

# Impact of COVID-19 on Mental Health Among Healthcare Workers in India: A Mixed-methods Systematic Review

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## ABSTRACT

Healthcare workers (HCWs) experienced significant mental health challenges during the COVID-19 pandemic. This review aimed to comprehensively assess the impact of the COVID-19 pandemic on the mental health of HCWs in India. We conducted a mixed-methods systematic review, which adopts a results-based convergent approach that incorporates quantitative and qualitative data. A comprehensive literature search was conducted in relevant databases: PubMed-Medline, CINAHL, Web of Science, and ProQuest. All available full-text studies in the English language that assessed the mental health outcomes (anxiety, stress, and depression) of HCWs during the pandemic and published until 28 February 2022 were included. A total of 31 studies were included in this review (27 quantitative studies, three qualitative studies, and one mixed-method study). The pooled prevalence of depression, anxiety, and stress among HCWs in India was 32.96%, 29.49%, and 33.47%, respectively. Integration of quantitative and qualitative findings using social determinants of health framework resulted in various contributing factors and coping strategies. There is a need for a supportive work environment, mental health support, and mental health policies for HCWs in India.

On 30<sup>th</sup> January 2020, the World Health Organization, reported the discovery of the novel coronavirus and designated it a Public Health Emergency of International Concern under the International Health Regulation.<sup>1</sup> The emergence of the COVID-19 pandemic resulted in a high percentage of viral infection-related deaths as well as psychological and emotional consequences.<sup>2</sup> Healthcare workers (HCWs) had to respond to this pandemic by becoming actively involved in the diagnosis and treatment of COVID-19 patients, risking exposure to the novel virus and thereby bearing the brunt of physical, psychological, and behavioral health issues.<sup>3</sup>

It has become evident that extreme pressure while working affects the physical, emotional,

and mental health of the HCWs.<sup>4</sup> Furthermore, it has been reported that most HCWs experienced depression, insomnia, stigma, and frustration during the pandemic. Southeast Asia had lower rates of anxiety, depression, and sleeplessness compared with other regions, as evident from comparing two meta-analyses.<sup>5</sup> The discrepancy is compounded when contrasted with South European nations like Spain, France, Italy, and Greece. Southeast Asia's lower prevalence rates may be attributed to the region's recent experience with epidemics and the use of early interventions similar to those in China and East Asia to improve HCWs' mental health.<sup>5</sup>

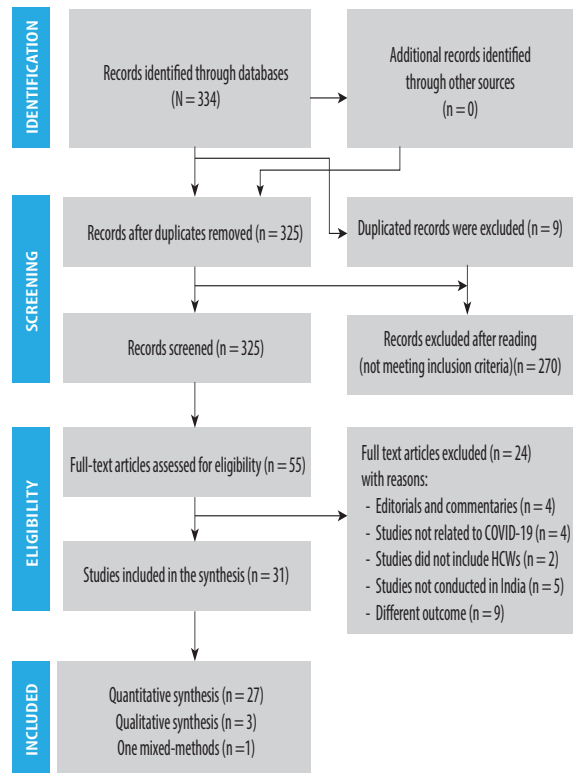
According to the Oxford COVID-19 Government Response Tracker, India was the most impacted country in terms of confirmed COVID-19 cases, after only the USA, Brazil, Russia, Spain, and

the UK.<sup>6</sup> Among the Indian population, stress, anxiety, and depression were reported to be present among 28.9%, 35.6%, and 17.0% respectively, during the COVID-19 lockdown.<sup>7</sup> The mental health issues experienced by HCWs impacted competency and motivation, increasing the risk of emotional exhaustion and hindering the healthcare response to COVID-19.<sup>8</sup> A cross-sectional study from India identified the prevalence of anxiety (23.9%) and depression (20%) among HCWs.<sup>9</sup> However, to date, there is no robust evidence on the magnitude of stress, anxiety, and depression among HCWs in India and its context as a mental health problem in the Indian healthcare system. Therefore, the purpose of this mixed-methods systematic review was to measure the impact of COVID-19 on the mental health of HCWs in India and to identify the contributing factors to contextualize evidence to inform policies to meet the mental health needs of HCWs in the future.

## METHODS

This review adopted a results-based convergent approach incorporating quantitative and qualitative data.<sup>10,11</sup> We began with quantitative survey data to determine the prevalence of mental health problems faced by HCWs in India during the COVID-19 pandemic and integrated quantitative (meta-analysis) and qualitative data (themes) to identify the contributing factors and coping strategies across six domains: individuals, family, peers, community, health services, and the wider society.

This systematic review protocol was registered in PROSPERO (CRD42021236500) (<https://www.crd.york.ac.uk/PROSPERO>). We adhered to the Preferred Reporting Items for Systematic Meta-analysis (PRISMA) framework to report this systematic review.



HCWs: healthcare workers.

**Figure 1:** Study selection process.

### Search strategy

The search was limited to papers published in the English language until 28 February 2022. An electronic search of four databases (PubMed-Medline, CINAHL, Web of Science, and ProQuest) was conducted to identify peer-reviewed articles focusing on the impact of COVID-19 on the mental health of HCWs in India. The search process is reported using the PRISMA diagram [Figure 1]. Initially, each database was searched, and the title and abstract were screened independently by two reviewers based on the inclusion and exclusion criteria [Table 1]. Subsequently, the full text of each article was thoroughly reviewed independently by

**Table 1:** Study eligibility criteria.

Criteria	Inclusion criteria	Exclusion criteria
Population	Doctors, nurses, and paramedical health personnel (technicians and physiotherapists)	Studies that included children and the general population
Study type	Descriptive, cross-sectional, observational, qualitative, and mixed-method studies	Intervention studies, systematic reviews, commentaries, literature reviews, and letters
Outcome	Anxiety, depression, and stress	
Context	Studies that were conducted among HCWs working in hospital settings in India during the COVID-19 pandemic	

HCWs: healthcare workers.

two reviewers. Reference lists of relevant studies were examined to identify the additional studies. Discrepancies between the two reviewers were resolved through discussion with a third reviewer.

