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**SYSTEMIC REVIEW**

# A Systematic Review and Meta-Analysis of Prevalence of Depressive Symptoms among Healthcare Workers in Pakistan during Covid Pandemic

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## ABSTRACT

Workload and stress of healthcare workers has increased manifolds as result of COVID-19. Healthcare workers in developing countries like Pakistan face lack of resources and psychological support in addition to changes in work routines, fear, isolation and separation from families. We conducted a systematic review and meta-analysis of prevalence of depressive symptoms among healthcare workers in Pakistan during COVID-19 pandemic. PubMed and Google Scholar were searched on January 2nd 2022. We included cross-sectional studies published during COVID outbreak in Pakistan (from January 2020 to December 2021). We extracted data on study characteristics and depression prevalence. Random effects models was used to conduct Meta-analysis. In total, 10 studies involving 12507 participants were included. The pooled prevalence of depression was 25.5% (95% CI, 19.5% to 32.5%), with significant between-study heterogeneity ($I^2$= 95.83%, Q=216.15, p < 0.001). This calls for urgent actions and interventions to support mental health care of healthcare workers in Pakistan.
**Keywords:** Depression, Healthcare Workers, Prevalence, Pakistan, COVID-19

## INTRODUCTION

COVID-19 was declared as a pandemic by the World Health Organization in March 2020. First emerging in December, 2019, COVID-19 has infected 328,532,929 people around the world including 5.5 million deaths (*as of January 15, 2022*)[1]. Pakistan reported its first case of COVID-19 on 26th February, 2020. The country has reported 1,324,147 cases of COVID-19 with 29,012 deaths[2].

Healthcare workers are constantly exposed to stressors due to the nature of their jobs. Previous literature reports a high prevalence of mental health problems among healthcare workers[3,4]. Evidence from all over the globe indicates an elevated level of stress and mental health problems, particularly depression among healthcare workers during COVID-19 pandemic. Studies conducted in China during the first wave of COVID-19 report a depression prevalence of 44% to 56%[5,6]. Similarly high rates of depression have been reported among healthcare workers from India (34%), Bangladesh (43%), Iran (60%), Nepal (33%), Saudi Arabia (44%), Turkey (46%), Singapore (41%), Japan (28%) and Qatar (42%)[7].

Health emergencies and epidemics put healthcare workers under extreme pressure with excessive workload, prolonged duty hours, exhaustion, sleep deprivation, difficult decision making, isolation, separation from families, stigma, fear of being infected, fear of infecting their families, loss of control and pain of losing patience and colleagues[8-10]. Healthcare workers, therefore, are highly likely to be experiencing mental health problems.

Although disease outbreaks such as COVID-19, pose a huge challenge to healthcare systems all across the world, in developing countries like Pakistan weak health systems, poor facilities, insufficient human resource and lack of health knowledge in public worsens the existing situation[11]. Disease outbreaks and health emergencies increase the job demands and stressors of healthcare workers. Pakistan is ranked 122nd in the world in overall quality of health-care systems and infrastructure[12]. With a high burden of disease, the healthcare system is already not sufficient to fulfil the needs of a population of around 220 million. Healthcare workers from Pakistan have reported that they experience both personal and institutional challenges in performing their duties during COVID-19 such as poor facilities in isolation wards, unavailability of personal protective equipment (PPE), extreme workload, and almost non-existent psychological support services for employees in their institutions[13].

Therefore, it is of utmost importance to quantify the burden of mental health problems particularly depression among healthcare workers in Pakistan, who have been experiencing much worse conditions compared to their counterparts in developed countries. This systematic review and meta-analysis aims to provide evidence on prevalence of depressive symptoms among healthcare workers in Pakistan during the COVID-19 pandemic.

## METHODS

The study was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and Meta-analysis of Observational studies in Epidemiology (MOOSE) guidelines[14,15].

