

Occupational Related Upper and Low Back Pain Among Working Population of Ethiopia: Systematic Review and Meta-Analysis

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Abstract

Background: Occupational-related musculoskeletal disorders (MSDs) are a major public health problem and result in the growing demands for utilization of healthcare services, causing temporary and permanent disability and reduced quality of life. In developing countries, particularly Ethiopia, there is no adequate evidence on the overall prevalence of occupational-related MSDs and remains less prioritized and empirically unrepresented. Thus, this study aimed to determine the pooled prevalence of occupational-related musculoskeletal disorders, particularly low and upper back pain among the working population of Ethiopia.

Methods: This systematic review and meta-analysis considered studies conducted in Ethiopia, written in English, and published in 2017-2020. The articles were searched using the following electronic databases such as Web of Science, SCOPUS, PubMed, Google Scholar, CINAHL, Cochrane Library, African Index Medicus, African Journals Online database, and Science directly using a combination of Boolean logic operators, Medical Subject Headings, and main keywords. The quality assessment of the articles was performed using the Joanna Briggs Institute Critical Appraisal tools to determine the relevance of the articles to the study.

Results: In the current study, the pooled prevalence of occupational-related upper and lower back pain in the previous year was 27.1% [95% of the CI: 18.4, 37.9%] and 54.2% [95% of the CI: 48.2, 60.0%], respectively. However, the pooled prevalence of occupational-related upper back pain in the previous year according to the publication year, the study population and the study area was 43.8% [95% of CI: 39.3, 47.7%], 34.7% [95% of CI: 33.1, 36.2%] and 36.2% [95% of CI: 33.6, 39.0%] respectively while the prevalence of low back pain in the previous year according to the publication year, the study population and the study area was 61.8% [95% of CI: 58.9, 64.6%], 52.8% [95% of CI: 51.3, 54.3%] and 55.2% [95% of CI: 51.4, 59.0%] respectively.

Conclusions: This systematic review and meta-analysis found that more than half of the included study participants had experienced low back pain in the previous year, while more than one-fourth of the included participants had experienced upper back pain. Therefore, the application of occupational health and safety practices in the workplace plays an important role in reducing MSDs related to work and other occupational hazards.

Background

Musculoskeletal disorders (MSD) are body dysfunctions that affect various parts of the body such as muscles, tendons, ligaments, joints, nerves, bones, and the blood circulation system [1, 2] and are characterized by various symptoms such as pain, ache, and discomfort [3,4]. Workers involved in various occupational settings such as health care, driving, manufacturing, general labor, maintenance or repair, and cleaning are at the highest risk of MSD [5].

Occupational-related MSDs are an important public health problem that affects the neck, shoulders, elbows, wrists, hands, upper back, low back, hips, knees, ankles, and feet [6-10]. Furthermore, occupational-related MSDs result in increasing demands for the utilization of healthcare services, causing temporary and permanent disability, and reduced quality of life [11, 12].

Globally, occupational-related MSDs are among the most common leading causes of worker complaints [13]. According to the Global Burden of Disease report, 2016, musculoskeletal disorders were the leading cause of disability adjusted life years [14], with a double burden of economic costs and health care needs, as well as a

major social problem [15]. Annually, more than 2.3 million people die from occupational injuries or related diseases [16,17]. In developing countries where there is poor awareness of ergonomic issues, lack of adequate training, and problems are under-reported, occupational-related MSDs have increased [18].

Furthermore, health and safety procedures are often ignored, and infrastructure and preventive measures are poor in developing countries [19]. In developing countries, occupational-related MSDs remain less prioritized and empirically unrepresented [20] and only 5 to 10% of workers have access to basic occupational health services [21].

Many studies have been conducted on occupational-related MSDs such as upper and lower back pain in different occupational settings in Ethiopia [22, 23, 29-48]. However, no study that provides adequate evidence on the overall pooled prevalence of upper and lower back MSDs that may be important to policymakers, the federal Ministry of Health, and to better understand the current evidence on the prevalence of upper and lower back MSDs in Ethiopia. Thus, this study aimed to determine the pooled prevalence of occupational-related upper and lower back pain or disorder among the working population in Ethiopia.

