.27, 95% CI: (1.29-3.97)], having no training on safety [AOR:4.92, 95% CI: (2.75-8.79)], had ≤5 years' work experience [AOR: 9.0: 95% CI: (4.88-16.60)], recapping of used needles [AOR: 2.63, 95% CI: (1.39-4.99)] were associated with NSSIs	Physicians, nurses, midwives, health officers, laboratory technologists, anesthetist, & cleaners.	Last 12 months	NSSI	Hospital	Ethiopia
[54]	161	2018	• 53 (32.90%) HCWs had a history of sharps injury. • Of which 25 (47.16%) were nurses, 11 (20.76%) were residents, and 6 (11.32%) were dentists.	Nurses, residents, dentists, & housekeeper	6 months and 12 months	Sharp injuries	Hospital	Saudi Arabia
[21]	61309	2019	• 935 (1.53%) HCWs experienced various types of sharp injuries in one month. • Interns experienced the highest proportion of sharp injuries (4.12%). • The most common location where sharp injuries occurred in HCWs (36.05%), while disposable syringes were the most common medical devices that caused sharp injuries (32.11%).	Doctors, nurses, logistical workers, medical technicians, and interns.	One month	Sharps injuries	Hospital	China
[34]	147	2020	• The prevalence of needlestick and sharp injuries was 75.5%. • Recapping practice of needle (AOR: 3.88; 95% CI: 1.666-9.036), working room (AOR: 2.968;	Midwives and nurses	Career	NSSIs	Hospital	Ethiopia

(continued)

Table 1. (continued)

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
			95% CI: 1.012-8.703), and contagious room like emergency room (AOR: 3.587; 95% CI: 1.383-9.301) are significantly associated with needlestick and sharp injuries.					
[43]	171	2021	• Factors associated with the incidence of NSIs were work, career or experience of <5 years ($P < .01$; [AOR] = 5.04; 95% [CI] = 2.04-12.42), noncompliance with working procedures ($P = .01$; AOR = 2.47; 95% CI = 1.26-4.82), being female ($P = .03$; AOR = 2.21; 95% CI = 1.01-4.55), and unsafe workplace conditions ($P = .04$; AOR = 2.23; 95% CI = 1.01-4.92).	Doctor, nurse/midwife, radiology, laboratory, cleaning staff, and Nursing student	Past 12 months	Risk factors of NSSI	Hospital	Indonesia
[35]	340	2015	• The prevalence of lifetime needlestick and sharp injury was 37.1% • The prevalence of injuries within the past one year was 19.1% • Participants who practiced needle recapping had higher odds of needlestick and sharp injuries within the past 12 months (AOR = 3.23, 95% CI: 1.78, 5.84) compared to their counterparts.	Nurse, physician, midwife, anesthesia, Health officer, Clinical laboratory, & Janitor	Lifetime & last year	Factor & NSSIs	Hospital	Ethiopia
[50]	3079	2013	• About 70.4% of the nurses had experienced needlestick or sharp injuries in the previous year. • The risk for NSI significantly decreased as the years working as an RN increased (OR = 0.990, CI = 0.988-0.991). • The risk for NSI significantly decreased with the increase in staffing and resource adequacy (OR = 0.794, CI = 0.671-0.940). • Safety containers for disposal of sharps and needles (OR = 0.727, CI = 0.580-0.913) significantly decreased the risk for NSIs.	Nurses	Last year	Factor, & NSSIs	Hospital	Korea
[26]	609	2021	• The overall needlestick and sharp injury incidence rate was 24%. • HCWs working in tertiary hospitals were 61% less likely to have needlestick and sharp injuries than those employed in secondary hospitals	Nurse, Doctor, Physician	Last year	NSSIs	Hospital	Saudi Arabia
[37]	144	2013	• 56.9% (82/144) experienced occupational exposure	Dental & medical	Last 12 months	Sharp injuries	Hospital	Nigeria
[15]	2031	2016	• The prevalence of NSIs and sharp injuries was 23.7%, and 9.8%, respectively	Nurses	Not specified	Factor & NSSIs	Hospital	Thailand