**Literature search strategy:** PubMed and Google scholar databases were searched systematically on January 2nd, 2022 for studies providing data on depressive symptoms among healthcare workers in Pakistan published since the outbreak of COVID-19 pandemic. Our search strategy combined terms related to healthcare workers and depression. Search strategy has been provided below.

| | |
|---|---|
| Healthcare workers | Healthcare worker*"OR "healthcare professional*" OR "paramedical staff" OR Nurse* OR physician*OR GPs OR "Postgraduate trainee*" OR "hospital staff" OR "medical staff" OR clinician* OR trainee* OR resident* OR "health worker*"OR "primary care" |
| Depression | Depression OR "Depressive symptoms" OR "Major Depression" OR "Major Depressive Disorder" OR "Depressive Disorder" OR Depressed OR Sadness OR depress* |
| Country | Pakistan* |

Our search was restricted to only studies published between January 2020 to December, 2021, in English language. In addition, we reviewed the reference lists of recent systematic reviews reporting data on prevalence of depression among healthcare workers to identify any additional studies.

**Study selection criteria:** Studies were included if they used a cross-sectional study design and reported prevalence of depression/depressive symptoms (Numbers and percentages) among healthcare workers in Pakistan. We included only those studies which were conducted/collected data during the COVID-19 pandemic period in Pakistan.

We did not include longitudinal studies, case control studies, systematic reviews, qualitative studies**.** Unpublished or non-peer reviewed articles were also excluded.

**Data extraction and Quality assessment:** One author (MZA) conducted the database searches on 2nd January 2022. Duplicates were deleted using Endnote software. Title and abstracts screening was performed by two authors (PA and MZA)

independently. In case of disagreement, a third author (MNK) was consulted and disagreements were resolved through a discussion. Following this, two authors (PA and MZA) reviewed the full-texts of all articles independently. If there was a disagreement between authors on decision to include a particular study, study was discussed with a third author (MNK). For the purpose of quality control and to ensure accuracy of data extraction, two author independently extracted data from all the included articles.

Data on characteristics of included studies was extracted using a pre-tested and standardized data extraction sheet. We extracted data on including (but not limited to) study author and year of publication, design, sample size, age of sample, questionnaire and cut off score to measure depression and prevalence of depressive symptoms.

Joanna Briggs Institute (JBI) critical appraisal checklist for prevalence studies was used to assess quality of articles included in this review[16]. This checklist evaluates each study on nine indicators. This tool has been used previously in systematic reviews and meta-analyses of prevalence studies[17]. We categorized studies to be at low risk of bias (7 or more points), moderate risk of bias (4–6 points) or high risk of bias (below 4 points), study quality.

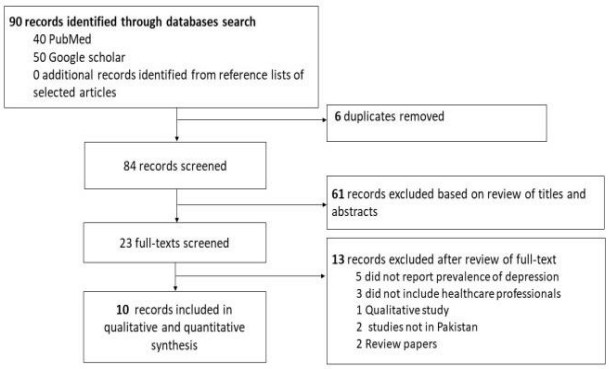
**Statistical analysis:** Comprehensive Meta-Analysis software version 3(18) was used to conduct meta-analysis. As we observed a substantial heterogeneity among studies, one true effect size cannot be presumed. Therefore, we used a random effects model to calculate the pooled prevalence with its 95% confidence intervals. The $I^2$ index was used to assess the heterogeneity of the included articles [heterogeneity was categorized into three classes: low heterogeneity= less than 25%, medium heterogeneity =25–75% and high heterogeneity = more than 75%]. Between-study heterogeneity was assessed using standard $\chi^2$ tests, $Tau^2$ and the $I^2$ statistic[19,20].

