# Health Problems and Associated influence factors among Health Care workers during COVID-19 Pandemic: A Systematic Review and Meta-analysis

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## ABSTRACT

The health care professionals are at the high risk to develop the health problems during the pandemic. This systematic review aims to investigate the health problems and associated influence factors among HCWs during COVID-19. A systematic search was conducted in the four databases between January and May 2023. PRISMA method were used. Review Manager 5 and STATA 15.1 software were used to identify the pooled prevalence, the sensitivity analysis, and the publication bias of the outcomes. NOS was used to assess the quality appraisal of the eligible studies. A total of 6,878 participants were surveyed across the 10 studies. The studies were between March 5, 2020, and June 30, 2021. The ten eligibility studies conducted in 9 countries were included. The pooled prevalence of depression, anxiety, and insomnia was 30%,35% and 47%, respectively. The pooled prevalence of PTSD, stress, EE, DP, and a PA, was 9%, respectively across 2 studies by a random

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effects model. The study also identified various influential factors associated with these health problems. Heterogeneity across analyses was assessed by using $I^2$ statistics, with $I^2 \geq 25\%$, $\geq 50\%$, and $\geq 75\%$ representing low, medium, and high heterogeneity, respectivel. Subgroup analysis was done in the following categories: gender and HCWs. The prevalence rates of depression, anxiety, PTSD, insomnia, and stress ranged from 18.1% and 76.5%, 27.9% to 78.8%, 2.2% to 16%, 40.8.0% to 52.0%, and 63.5% to 63.7%, respectively. Comparing to another study, depression, anxiety, PTSD, and insomnia were prevalent in 9 to 67%, 11% to 74%, 6 to 25%, and 17% to 61%. Moreover, the associated risk factors have been discussed in this systematic review as well.

Keywords: Health problems, prevalence, influence factors, HCWs, COVID-19

## 1. INTRODUCTION

COVID-19 was declared as the pandemic by the World Health Organization on March, 12th 2020 (Mohamadian, 2021). It has resulted in a negative impact on people, especially HCWs. For instance, medical staffs in some countries faced mental stress, physical exhaustion, fatigue, nervousness, and weakness family separation, stigma, and the pain of losing family or friends than those not in the front line (Chersich, 2020) (Trumello, 2020) (Walton, 2020).

To assist COVID-19 health effect, the HCWs have been given the personal protective equipment (PPE), alcohol, gloves, offered practical guidance, and adopt strict control. Providing psychological intervention and counseling to support mental health of the HCWs (Vizheh, 2020).

Also, the previous studies of the systematic review showed that among HCWs the estimated prevalence of depression, anxiety, PTSD, and insomnia ranged between 21%-25%, 22%-26%, 9.6%-21.5%, 38.9%, 38.9% respectively (Walton, 2020, Li, 2021, Pappa, 2020). In addition, 15.1%, 26.3%, 7.0%, participants experienced high

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levels of emotional exhaustion(EE), depersonalization(DP), personal accomplishment(PA), respectively. (Ahmad, 2022). Among the critical care and emergency nurses in Spain, 37.5% reported fear of infection and 28.2% reported workload (González-Gil, 2021). Moreover, the associated factors of the mental and physical health including, shifts lasting ≥8 hours, being redeployed, age, working hours, work zone, limited facilities and resources, risk of disease transmission and personal work demands(Aditya, 2022, Tan, 2020)

COVID-19 results related not only to mental and physical health, but also to family issues, economic issues, workload, and burnout.

As a solution to the problems, Healthcare organizations should provide mental health support and resources to those working closely with COVID-19 patients. Organizations should also consider implementing interventions to reduce the workload of HCWs, particularly nurses, and provide support to those working in rural areas. Furthermore, the study presents the need for further research to explore the long-term effects of the pandemic on the mental and physical health of HCWs.

Thus, this systematic review aims to examine the healthcare situation and influence factors among HCWs during COVID-19 pandemic. The finding is related to the mental health and other health problems of HCWs together with the various associated risk factors that caused the problems to the HCWs.