(continued)

Table 1. (continued)

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
			• Risk factors for NSIs were training without practice (OR, 1.67; 95% CI, 1.29-2.17), haste (OR, 4.81; 95% CI, 3.41-6.79), lack of awareness (OR, 1.36; 95% CI, 1.04-1.77), inadequate staffing (OR, 1.60; 95% CI, 1.21-2.11), and outdated guidelines (OR, 1.69; 95% CI, 1.04-2.74) • One risk factor was identified for sharp injuries: haste (OR, 2.43; 95% CI, 1.57-3.76)					
[47]	1000	2021	• A total of 130 (13%) NSIs were reported during the study period, with an incidence of 8 injuries per 1000 HCP. • NSIs occurred in 10.1 per 1000 nurses and in 12.4 per 1000 doctors.	Doctors, nurses, and others	Months	NSIs	Hospital	Qatar
[22]	901	2018	• 248 [27.5%] HCWs had sustained a sharp injury in the previous year. • Job categories, titles, education, departments, and training programs were associated with the occurrence of sharp injuries.	Doctor and nurse	Previous year	Sharp injuries	Hospital	China
[23]	1956	2019	• Psychosocial working conditions and stress perception were directly associated with the events of needlestick injury, as 0.39 (95%CI: 0.32-0.48) and 0.32 (95%CI: 0.22-0.39), respectively. • Stress perception had a mediating effect (0.25, 95% CI: 0.19-0.31) between psychosocial working condition and NSIs	Physician, Nurse, and Technician	Last 12 months	Factors & NSSIs	Hospital	China
[36]	195	2017	• The prevalence of sharp injury was 32.8%. • HCPS who had no in-service job training were 4.7 times more likely sustained sharp injuries compared with those who had in-service job training (OR: 4.7, 95% CI: 2.05-10.56). • HCPS who had previous exposure to sharp injuries were 3.7 times more likely sustained sharp injury compared with those who were not exposed (OR: 3.7, 95% CI = 1.62-8.27).	Nurse, midwife, laboratory, and Others	Last 12 months	Sharps injury	Hospital	Ethiopia
[45]	676	2010	• About 72.6%, 491/676 of staff reported sharp injury in the preceding 12 months • Most at risk were gynecologist/obstetricians (96.1%) followed by surgeons (91.1%), nurses (80.2%), dentists (75.4%), midwives (62.0%), technicians (50.0%), and pediatricians (47.5%).	Gynecologist/obstetrician, surgeons, nurses, dentist, midwife, and others	12 months	Occupational injury	Hospital	Afghanistan

(continued)

Table 1. (continued)

References	Sample size	Publication year	Outcomes	Participants	Exposure status	Types of injury	Types of health facility	Country/ Region
[51]	236	2014	• The prevalence of needlestick and sharp injuries among nurses was (74.57%) during the whole work duration • About 72.8% of nurses exposed to needlestick while (39.4%) exposed to sharp injuries. • About 55.93% of the study participants were exposed during the last year.	Nurses	Career and 12 months	NSSIs	Hospital	Egypt
[38]	200	2020	• The prevalence of needlestick or sharps injury in the past 6 and 12 months was 17.0% and 23.0%, while the mean numbers of injuries were 2.24 ± 2.001 and 2.48 ± 2.858, respectively.	Doctors, nurses, laboratory, ward orderlies	Past 6 and 12 months	NSSI	Hospital	Nigeria
[29]	219	2021	• 70 (32%) of HCWs had been exposed to stick injuries. • The injuries occurred in almost one-half 48.6%) of the study participants (in the past year.	Doctors, nurses, and laboratory technicians	Career time and 12 months	NSI	Hospitals	Saudi Arabia

Abbreviations: NSI, needlestick injuries; NSSI, needlestick and sharp injuries; HCWs, healthcare workers; HCP, health care personally; OR, odd ratio.