### **Data extraction**

The studies that met the inclusion criteria were exported from each database into an Excel sheet. Two reviewers independently performed the data extraction using the piloted data extraction form. The form included information on the authors, year of publication, study design, sample size, outcomes, and study findings.

For the included qualitative studies, the same two reviewers independently reviewed them and conducted line-by-line coding of the findings to identify themes. Common themes were derived after summarizing the findings, and supporting quotes were drawn from the qualitative studies. Any disagreement between the two reviewers was resolved through consultation with a third reviewer.

### **Critical appraisal**

The methodological quality of the included quantitative and qualitative studies was assessed using the Joanna Briggs Institute (JBI) quality assessment instruments,<sup>12,13</sup> and the Mixed Methods Appraisal Tools Version 2018 as appropriate.<sup>14</sup> The first and second reviewers independently assessed the quality of the included studies. Any discrepancies between the two authors were resolved in a discussion with a third reviewer. The quality assessment is presented in Tables 2, 3, and 4.<sup>15-45</sup>

### **Data synthesis**

The data synthesis was conducted in three stages following the framework described in another study.<sup>46</sup> Firstly, a meta-analysis was performed using Stata software (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.) to determine the pooled prevalence of anxiety, stress, and depression among the HCWs during the pandemic, based on quantitative studies. A heterogeneity ( $I^2$ ) statistic between estimates was assessed, which describes the percentage variation.  $I^2$  value > 75% indicates a high heterogeneity. We anticipated significant  $I^2$  and used the random effects model for meta-analysis. Forest plots were generated for each outcome, and the results were presented as pooled prevalence with a 95% CI. Next, we

conducted a thematic synthesis of the findings from the qualitative studies. Finally, a conceptual matrix was utilized to integrate the findings of quantitative and qualitative synthesis. This integration provided a clear explanation of the factors related to individuals, family, peers, community (living and working conditions), health services, and wider society that influenced the mental health of HCWs during the COVID-19 pandemic.

## **RESULTS**

### **Studies selection**

A total of 334 studies were retrieved from four databases [Figure 1]. After removing 9 duplicated records, the remaining 325 studies underwent title screening, resulting in the exclusion of 270 studies. The remaining 55 studies were assessed against the eligibility criteria, leading to the exclusion of 24 articles (four editorials and commentaries, four studies unrelated to COVID-19, two studies did not involve HCWs, five studies conducted outside of India, and nine studies including outcomes beyond the scope of this review). Finally, 31 studies met the inclusion criteria and were included in this review (27 quantitative studies, three qualitative studies, and one mixed-methods study). However, for meta-analysis, 26 studies were included (25 quantitative and one mixed-methods study). However, two studies reported the findings using mean and SD and were not included in the meta-analysis.<sup>19,23</sup> For the qualitative synthesis, data from three qualitative studies and one mixed-methods study were incorporated.

### **Characteristics of the included studies**

The review included a total of 10 043 HCWs as participants. The age of the participants ranged from 18 to 78 years, and they were employed in both governmental and non-governmental organizations across various parts of India. The participants comprised nurses, doctors (including residents), paramedical staff, and support staff. Table 5 provides a summary of the included studies.

### **Assessment of publication bias**

The publication bias among the included quantitative studies was assessed using Egger's test which indicated no evidence of publication bias ( $p > 0.05$ ) [Table 6].

**Table 2:** Critical appraisal of quantitative studies based on the Joanna Briggs Institute checklist for cross-sectional studies.

Authors, year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective and standard criteria used for the measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Overall appraisal
Chatterjee et al, <sup>15</sup> 2020	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Include
Wilson et al, <sup>16</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Dordi et al, <sup>17</sup> 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Suryavanshi et al, <sup>18</sup> 2020	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Include
Khanam et al, <sup>19</sup> 2020	Yes	Yes	Unclear	Yes	Unclear	Unclear	Yes	Yes	Include
Chew et al, <sup>20</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Rathore et al, <sup>21</sup> 2020	Yes	Yes	No	No	Unclear	Unclear	Yes	Yes	Include
Patel et al, <sup>22</sup> 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Rehman et al, <sup>23</sup> 2020	Unclear	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Uvais et al, <sup>24</sup> 2020	Yes	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Gupta et al, <sup>25</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Chauhan et al, <sup>26</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Das et al, <sup>27</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Dharra et al, <sup>28</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Include
Garg et al, <sup>29</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Khan et al, <sup>30</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Jakhar et al, <sup>31</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Mishra et al, <sup>32</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Raj et al, <sup>33</sup> 2020	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Include
Chatterji et al, <sup>34</sup> 2021	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Include
Sharma et al, <sup>35</sup> 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Gupta et al, <sup>36</sup> 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Singh et al, <sup>37</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sukumaran et al, <sup>38</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sharma S et al, <sup>39</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sharma V et al, <sup>40</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Yadav et al, <sup>41</sup> 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include

**Table 3:** Critical appraisal of qualitative studies based on the Joanna Briggs Institute checklist for qualitative studies.

Author, year	Is there congruity between the stated philosophical perspective and the research methodology?	Is there congruity between the research methodology and the research objectives?	Is there congruity between the research methodology and the methods used to collect data?	Is there congruity between the research methodology and the representation and analysis of data?	Is there congruity between the research methodology and the interpretation of results?	Is there a statement locating the researcher culturally or theoretically?	Is the influence of the researcher and vice-versa, addressed?	Are participants, and their voices, adequately represented?	Is the research ethical according to, or for recent studies, and is there evidence of ethical approval by an appropriate body?	Do the conclusions drawn in the research report flow from the analysis or interpretation of the data?	Overall appraisal
Chakma et al, <sup>42</sup> 2021	Yes (research methodology was mentioned as qualitative research)	Yes	Yes (telephonic interview)	Yes (thematic analysis)	Yes	No	Unclear	Yes	Yes	Yes	Include
Golecha et al, <sup>43</sup> 2021	Yes (The study followed a qualitative approach applying in-depth one-on-one interviews)	Yes	Yes (telephonic interview)	Yes (Colaizzi's protocol was followed)	Yes	No	Unclear	Yes	Yes	Yes	Include
Banerjee et al, <sup>44</sup> 2021	Yes (adopted a qualitative design for the study with a social constructivist paradigm)	Yes	Yes (virtual (Google Meet/Zoom/Skype) one-to-one detailed interviews)	Yes (Charmaz's grounded theory approach)	Yes	No	Unclear (not specified)	Yes	Yes	Yes	Include