Methods

This study included articles that reported the prevalence of low back pain or/and upper back pain musculoskeletal disorders in the previous year. This study was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [24].

Eligibility criteria.

Articles that met predetermined inclusion criteria were included in the systematic review and meta-analysis. In this study a cross-sectional study design was conducted in Ethiopia from 2017 to 2020 that provided quantitative results (magnitude, frequency or prevalence) of low and/or back musculoskeletal disorders in the last 12 months. Furthermore, the study included full-text articles written in the English language and published in peer-reviewed journals from 2017 to 2020.

Information Sources and Search Strategy

The searches were focused on keywords of the systematic review and meta-analysis through search strategies such as Web of Science, SCOPUS, PubMed, Google Scholar, CINAHL, Cochrane Library, African Index Medicus and African Journals Online databases, and Science Direct. Articles were searched using a combination of Boolean logic operators (AND, OR, and NOT), medical subject headings (MeSH), and major keywords.

The following is a search term that the authors (DAM, AA and YMD) used in the initial search of the articles: "Prevalence" OR "Magnitude" AND "Occupational related" OR "Work related" AND "Musculoskeletal" OR "Low back" OR "Upper back" AND "Disorders" OR "Disease" OR "Problems" OR "Pain" OR "Injury" AND "Working group" OR "Working population" OR "Workers" AND "Ethiopia". Furthermore, the manual search was made to cover the search missed from the electronic databases.

Finally, all identified keywords and an index term were checked by the authors (DAM, AA, and YMD) across the included electronic databases. The last search was done on 12 October 2020.

Study Selection

After searching, duplicated articles were removed using the ENDNOTE software version X5 (Thomson Reuters, USA). The authors (DAM, AA and YMD) screened the titles and abstracts of the identified articles by applying the predetermined inclusion and exclusion criteria. Finally, the systematic review included articles conducted in Ethiopia and published from 2017 to 2020 that reported the last year's prevalence of occupational-related musculoskeletal disorders (low and upper back pain) in different occupational settings.

Data Extraction and Quality Assessment

The authors (DAM, AA and YMD) independently extracted the required data from the eligible articles. Relevant data required for the study were extracted under the following headings: author; publication year; sample sizes, study area/region; study design and primary outcomes of interest were extracted using a Microsoft Excel 2016 format.

The quality of each article was evaluated to confirm the relevance of the articles to the study. The selected articles were subjected to a rigorous and independent evaluation using standardized critical evaluation tools, Joanna Briggs Institute (JBI) Critical Assessment tools) [25] to determine the quality and relevance of the articles. The score was then taken from all studies and classified as high (85% and above score), moderate (60-85% score), and low (<60% score). Disagreements made between authors (DAM, AA, and YMD) were solved by discussion after repeating the same procedure.

Data Analysis and Statistical Procedures.

The pooled prevalence of occupational-related low and upper back musculoskeletal disorders in the previous year was performed using comprehensive meta-analysis (CMA) version 3.0 statistical software. The forest plot and the random effects model were used to determine the pooled prevalence of selected musculoskeletal disorders in the previous year.

The publication bias of the included articles was evaluated using funnel plots and a P-value of less than 0.05 was considered as evidence of publication bias. Furthermore, the subgroup analysis was performed based on the publication year, occupation categories / population and the study region to minimize random variations between the point estimates of the included articles. Finally, the characteristics of the included articles were presented using text, tables, and graphs.

Heterogeneity

The Cochran Q test (Q) and I Squared test (I^2 statistics) were used to evaluate the heterogeneity between the included articles. I^2 statistics is the proportion of the variation in prevalence estimates due to genuine variation in prevalence [26,27]. The level of heterogeneity was divided into four categories; no heterogeneity (0%), low (25–50%), moderate (50–75%) and high (greater than 75%). [28]. Furthermore, subgroup analysis and meta-regression were used to determine the heterogeneity in the prevalence of MSD based on the years of publication, occupation/study population, and study areas.

Results

Study Selection

About 1114 articles, editorials, and reports were searched through electronic databases such as Web of Science, SCOPUS, PubMed, Google Scholar, CINAHL, Cochrane Library, African Index Medicus, African Journals Online databases, and Science directly from 10 September to 12 October 2020. Following the search for articles, 285 duplicate articles were excluded. Furthermore, 706 articles were excluded after initial selection, and 35 articles were excluded after full-text articles were assessed for eligibility, of which 20 articles were included in the systematic review and meta-analysis (Figure 1).

