









Analysis of mental health effects among nurses working during the COVID-19 pandemic: A systematic review

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Accessible Summary

What is Known on the subject?

- Working on the frontline during the pandemic has had a negative impact on the mental health of health professionals. A significant proportion experienced anxiety, insomnia, posttraumatic stress or depression.

What the paper adds to existing knowledge?

- Analysis and synthesis of the evidence of the impact of the COVID-19 pandemic on the mental health of nurses based on their work context. There exists a gap in the literature as no studies were found that analysed the effects on nurses' mental health according to the level of care they worked in (hospital–primary care–nursing home).

What are the implications for practice?

- There is an urgent need to assess and respond to the impact of COVID-19 on the physical and mental well-being of nurses, and to monitor international policies for the improvement of nurses' working conditions.

Abstract

Introduction: Health professionals have suffered negative consequences during the COVID-19 pandemic. No review has specifically addressed the impact of the pandemic on the mental health of nurses exclusively according to the work context.

Aim: To analyse the impact of the COVID-19 pandemic on the mental health of nurses who have worked in hospitals, primary care centres and social health centres.

Method: PubMed, CINAHL, PsychINFO and Cochrane databases were searched (Prospero number: CRD42021249513). Out of 706 papers, 31 studies (2020–2021) were included in the systematic review. A qualitative synthesis method was used to analyse the data.

Results: Most studies were conducted in hospitals or frontline settings. The prevalence of moderate-to-severe symptoms was for anxiety 29.55%, depression 38.79%, posttraumatic stress disorder 29.8%, and insomnia 40.66%.

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Discussion: This review highlights the mental health effects among nurses working in acute hospital settings. It also evidences a data gap on mental health effects among nurses working in primary health care and in nursing homes.

Implications for practice: In the post phase of the pandemic, there is an urgent need to assess and respond to the impact on the mental well-being of nurses, and to monitor international policies for the improvement of nurses' working conditions.

KEYWORDS

COVID-19 pandemic, health services, mental health, nurses, systematic review

1 | INTRODUCTION

When the World Health Organization (WHO) declared on 11 March 2020, a global health pandemic due to COVID-19, no one expected that we would be faced with a global health emergency and more than 6.2 million deaths (World Health Organization, 2022). Nor did healthcare professionals, and nurses in particular, figure that they would be confronted with a new disease that caused many severe cases of acute respiratory syndrome and pneumonia, and that involved lack of supplies and intensive care unit beds in hospitals, and many people dying prematurely, and in some cases unable to be cared for (Lai et al., 2020). Many nurses had to be transferred to ICUs and special units due to staff shortages but with the aggravating factor of having no training in intensive care and no experience in caring for critically ill patients (Stayt et al., 2022). In addition to this work scenario, many health providers were contaminated, hospitalized, and died from SARS-CoV-2 coronavirus (International Council of Nurses, 2021) with an estimation of more than 115,000 deaths (World Health Organization, 2021).

Consequently, approximately one-third of health professionals, including nurses, have experienced negative effects such as anxiety, insomnia, posttraumatic stress or depression (de Kock et al., 2021; Pappa et al., 2020). These health outcomes seem to worsen in the presence of some factors, such as being a woman, being a nurse, or working on the front line (Lai et al., 2020). For this reason, it is not surprising that nurses are one of the groups most affected by the pandemic. The nursing profession is associated with a high burden of care due to the global lack of nurses during the pandemic, and their involvement at all levels of care imparts a great level of responsibility and overload across time (Fry-Bowers & Rushton, 2021). The International Council of Nurses (ICN) also warns about the negative effects of the pandemic on nurses, reiterating that there was a shortage of professionals and a high level of burnout and abandonment before the pandemic, which has only accentuated these issues (International Council of Nurses, 2021).

Many studies have focussed on the impact of the pandemic on the mental health of nurses in the context of hospitalization units and intensive care units where work overload and lack of beds and human resources for care were common (Greenberg et al., 2021; Hackett, 2020; Shen et al., 2020). Notably, in two other health sectors substantially affected by the pandemic, primary care centres

and social health centres or nursing homes, nurses are the pillars of care (Fallon et al., 2020). The pandemic itself has evolved through nurses' different work environments. Social health centres and nursing homes (i.e. aged care facilities) were, at first, the most affected because of lack of supplies for the care of institutionalized elderly people who were at greater risk of being infected by COVID-19 because they were more vulnerable due to age-related pathologies and the environment where they lived (Riello et al., 2020). Subsequently, across time, the context of primary care has become associated with work overload, becoming the centre of care for chronic patients whose follow-up has been altered by the pandemic, individuals newly diagnosed with COVID-19, and individuals with persistent COVID-19 symptoms after infection (Knight & Vancheeswaran, 2021). Therefore, as the pandemic has continued, the primary care workforce has become more affected (Aranda-Reneo et al., 2021).

Although there is evidence of the impact of the pandemic on health professionals who have worked in hospitals and, to a lesser extent, in social health centres and primary care centres, to date, no review has been found through a quick database search that specifically addressed the impact of the pandemic on the mental health of nurses exclusively, nor the level of care at which nurses perform their professional duties during the pandemic. A worldwide inclusive response should include a focus on the mental health impact on nurses who have worked in different levels of health care. Therefore, herein, we analyse the impact of the COVID-19 pandemic on the mental health of nurses based on their work context.

2 | AIMS

This systematic review aimed to answer the following question: What is the impact of the COVID-19 pandemic on the mental health of nurses working in different health contexts during the pandemic?

The main objective of the review was to analyse the impact of the COVID-19 pandemic on the mental health of nurses who have worked in hospitals, primary care centres and social health centres. The secondary objectives were (1) to identify the prevalence of anxiety, depression, sleep disorder and posttraumatic stress in nurses who have worked during the COVID-19 pandemic and (2) to

compare the effects of the pandemic on the mental health of nurses based on level of care (primary care, secondary and tertiary care).