**Table 4:** Critical appraisal of mixed methods study based on Mixed Methods Appraisal Tool, version 2018.

Author, year	Are there clear research questions?	Do the collected data allow to address the research questions?	Is there an adequate rationale for using a mixed methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
George et al, <sup>45</sup> 2020	Yes	Yes	Yes (This design helped the researchers explore diverse perspectives and uncover complex relationships in this unique social and cultural context)	Yes	Yes	Yes	Yes

**Table 5:** Characteristics of included studies.

Author, year, and region	Setting/ mode	Study design	Sample characteristics	Outcome variable	Instrument used	Results
Chatterjee et al, <sup>15</sup> 2020, West Bengal	Online survey	Cross-sectional study	152 doctors 119 male 33 female Mean age: 42.05 ± 12.19 years	Depression, anxiety, and stress	Depression, Anxiety, and Stress Scale (DASS)-21	34.9% were depressed and 39.5% and 32.9% had anxiety and stress, respectively
Wilson et al, <sup>16</sup> 2020, India Nationwide (10 states and one union territory)	Online survey	Cross-sectional survey	350 doctors and nurses 187 males 163 females Age: 18–60 years	Depression, anxiety, and stress	Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder-7, and Cohen's perceived stress scale (PSS)	The prevalence (95% CI) of healthcare workers (HCWs) with high-level stress was 3.7% (2.2–6.2), depressive symptoms requiring treatment, and anxiety symptoms requiring further evaluation were 11.4% (8.3–15.2) and 17.7% (13.9–22.1), respectively
Dordi et al, <sup>17</sup> 2020, Sir H.N. Reliance Hospital and Research Centre	Hospital-based survey	Hospital-based survey	280 (100 patient-facing and 100 non-patient facing) participants from the hospital 80 males 200 females Age: 20–60 years	Depression, anxiety, and psychological distress	Beck Depression Inventory (BDI-II), Hamilton Anxiety Rating Scale (HAM-A), Kessler, and Psychological Distress Scale	Depression (17%), anxiety (7.12%), and psychological distress (31.67%). There was a higher prevalence of distress among nurses than in doctors. There was a significant difference in the depression scores of HCWs who were seeing patients versus HCWs not seeing any patients
Suryavanshi et al, <sup>18</sup> 2020, Maharashtra	Online survey	Survey	197 HCWs including doctors, nurses, and paraclinical staff 96 males 101 females	Depression and anxiety	PHQ-9 Generalized Anxiety Disorder-7 (GAD-7)	Symptoms of depression (92, 47%), anxiety (98, 50%), and low quality of life (89, 45%). Odds of combined depression and anxiety were 2.37 times higher among single healthcare professionals compared to married (95% CI: 1.03–4.96). Work environment stressors were associated with a 46% increased risk of combined depression and anxiety (95% CI: 1.15–1.85)
Khanam et al, <sup>19</sup> 2020, Kashmir, India	Hospital-based online survey	Exploratory study	133 front-line HCWs including doctors, nurses, technicians, and others 74 males 59 females Age: not specified	Stress and psychological impact	Self-reported stress questionnaire Impact of Event Scale-Revised scale	Nurses had significantly more stress than doctors. Stress was seen more in FHCWs working in the swab collection center as compared to those working in the other departments. The severe psychological impact was seen in 81 (60.9%) of FHCWs and was significantly more in males and married HCWs
Chew et al, <sup>20</sup> 2020, Singapore and India	5 major hospitals from India and Singapore	A multi-national, multicenter study	426 HCWs from India including doctors, nurses, allied health staff, administrators, clerical staff, and maintenance workers. Age: 25–35 years	Depression, anxiety, and stress	DASS-21	The prevalence of depression in Indian HCWs was 53 (12.4%), anxiety 73 (17.1%), stress 16 (3.8%), and PTSD 31 (7.3%)

**Table 5:** Characteristics of included studies.

Author, year, and region	Setting/ mode	Study design	Sample characteristics	Outcome variable	Instrument used	Results
Rathore et al., <sup>21</sup> 2020, India	Online survey	Cross-sectional study	100 HCWs 69 males 31 females Age: < 30–45 years	Anxiety and stress	Likert scale Likert scale	72% of HCWs were concerned about the risk of infection, while 46% reported disruption in daily activities. 17% of HCWs were concerned about inadequate PPE and related challenges. 20% had inadequate knowledge and training about COVID. 16% of HCWs were anxious all the time, 11% feared all the time, and 12% had stress all the time while treating COVID patients
Patel et al., <sup>22</sup> 2020, India	Tertiary care institutions in a western state of India	Online survey	302 HCW>S 189 males 113 females Age: 21–60 years	Depression, anxiety, and stress	DASS-21 PSS	101 (33.44%) HCWs reported low, 185 (61.26%) moderate, and 16 (5.30%) high levels of stress. Depression was reported by 56 (18.54%) subjects, 60 (19.87%) were found to have anxiety, and 50 (16.56%) reported having stress. Perceived stress was significantly correlated with depression, anxiety, and stress
Rehman et al., <sup>23</sup> 2020, India	Online survey	Online survey	403 total sample: 34 mental health professionals, 33 health professionals (doctors and nurses) Average age: 28.95 years	Depression, anxiety, and stress	DASS-21	The mean (SD) depression score of healthcare professionals was 10.79 (6.56) and that of mental health professionals was 6.76 (10.04). The mean anxiety score was mean 12.55 (6.23) in health professionals and 5.65 (8.35) in mental health professionals. The mean stress score in health professionals was 14.61 (7.85) and in mental health professionals was 9.29 (8.87)
George et al., <sup>45</sup> 2020, Bangalore, India	Community Health Division, Baptist Hospital, Bangalore	A quantitative (QUAN) paradigm nested in the primary qualitative (QUAL) design	HCWs include doctors, nurses, paramedical, and support staff. Out of 87 staff, 42 participated in the QUAN study, and 64 participated in the QUAN survey 40 males 24 females Mean age: 34.6 ± 10.7 years	Anxiety and stress	Likert scale	Hobbies (20.3%) and spending more time with family (39.1%) were cited as a means of emotional regulation in the QUAN survey. QUAL findings: fear of death, guilt of disease transmission, anxiety about probable violence, stigma, and exhaustion were the major themes causing stress. Positive reframing, peer support, distancing, information seeking, response efficacy, self-efficacy, existential goal pursuit, value adherence, and religious coping were the coping strategies
Uvais et al., <sup>24</sup> 2020, Kerala, India	Staff working in the Dialysis unit	Online survey	335 (dialysis technicians and dialysis nurses) 91 males 244 females Age: 18–30 years	Stress	PSS	121 (36.1%) had high stress and the mean PSS-10 score was 17.72 (4.48)
Gupta et al., <sup>25</sup> 2020, India	Online survey	Cross-sectional online study	368 (full-time practicing doctors, nurses, dentists, and paramedic staff) 168 males 200 females Age: 30–60 years	Anxiety	GAD-7	Severe anxiety was observed among 7.3% (27/368) HCWs, whereas moderate, mild, and minimal anxiety was observed among 12.5% (46/368), 29.3% (108/368), and 50.8% (187/368), respectively

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**Table 5:** Characteristics of included studies.