Characteristics of Included Articles

In this study, a total of 9,410 participants were included in 20 articles conducted in Ethiopia and published from 2017 to 2020 [29-48]: 9 (45.0%) articles [30,32,38,39,41,43,44,47,48] conducted in Oromia, three (15%) in Tigray [31,36,45], three (15%) in SNNP [29,34,35], three (15%) articles in Addis Ababa [33,40,46], two (10%) articles in the Amhara region state. All included studies were cross-sectional studies with a sample size ranging from 264 [45] to 771 [40] study participants.

Among the included articles, 10(50%) [30,33,34,36,37,39,40,42,43,47] of the included articles reported the prevalence of both low back pain and upper back pain, 9(45%) articles [29,31,32,35,41,44-46,48] reported the prevalence of low back pain alone and 1(5%) [38] reported the prevalence of upper back pain alone.

Furthermore, 8 (40%) included articles were published in 2020 [29,31,32,34,44-47], followed by studies published in 2019[36-38, 41-43] that represented 6 (30%) of the included articles. According to the JBI Critical Assessment tool [25], all included articles had a low risk of bias. The occupational-related prevalence of low and upper back pain in the previous year ranged from 25.5% [41] to 74.8% [36] and 10.4% [29] to 60.4% [35], respectively (Table 1).

Prevalence of Occupational-Related Upper and Low Back Pain

The meta-analysis was performed using the Comprehensive Meta-Analysis (CMA) Version 3 statistical package (software) to determine the combined prevalence of occupationally related low back and upper back musculoskeletal disorders in Ethiopia.

Prevalence of Occupational-Related Upper Back Pain

The pooled prevalence of occupational-related upper back pain in the previous year was 27.1% with a 95% CI of 18.4 to 37.9% (Figure 2). After a subgroup analysis was performed based on occupation, the overall pooled prevalence of occupational-related upper back pain in the previous year was 34.7% (95% CI: 33.1, 36.2%). The lowest prevalence [10.4% (95% CI 7.6, 14.1%)] was reported among vehicle repair workers, while the highest prevalence [60.4% (95% CI 55.7, 65.0%)] was reported among women loading pedestrians (Supplementary file I; Figure 1).

After the subgroup analysis was performed based on the publication year, the overall pooled prevalence of occupational-related upper back pain in the previous year was 43.8 % [95% CI 39.9, 47.7%]. The lowest prevalence [15.3% (95% CI: 11.7%, 19.8%)] was reported in the study published in 2018 while the highest prevalence [60.4% (95% CI: 55.7, 65.0%)] was observed among the study published in 2017 (Supplementary file I; Figure 2).

Furthermore, based on the study region, the total pooled prevalence of occupational-related upper back pain was 36.2 % with 95% CI: 33.6, 39.0%]. The lowest pooled prevalence [22.1% (95% CI: 9.2%, 44.5%)] was reported

among the studies conducted in the Oromia regional state, while the highest prevalence [38.8% (95% CI: 34.2, 43.6%)] was reported by the study conducted in the Amhara regional state (Supplementary file I; Figure 3).

Prevalence of Occupational-Related Low Back Pain

The pooled prevalence of occupational-related low back pain in the previous year was 54.2% with a 95% CI of 48.2, 60.0 (Figure 3). Based on the subgroup analysis of the prevalence based on occupation, the overall pooled prevalence of occupational-related low back pain in the previous year was 52.8% (95% CI 51.3, 54.3%). The lowest prevalence [25.5% (95% CI: 21.5, 29.9%)] was reported among construction workers, while the highest prevalence [67.3% (95% CI: 62.7, 71.6%) with a p-value <0.001] was reported among women loading pedestrians (Supplementary File I; Figure 4).

After subgroup analysis was performed based on the publication year, the overall pooled prevalence of occupational-related low back pain was 61.8 % (95% CI: 58.9, 64.6%). The lowest pooled prevalence [46.9% (95% CI: 39.9%, 54.0%)] was reported among studies published in 2020, while the highest pooled prevalence [65.7%, (95% CI: 62.5, 68.9%)] was observed among studies published in 2017 (Supplementary file I; Figure 5).