## 2. METHODS

### Search process

HCWs were assessed for mental health, physical health, and other problems during the COVID-19 pandemic using the PRISMA method (Liberati, 2009). Between January and the end of May 2023, we reviewed an original article in PubMed, Web of Sciences, Embase, and Google Scholar. We used the following strategy for Embase, PubMed, and Web of Sciences:

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((mental health OR psychological health OR psychological distress OR depression OR anxiety OR PTSD OR Insomnia OR psychological stress) AND (risk factors OR influencing factors) AND (Medical workers OR Health care workers OR hospital workers) AND (novel coronavirus disease OR 2019 novel coronavirus OR COVID-19 OR 2019-nCOV)). ((Physical Health OR Nervous OR Weak OR Tired OR Fatigue AND (risk factors OR influencing factors) AND (Medical workers OR Health care workers OR hospital workers) AND (novel coronavirus disease OR 2019 novel coronavirus OR COVID-19 OR 2019-nCOV)). ((Economic Crisis OR Family issues OR Overtime working OR Workload OR Family Problems OR Economic issues AND (risk factors OR influencing factors) AND (Medical workers OR Health care workers OR hospital workers) AND (novel coronavirus disease OR 2019 novel coronavirus OR COVID-19 OR 2019-nCOV)). And used this strategy to search in Google Scholar ((mental health OR depression OR anxiety OR PTSD OR Insomnia OR psychological stress) AND (risk factors OR influencing factors) AND (Health care workers OR hospital workers) AND (COVID-19 OR 2019-nCOV)). The article was conducted in three steps. Titles were screened first. Second, we assessed relevant abstracts. Lastly, full-text screening was performed on selected articles.

Study selection and eligibility criteria

We first screened the title and the abstracts of each article and then full articles to assess the eligibility. The inclusion criteria were applied: (1) used a cross-sectional study design, (2) assessed the mental health status, physical health status, and other problems (burnout, overtime working) of the HCWs during the COVID-19 pandemic, including prevalence and risk factors, (3) used scales for measurement of mental health problems and physical problems and other problems (4), conducted in

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worldwide, (5) studies were published in English. Also, the study excluded, (1) reviews, (2) different study designs, (3) no abstract, (4) inaccessibility of full article, (5) duplicate, (6) non-English languages, and (7) incomplete information.

Data extraction process

Two independent investigators conducted the data extractions and assessed the eligibility articles. The structured forms were used to extract the data from each study, including (1) authors and publication year, (2) time, (3) location, (4) study design, (5) sample size, (6) sample characteristics, (7) prevalence of mental health/ depression/ anxiety/ insomnia/ physical health/ workload or burnout, (8) risk factors associated with the outcomes.

Study quality appraisal

The Newcastle-Ottawa Scale (NOS) is used as the quality assessment scale to adapt for cross-sectional studies in this review. This scale is divided into three sections:(1) Selection, (2) Comparability, and (3) Outcome. The overall seven categories were included (representativeness of the cases, sample size, non-response rate, ascertainment of the screening/surveillance tool, the potential confounders were investigated by subgroup analysis or multivariable analysis, assessment of the outcome, statistical test). The selection gets a maximum of five stars, comparability gets 2 stars, and outcome gets three stars. A total of 9-10 points (very good studies), 7-8 points (good studies), 5-6 points (satisfactory studies), and 0-4 points (unsatisfactory studies)(Feng).

Data analysis

The pooled prevalence of depression, anxiety, PTSD, insomnia, exhaustion, personalization, and PA was calculated by using RevMan 5. The analysis was calculated by using a

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random-effects model. Heterogeneity across analyses was assessed by using $I^2$ statistics, with $I^2 \geq 25\%$, $\geq 50\%$, and $\geq 75\%$ representing low, medium, and high heterogeneity, respectively (Higgins, 2003). Subgroup analysis was done in the following categories: gender and HCWs. These included several studies, the total sample, the pooled prevalence of depression and anxiety, and the test of difference within each subgroup (chi-square value, p-value). The sensitivity analysis, the Funnel plots, Begg's test, and Egger's test were done by STATA 15.1 software. The Funnel plot, Begg's test, and Egger's test are used to assess the publication bias. If the graph is asymmetry, the publication bias is considered. All statistical analyses were two-tailed with a significance level of 0.05

## 3. RESULTS

### Characteristis of the included studies

7898 articles were identified through the four-database check and duplicate. After excluding duplicates, 3653 articles were screened for title and abstract. Ten studies met the inclusion criteria after screening. The process of selecting the studies is shown in Figure 1 and their characteristics are shown in Table 1. March 5, 2020, was the earliest survey time, and June 30, 2021, was the latest. All included studies used cross-sectional surveys. The surveyed regions included United Arab Emirates, Bangladesh, Northwest Ethiopia, Thailand, Brazil, Ethiopia, the UK, India, China, and Pakistan. Ten studies were conducted, involving 6,878 participants. Sample sizes ranged from 238 to 2,334 participants.