Author, year, and region	Setting/ mode	Study design	Sample characteristics	Outcome variable	Instrument used	Results
Chauhan et al., <sup>26</sup> 2021, India	HCWs of two large tertiary care hospitals providing COVID-19 treatment	Cross-sectional	200 High COVID Exposure (HCE) HCWs 129 males 71 females Age: 18–60 years	Depression, anxiety, and stress	PHQ-9 GAD-7 IES-R	Stress symptoms were found in 23.5%, depressive symptoms in 17%, and anxiety symptoms in 10.85% among the HCE HCWs
Das et al., <sup>27</sup> 2021, Andhra Pradesh	COVID-19 care settings	Cross-sectional survey	321 frontline HCWs (doctors and nurses) 168 males 153 females Age: not specified	Stress	PSS-10	About 69.7% of the frontline, HCWs recorded higher perceived stress
Dharra et al., <sup>28</sup> 2021, Uttarakhnad	All India Institutes of Medical Sciences, Rishikesh.	Cross-sectional study	368 nurses 149 males 219 females Mean age: 28.91 ± 3.68	Anxiety	GAD-7	The mean anxiety scores were 32.19 ± 4.53 and 3.82 ± 2.87 for female and male nurses. Age > 30 years ( $p = 0.003$ ), diploma qualification ( $p < 0.001$ ), and lack of training in handling COVID-19 patients ( $p = 0.003$ ) were significant determinants of higher anxiety among nurses
Garg et al., <sup>29</sup> 2020, India	COVID-19 exclusive hospital	Online cross-sectional survey	209 nurses 16 males 193 females Age: 21–60 years	Anxiety and stress	GAD-7 PSS-10	65 (31.1%) participants had anxiety symptoms and 35.40% had moderate to high stress. The risk factors of anxiety and stress were working experience of > 10 years (odds ratio [OR] = 3.36), direct involvement in the care of suspected/ diagnosed patients (OR = 3.4), feeling worried about being quarantined/isolated (OR = 1.69), and high risk of being infected at the job (OR = 2.3)
Khan et al., <sup>30</sup> 2021, Pan India	COVID ward and COVID intensive care unit	Cross-sectional study (online)	829 HCWs including doctors, nurses and other medical staff 475 males 354 females Age: 19–64 years	Depression and anxiety	PHQ9 HAM-A	Anxiety and depression were significantly higher in doctors and staff nurses as compared to other medical staff. 64.7% of respondents had mild depression, 25.9% mild to moderate, and 9.4% moderate to severe depression. Anxiety was mild in 540 (65.1%), mild to moderate in 182 (22%) and moderate to severe in 107 (12.9)
Jakhar et al., <sup>31</sup> 2021, Across the nation	Government health sectors	Cross-sectional survey (online)	450 HCWs (doctors and nurses) 216 males 234 females Age: 31.6 ± 6.6 years	Depression, anxiety, and stress	DASS – 21	The prevalence of stress, anxiety, and depression among HCWs were 33.8, 38.9, and 43.6%, respectively
Mishra et al., <sup>32</sup> 2020, Chhattisgarh, India	Dentists working in various regions of the Chhattisgarh	Cross-sectional survey (Online)	1253 dentists 607 males 646 females Mean age: 28 ± 7.64 years	Stress	PSS	The mean PSS for dentists was 18.61 ± 6.87 in phase I and 20.72 ± 1.95 in phase II No family time due to long working hours (90%) was the major stressor among dentists during phase I and concern about getting infected (83.3%) was identified as the most frequent stressor during phase II

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**Table 5:** Characteristics of included studies.*-continued*

Author, year, and region	Setting/ mode	Study design	Sample characteristics	Outcome variable	Instrument used	Results
Raj et al, <sup>33</sup> 2020, India	Electronic Mail System	Cross-sectional study	Physicians n = 100, nurses n = 80, technical staff n = 20 Males: physicians 37.2%, nurses 15%, technical staff 57% Females: physicians 62.8%, nurses 85%, and technical staff 43% Mean age: doctors (35.54 ± 6.09), nurses (33.84 ± 7.87), and technical staff (32.16 ± 5.89)	Depression and anxiety	Structured questionnaire	Anxiety was seen in 55.65%, 48.54%, and 52.34% of physicians, nursing staff, and technicians of the study population while depression was evidently reported in 32.1%, 53.72%, and 42.7%, respectively
Charterji et al, <sup>34</sup> 2021, West Bengal, India	Diamond Harbour Medical College and Hospital	Cross-sectional study	N = 140 HCWs (56 doctors, 46 nurses, 20 ward staff, and 18 non-clinical staff) 61 males 79 females Mean age: 37.67 ± 9.8 years	Stress	PSS-10	Low stress 29 (20.7%), moderate stress 102 (72.9%), and high stress 9 (6.4%) were reported by the HCWs. Doctors had the highest level of anxiety. Younger age, higher education, female gender, and urban habitat were associated with a greater perception of anxiety
Sharma et al, <sup>35</sup> 2020, Noida, UP	Super Speciality Paediatric Hospital and Post Graduate Teaching Institute	Cross-sectional study	150 HCWs	Depression, anxiety, and stress	DASS-21	HCWs demonstrated a high prevalence of anxiety: 85/150 (56.7%), stress: 82/150 (54.7%), and depression: 72/150 (48.0%)
Gupta et al, <sup>36</sup> 2020, Across India	Not specified	Cross-sectional study	1124 HCWs, including 749 doctors, 207 nurses, 135 paramedics, 23 administrators, and 10 supporting staff members. 718 males 406 females Age: not specified	Depression	Hospital Anxiety and Depression Scale (HADS)	One-third of the HCWs reported anxiety and depressive symptoms. The risk factors for anxiety symptoms were female gender, younger age, and job profile (nurse), and for depressive symptoms younger age and working at a primary care hospital
Singh et al, <sup>37</sup> 2021, New Delhi, India	Hospitals providing Covid care	Cross-sectional online survey	348 HCWs 194 males 154 females Mean age: 31.8 years	Depression and anxiety	PHQ-9 GAD-7	Depression, anxiety, and somatic symptoms were present in 54%, 44.3%, and 54.6% of HCWs