Furthermore, after the subgroup analysis was performed by study region, the overall pooled prevalence of low back pain was 55.2 % (95% CI: 51.4, 59.0%). The lowest pooled prevalence [50.7% (95% CI: 25.0, 76.0%)] was reported among studies conducted in the Tigray regional state, while the highest prevalence [56.3% (95% CI: 37.1, 73.9%)] was reported among studies conducted *in Southern Nations, Nationalities, and Peoples* (Supplementary File I; Figure 6).

Discussion

The current study was conducted to determine the pooled prevalence of occupational-related musculoskeletal disorders; lower back and upper back pain in the previous year in Ethiopia based on previously published articles (2017-2020). In this study, a total of 9,410 study participants, regardless of their occupation categories, were included in 20 articles conducted in Ethiopia [29-48].

Musculoskeletal disorders are the leading causes of loss of productivity and absenteeism of employees and affect quality of life [49, 50]. The study found that the prevalence of low back pain among various groups of the Ethiopian working population ranged from 25.5% to 67.3%, which was lower than the finding of another study conducted in Saudi Arabia and found that the prevalence of lower back pain in different professional groups ranged from 64% to 89% [51].

Furthermore, the current found pooled prevalence of occupational-related low back pain accounted for 54.2% [95% of CI: 48.2, 60.0%], which was relatively lower than the pooled prevalence of low back pain in Africa, accounted for 57% [52]. The difference may be related to the scope of the study or variation in the implementation of occupational health safety practices or low awareness of occupational health issues.

The pooled prevalence of low back pain increased to 61.8% [95% CI 58.9, 64.6%] and 55.2% [95% CI 58.4, 59.0%] after the subgroup analysis based on publication year and study area, respectively. However, the prevalence of low back pain decreased to 52.8% [95% CI: 51.3, 54.3%] based on the subgroup analysis by study participants/population. There was variation in the prevalence of low back pain among different study populations or occupations. The variation may be due to the difference in an occupation or working environment

or to a difference in the implementation of occupational health and safety practices. For example, the current study found that the prevalence of occupational-related low back pain among nurses in the previous year accounted for 65.4%, which was relatively consistent with work done in Saudi Arabia and Iran that found a prevalence of 65.0% and 61.2% of low back pain, respectively [50,53].

On the other hand, the current study found the combined prevalence of occupational-related upper back pain in the previous one-year account 27.1% [95% CI 18.4 to 37.9%]. However, the pooled prevalence of upper back pain was increased to 43.8% [95% CI 39.3, 47.7%], 34.7% [95% CI 33.1, 36.2%] and 36.2% [95% CI 33.6, 39.0%] after subgroup analysis of the prevalence of upper back pain based on publication year, study participants and study area, respectively. The highest prevalence (60.4%) of work-related upper back pain was reported among women who were reloading pedestrians, followed by the prevalence (50.4%) reported among hairdressers, while the lowest prevalence (10.4%) was reported among vehicle repair workers. The variation may be related to the variation in activities or workload or work time or nature of the work, or availability and implementation of occupational health safety services.

In general, the current study found that at least one out of four study participants experienced work-related upper back musculoskeletal disorders, while one out of two participants experienced work-related low back pain regardless of occupation categories. Therefore, the implementation of occupational health and safety practices such as engineering control, administrative control, and the use of personal protective equipment in the workplace plays an important role in reducing these problems [53, 54].

Limitations

There was an unequal distribution of occupations among the included articles. On the other hand, the prevalence of MSDs in some regions of Ethiopia was not covered due to the lack of studies in those regions.

Conclusion

Occupational related musculoskeletal disorders continue to have a potential impact on worker health, productivity, and quality of life worldwide. This systematic review and meta-analysis found that more than half of the included participants experienced low back pain at least once a year in the previous year, while more than a fourth of the included participants experienced upper back pain. Thus, the application of occupational health and safety practices in the working environment plays an important role in reducing these problems.