General Characteristics of the Included Studies

In the current study, 139 578 HCWs, ranging from 76 to 61 309 HCWs were included in 33 articles, which were published from 2010 to 2021. Six articles were conducted in China,[20–25] 4 in Saud Arabia,[26–28] 2 in each India,[28–30] Iran,[31,32] Ethiopia,[33–36] Nigeria,[37,38] and Turkey.[39,40] One study was conducted in each of Ghana,[41] South Africa,[42] Indonesia,[43] Taiwan,[44] Afghanistan,[45] Uganda,[28] Iraq,[46] Qatar,[47] Kenya,[48] Tanzania,[49] Korea,[50] Thailand,[15] Egypt,[51] and Afghanistan.[45]

The mean prevalence of occupational-related injury among HCWs in the last year and career time was 39.16% and 60.17%, respectively. Workload, stress at work, occupation, age, training in infection prevention, use of universal precautions, recapping needles, ward, work experience, staffing and resource adequacy, awareness, outdated guidelines, and previous exposure to sharp injury were statistically associated with occupational related injuries (Table 1).

Discussion

The current study aimed to determine the prevalence of occupational-related injuries among HCWs in developing countries. A total of 139 578 HCWs were included in the current review article. The prevalence of occupational injuries among various HCWs, including doctors, nurses, midwives, radiology, laboratory technicians, cleaning staff, mortuaries, housekeepers, public health, anesthetists, gynecologists, obstetricians, and surgeons was included in the current study.

The mean prevalence of occupational injury among HCWs in the last year was 39.16%, which was lower than the finding of another study that reported a 1-year global prevalence of NSIs among HCWs accounted for 44.5%.[7] Another study conducted in developing countries reported that the prevalence of NSI among HCWs was 35.7%,[17] which was lower than the current finding. The variation may be related to the scope of the study and the outcome reported. Because, the current study reported the prevalence of NSSIs, NSI, and sharp injuries.

Similarly, the current study found a lower prevalence than the findings of another study conducted in sub-Saharan Africa, which reported a one-year prevalence of NSIs ranged from 39% to 91%.[3] The variation may be attributed to the scope of the study and the type of occupational exposure to injury considered. Because the latter study was conducted mainly in sub-Saharan Africa that may not represent developing countries.

Furthermore, the current finding was supported by the findings of another study, which reported the last year's prevalence of occupational exposure to NSI among HCWs accounted for 37.8%.[55] In this study, the prevalence of occupational exposure to sharp injuries in the last year varied across the included study areas (Figure 2).

Furthermore, the current study found that the mean prevalence of occupational injury in the career was varied across the included study areas, with the mean prevalence of 60.17%. Another study conducted in sub-Saharan Africa, which reported a lifetime prevalence of NSI ranged from 22% to 95%.[3] The variation might be attributed to the scope of the study location and the types of occupational-related injuries considered in the study. The later finding is based on studies conducted in sub-Saharan Africa.

The finding of the current study was lower than the finding of another study, which reported the prevalence of NSI in the career accounted for 64.1%.[17] However, it was higher than the findings of another study, which reported 57.0% of HCWs exposed to NSIs.[55] The variation can be attributed to the differences in types of exposure and regions or scope of the study. Because, the current study reported the prevalence of NSSIs, NSIs, and sharp injuries.

Furthermore, the current study found that the mean prevalence of occupational-related injury in the career time was varies across the world (Figure 3). Overall, the study found a prevalence of any occupational injuries in the last year and career time among HCWs working in the health facility, which accounted for 39.16% and 60.17%, respectively.