**Table 5:** Characteristics of included studies.*-continued*

Author, year, and region	Setting/ mode	Study design	Sample characteristics	Outcome variable	Instrument used	Results
Sukumaran et al. <sup>38</sup> 2021, Kerala	Online survey mode	Cross-sectional survey	544 HCWs (doctors, nurses, and paramedical staff) 186 males 358 females Age: 22–78 years	Depression, anxiety, and stress	DASS-21	9.7% of HCWs had mild depression and 13.3% had moderate-to-severe depression. While 4% had mild anxiety and 3.5% had moderate-to-severe anxiety, about 6.8% had mild stress and 6.4% had moderate-to-severe stress. Emotional and social support from higher health authorities are a significant protective factor against stress and depression
Sharma S et al. <sup>39</sup> 2021, Covid care institutes of India	Government tertiary healthcare institutes	Cross-sectional online survey	354 nurses 241 males 113 females Mean age: 28.78 ± 4.3 years	Depression and anxiety	HADS	Of 354 nurses, 12.1% were suffering from anxiety while 14.7% had depression
Sharma V et al. <sup>40</sup> 2021, India	Online survey	Cross-sectional study	100 male Orthopedic surgeons Age: 30–60 years	Anxiety	GAD-7	Severe anxiety scores were observed in 8%; moderate, mild, and minimal anxiety was observed in 12%, 27%, and 53% of surgeons
Yadav et al. <sup>41</sup> 2021, India	Private practitioners' clinics	Internet-based survey	120 private practitioners 99 males 21 females Age: 29–50 or more	Depression, anxiety, and stress	DASS-21	Severe depression was in 35% and 13.3% of HCWs had extremely severe depression. Severe and extremely severe anxiety was noticed in 31.66% and 15% of HCWs. Severe and extremely severe stress was found in 30% and 12.5% of private practitioners
Chakma et al. <sup>42</sup> 2021, 10 States across India	A multicenter study conducted in 10 States across India	A qualitative study (Telephonic interviews)	111 HCWs (doctors, nurses, pharmacists, ambulance workers, community workers, housekeeping staff, security guards, stretcher-bearers, sanitation workers, laboratory staff, and hospital attendants) 51 males 60 females Age: 20–30 years	Psychosocial challenges faced and coping strategies adopted by HCWs	Interview questionnaire	HCWs report major changes in the work-life environment. Family-related issues. Stigma from the community and peers. Coping strategies included peer and family support and positive experiences
Golecha et al. <sup>43</sup> 2021, Gujarat	Primary and community health centers of rural Gujarat	A qualitative study (In-depth one-to-one interviews)	19 Rural primary care providers (12 doctors and 7 nurses) 14 males 5 females Average age: 35 years	Perspectives and lived experiences of PCPs during COVID-19	Semi-structured questionnaire	The themes identified were lack of preparedness, vulnerability, management, workload, training, equipment and supplies, organizational factors, psychosocial support, and health system resource. Resilience mechanisms were recognition from communities and authorities, professional and family networks, and self-regulatory behaviors such as faith-based activities and wellness and motivation activities
Banerjee et al. <sup>44</sup> 2021, India	COVID-designated centers all over India	A qualitative study with a constructivist paradigm (Charmaz's grounded theory)	172 physicians Mean age: 29.2 ± 3.8 years	Challenges, needs, and processes of coping and support	Semi-structured interview guide	Fear of infection, uncertainty, stigma, guilt, and social isolation emerged as the main challenges. «unmet needs» were flexible work policies, administrative measures for better medical protection, the sensitivity of media toward the image of HCW, effective risk communication for their health, and social inclusion. A resilience «framework» emerged: a «resilient identity.» managing the resilience, and working through occupational distress. The role of mental well-being, social network, peer support, problem negotiation, and self-care emerged as the key coping strategies

**Table 6:** Results of Egger's test for publication bias.

Coefficient	Estimate (95% CI)	p-value
<b>Depression</b>		
Slope	0.1327 (-0.1901–0.4557)	0.393
Bias	3.4729 (-2.9008–9.8468)	0.262*
<b>Anxiety</b>		
Slope	0.2279 (-0.0286–0.4845)	0.079
Bias	1.2759 (-3.4444–5.9963)	0.579*
<b>Stress</b>		
Slope	0.6358 (0.1861–1.0855)	0.009
Bias	-4.5075 (-12.7106–3.6954)	0.258*

\*not significant,  $p > 0.05$ .

### Findings from the quantitative studies

#### DEPRESSION

Sixteen studies reported the prevalence of depression.<sup>15–18,20,22,26,30,31,33,35–39,41</sup> Other characteristics of the study findings are presented in Table 5. The calculated pooled prevalence by the random effect model was 32.96% (95% CI: 23.74–42.90,  $I^2 = 98.47\%$ ;  $p < 0.00$ ) [Figure 2].

#### ANXIETY

Twenty-two studies (21 quantitative studies and one mixed method study) reported the prevalence of anxiety among HCWs.<sup>15–18,20–22,25,26,28–31,33,35–41,45</sup>

Other characteristics of the study findings are presented in Table 5. The pooled prevalence of anxiety [Figure 3] was calculated using the random effect model, and it was found to be 29.49% (95% CI: 21.52–38.13,  $I^2 = 98.39\%$ ;  $p < 0.00$ ) [Figure 3].