List Of Abbreviations

CDC: Centers for Disease Control and Prevention; CMA: Comprehensive Meta-Analysis; JBI: Joanna Briggs Institute; MSDs: Musculoskeletal Disorders; PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis; SNNP: Southern Nations, Nationalities, and Peoples.

Declarations

Ethics approval and consent to participate.

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials.

Almost all data are included in this study. However, additional data will be available from the corresponding author upon reasonable request. The PRISMA-P 2015 checklist (Preferred Reporting Items for Systematic Review and Meta-Analysis) is one of the recommended items to address in a systematic review and meta-analysis.

Competing Interests

The authors declare that they have no competing interests in this work.

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Authors' Contributions

DAM conceived the idea and played an important role in the review, extraction and analysis of data, writing, drafting, and editing of the manuscript. AA and YMD contributed to data extraction, analysis, and editing. Finally, the authors (DAM, AA, and YMD) read and approved the final version of the manuscript to be published and agreed on all aspects of this work.

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Tables

Table 1. Overall characteristics of the articles included in the systematic review and meta-analysis, 2020.

Author	Publication year	Study year	Sample size	Study design	Low back pain (%)	Upper back pain (%)	Population	Region	Reference
ie et	2020	2019	344	Cross-sectional	62.8	10.4	Vehicle Repair Workers	SNNP	[29]
et	2018	2015	422	Cross-sectional	64.9	NA	Industry workers	Oromia	[30]
et	2020	2018	307	Cross-sectional	40.4	33.6	Bank workers	Tigray	[31]
et al	2020	2018	412	Cross-sectional	35.9	15.8	Industry workers	Oromia	[32]
no	2017	2015	422	Cross-sectional	64.2	NA	Industry workers	Addis Ababa	[33]
et	2020	2017	625	Cross-sectional	38.4	NA	Civil service workers	SNNP	[34]
	2017	2016	422	Cross-sectional	67.3	60.4	Pedestrian back-loading women	SNNP	[35]
ie et	2019	2015	611	Cross-sectional	74.8	NA	Teachers	Tigray	[36]
et	2019	2018	400	Cross-sectional	65.0	NA	Truck Drivers	Oromia	[37]
men a)	2019	2018	417	Cross-sectional	NA	38.8	Barbers	Amhara	[38]
	2018	2017	660	Cross-sectional	58.2	NA	Industry workers	Oromia	[39]
w, et	2018	2016	771	Cross-sectional	44.0	NA	Teachers	Addis Ababa	[40]
et	2019	2017	410	Cross-sectional	25.5	15.7	Construction workers	Oromia	[41]
men	2019	2017	429	Cross-sectional	55.7	NA	Barbers	Amhara	[42]
men	2019	2017	418	Cross-sectional	63.6	NA	Nurses	Oromia	[43]
men b)	2020	2019	652	Cross-sectional	53.2	50.4	Hairdressers	Oromia	[44]
et	2020	2019	264	Cross-sectional	34.8	17.0	Cleaners	Tigray	[45]
et	2020	2016-2017	755	Cross-sectional	54.3	35.4	Bank workers	Addis Ababa	[46]

	2020	2018	368	Cross-sectional	55.7	NA	Beauty Salon Workers	Oromia	[47]
sa	2018	2015	301	Cross-sectional	67.8	15.3	Nurses	Oromia	[48]

