



Review Article

The prevalence of depressive symptoms among frontline healthcare workers during COVID-19 pandemic: A rapid umbrella review

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ABSTRACT

There is a large body of research with multiple systematic reviews on the prevalence rate of mental health conditions in healthcare workers (HCWs) during the COVID-19 pandemic. The reports on mental health conditions have been contradictory, especially on the prevalence rate of depression. The rapid umbrella approach sought to fill this research gap. The symptoms of depression had a rate of 24–36% in the HCW community, and 14–53% in the frontline HCW population. Female HCWs, nurses, and frontline health workers showed a prevalence of a larger rate of depression. Earlier reports have been highly heterogeneous, representing a key explanation for the substantially varied reports on depression rates in HCWs and frontline HCW populations. Thus, it is suggested that future research, including meta-analysis and primary research works, should be focused on minimizing the inconsistency of results and maximizing their reliability using efficient and effective techniques.

Keywords: COVID-19, Depression, Frontline, Health workers, Prevalence

INTRODUCTION

The COVID-19 pandemic emerged in Wuhan, China, in late 2019 and spread across the world in a short time.^[1-8] It not only caused significant mortality and morbidity rates but also had dramatic health consequences, such as mental health conditions.^[9-12]

The healthcare worker (HCW) population, especially frontline HCWs, would potentially have a higher vulnerability to such conditions.^[13-17] The fear of COVID-19 infection, witnessing COVID-caused colleague mortality, prolonged work shifts, the unavailability of effective therapeutic strategies, social distancing, separation from family/colleagues, and the severe illness of COVID-19 patients were among the factors that could pose an adverse effect on the mental health of HCWs.^[16]

There is a large body of research with multiple reviews on the rate of mental conditions in the HCW community.^[15,18-22] Earlier works have reported contradictory results on the rate of depression in HCWs.^[8,15,20-23] To the best of the authors' knowledge, this study pioneers the analysis of the rate of depression in frontline HCWs on a global scale through the rapid umbrella approach.

MATERIAL AND METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were adopted in this review.^[24]

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Search strategy

The papers were collected from various systematic review databases, including Google, Cochrane, and Google Scholar, based on the keywords of COVID-19, disorder, illness, mental, psychiatric, pandemic, coronavirus, depression, prevalence, nurse, doctor, meta-analysis, systematic review, and frontline HCW for a duration between October 6–13, 2021.

The titles and abstracts of the papers were employed for screening based on particular inclusion and exclusion criteria. Once the screening of the titles and abstracts had been completed, inclusion criteria were applied to review the full-text versions of the papers. The inclusion criteria included:

- Systematic reviews
- Numerical data provided on depression prevalence rates in HCWs during the COVID-19 pandemic
- English papers
- Peer-reviewed journal publications.

Data extraction

A researcher-constructed form was employed to extract data on factors such as the first author, publication year, HCW sample size, frontline HCW sample size, depression evaluation scale, and overall HCW depression prevalence.

Quality assessment

The critical appraisal tools of the Joanna Briggs Institute (JBI) for systematic reviews, particularly the Checklist for Prevalence Studies, were utilized to assess the quality of the selected papers.^[25]

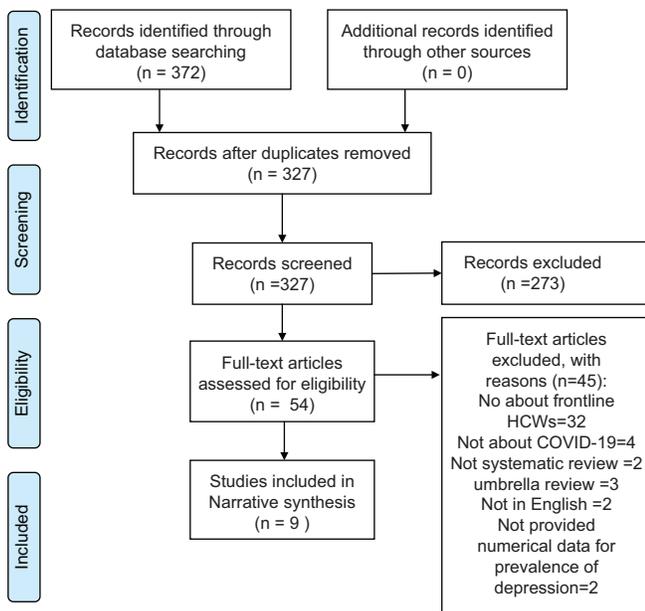


Figure 1: PRISMA flowchart of literature search.