According to the studies included, depression and anxiety were major problems. Several of these studies reported other

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health problems such as PTSD, insomnia, stress, workload, and burnout (EE, DP, PA), which are summarized below.

Quality appraisal of included studies

Table-2 displays the result of the quality appraisal using NOS. The overall quality of the selected studies was with the total stars were seven points and eight points. Seven studies scored eight points(AlGhufli, 2021, Ali, 2021, Asnakew, 2021, Habtamu, 2021, Chinvararak, 2022, Flesch, 2022, Salman, 2022). Three studies scored seven (Pappa, 2021, Zhang, 2021, Sharma, 2022). The ten cross-sectional studies were scored as good studies.

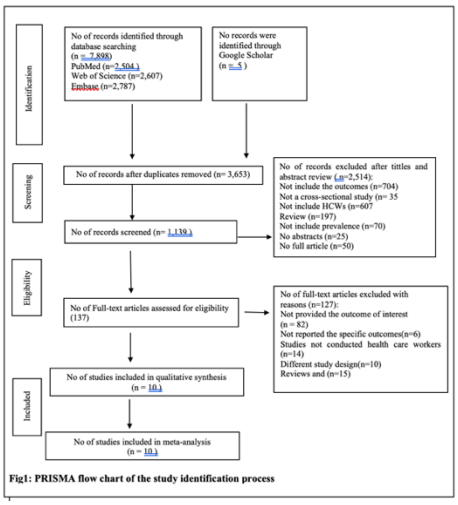

Fig1: PRISMA flow chart of the study identification process

The health problems and associated influential factors during the COVID-19 pandemic

During the COVID-19 pandemic, depression and anxiety were the major health problems reported by HCWs. The studies also reported issues such as EE, DP, PA, PTSD, insomnia, workload, and stress symptoms. Here are the detail of the health situation among HCWs and its risk factors:

The Prevalence of Depression and associated risk factors

Ten studies conducted from April,15th 2020 to June 2021 reported depression as a significant mental health problem among HCWs during the COVID-19 pandemic (AlGhufli, 2021, Ali, 2021, Asnakew, 2021, Habtamu, 2021, Pappa, 2021, Zhang, 2021, Chinvararak, 2022, Flesch, 2022, Salman, 2022, Sharma, 2022).

The prevalence of depressive symptoms among ten studies ranged between 13.8.1% and 76.5%. Two of the studies used the DASS-21 depression scale (AlGhufli, 2021,

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Asnakew, 2021). Six of the studies used the PHQ-9 scale (Ali, 2021, Habtamu, 2021, Pappa, 2021, Chinvararak, 2022, Flesch, 2022, Salman, 2022). One of the studies used the Hamilton depression scale (Zhang, 2021). One of the studies used PHQ-4 (Sharma, 2022) and One of the studies also use PHQ-2 (Chinvararak, 2022) to assess depressive symptoms.

Associated risk factors

Age between 18-31 (AlGhufli, 2021), being female (AlGhufli, 2021, Ali, 2021, Habtamu, 2021, Pappa, 2021), frontline HCWs (Zhang, 2021, Salman, 2022), being nurse (Ali, 2021, Zhang, 2021, Sharma, 2022), being married (Habtamu, 2021),being younger (Flesch, 2022), being single (Ali, 2021, Habtamu, 2021, Flesch, 2022), Being worried about the family and loved ones (AlGhufli, 2021), financial difficulty(Ali, 2021), medical illness(Asnakew, 2021, Chinvararak, 2022), had contact with confirmed COVID-19 (Asnakew, 2021), mental illness (Asnakew, 2021), poor social support (Asnakew, 2021), duration of exposure 1-2 hours and assigned place of work(Habtamu, 2021), those with family history of depression, resident professional, who were exposed to three or more situations of moral dilemma, and those who had to put off a physiological need until later, having risk factor for COVID-19, being smoker, being physical inactive (Flesch, 2022) , working in states with higher caseload (Sharma, 2022) was associated with depression.

The Prevalence of Anxiety and associated risk factors

A total of nine studies conducted from April,15th 2020 to June,30th 2021 reported anxiety as a fundamental mental health problem among HCWs during the COVID-19 pandemic (AlGhufli, 2021, Ali, 2021, Asnakew, 2021, Habtamu, 2021, Pappa, 2021, Zhang, 2021, Chinvararak, 2022, Salman, 2022, Sharma, 2022). The prevalence of anxiety symptoms reported by

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these studies ranges from 15.9% to 78.8%. Two of the studies used the DASS-21 anxiety scale (AlGhufli, 2021, Asnakew, 2021). One of the studies used the General anxiety disorder-2 scale (Ali, 2021). One of the studies used the Hamilton anxiety scale (Zhang, 2021). Four of the studies used the General anxiety disorder-7 (Habtamu, 2021, Pappa, 2021, Chinvararak, 2022, Salman, 2022) and one of the studies used the PHQ-4 scale (Sharma, 2022) to assess anxiety symptoms.