Keys: NA: Not Applicable; SNNP: Southern Nations, Nationalities, and Peoples

Figures

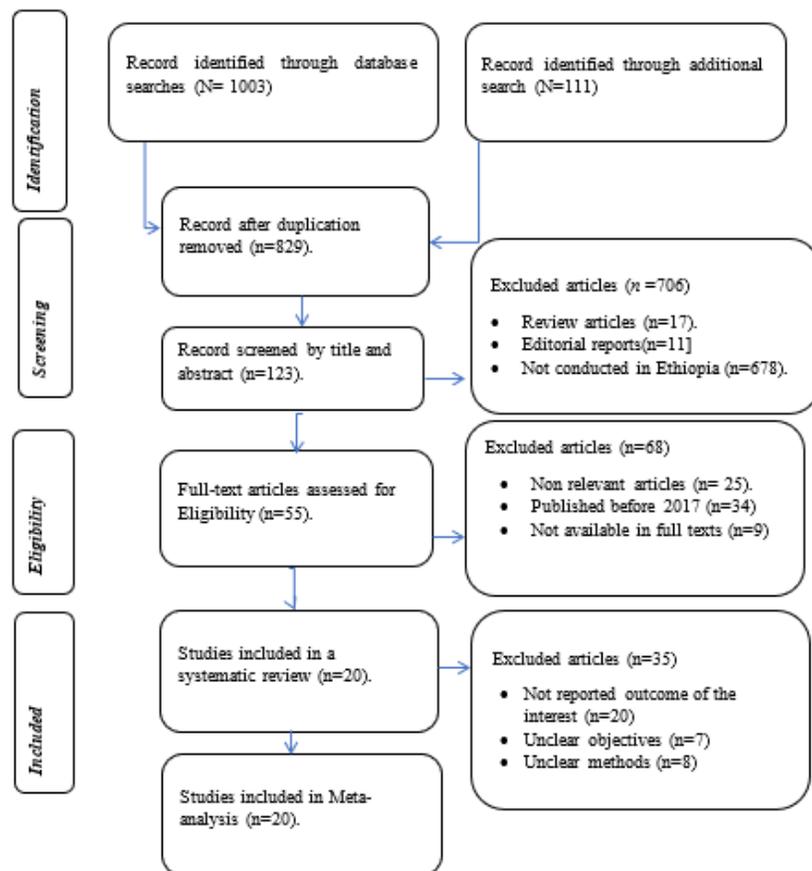


Figure 1

Study selection process of included articles for a systematic review and meta-analysis, 2020.