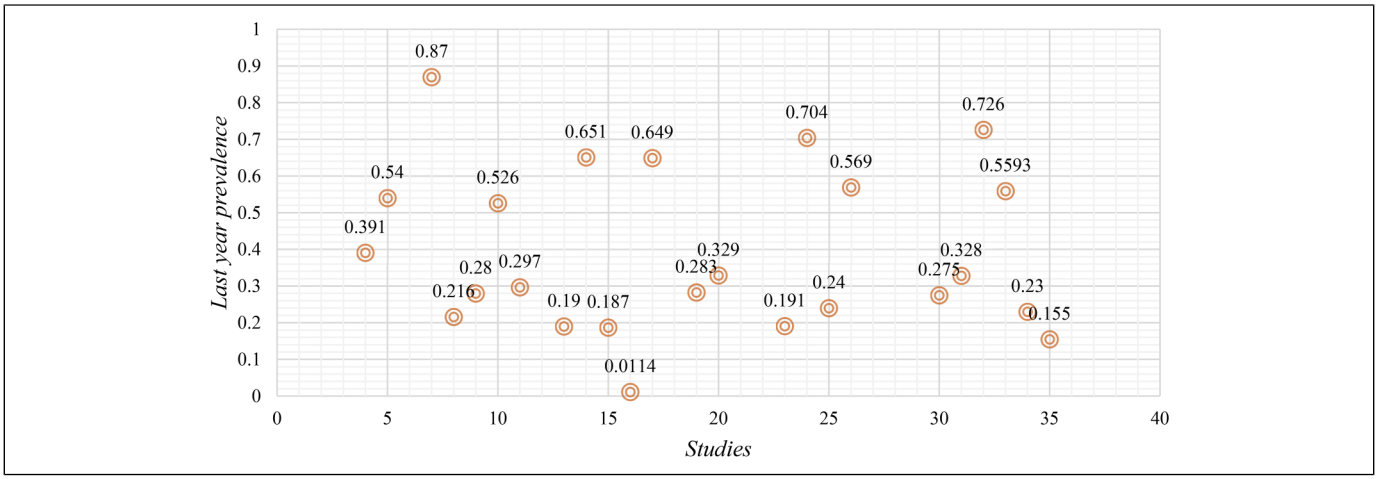

Figure 2. The prevalence of occupational injuries in the last year among healthcare workers.

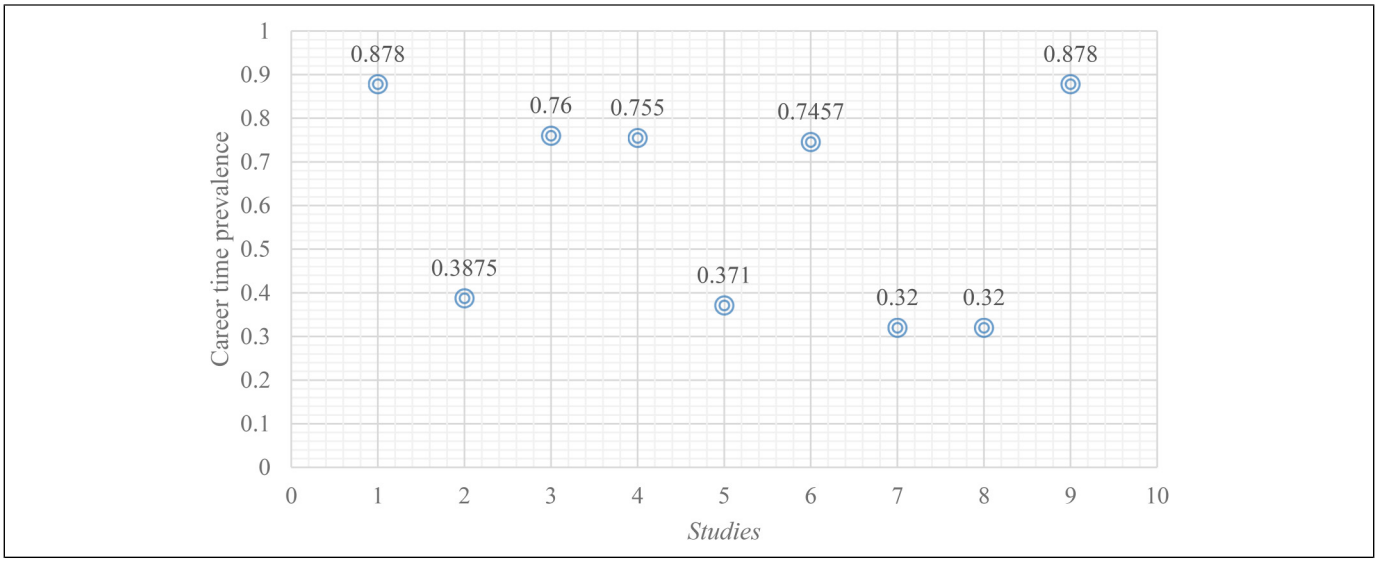

Figure 3. The prevalence of occupational-related injuries in the last year among healthcare workers.