Associated risk factors

Age between 18-25(Ali, 2021), age between 18-31(AlGhufli, 2021), being female (Ali, 2021, Asnakew, 2021, Zhang, 2021, Salman, 2022), frontline HCWs (Zhang, 2021), nurse (Zhang, 2021, Sharma, 2022), doctor(Sharma, 2022), being single(Ali, 2021), being worried about the family and loved ones (AlGhufli, 2021), financial difficulty (Ali, 2021), mental illness (Chinvararak, 2022), contact with confirmed COVID-19 (Asnakew, 2021), had family with chronic illness (Asnakew, 2021) was associated with anxiety.

The prevalence of PTSD, Insomnia, Stress, and associated Risk factors

Two studies conducted from May,15th 2020 to June, 30th 2021 reported PTSD as a significant mental health problem among HCWs during the COVID-19 pandemic (Habtamu, 2021, Chinvararak, 2022). The prevalence of PTSD symptoms in the two studies ranged between 2.2% and 16%. One of the studies used the PCL-C scale (Habtamu, 2021). One of the studies used DSM-5 criteria (Chinvararak, 2022) to assess post-trauma stress disorder symptoms.

Four studies conducted from May,15th 2020 to September,14th 2020 reported Insomnia as a significant mental health problem among HCWs during the COVID-19 pandemic (AlGhufli, 2021, Ali, 2021, Habtamu, 2021, Pappa, 2021). The prevalence of insomnia symptoms

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in four studies ranged between 40.8.0% and 52.0%. Two of the studies used ISI scales (AlGhufli, 2021, Ali, 2021). One of the studies used the Athens insomnia scale (Pappa, 2021). One of the studies used PSQI scales (Habtamu, 2021) to assess insomnia symptoms.

Two studies conducted from July,28th 2020 to November 2020 reported stress as a significant mental health problem among HCWs during COVID-19 (AlGhufli, 2021, Asnakew, 2021). The prevalence of stress symptoms in the two studies ranged between 63.5% and 63.7%. These two studies used DASS-21scale (AlGhufli, 2021, Asnakew, 2021) to report stress symptoms.

Associated risk factors

Age between 18-25, being female, being single, financial difficulty (Ali, 2021), and history of mental health(Pappa, 2021) were associated with insomnia. Mental illness was associated with PTSD (Chinvararak, 2022). Age between 18-31 (AlGhufli, 2021) and poor social support (Asnakew, 2021) were associated with stress symptoms.

The prevalence of other health problems and associated risk factors

Two studies conducted from June 2020 to June,30th 2021 reported burnout, including EE, DP, and PA as a significant physical health among HCWs during the COVID-19 pandemic (Pappa, 2021, Chinvararak, 2022). The prevalence of EE, DP, and PA, in two studies, ranged from 16.3% to 52%, 16%-19.5%, and 53.5%-55.5%, respectively. Two of the studies used the MBI scale, including EE, DP, and PA to measure burnout.

One study conducted from Feb 2020 to July 2020 reported exhaustion and workload as significant other problems among HCWs during COVID-19 (Sharma, 2022). The prevalence of exhaustion and workload were 26.5% and 30.3%, respectively. 19-StressQ was used to assess the

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prevalence of exhaustion and workload.

Associated risk factors

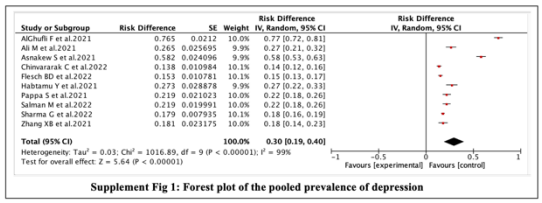
Being female(one study) (Pappa, 2021), being male, a nurse, working at a COVID-19 inpatient unit, working at COVID-19 intensive care unit (Chinvararak, 2022), being a doctor (Chinvararak, 2022, Sharma, 2022), working in states with higher caseload (Sharma, 2022) were associated with EE.

Frontline HCWs, nurses, being younger, change accommodation during the crisis (AlGhufli, 2021) and history of mental health (Pappa, 2021) were associated with burnout. Nurses working in states with higher caseloads (Sharma, 2022) were associated with a heavy workload.