To see the effect of each study on overall prevalence, sensitivity analysis was conducted using "leave one out" approach. Funnel plot's visual inspection and Egger's tests ($p<0.1$) were used to assess the publication bias in included studies.

## RESULTS

**Study selection process:** Figure 1 presents the detailed process of study search and selection. At studies identification stage, our databases search yielded 90 records. No unique records were identified from the references list of recent systematic reviews. 6 studies were excluded due to duplication. After that, 84 titles and abstracts were screened. After the completion of screening process, a total of 23 full texts were assessed against the inclusion criteria. We excluded 13 studies as the authors did not report prevalence of depression. A total of 10 full texts were included in both the systematic review and meta-analysis.

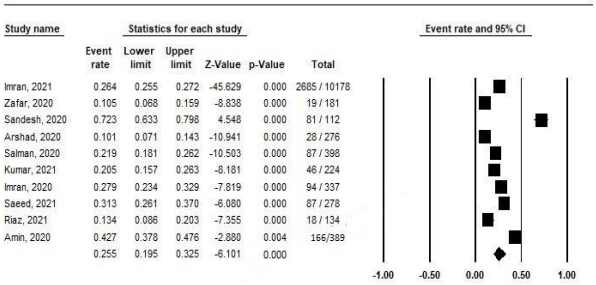
Figure 1: PRISMA flow chart




**Study characteristics:** Characteristics of the 10 studies included in our review have been provided in table 1. We included 10 studies[21-30] involving 12507 participants, reporting data on prevalence of depression among healthcare workers in the final analysis. The median sample size per study was 277 (range, 112-10178). For all the included studies, data was collected during the first wave of COVID-19 in Pakistan (February 2020 to July 2020). All the included studies used self-reporting screening tools to assess depression; 4(40%) used DASS-21, 3 studies used PHQ-9, 2 studies used SRQ-20. One study used ZUNG-Self-reporting Depression scale (Zung-SDS) to ascertain depression levels. All the studies used web-based platforms for data collection. Most of the studies included healthcare workers from multiple specialties and professions (i.e. included both doctors and nurses).

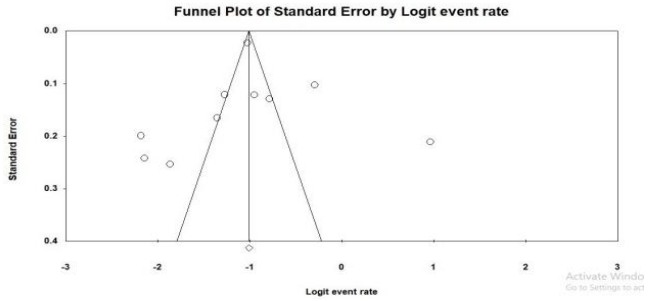
**Prevalence of depression:** Our meta-analysis revealed a pooled depression prevalence of 25.5% among healthcare workers in Pakistan (95% CI, 19.5% to 32.5%). Significant between-study heterogeneity ($I^2$=95.83%, Q=216.15, $p<0.001$) was observed. The prevalence estimates reported by the individual studies ranged from 10% to 72% (Fig 2).

Figure 2: Prevalence of depressive symptoms among healthcare workers in Pakistan




**Assessments of publication bias:** Visual inspection of funnel plot and Egger's regression statistic (Figure 3) did not indicate any substantial publication bias in the studies included in our review (p=0.96).

Figure 3: Funnel plot for publication bias




**Sensitivity analysis:** No significant changes were observed in the mean prevalence of depression when individual studies were knocked out from the meta-analysis. Only the elimination of one study (Sandesh, 2021) reduced the prevalence rate of depression from 25% to 22% (95% CI; 17.3% to 27.3%).