Data synthesis

Since primary reports had significant inconsistency/interference, data were synthesized through a narrative approach.

RESULTS

Figure 1 represents the potential papers, search and screening procedure, and reported findings.

Characteristics of the included papers

Three of the nine meta-analyses were conducted in 2020, with the remaining six being reported in 2021. Moreover, 60% (259) of the 429 primary studies had been conducted in China, mostly using online questionnaires and adopting a cross-sectional design.

They mostly reviewed females. Several measures with various cut-offs had been used to assess depression, with the majority of the papers using patient health questionnaire-9 assessment. The quality scores of six meta-analyses were found to be high based on the JBI scale, including three papers with a score of 7, two papers scoring 9, and the one remaining meta-analysis scoring 10. This umbrella review also found three of the works having medium quality scores (two with a score of 7 and one with a score of 4).

The depression prevalence heterogeneity of the included reviews was significant. The HCW community had been reported to have a depression prevalence rate of 24–53%, and the female HCWs showed higher rates of depression symptoms than their male counterparts. The frontline HCWs also showed higher depression rates than the other HCWs, and depression was more prevalent among nurses than among doctors. The rate of depression was also larger in PHQ-9 reviews than in papers using other depression scales based on subgroup analysis, as shown in Table 1.^[3,7,26-31]

DISCUSSION

This study used the rapid umbrella technique to tackle the inconsistency in reports on the prevalence rate of depression in frontline HCWs during the COVID-19 pandemic.

The results of this study showed that the prevalence rate of depressive symptoms among all HCWs ranged from 24% to 36%, and among frontline HCWs ranged from 14% to 53%.

A review of earlier reports demonstrated that the findings had been highly consistent, in agreement with earlier umbrella reviews on the HCW community.

A depression rate of 5–89% was reported in earlier umbrella reviews, reviews, and meta-analyses for general populations, HCWs, and frontline HCWs.^[8,16,18,20,26,32-37]

Table 1: Characteristics of included studies.

First author (year)	Batra (2020) ^[27]	Wu <i>et al.</i> (2021) ^[31]	Salari <i>et al.</i> (2020) ^[7]	Bareeqa (2021) ^[29]	Al-Maqbali <i>et al.</i> (2021) ^[26]
Total number of primary studies	65	66	29 - among them, 21 studies had focused on depression	19	93
Country of primary studies	51 from Asia (31 from China, 4 from India, 3 from Iran, 2 from Pakistan, 2 from Jordan, 1 from Bahrain, 1 from Hong Kong, 1 from Israel, 1 from Nepal, 1 from Oman, 1 from Saudi Arabia, 1 from South Korea, 1 from India and 1 from Singapore), 10 were from Europe (3 from Italy, 4 from Turkey, 1 from Switzerland, 1 from Serbia, 1 from Ireland), 2 were from south America (1 from Argentina, Brazil, Chile and Mexico, and one from Brazil alone), and 2 from North America	62 from China, 1 each from Iran, Jordan, Singapore and India	19 studies from China, 2 studies from Iran, 2 studies from Hong Kong, 1 study each from following countries: Singapore, Romania, India, France, Australia, and others	China	China=49 other countries=44
Total sample size	79437	Depression data were reported by 48 studies with 125121 participants drawn from seven populations	22380 in total and 1024 in the frontline	62382	93112
Numbers of HCWs				62382	93112
Numbers of frontline HCWs	16 studies, 36315 (45/7%) were nurses, 19287 (25%) were doctors, and the remaining were from other occupational groups	10429	4 studies in nurses and 2 studies in physicians, with 8063 and 643 participants, respectively	8 studies with 10267 frontline HCWs	NR
Mean age	NR	NR	NR	36/44	NR
Sex					
M		NR	7856	-	NR
F	57244 (72%) were female	NR	14524	69/7%	NR

(Contd...)

Table 1: (Continued).