However, occupational injuries have serious health problems and are a potential source of blood-borne pathogens such as HBV and HIV. Therefore, applying standard precautions, occupational health and safety measures or services, regular training on infection prevention, and proper implementation of guidelines plays a major role in reducing occupational exposure to sharp injuries and preventing infectious diseases among HCWs.

Possible Prevention Strategies

Integrated approaches to occupational health and safety, including engineering measures, administrative policy, and the use of personal protective equipment should be implemented to control, eliminate, or reduce occupational exposure to injuries or hazards.[56] Furthermore, there is a need to implement priority strategies, which include strengthening of international and national policies for health at work, promotion of a healthy work environment, healthy work practices, strengthening occupational health services, development of occupational health standards, and strengthening of research.[57] By improving HCWs' knowledge, behavior, or processes regarding the proper choice and safe operation of needles, scalpels, and other sharp devices necessary in the delivery of healthcare, education and training interventions also play a significant role in reducing sharps injuries.[58]

Conclusions

This systematic review found a higher percentage of career time and previous 1-year occupational injuries in developing countries. The study suggests that about 39% and more than half (60%) of HCWs were experienced occupational-related injuries in the last year and in their career time, respectively. Therefore, efforts should be made to reduce the high burden of occupational-related injuries through effective implementation of standard precaution measures along with occupational health and safety measures.

Limitations

There was an unequal distribution of occupations among the included articles that made the comparison of occupational injuries among different occupations more difficult. On the other hand, the prevalence of occupational injuries in some countries was not covered due to the lack of studies.

Acknowledgments

The authors extend their deepest thanks to Haramaya University, Department of Environmental Health staff, for providing their constructive support.

Authors' Contributions

DD conceived the idea and had a major role in the review, extraction, and analysis of data, writing, drafting, and editing of the manuscript. DD, DAM, STT, WD, and AA have contributed to data extraction. DD, DAM, STT, WD, and AA contributed to quality assessment, drafting, and editing of the manuscript. Finally, all authors DD, DAM, STT, WD, and AA read and approved the final version of the manuscript to be published and agreed on all aspects of this work.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Dechasa Adare Mengistu https://orcid.org/0000-0002-0076-5586

Data Availability Statement

Almost all data are included in this study. However, additional data can be available from the corresponding authors on the reasonable request. Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Supplemental Material

Supplemental material for this article is available online.