Meta-Analysis of health status

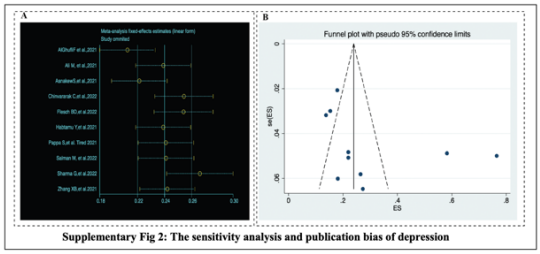
The Meta-Analysis of Depression among 10 Studies

The prevalence of depression among HCWs was reported between 13.8% and 76.5%, with the lowest found in Thailand and the highest found in Dubai(AlGhufli, 2021, Chinvararak, 2022). The overall heterogeneity was high across studies ( I2=99%, P<0.00001 ), and the pooled prevalence of depression among HCWs was 30%(95%CI: 19%-40%) by a random effects model (Supplement Fig 1). The sensitivity analysis of this study was shown for depression, and the results showed that two studies by AlGhufli F et al. 2021 and Sharma G et al.2022 might have an impact on




**Supplement Fig 1: Forest plot of the pooled prevalence of depression**

study was observed in the Funnel plot, with Begg's test results ($P$=1.88>0.05) and Egger's test results ($P$=0.33>0.05). (Supplementary Fig 2).




**Supplementary Fig 2: The sensitivity analysis and publication bias of depression**

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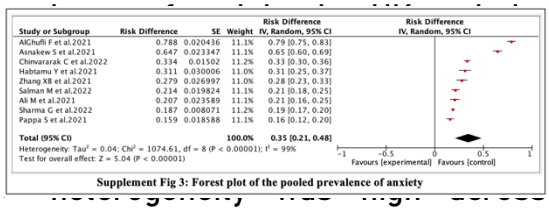
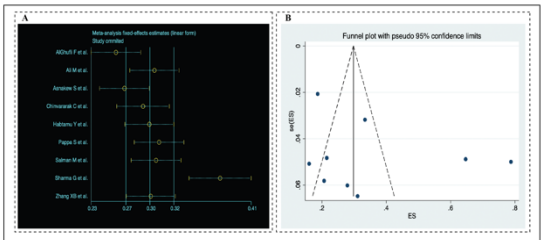
The Meta-Analysis of anxiety among 9 studies

The prevalence of depression among HCWs was reported between 15.9% and 78.8%, with the




Supplement Fig 3: Forest plot of the pooled prevalence of anxiety

studies ( $I^2$=99%, P<0.00001 ), and the pooled prevalence of anxiety among HCWs was 35%(95%CI: 21%-48%) by a random effects model (Supplementary Fig 3). The sensitivity analysis of this study was shown for anxiety, and the results showed that a few studies by AlGhufli F et al. 2021, Asnakew S et al., and Sharma G et al.2022 might have an impact on the stability, but it was still in the acceptable range (Supplementary Fig 4). The publication bias of this study was observed in the Funnel plot, with Begg's test results ($P$=0.83>0.05) and Egger's test results ($P$=0.76>0.05) (Supplementary Fig 4).




Supplementary Fig 4: The sensitivity analysis and publication bias of anxiety

The Meta-Analysis of PTSD among two studies

The prevalence of PTSD among HCWs was reported between 2.2% and 16%, with the lowest found in Thailand and the highest found in Ethiopia (Chinvararak, 2022, Habtamu, 2021). The overall heterogeneity was high across studies ($I^2$=97%, P=0.2 ), and the pooled prevalence of PTSD among HCWs was 9%(95%CI: -5%, 22%) by a random effects model (Supplementary Fig 5). The sensitivity analysis of this study was shown for PTSD, and the results showed that one study by Chinvararak C et al. might have had an impact on the stability, but it was still in the acceptable range . The publication bias of this study was not observed in the Funnel plot, with Begg's test results ( $P$=1>0.05) (Supplementary Fig 6).

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The Meta-analysis of Insomnia among four studies

The prevalence of insomnia among HCWs was reported between 40.8% and 52.0% with the lowest found in Ethiopia and the highest found in UK(Habtamu, 2021, Pappa, 2021). The overall heterogeneity was high across studies ( $I^2$=67%, P<0.00001 ), and the pooled prevalence of insomnia among HCWs was 47%(95%CI: 42%, 51%) by a random effects model (Supplementary Fig 7). The sensitivity analysis of this study was shown for Insomnia, and the graphs showed that there was no study impact on the stability of the results, which means the results of this study were stable . The publication bias of this study was not observed in the Funnel plot, with Begg's test results ( $P$=1.02>0.05) and Egger's test results ($P$=8.14>0.05) (Supplementary Fig 8).