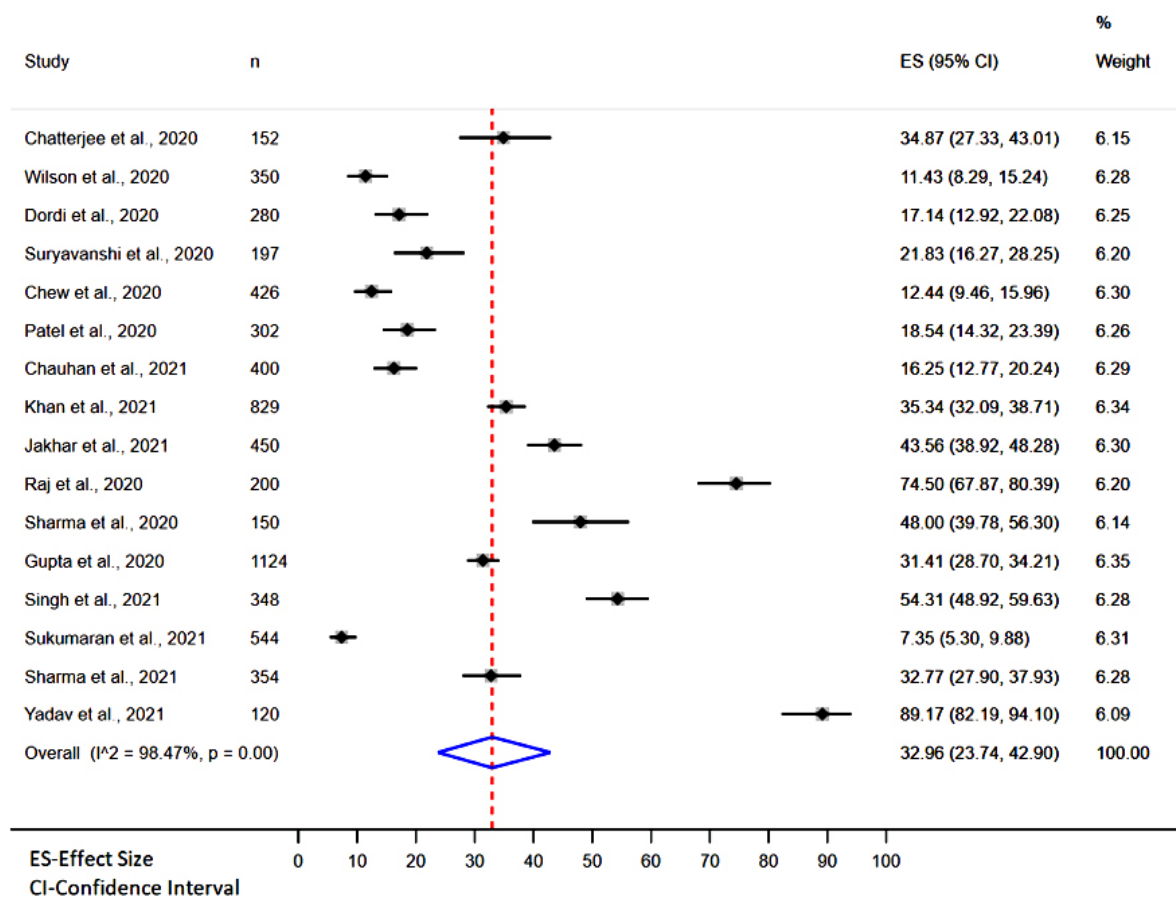
#### STRESS

Stress was reported in 16 studies (15 quantitative studies and one mixed method study).<sup>15,16,20–22,24,26,27,29,31,32,34,35,38,41,45</sup>

Other characteristics of the study findings are presented in Table 5. The pooled prevalence of stress was 33.47% (95% CI: 18.45–50.43,  $I^2 = 99.36\%$ ;  $p < 0.00$ ), as depicted in Figure 4.

### Findings from the qualitative review

Qualitative data were extracted from four studies. The data from three qualitative studies<sup>42–44</sup> and one mixed-methods study<sup>45</sup> were synthesized [Table 5].



**Figure 2:** Pooled prevalence of depression.

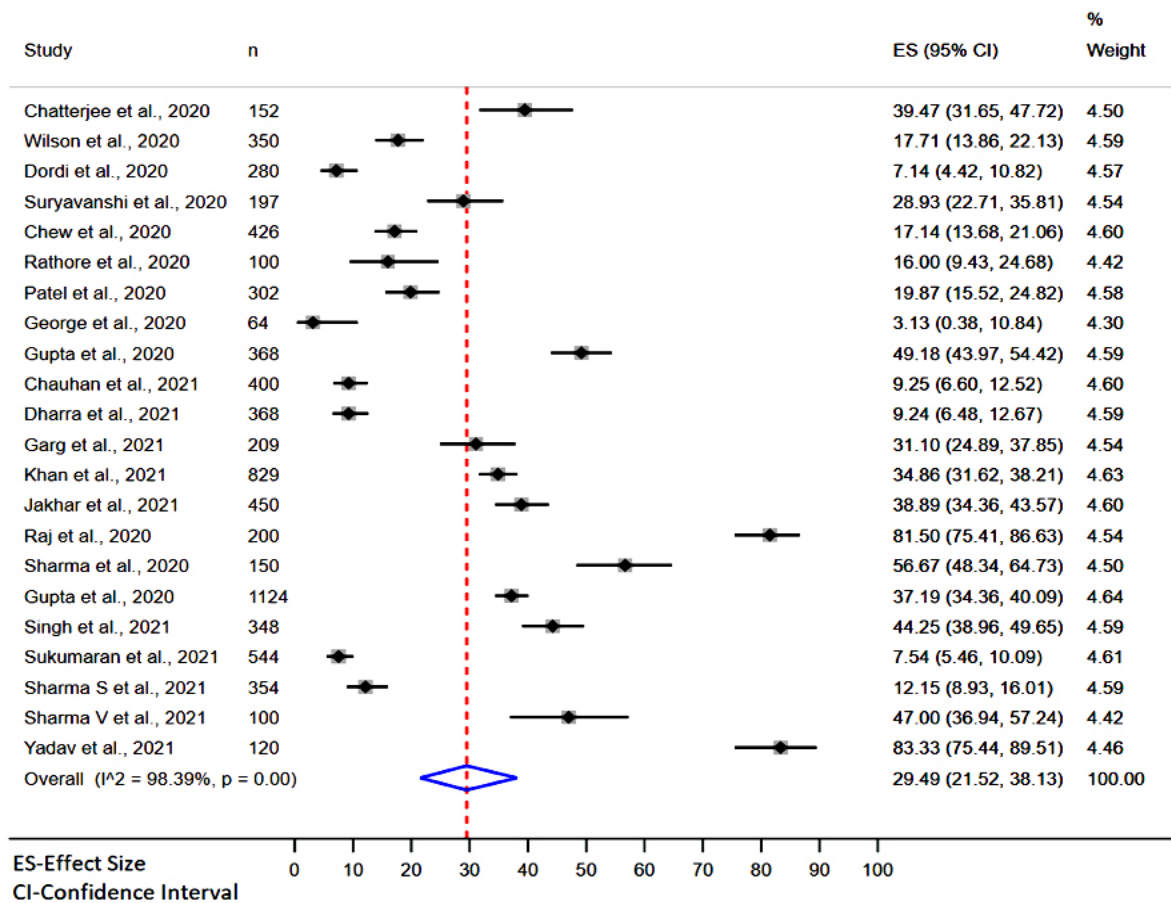


Figure 3: Pooled prevalence of anxiety.