**Quality assessment:** Quality assessment showed that overall most of the included studies had a moderate risk of bias. On average, each study had a quality score of 6.3 (SD; 0.86) out of 9. Overall, 7 out of 10(70%) studies had a moderate risk of bias. Out of 26 studies, none of the studies employed a random sampling technique. Although, most of the studies recruited an adequate sample, one study reported the sample size calculation. Response rate was provided in only 2 (20%) studies. Table 2 presents the quality score for all included studies.

Table 1: Characteristics of the 10 studies included in meta-analysis

| Study | Population | Data collection period | Data collection | Depression Screening Instrument | Cut off | Sample size | Sampling technique | Mean age (SD) | Females (No.,%) | Females with depression (No.,%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Imran, 2021 | Postgraduate trainees | 15 April to May 2020 | Web-based | PHQ-9 | 8 or above | 10178 | Non-random | 31.50 (6.9) | 5776 (56.7) | 1683 (29.1) |
| Zafar, 2020 | Doctors, Nurses | 27 March to 22 April 2020 | Web-based | Zung-SDS | 50 or above | 181 | Non-random | NR | NR | NR |
| Sandesh, 2020 | HCWs in COVID isolation wards | May-2020 | Web-based | DASS-21 | 7 or above | 112 | Non-random | NR | 48 (42.9) | 31 (64.6) |
| Arshad, 2020 | physicians, Nurses | 10 April to 5 June 2020 | Web-based | DASS-21 | 10 or above | 276 | Non-random | 26-30 | 94 (34.1) | 12 (12.8) |
| Salman, 2020 | Doctors, Nurses, Pharmacists | 15 April to 20 May 2020 | Web-based | PHQ-9 | 10 or above | 398 | Non-random | 28.67 (4.15) | 223 (56) | NR |
| Kumar, 2021 | Physicians, Nurses, Allied healthcare workers | 1 July to 20 July 2020 | Web-based | DASS-21 | 14 or above | 224 | Non-random | NR | 54 (24.1) | NR |
| Imran, 2020 | Physicians, Nurses, Paramedical staff | 30 March to 15 April 2020 | Web-based | PHQ-9 | 10 or above | 337 | Non-random | 30.4 (6.7) | 178 (53) | 54 (30.3) |
| Saeed, 2021 | Doctors, Nurses, Pharmacists | NR | Web-based | SRQ-20 | 8 or above | 278 | Non-random | NR | NR | NR |
| Riaz, 2021 | Doctors, Nurses | Jul-2020 | Web-based | DASS-21 | 14 or above | 134 | Non-random | 21-30 | 49 (36.6) | NR |
| Amin, 2020 | Frontline doctors | March to April 2020 | Web-based | SRQ-20 | 8 or above | 389 | Non-random | 35 (IQR = 30-45) | 188 (48.3) | NR |

**Abbreviations:**, Depression Anxiety Stress Scale; PHQ-9, 9-item Patient Health Questionnaire; SRQ, Self-Reporting Questionnaire-20 items; Zung-SDS, Zung Self-Rating Depression Scale; HCW, Healthcare Workers, NR, not reported;

Table 2: Quality assessment of studies included in the review

| Author, year | Sample representativeness | sampling technique | Sample size | Descripti-ve statistics | Scale reliable/valid | Ascertainment of depress-ion | Standard measurement | Statistical analysis | Respon se rate | Total score | Risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Imran, 2021 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 6 | Moderate |
| Zafar, 2020 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | Low |
| Sandesh, 2020 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 5 | Moderate |
| Arshad, 2020 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | Low |
| Salman, 2020 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 6 | Moderate |
| Kumar, 2021 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 6 | Moderate |
| Imran, 2020 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 6 | Moderate |
| Saeed, 2021 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 6 | Moderate |
| Riaz, 2021 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 6 | Moderate |
| Amin, 2020 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 7 | Low |

## DISCUSSION

Our review identified 10 studies on prevalence of depressive symptoms among healthcare workers in Pakistan in the context of COVID-19 pandemic. The pooled prevalence of depressive symptoms was 25.5% (95% CI, 19.5% to 32.5%), with a significant heterogeneity among studies.