First author (year)	Batra (2020) ^[27]	Wu <i>et al.</i> (2021) ^[31]	Salari <i>et al.</i> (2020) ^[7]	Bareeqa (2021) ^[29]	Al-Maqbali <i>et al.</i> (2021) ^[26]
Most instruments are used for depression.	PHQ-9	NR	SDS=7 DASS -21=7 BDI -II=4 HAD=1	PHQ-9	PHQ-9=10 studies SDS=2 HADS=2 DASS=4 BDI-II=1 Study PHQ-2=1 Study PHQ-4=1 study
Cut off point	Varied cut-off points of PHQ-9 including 4 and over (2 studies), 5 and over (6 studies), 10 and over (7 studies), and 15 and over (1 study)	NR	NR	NR	With varied cut-off points
Pooled prevalence of depression among HCWs	31/8% in 46 primary studies	31/4% (95% CI 27/3–33/5%)	24/3% (95% CI: 18/2–31/6%).	26/9% (95% CI: (20–34/3% I ² =99/68%)	
Prevalence of depression among front-line HCWs	23/6% compared to 19/6% among second line HCWs	28/8% (20/7–37/6) Among frontline and 26/2% (18/4–34/8) among second line physician and nurses	In physicians=40/4% (95% CI: 36/4–44/5%) in nurse=28% (95% CI: 16–44/2%)	31/5% (95% CI; 24–43%, I ² =99/30%)	33% (95% CI: 24–43, I ² =99).
Heterogeneity	Significant, I ² =99/2%	A high degree of heterogeneity was found (I ² =99/6%)	I ² =98/9	Significant, 99/68%	Significant, I ² =99
Method of analysis	Random effects model	Random effects model	Random effects model	Random effects model	Random effects model
Study design	Cross-sectional	95/5% Were cross-sectional, and most were online surveys	NR	Cross-sectional	Cross-sectional
Subgroup analysis	Conducted that showed higher anxiety and depression among females, nurses, and frontline HCWs than among males, doctors, and second-line HCWs.	Conducted that showed physicians and nurses had the highest prevalence of depression, anxiety, distress, and insomnia, while nonmedical staff had the lowest prevalence	Conducted that showed that the Prevalence of depression in physicians was higher than in other hospital staff	Conducted that the prevalence of depression assessed via PHQ-9 was higher than other instruments (35/5%) and showed that the prevalence of depression was higher among frontline HCWs and women.	The study showed that the prevalence of depression in low risk of bias studies was higher (39%) than that of moderate risk of bias (34%).

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Table 1: (Continued).

First author (year)	Batra (2020) ^[27]	Wu <i>et al.</i> (2021) ^[31]	Salari <i>et al.</i> (2020) ^[7]	Bareeqa (2021) ^[29]	Al-Maqbali <i>et al.</i> (2021) ^[26]
Setting	NR	NR	Hospital		Hospital=67 studies mixed setting=17 not reported=9
First author (year)	Sun <i>et al.</i> (2021) ^[28]	Dutta <i>et al.</i> (2021) ^[29]	Olaya <i>et al.</i> (2021) ^[30]	Hao <i>et al.</i> (2021) ^[3]	
Total number of primary studies	47	33	57- among them, 48 studies reported the prevalence of depression in HCWs	20	
Country of primary studies	China=29 Iran=2 Italy=2, 1 study each for Singapore, France, Ecuador, Libia, Philipines, Pakistan, Poland, Saudi Arabia, Brazil, Spain and America	18 from China, 4 from India, 2 from Pakistan and One each from Iran, Turkey, Singapore, Brazil, Italy, Poland, Jordan, Nepal, US	China=32, Italy=3 Turkey=3 India=4, Singapore=1, Kameron=1 and 1 each for Spain, Libya, Kosovo, Nepal, USA, Switzerland, Jordan, Croatia, Serbia, Poland, South Korea, Brazil, Iran	China=19 studies, Singapore=1	
Total sample size	81277	39703	53505	12788	
Numbers of HCWs	81277	35843	53505	10886	
Numbers of frontline HCWs	Mostly frontline (doctors and nurses)	21 studies with 19840 total participants, including 16003 doctors and 19840 nurses	5704	NR	
Mean age	18-53	NR	NR	NR	
Sex					
M					30%
F	Mostly females	64/35%	Mostly females		70%
Most instruments are used for depression.	PHQ-9=17 HADS=5 SDS=4 PHQ-2=3 DASS=3 DASS-21=2 CES-D=2 HAMD=1	PHQ-9=8 studies DASS-21=8 studies SDS=4 studies HADS=4 studies PHQ-4=2 studies CES-D=2 studies HDRS=1 BDI-2=1	Mostly used PHQ-9, n=27 studies DASS-21, n=8 and HADS, n=8 studies		PHQ-9, SCL -90, PHQ-2 and SDS
Cut off point		Varied cut-off points of PHQ-9, including 4, 5, and 10 and over, as well as for DASS-21, including over 9 and 10	Varied cut of points including 10 and over, n=21 studies for PHQ-9 and 5 cut off point 5 in 4 studies and 9 and over in 1 study		Varied cut of points
Pooled prevalence of depression among HCWs		32/4% (95% CI: 25/9–39/3, I ² =99%)	24%, nurses=25% medical doctors=24%	24/1% (95% CI: 16/2–32/1, I ² =99%)	

(Contd...)