References

1. Tawiah B-A, Alberta B-A, Appiah-Brempong E, et al. Identifying occupational health hazards among healthcare providers and ancillary staff in Ghana: a scoping review protocol. *BMJ Open*. 2022;12(1):e058048.
2. World Health Organization. Occupational health [Internet], 2021. https://www.who.int/health-topics/occupational-health
3. Mossburg S, Agore A, Nkimbeng M, Commodore-Mensah Y‡. Occupational hazards among healthcare workers in Africa: a systematic review. *Ann Glob Health.* 2019; 85(1): 78, 1-13.
4. World Health Organization. Health workers: health worker occupational health. who.int, 2018. http://www.who.int/occupational_health/topics/hcworkers/en/
5. Hämäläinen P, Takala J. Global estimates of occupational accidents and work-related illnesses 2017. workplace safety and health Institute, Singapore and Ministry of social Affairs and health, Finland. 2017. http://www.icohweb.org/site/images/news/pdf/Report%20Global%20Estimates%20of%20Occupational%20Accidents%20and%20Work-related%20Illnesses%202017%20rev1.pdf
6. World Health Organization (WHO). Needlestick injuries. 2019. https://www.who.int/occupational_health/topics/needinjuries/en/
7. Bouya S, Balouchi A, Rafiemanesh H, Amirshahi M, Dastres M, Poodineh M. Global prevalence and device related causes of needle stick injuries among health care workers: a systematic review and meta-analysis. *Ann Glob Health.* 2020; 86(1): 35, 1-8.
8. Reis LA, La-Rotta EIG, Diniz PB, Aoki FH, Jorge J. Occupational exposure to potentially infectious biological material among physicians, dentists, and nurses at a university. *Saf Health Work.* 2019;10(4):445-e451.
9. Tarantola A, Rachline A. Infection risks following accidental exposure to blood or body fluids in health care workers: a review of pathogens transmitted in published cases. *Am J Infect Control*. 2006;34(6):367-e75.
10. CDC. Guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for postexposure prophylaxis. *Morbid Mortal Weekly Report*. Atlanta 2001;50(3):3e7.
11. Prüss-Üstün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med*. 2005;48(6):482-490.
12. Cheng HC, Su CY, Yen AMF, Huang CF. Factors affecting occupational exposure to needlestick and sharps injuries among dentists in Taiwan: a nationwide survey. *PLoS ONE*. 2012;7(4): 34911.
13. Weldesamuel E, Gebreyesus H, Beyen B. Assessment of needle stick and sharp injuries among health care workers in central zone of Tigray, Northern Ethiopia. *BMC Res Notes*. 2019; 12(2019):654.
14. Cooke CE, Stephens JM. Clinical, economic, and humanistic burden of needlestick injuries in healthcare workers. *Med Devices (Auckl)*. 2017;10(2017):225.
15. Kasatpibal N, Whitney JD, Katechanok S. Prevalence and risk factors of needlestick injuries, sharps injuries, and blood and body fluid exposures among operating room nurses in Thailand. *Am J Infect Control.* 2016;44(1):85-90.
16. Santos LT, Rocha FLR, Marziale MHP. Needlesticks with safety devices and accident prevention: an integrative review. *Rev Bras Enferm.* 2018;71(6):3084-3092.
17. Mengistu DA, Tolera ST. Prevalence of occupational exposure to needle-stick injury and associated factors among healthcare workers of developing countries: systematic review. *J Occup Health*. 2020;62:e12179.
18. Moher D, Shamseer L, Clarke, M., et al. PRISMA-P Group, Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev.* 2015;4(1):1-9. 2015.
19. The Joanna Briggs Institute. Critical appraisal tools for use in the JBI systematic reviews checklist for prevalence studies. 2017.
20. Zhang X, Gu Y, Cui M, Stallones L, Xiang H. Needlestick and sharps injuries among nurses at a teaching hospital in China. *Workplace Health Saf.* 2015;63(5):219-225.
21. Lin J, Gao X, Cui Y, et al. A survey of sharps injuries and occupational infections among healthcare workers in Shanghai. *Ann Transl Med.* 2019;7(22):2019.
22. Cui Z, Zhu J, Zhang X, Wang B, Li X. Sharp injuries: a cross-sectional study among health care workers in a provincial teaching hospital in China. *Environ Health Prev Med.* 2018;23(1):1-7.
23. Wang C, Huang L, Li J, Dai J. Relationship between psychosocial working conditions, stress perception, and needle-stick injury among healthcare workers in Shanghai. *BMC Public Health*. 2019;19(1):874.
24. Zhao F, Zhang M, Xuan J, et al. Burden of insulin injection-related needlestick injuries in mainland China–prevalence, incidence, and healthcare costs. *Int J Nurs Stud.* 2019;97 (2019):78-83.
25. Sun J, Qin W, Jia L, et al. Investigation and analysis of sharp injuries among health care workers from 36 hospitals in Shandong Province, China. *Biomed Res Int.* 2021;2021:1-7.
26. Makeen AM, Alharbi AA, Mahfouz MS, et al. Needlestick and sharps injuries among secondary and tertiary healthcare workers, Saudi Arabia. *Nurs Open.* 2022;9(1):816-823.
27. Fadil RA, Abdelmutalab NA, Abdelhafeez SA, et al. Pattern and risk factors of sharp object injuries among health care workers in two tertiary hospitals, al Taif-Kingdom of Saudi Arabia 2016–2018. *Saudi J Biol Sci.* 2021;28(11):6582-6585.
28. Alitubeera PH, Mutanda JN, Aggrey M, et al. Prevalence, correlates of occupational percutaneous injuries and use of post exposure prophylaxis against HIV, hepatitis B among health workers in Kampala, Uganda-May 2016. *J Interv Epidemiol Public Health*. 2021;4(3):13-31.