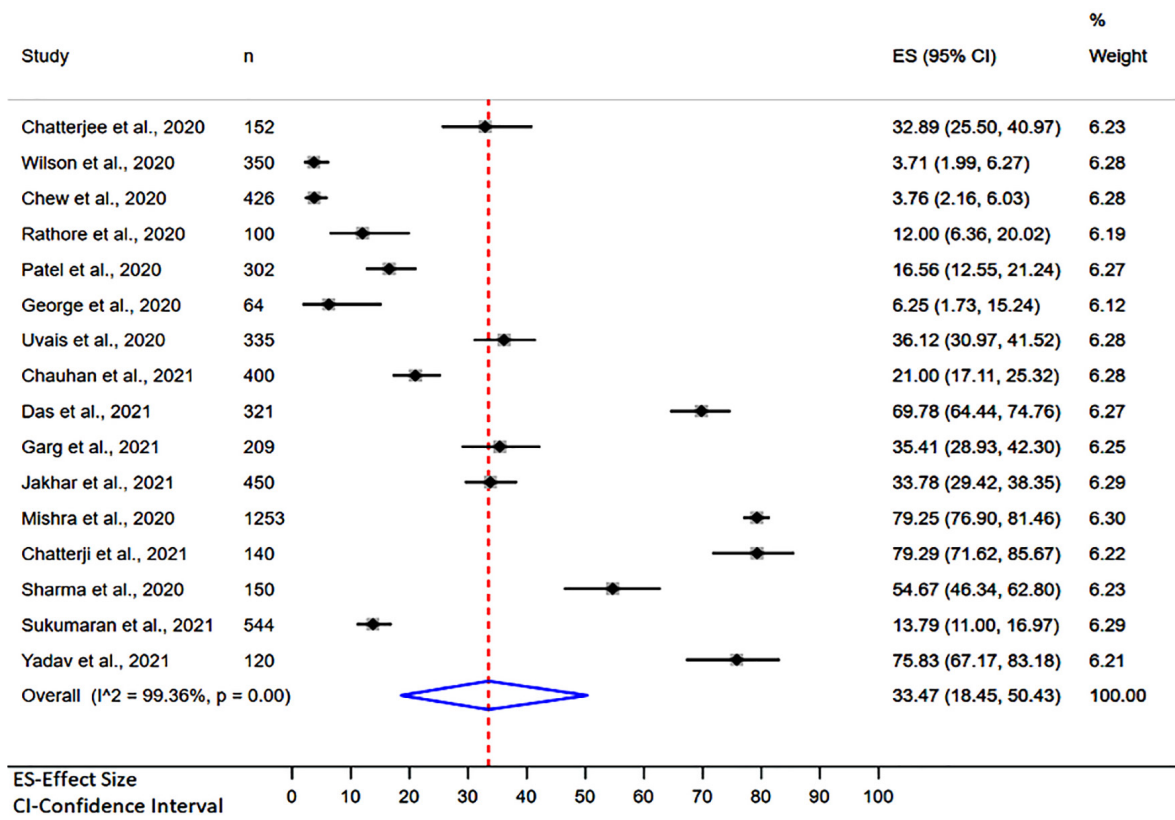


Figure 4: Pooled prevalence of stress.

The three included qualitative studies used different approaches to data analysis. Banerjee et al,<sup>44</sup> used 'Charmaz's grounded theory approach', followed 'Colaizzi's protocol', and Chakma et al,<sup>42</sup> did not use any preconceived theoretical framework but performed descriptive content data analyses. George et al,<sup>45</sup> used the framework approach for data analysis. Thematic synthesis resulted in the following themes:

#### CHALLENGES

- i. *Fear of contracting the disease and spreading it to family:* a common theme in all four studies was fear of contracting the virus and spreading it to family members. Due to their daily contact with infected patients and the high infectivity of the novel virus, HCWs expressed fear of becoming infected themselves. They were also concerned about the possibility of transmitting the virus to their families, particularly vulnerable individuals such as children and elderly parents with chronic health conditions. Participants mentioned that severe infection and death were topics of conversation within their families.
- ii. *Extreme stress, anxiety, and frustration:* all four studies also provided data on the high levels of stress experienced by HCWs. They expressed stress due to their high susceptibility to contracting the virus as well as the increased workload resulting from the high volume of patients, leading to exhaustion and frustration.<sup>42,45</sup> One study highlighted that HCWs not only had the responsibility of providing care, but also the additional emotional burden of offering psychological and emotional counseling and assurance to patients, families, and colleagues.
- iii. *Work fatigue and disruption of everyday life:* HCWs were expected to work for extended periods, to meet demand and cover staff illnesses. This resulted in significant fatigue and physical tension, impacting their mental health and decision-making abilities. The management's ability to cope with the unprecedented pandemic situation exceeded their previous training and experience, resulting in overworking and excessive duty hours, leading to burnout. HCWs also faced challenges in balancing their work commitments with their family life, with separation from their families for extended periods being a significant disruption.
- iv. *Social stigma:* findings from the qualitative

study findings revealed that HCWs attending to COVID-19 patients experienced social discrimination and rejection. Neighbors, friends, and even family members treated them as potential spreaders of COVID-19, often influenced by media coverage. They faced unpleasant remarks and hesitancy from society to engage with them, leading to avoidance.

- v. *Personal Protective Equipment (PPE) concerns:* HCWs expressed concerns about wearing PPE kits for prolonged periods, as it caused physical exhaustion, discomfort due to heat, and limited access to basic needs such as eating, drinking, and using the washroom easily. The quality of PPEs also was a cause of concern for the HCWs, undermining their confidence in providing care.