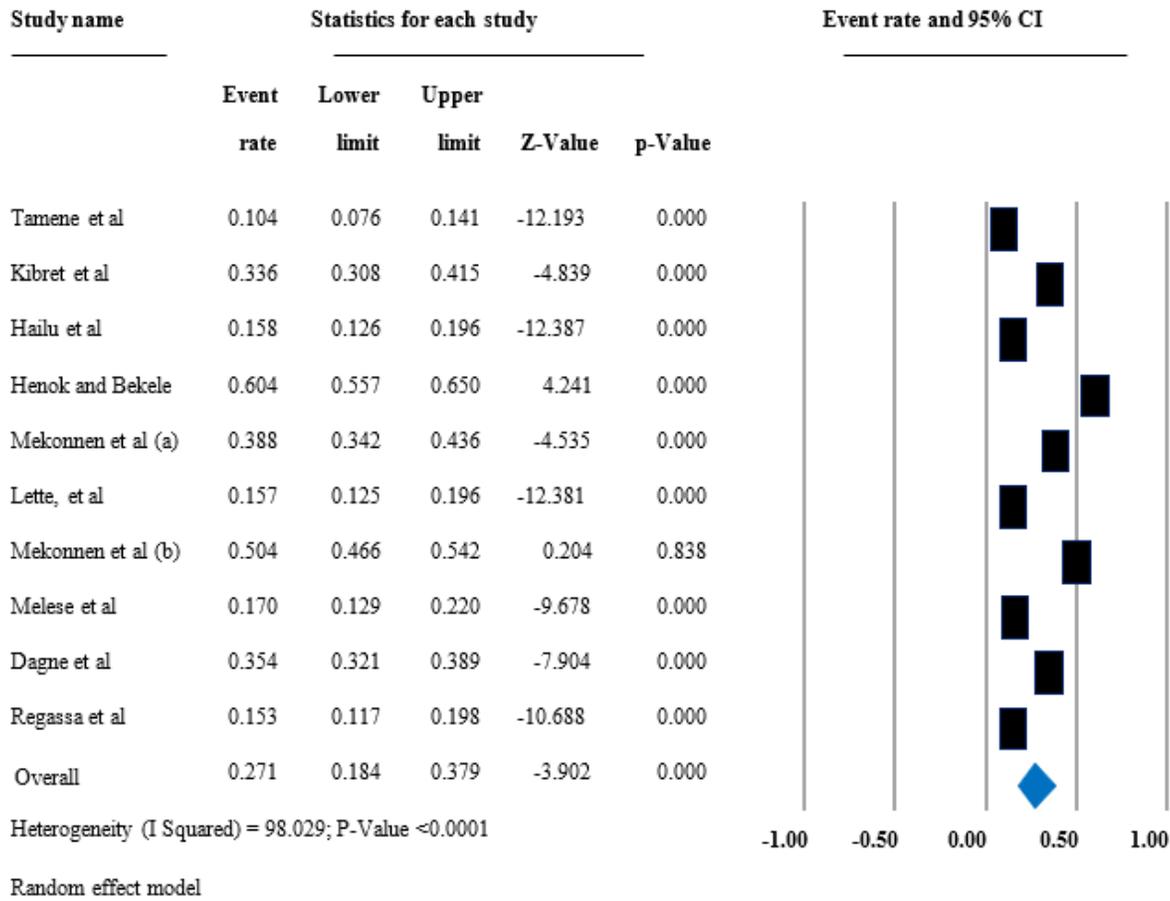


Figure 2

Forest plot shows the pooled prevalence of occupational-related upper back pain in the previous year in Ethiopia, 2020.

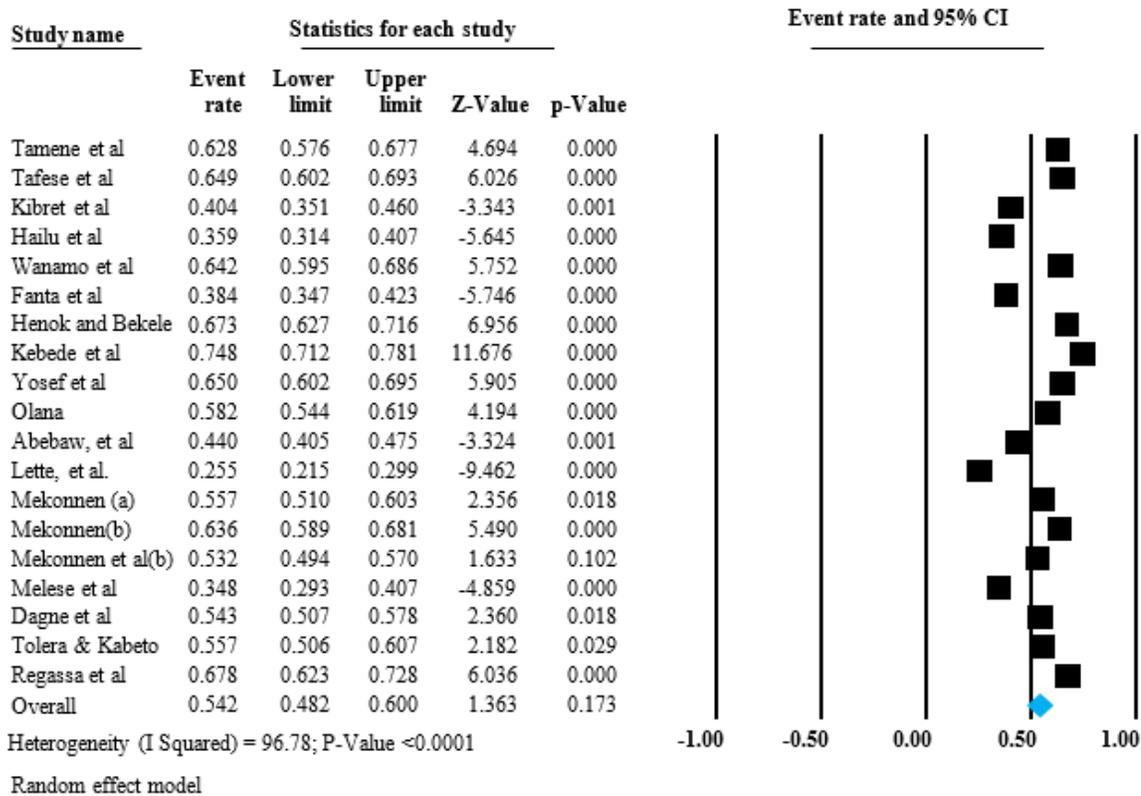


Figure 3

Forest plot shows the pooled prevalence of occupational-related low back pain in the previous year in Ethiopia, 2020.

Supplementary Files

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