The Meta-analysis of Stress among two studies

The prevalence of stress among HCWs was reported between 63.5% and 63.7% with the lowest being found in Dubai and the highest being found in North West Ethiopia (AlGhufli, 2021, Asnakew, 2021). The overall heterogeneity was low across studies ( $I^2$=0%, P<0.00001 ), and the pooled prevalence of stress among HCWs was 64%(95%CI: 60%, 67%) by a random effects model (Supplementary Fig 9). The sensitivity analysis of this study was shown for Stress, and the graphs showed that there was no study impact on the stability of the results, which means the results of this study were stable. The publication bias of this study was not observed in the Funnel plot, with Begg's test results ( $P$=0.00>0.05) (Supplementary Fig 10)

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The Meta-analysis of EE, DP, PA among two studies

The prevalence of EE, DP, PA among HCWs was reported between 16.3% and 52%,16% and 19.5%, and 53.5% and 55.5%, respectively, with the lowest found in Thailand and the highest found in UK(Chinvararak, 2022, Pappa, 2021). The overall heterogeneity was high, medium and low across the studies with EE( $I^2$=99%, P=0.06 ), DP( $I^2$=56%, P<0.00001 ), PA( $I^2$=0%, Table 3 and Table 4 represent the results of subgroup analyses of depression and anxiety among males, females, doctors, and nurses. The results were as follows:

P<0.00001 ), and the pooled prevalence of EE, DP, PA among HCWs was 34%(95%CI: -10%,69%), 17%(95%CI:0.14,0.21), 54%(95%CI: 51%, 57%), respectively by a random effects model (Supplementary Fig 11,12,13).

The sensitivity analysis of this study was shown for EE, and the results showed that one study by Chinvararak C et al. might have had an impact on the stability, but it was still in the acceptable range. The publication bias of this study was observed in the Funnel plot, with Begg's test results ( $P$=0.52>0.05) and Egger's test results ($P$=0.47>0.05) (Supplementary Fig 14).

The sensitivity analysis of this study was shown for DP and PA, and the graphs showed that there was no study impact on the stability of the results, which means the results of this study were stable. The publication bias of this study was not observed in the Funnel plot of DP, with Begg's test results ( $P$=1.88>0.05) and Egger's test results ($P$=0.33>0.05) and PA was Begg's test results ( $P$=1.00>0.05) (Supplementary Fig 15,16)

Subgroup analysis

Meta-Analysis of Gender (Female)

Depression: The overall heterogeneity across five studies was as follows: $Tau^2$=0.04; $Chi^2$=203.93, df=4(P<0.00001); $I^2$=98%. The results showed a high

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heterogeneity between the five studies using the random effect meta-analysis. The pooled prevalence of depression among females was 32% (95% CI:0.15,0.49); the results were significant ( Z=3.78, P=0.0002) ( Table 3).

Anxiety: The overall heterogeneity across three studies was as follows: $Tau^2$=0.04; $Chi^2$=9.77, df=2 (P=0.008*);* $I^2$=80%. The results showed a high heterogeneity between the three studies using the random effect meta-analysis. The pooled prevalence of anxiety among females was 25% (95% CI:0.18,0.32); the results were significant ( Z=7.24, P<0.00001) ( Table 4).

Meta-Analysis of Gender (Males)

Depression:

The overall heterogeneity across five studies was as follows: $Tau^2$=0.04; $Chi^2$=200.56, df=4(P<0.00001*);* $I^2$=98%. The results showed a high heterogeneity between the five studies using the random effect meta-analysis. The pooled prevalence of depression among males was 31% (95% CI:0.13,0.49); the results were significant ( Z=3.41, P=0.0006) ( Table 3).

Anxiety : The overall heterogeneity across three studies was as follows: $Tau^2$=0.00; $Chi^2$=3.86, df=2 (P=0.15*);* $I^2$=48%. The results showed a low heterogeneity between the three studies using the random effect meta-analysis. The pooled prevalence of anxiety among males was 19% (95% CI:0.14,0.32); the results were significant ( Z=8.46, P<0.00001) ( Table 4).