#### COPING STRATEGIES

- i. *Family and peer support:* HCWs expressed that the support they received from their immediate family, friends, and co-workers was crucial in helping them cope with the challenges they faced. Co-workers were a significant source of support, and sharing their difficult experiences with them was encouraging. Having another family member on COVID-19 duty was a powerful motivator for HCWs. They also mentioned that appreciation from higher authorities and recognition on social media were uplifting for them.
- ii. *Self-care and lifestyle modifications:* HCWs adopted individual coping strategies focused on self-care and making lifestyles modifications. They engaged in wellness activities and specific relaxation techniques such as yoga, meditation, listening to music, going for walks, and exercising to improve their physical and mental well-being.<sup>43</sup>
- iii. *Higher purpose through God/religion:* for some HCWs, their faith in God and religious beliefs played a role in coping with the challenges they faced. Praying and spiritual dependency provided them with a sense of higher purpose and strength.<sup>42</sup>
- iv. *Value of duty and passion:* many HCWs expressed that they felt a sense of duty and a calling to serve patients, even at the risk of their own lives. They recognized the value and strength of being healthcare professionals and believed that their passion for their work helped them cope.<sup>42,44</sup>

### *Synthesis of quantitative and qualitative findings*

The quantitative and qualitative findings were integrated using the social determinants of health framework.<sup>47</sup> The following domains were identified:

#### **INDIVIDUAL DOMAIN**

Fear of contracting and spreading COVID-19, as well as physical and emotional exhaustion, contributed to the significant stress and anxiety experienced by the HCWs. Individually, HCWs coped by engaging in self-initiated well-being activities, fulfilling moral and social obligations, and drawing strength from their own spiritual beliefs.

#### **INTERPERSONAL DOMAIN (FAMILY AND PEERS)**

HCWs with vulnerable family members, including the elderly and young children, were particularly concerned about their well-being. Some HCWs had to stay away from their families as a protective measure, which affected their mental health. Isolation and discrimination from family members and peers added to their stress. HCWs with childcare responsibilities faced difficulties in balancing home life and work. However, the support and encouragement from family and friends were crucial coping resources for HCWs.

#### **HEALTH SERVICES DOMAIN**

Increased workload and long working hours were major sources of stress for HCWs. The lack of mental health support for the public and the support staff in healthcare settings placed emotion burdens on HCWs. Assuming new responsibilities without adequate preparation and working in unsafe environments with unpredictable consequences added to their anxiety and stress. PPE-related issues such as shortage, discomfort, and poor quality were additional stress factors.

#### **COMMUNITY AND WIDER SOCIETY**

HCWs felt rejected and stigmatized by society, often facing discriminatory behaviors and hatred. Some faced eviction from rented properties, leading to depression. The support received from co-workers was highly valued by HCWs.

## **DISCUSSION**

India was one of the nations hardest-hit by the COVID-19 pandemic. India's dense population placed a massive burden on mortality and morbidity. The remarkable effect of COVID-19 had a grave psychological impact on the HCWs. Therefore, this mixed-methods review was undertaken to determine the impact of COVID-19 on HCWs' mental health status in India and its attributing factors.

Compared to the global prevalence by Ghahramani et al,<sup>48</sup> our review findings showed a lower prevalence of depression (32.96% vs. 36%) and anxiety (29.49% vs. 47%). Stress was the only exception, which had a higher prevalence in India (33.47% vs. 27%). According to our findings, the prevalence of depression and anxiety among HCWs is much higher in India than in the Asian subcontinent (China, South Korea, Saudi Arabia, Israel, Jordan, Palestine, Turkey, India, and Pakistan) and the Southeast-Asia region (Bangladesh, Pakistan, and Nepal) wherein the pooled prevalence was 27.2% (10 617/39 014), and 25.9% (6305/24 297) and 34.1% and 41.3%, respectively.<sup>49</sup>

The review also highlighted common themes identified in other studies worldwide,<sup>50</sup> such as fear of contagion, issues with PPE, heavy workload, social stigma, and the complex dynamics between HCWs, family members, colleagues, media, and society. These findings demonstrate that the impact of COVID-19 on HCWs transcends geographical and temporal boundaries.

In India, PPE was a great concern for HCWs during the pandemic. Similarly, in Oman, they faced an excessive need for face masks and gowns which was tackled by the endowment fund dedicated to public healthcare services.<sup>51</sup> Only one study included in the review compared the anxiety score between male and female HCWs which reported female HCWs had higher anxiety.<sup>25</sup> This finding was similar to a study conducted among female HCWs during the pandemic in Oman wherein 27.9% had moderate to severe anxiety.<sup>52</sup> Another important stressor among the HCWs was the heavy workload which was causing fatigue and affecting their mental health due to the high number of cases admitted to the hospitals. An effective intervention to overcome such a challenge would be a healthcare system change. One of the exemplary models adopted in response to the pandemic in India was the Udipi-Manipal model which was a public-

private partnership. One of the private hospitals was designated as a COVID-19 hospital to treat the overwhelming number of COVID-19 cases in the district.<sup>53</sup> Similarly, the primary health care in Oman partnered with private establishments, in tracking, testing, managing the cases, and data management as well.<sup>54</sup> However, studies on the role of the healthcare system in supporting the mental health of HCWs during the pandemic are lacking.

### ***Recommendations for policy and practice***

As HCWs continue to be the front-line workers in the face of the pandemic, they continue to be at significant risk of developing long-term psychological impacts. Implementing appropriate interventions to help HCWs cope with various mental health problems is the need of the hour. However, there were no studies on healthcare policies and interventional measures to meet the mental health needs of the HCWs during the pandemic. Due to the observed deficiency from this review, we recommend that there must be interventions and protocols at the institutional level, and policies at the governmental level to support HCWs' mental health. Furthermore, adequate training in management and counseling services to equip the HCWs in providing care confidently can play a role in mitigating the psychological impact of the COVID-19 pandemic. The role of media should be above and beyond to spread community awareness to remove the stigma associated with COVID-19.

### ***Strengths and limitations***

In our mixed method analysis, integrating the quantitative and qualitative data using the social determinants of health framework provided a comprehensive insight into the factors related to individuals, family, peers, community, health services, and wider society that influence the mental health of HCWs during the pandemic. There is no evidence of publication bias in the included studies in the three outcomes assessed.

Due to the I<sup>2</sup> in the data from the included studies, we were unable to perform a sub-group analysis. Another limitation of this review was that outcomes like insomnia, fear, quality of life, psychological impact, and post-traumatic stress disorder were not measured because we found that the most reported mental health outcome among the HCWs in India was anxiety, stress, and depression.

## **CONCLUSION**

This review emphasizes the significant prevalence of depression, anxiety, and stress among HCWs in India. Integrating quantitative and qualitative data explained the psychological impact of the COVID-19 pandemic on the mental health of HCWs. We recommend multi-prong and multi-level approaches as a way forward to protect the HCWs and preserve their service.

### ***Disclosure***

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