Findings of our study are consistent with the global estimates of depression prevalence among healthcare workers during COVID-19. A systematic review of 10 studies from China published during the early phase of COVID-19 reported a pooled prevalence of 23% (95% CI; 15% to 31.5%)[31]. Meta-analysis of 21 studies by Salari and colleagues[32] have reported a depression prevalence of 24.3% (18% CI 18.2–31.6%). In an umbrella review of 10 systematic reviews, consisting of 100 studies, Fernandez et al.,2021 also reported that 18 to 36% healthcare workers experienced depression[33].

A considerable heterogeneity was observed in overall meta-analysis. This can be explained due to diversity in samples in terms of sample size, gender ratio in the sample and different professional categories of healthcare workers. There was an enormous variation in the sample size recruited across studies. Different screening tools were used in the included studies, with different cutoff points and validity and reliability. Although all the studies collected data during first wave of COVID-19 in Pakistan, there was still variation in time points that could influence overall results.

Symptoms of depression can not only effect quality of life and physical health of healthcare workers but may also compromise the performance in healthcare delivery and cause poor decision making, which is an integral part of their duties. Moreover, in countries like Pakistan, where resource constraints always create challenges in optimal performance, it is important to equip health professionals with strategies and psychological resources to better cope with challenging situations. Stress management and coping strategies should be included in the training curriculum and regular practise must be encouraged. Clinical supervisions should have mental health of trainees as rolling agenda. In emergency situations, such as COVID, short mental health breaks can play an important role to improve wellbeing and performance.

As there is general lack of professional mental health work force in Pakistan, self-help, peer support and digital mental health interventions can be implemented to support psychological wellbeing of healthcare workers.

For future research, there is a need to conduct high quality studies on both prevalence of depression and interventions to improve mental health and wellbeing of healthcare workers in Pakistan. Such interventions can be integrated in the routine training for better uptake and optimal use of available scarce resources.

To the best of our knowledge, this is the first study to summarize the prevalence of depressive symptoms among healthcare workers in Pakistan during COVID-19 pandemic. We did not exclude studies based on study quality or sample size to include all the available evidence.

Our findings should be interpreted with cautions. The studies included in meta-analysis employed a diverse sample as well as ample sizes varied across studies. All the studies used self-reporting measures of depressions. Such measures differ in their psychometric properties and cut-off points for ascertainment of depression. Due to small number of studies and lack of reported data on subgroups, we could not run a subgroup analysis to see the effect of moderator variables on the overall prevalence and sources of heterogeneity. Studies included in the meta-analysis did not report prevalence of depressive symptoms in different categories of healthcare workers such as doctors, nurses and allied healthcare workers or male vs. females, so we could not estimate separate prevalence rates for different group of professionals. We could not identify studies reporting on prevalence of depression from latter stages of COVID-19 pandemic, hence, time trends in prevalence could not be examined.

## CONCLUSION

In conclusion, the global COVID-19 pandemic has had a strong negative impact on the mental health of healthcare workers in Pakistan. Our systematic review and meta-analysis synthesized the quantitative evidence on prevalence of depressive symptoms among healthcare workers in Pakistan and showed that one fourth of healthcare workers experienced depressive symptoms while

performing their duties during COVID-19 pandemic. This calls for urgent actions and resource allocation for mental health care of healthcare providers.

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**Conflict of Interests:** None

**Authors 'Contribution: MZA & MNK** conceptualized and designed the study. **MZA & PA** performed the article search and data extraction. **MZA & PA** analyzed the data. **MZA, MNK & PA** interpreted the results. **MZA and PA** drafted the manuscript in support with **MNK.** All authors reviewed and approved the final version of the manuscript

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