Meta-Analysis of professionals (Doctors)

Depression: The overall heterogeneity across four studies was as follows: $Tau^2$=0.00; $Chi^2$=13.56, df=3 (P<0.004*);* $I^2$=78%. The results showed a high heterogeneity between the four studies using the random effect meta-analysis. The pooled prevalence of depression among doctors was 22% (95% CI:0.14,0.30); the results were significant ( Z=5.31, P<00001) ( Table 3).

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Anxiety: The overall heterogeneity across four studies was as follows: $Tau^2$=0.00; $Chi^2$=10.32, df=3 (P=0.02); $I^2$=71%. The results showed a medium heterogeneity between the four studies using the random effect meta-analysis. The pooled prevalence of anxiety among doctors was 24% (95% CI:0.17,0.32); the results were significant ( Z=6.49, P<00001) ( Table 4).

Meta-Analysis of professionals (Nurses)

Depression: The overall heterogeneity across four studies was as follows: $Tau^2$=0.00; $Chi^2$=19.40, df=3 (P=0.0002); $I^2$=85%. The results showed a high heterogeneity between the four studies using the random effect meta-analysis. The pooled prevalence of depression among nurses was 19% (95% CI:0.14,0.25); the results were significant ( Z=7.16, P<00001) ( Table 3).

Anxiety: The overall heterogeneity across four studies was as follows: $Chi^2$=13.99, df=3 (P=0.003); $I^2$=79%. The results showed a high heterogeneity between the four studies using the random effect meta-analysis. The pooled prevalence of anxiety among nurses was 22% (95% CI:0.20,0.24); the results were significant ( Z=24.99, P<00001) ( Table 4).

Table-4 The Pooled Prevalence of Anxiety among Subgroups

| Subgroups | | Number of studies | Total sample | Pooled prevalence (%) (95% CI) | Test of difference within each subgroup | |
|---|---|---|---|---|---|---|
| | | | | | Chi-square value | *P* value |
| Genders | Female | 3 | 1712 | 0.25(0.18, 0.32) | 9.77 | 0.008 |
| | Male | 3 | 1190 | 0.19(0.14,0.23) | 3.86 | 0.15 |
| Healthcare professionals | Doctors | 4 | 495 | 0.24(0.17-0.32) | 10.32 | 0.02 |
| | Nurses | 4 | 2234 | 0.22(0.20,0.24) | 13.99 | 0.003 |

## 4. DISCUSSION

During COVID-19, a comprehensive systematic review was conducted to study the prevalence and risk factors among HCWs. The most reported HCWs' problems were depression and anxiety, followed by insomnia, exhaustion, PTSD, stress, burnout, and having a lot to do.

As a result, the prevalence rates of depression, anxiety, PTSD, insomnia, and stress ranged from 18.1% and 76.5%, 27.9% to 78.8%, 2.2% to 16%, 40.8.0% to 52.0%, and 63.5% to 63.7%, respectively. According to another study, depression, anxiety,

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PTSD, and insomnia were prevalent in 9 to 67%, 11% to 74%, 6 to 25%, and 17% to 61%. In a systematic review, however, HCWs with COVID-19 patients were found to be 24.1-67.55% depressed, 12.1% 55.89% stressed, and 29.8% 62.99% anxious.

Our systematic review found that burnout rates ranged from 16.3% to 26.5%, 16 to 19.5%, and 53.5 to 55.5%, respectively. During the pandemic, 30.3% of HCWs reported having a workload. According to a few studies, 22.6%-69.2% displayed EE, 12.6%-57.4% DP, and 15.2%-39.4% low PA levels (Ulbrichtova, 2022, Zemni, 2023, Galanis, 2021). The prevalence by burnout dimension was 39.4% for personal, 38.4% for work-related, and 22.1% for patient-related burnout (Agbobli, 2022).

The study also identified various influential factors associated with these health problems, such as gender, age, frontline HCWs, nurse professionals, being younger, being single, changing accommodations during the crisis, being worried about the family and loved ones, financial difficulty, medical illness, mental illness, had contact with confirmed COVID-19, poor social support, had a family with chronic illness, working at COVID-19 inpatient unit, working at COVID-19 intensive care unit, those with a family history of depression, history of mental health, being physically inactive, having a risk for COVID-19 and being smokers.