29. Albeladi OA, Almudaraa Ss, Alqusibri AA, Alqerafi NM, Alsenani YS, Abd-Ellatif EE. Needle stick injuries among health care workers in AL-Madinah AL-Munawara Governmental Hospitals in Saudi Arabia. *Glob J Health Sci.* 2021;13(11):76-88.
30. Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of needlestick and injuries among health-care workers of a tertiary care teaching hospital in north India. *J Lab Physicians*. 2017;9(1):20-25.
31. Jahangiri M, Rostamabadi A, Hoboubi N, Tadayon N, Soleimani A. Needle stick injuries and their related safety measures among nurses in a university hospital, Shiraz, Iran. *Saf Health Work.* 2016;7(1):72-77.
32. Masoumi-Asl H, Rahbar M, Soltani A, Pezeshki Z, Khanaliha K, Kolifarhood G. Epidemiology of needlestick injuries among healthcare workers in Tehran, Iran: a cross-sectional study. *Arch Clin Infect Dis*. 2017;12(2):1-7.
33. Assen S, Wubshet M, Kifle M, Wubayehu T. Magnitude and associated factors of needle stick and sharps injuries among health care workers in Dessie City Hospitals, north east Ethiopia. *BMC Nurs.* 2020;19(1):1-8.
34. Getie A, Wondmieneh A, Tesfaw G. The prevalence of needlesticks and sharp injuries, and the associated factors among midwives and nurses in North Wollo Zone Public Hospitals, North East Ethiopia: An institution-based cross-sectional study. *Drug Healthc Patient Saf.* 2020;12(2020):187-193.
35. Bekele T, Gebremariam A, Kaso M, Ahmed K. Factors associated with occupational needle stick and sharps injuries among hospital healthcare workers in Bale zone, Southeast Ethiopia. *PLoS One*. 2015;10(10):e0140382.
36. Sharew NT, Mulu GB, Habtewold TD, Gizachew KD. Occupational exposure to sharps injury among healthcare providers in Ethiopia regional hospitals. *Ann Occup Environ Med.* 2017;29(1):1-7.
37. Osazuwa-Peters N, Obarisiagbon A, Azodo CC, Ehizele AO, Obuekwe O. Occupational exposure to sharp injuries among medical and dental house officers in Nigeria. *Int J Occup Med Environ Health.* 2013;26(2):283-290.
38. Nwoga HO, Ajuba MO, Nwankwo MM. Occupational accidents among healthcare workers in a tertiary health facility in Enugu state, South-East Nigeria. *Int J Community Med Public Health*. 2020:7(6):2005-2010.
39. Çalıkoğlu EO, Bedir B, Akçay HB, Gümüş A. Needlestick and sharps injuries among nurses at atatürk university research hospital and their practices after injury. *Eur Res J*. 2019;5(1):128-133.
40. Düzgöl M, Aksay AK, Durgun E, et al. Risk groups for needlestick injury among healthcare workers in children's hospital: a cross-sectional study. *J Pediatr Infect/Cocuk Enfeksiyon Dergisi*. 2020;14(4):212-217.
41. Appiagyei H, Nakua EK, Donkor P, Mock C. Occupational injuries among health care workers at a public hospital in Ghana. *Pan Afr Med J.* 2021;39(1):1-13 .
42. McDowall A, Laher AE. Cross-sectional survey on occupational needle stick injuries among prehospital emergency medical service personnel in Johannesburg. *Afr J Emerg Med*. 2019;9(4):197-201.
43. Atmaja KW, Wirawan MA. Risk factors of needlestick and sharp injuries among health care workers at Sanglah Tertiary Hospital. *Jurnal Berkala Epidemiologi*. 2021;9(1):36-43.
44. Lee JJ, Kok SH, Cheng SJ, Lin LD, Lin CP. Needlestick and sharps injuries among dental healthcare workers at a university hospital. *J Formos Med Assoc.* 2014;113(4):227-233.
45. Salehi AA, Garner P. Occupational injury history and universal precautions awareness: a survey in Kabul hospital staff. *BMC Infect Dis.* 2010;10(1):1-4.
46. Ali SH, Majeed , Huwiezy . Prevalence of needlestick injuries among healthcare workers in Rizgary Teaching Hospital. *Polytechnic J.* 2020;10(2):27-31.