Table 1: (Continued).

First author (year)	Sun <i>et al.</i> (2021) ^[28]	Dutta <i>et al.</i> (2021) ^[29]	Olaya <i>et al.</i> (2021) ^[30]	Hao <i>et al.</i> (2021) ^[31]
Prevalence of depression among front-line HCWs		28% (19/4–37/4, I ² =98/8%), other healthcare workers (13/1% (3/2–27/4%, I ² =97/8%)	Up to 43%	14/6%, [95% CI: 6/3–23%, I ² =91%] is higher than those in the second line 8/7%, [95% CI: 3/9–13/4%, I ² =94%, P<0/01].
Heterogeneity		High heterogeneity found (I ² =98/8%)	Significant	Significant, [I ² =99%, P=0/01]
Method of analysis		Random effects model	Random effects model	Random effects model
Study design		Cross-sectional	Cross-sectional (online surveys)	Cross-sectional
Subgroup analysis	Conducted that showed a higher incidence of depression among women and frontline HCWs. Also, Nurses had higher rates of depression than doctors.	Conducted that showed a higher prevalence of depression assessed by PHQ-8 (42/8%) than assessed by other instruments.	Conducted that showed that the prevalence of depression was lower in China, in studies that used convenience sampling method, and in high methodological quality studies	Conducted that shows that the prevalence of depression was significantly associated with the instrument used for assessing depression and no correlation between the prevalence of depression and sample size, hospital, position (frontline or non-frontline), and type of staff (nurses, physicians, or mixed).
Setting		Mostly institutional setting	NR	Hospital-based=18, Population-based=2

HCW: Healthcare worker, CI: Confidence interval, NR: Not reported, PHQ: Patient health questionnaire, SDS: Zong self-rating depression scale, DASS: Depression anxiety and stress scale, BDI: Beck depression inventory, HAD: Hospital anxiety and depression, HADS: Hospital anxiety and depression scale, CES-D: Center for epidemiologic studies depression rating scale, HDRS: Hamilton depression rating scale, I²: Represents heterogeneity or it is as an heterogeneity index.

The included reviews were found to be significantly heterogeneous. This heterogeneity is potentially the explanation for the substantial variation of depression rates reported for HCWs and frontline HCWs. Different methodologies, depression assessment measures, sampling techniques, cut-off points, locations, methodological shortcomings/defects, and demographics can be other explanations.^[20,38]

This study found that primary studies had been conducted in a broad range of countries with various socioeconomic and cultural differences using various methodologies, e.g., different depression assessment measures with various cut-offs. This agrees with the literature.

Most of the papers had biased sampling since they did not sample participants randomly. This can be an explanation for the significant variation/inconsistency in the rates of depression prevalence. This study estimated a larger depression rate for female HCWs than for male HCWs, for nurses than for doctors, and frontline HCWs than for non-frontline HCWs. This agrees with earlier works. Fan *et al.*^[11] adopted an umbrella approach and found that HCWs in high-risk settings had short- and long-term mental health conditions, including post-traumatic stress disorder, anxiety, and depression, during pandemics/epidemics.

Chigwerde *et al.*^[39] reported a systematic review to find potential mental health risks, e.g., frontline healthcare (high-risk) settings, nurse/female, unavailability of personal protection equipment, inadequate virus knowledge, prolonged work shifts, lack of social support, experience, poor healthcare, history of quarantine, and poor/no education.

Koontalay *et al.*^[40] analyzed the COVID-caused burden on HCWs through a qualitative systematic review. Insufficient equipment, emotional challenges, occupational burnout, and insufficient knowledge were categorized as themes with negative impacts on both the mental and physical health of frontline HCWs, ultimately causing depression, stress, anxiety, and fear.

CONCLUSION

This study adopted an umbrella review approach and found significant inconsistency in the reported rates of depression prevalence in HCWs and explained it by heterogeneity in earlier works. Nevertheless, HCWs, especially frontline HCWs, have been reported to have high prevalence rates of depressive symptoms during the COVID-19 pandemic. It is recommended that preventive measures be implemented to mitigate depression in the HCW community.

Due to the significant heterogeneity/inconsistency of the reported depression rates, it is suggested that efficient and effective techniques should be coupled with the same depression assessment measures in future research to minimize errors. It is also recommended that future systematic reviews, particularly meta-analyses, review primary studies of higher homogeneity to maximize prevalence rate synthesis in various papers.

Ethical approval: Institutional Review Board approval is not required.

Declaration of patient consent: Patient's consent is not required as there are no patients in this study.

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