Our studies 'findings reported as the female sex was associated with depression (AlGhufli, 2021, Ali, 2021, Habtamu, 2021, Pappa, 2021, Zhang, 2021, Flesch, 2022, Salman, 2022), while the female sex was also associated with anxiety (Ali, 2021, Asnakew, 2021, Zhang, 2021, Salman, 2022). Moreover, the female sex also was associated with insomnia (Ali, 2021) and EE (Pappa, 2021). Women HCWs and nurses had the highest rates of mental health problems compared to men and the general population (Robles, 2021, Zemni, 2023, Al Ammari, 2020a, Pandey,

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2021, Tariku, 2022, Aisa, 2022). A comparative study found that female HCWs (particularly nurses) exposed to COVID-19 at a higher risk (Wei, 2020).

Our findings showed that being a frontline HCWs was associated with burnout(AlGhufli, 2021), depression, and anxiety (Salman, 2022, Zhang, 2021) while working at COVID-19 ICU was associated with EE (Chinvararak, 2022). Previous studies also pointed out that HCWs, especially those who work in the ICU, and infectious disease wards, are at high risk of developing the psychological impact (Spoorthy, 2020). During the COVID-19 pandemic, ICU nurses were mentioned to affect by the high levels of burnout symptoms (EE, DP, and reduced PA)(Toscano, 2022). Being a frontline worker was a risk factor for insomnia and depression, as mentioned by a study in Saudi Arabia (Al Ammari, 2020b). Moreover, working in the COVID-19 treatment centers and ICU, having any symptoms of COVID-19, and having poor social support were the predictors of common mental disorders field(Tariku, 2022).

The most relevant risk-associated influence factors in this study were being a nurse was associated with burnout (AlGhufli, 2021), depression, and anxiety(Ali, 2021, Sharma, 2022, Zhang, 2021), exhaustion (Chinvararak, 2022), and having workload(Sharma, 2022), while doctor professional was associated with exhaustion and anxiety (Chinvararak, 2022, Sharma, 2022). Many studies also mentioned that nurses, female workers, front-line HCWs, and younger medical staff reported more severe symptoms than the other HCWs(Vizheh, 2020, Pandey, 2021). However, a study by the Qatar Red Crescent Society showed that technicians and paramedics were more likely of having anxiety symptoms than nurse (Abed Alah, 2021). Moreover, unmarried, doctor professional was associated with a high depression field(Shekhar, 2022).

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The same as our findings being younger, single, the age between 18-31 were associated with depression, anxiety, stress, insomnia, and burnout (four studies)(AlGhufli, 2021, Ali, 2021, Flesch, 2022, Habtamu, 2021). However, Jie et al., found that workload, respiratory symptoms, digestive symptoms, COVID-19 test, negative coping style, and job burnout were the risk factors for depression and anxiety (Chen, 2021).

A study showed that HCWs experience more psychological symptoms than non-HCWs, including insomnia, anxiety, depression, and obsessive-compulsive (Zhang, 2020). A lack of adequate protective equipment, fear of being contagious, and physical exhaustion are also predictors of poor mental health (Teshome, 2020, Muller, 2020, Semo and Frissa, 2020). The study's findings are consistent with previous research that found HCWs to be at higher risk of developing mental health problems during pandemics.

Therefore, it is essential to understand the prevalence of mental health problems across different groups during COVID-19.

Strengths and Limitations

To the best of our knowledge, this is the first systematic review that investigated the prevalence of depression, anxiety, PTSD, insomnia, stress, and burnout among HCWs and identify the associated risk factor among them during the COVID-19 pandemic worldwide.

There were also some limitations to our study. Firstly, the literature reviews were only extracted from Embase, Google Scholar, PubMed, and Web of Sciences. Therefore, the information was limited. Secondly, most published studies mentioned only the prevalence of mental health and its associated risk factors; hence this study lack of prevalence of physical health and other problems. Thirdly, the time is

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limited; as a result, the included studies in this systematic review are only ten studies. Fourthly, most of the information from the included studies is different; thus, the subgroup is limited. Lastly, sensitivity and publication bias hasn't been done for the subgroups in this study.

## 5. CONCLUSION

The current systematic review highlights the significance of mental health, physical health problems, and other problems experienced by HCWs during the COVID-19 pandemic. The mental health problems include depression, anxiety, stress, PTSD, and insomnia. The physical health and other problems include burnout (EE, DP, PA) and having a workload. The study also identified various influential factors associated with these health problems, such as gender, age, frontline HCWs, nurse professionals, being younger, being single, changing accommodations during the crisis, being worried about the family and loved ones, financial difficulty, medical illness, mental illness, had contact with confirmed COVID-19, poor social support, had a family with chronic illness, working at COVID-19 inpatient unit, working at COVID-19 intensive care unit, those with a family history of depression, history of mental health, being physically inactive, having a risk for COVID-19 and being smokers.

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