47. Razzakh SS, Qureshi MF. Needlestick injuries among healthcare personnel in Qatar: a retrospective study. *Qatar Med J.* 2021;2021(2):35.
48. Mbaisi EM, Wanzala ZP, Omolo J. Prevalence and factors associated with percutaneous injuries and splash exposures among health-care workers in a provincial hospital, Kenya, 2010. *Pan Afr Med J*. 2013;14(1).
49. Chalya PL, Seni J, Mushi MF, et al. Needle-stick injuries and splash exposures among health-care workers at a tertiary care hospital in north-western Tanzania. *Tanzan J Health Res.* 2015;17(2):2014.
50. Cho E, Lee H, Choi SH, Park SH, Yoo Y. Factors associated with needlestick and sharp injuries among hospital nurses: a cross-sectional questionnaire survey. *Int J Nurs Stud.* 2013;50(8):1025-1032.
51. Ahmed AS. Needle stick and sharp injuries among nurses at Zagazig University Hospitals, Sharkia Governorate, Egypt. *Middle East J Appl Sci*. 2014;4(4):1205-1211.
52. Mishra R, Sharma SK, Gupta PK, Gupta P. Occupational health cognizance: needle stick injuries among student nurses. *Int J Afr Nurs Sci.* 2021;15:100370.
53. Dilie A, Amare D, Gualu T. Occupational exposure to needle stick and sharp injuries and associated factors among health care workers in Awi Zone, Amhara Regional State, Northwest Ethiopia, 2016. *J Environ Public Health.* 2017:1-7.
54. Abdulmageed SS, Alabbassi F, Alradi M, Alghanaim N, Banjar S, Alnakhli M. Assessment of occupational exposure to sharp injuries among health care workers in King Abdulaziz University Hospital. *Int J Community Med Public Health*. 2018;5(5):1756-1761.
55. Mengistu DA, Tolera ST, Demmu YM. Worldwide prevalence of occupational exposure to needle stick injury among healthcare workers: a systematic review and meta-analysis. *Can J Infect Dis Med Microbiol*. 2021:1-10.
56. Cooklin A, Joss N, Husser E, Oldenburg B. Integrated approaches to occupational health and safety: a systematic review. *Am J Health Promot.* 2017;31(5):401-412.
57. Goldstein G, Helmer R, Fingerhut M. The WHO global strategy on occupational health and safety. *Afr Newslett Occup Health Safety*. 2001;11(3):56-60.
58. Verbeek J, Husman K, Dijk V, Jauhiainen M, Pasternack HV. Building an evidence base for occupational health interventions. *Scand J Work Environ Health*. 2004;30(2):164-168.

Author Biographies

Desi Debelu is a MSc candidate in environmental health. Her research areas include public health, infection prevention and control, occupational health and safety, climate change, water quality and environmental health.

Dechasa Adare Mengistu holds MSc in environmental health. He is working as a lecturer and researcher as well as a director of Infection prevention and control. His research areas includes, food microbiology, public health, infection prevention and control, climate change and health, occupational health and safety, industrial hygiene and environmental health.

Sina Temesgen Tolera is a PhD candidate in environmental health. His research areas include public health, infection prevention and control, toxicology, industrial hygiene, climate change and health, occupational health and safety, and environmental health.

Alemayehu Aschalew is a PhD candidate in environmental health. His research areas include infection prevention and control, water quality, climate change and health, occupational health and safety, and environmental health.

Wegene Deriba holds a MSc in environmental health. His research areas include, sanitation, Water, Sanitation and Hygiene (WASH), environmental analysis, public health, vector prevention and control, and environmental health.