3 | METHODS

3.1 | Study design

A systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). Given the nature of the studies included, meta-analysis was not possible to perform.

The protocol is registered in the PROSPERO International Prospective Register of Systematic Reviews (ID: CRD42021249513).

The conceptual framework for the impact of traumatic events was used in this study. Three defining features of traumatic events include negative valence, lack of controllability and suddenness (Bisson, 2009) as was the case with the COVID-19 pandemic. Responses to the traumatic event comprise depression, anxiety, insomnia and difficulties in interpersonal relationships, among others (Bisson, 2009).

3.2 | Eligibility criteria

We aimed to include any potentially relevant research on the topic of interest; therefore, the inclusion criteria were as follows: (1) observational studies carried out in any setting (primary care centres, hospitals and nursing homes); and (2) studies that measured the levels of mental health burden in terms of anxiety, depression, posttraumatic stress disorder (PTSD) and/or insomnia in nurses who worked during the COVID-19 pandemic, as these are some of the most prevalent burdens reported by previous studies (Carmassi et al., 2020; Sahebi et al., 2021). The following exclusion criteria were applied: (1) literature reviews, qualitative studies, editorials and grey literature; (2) studies that analysed the mental health of nurses but not related to the COVID-19 pandemic; and (3) studies that analysed the mental health of other healthcare workers (HCWs) and/or students without separating their results from nurses' results.

In this review, nurses were defined as healthcare professionals with the skills and knowledge to assess, implement and evaluate nursing care plans and interventions independently (International Council of Nurses, 2022). The variables analysed in this review were those most frequent in the studies under consideration. According to

the Diagnostic and Statistical Manual of Mental Disorders in its 5th Edition (also known as the DSM-5), anxiety includes disorders that share features of excessive fear and anxiety and related behavioural disturbances; depression is a mood disorder in which those who suffer from depression experience persistent feelings of sadness and hopelessness and lose interest in activities they once enjoyed; PTSD refers to persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others and to experience a persistent negative emotional state (e.g. fear, horror, anger, guilt or shame); and insomnia refers to dissatisfaction with sleep quantity or quality, associated with one or more symptoms such as difficulty initiating sleep and/or maintaining sleep (American Psychiatric Association, 2013). There are many screening tools to determine an individual's level of anxiety, depression, PTSD and insomnia.

3.3 | Search strategy

Searches were performed in the following electronic databases: Pub, CINAHL, PsychINFO and Cochrane. The Population, Intervention, Context and Outcomes (PICO; Schardt et al., 2007) framework was used to develop the research question and select search terms. The Medical Subject Headings (MeSH) browser was also used by the research team under the guidance of a librarian to generate and refine search terms, which are presented in Table 1.

Searches were performed during August and September 2021. The following search limits were imposed: English, French, German, Portuguese and Spanish languages (because the authors of this review are fluent in these languages) and the years 2020 and 2021.

3.4 | Study selection

The article selection process was carried out in three phases using COVIDENCE, a virtual platform for performing systematic reviews. After the automatic elimination of duplicate articles, an author was responsible for the first round of screening by reading the titles and abstracts. Subsequently, the complete texts were read simultaneously by two authors and selected following the established criteria. Using the COVIDENCE platform, those articles in which there was no consensus were automatically detected, and discrepancies were resolved in a meeting with a third researcher. No major discrepancies were found.

TABLE 1 Search terms

Population	Intervention	Context	Outcomes
Nurs	COVID-19 OR SARS-CoV-2 OR coronavirus OR pandemic	Health facilities OR health services OR primary care OR primary health care OR ambulatory care facilities OR community health centres OR hospital OR secondary care centres OR Tertiary care centres OR nursing homes OR delivery of health care	Mental health OR insomnia OR depression OR anxiety OR stress disorders, posttraumatic

Many articles were excluded for the following reasons: patient population—studies that did not analyse the outcomes of nurses separately; outcomes—studies that did not analyse one or more of the target outcomes of this review (i.e. anxiety, depression, PTSD and insomnia); unclear setting—studies that did not specify the setting where the nurses were working; study design—studies whose design did not meet the inclusion criteria specified above; methods—studies that showed poor methodology or a high risk of bias (i.e. not specifying how they contacted the participants, no specific ethics approval or funding sources); withdrawn paper—studies no longer available when assessed for eligibility; intervention—studies that focused on performing an intervention without first assessing the prevalence rates of the goal outcomes; no full text—studies whose full text was not available, neither online nor after contacting the authors; and language other than the selected one—studies whose full text was not in one of the languages specified previously.

The PRISMA flow diagram (Page et al., 2021) in Figure 1 outlines the systematic search and screening process. The search yielded 706 papers, from which 625 studies remained after duplicates were removed. Of these, 426 articles were excluded because they did not meet the inclusion criteria; the remaining 199 articles were assessed

for eligibility. Of these, 125 articles were excluded for different reasons. Ultimately, a total of 31 studies met the inclusion criteria and were included in this review (Figure 1).

3.5 | Data extraction

All team members agreed to use a data extraction template from the COVIDENCE platform. The template included the main characteristics of the studies that were relevant for this review: year, country, number of participants (nurses), level of care, variables studied (anxiety, depression, PTSD and/or insomnia), instruments used to measure each variable, main results and other results of interest.

3.6 | Quality appraisal

The quality of included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional studies, an 8-point assessment tool (Joanna Briggs Institute, 2021). The studies obtained high scores, with 19 studies (61.3%) scoring 8 out of 8 and 12 studies (38.7%) scoring 7 out of 8 (see Table 2).

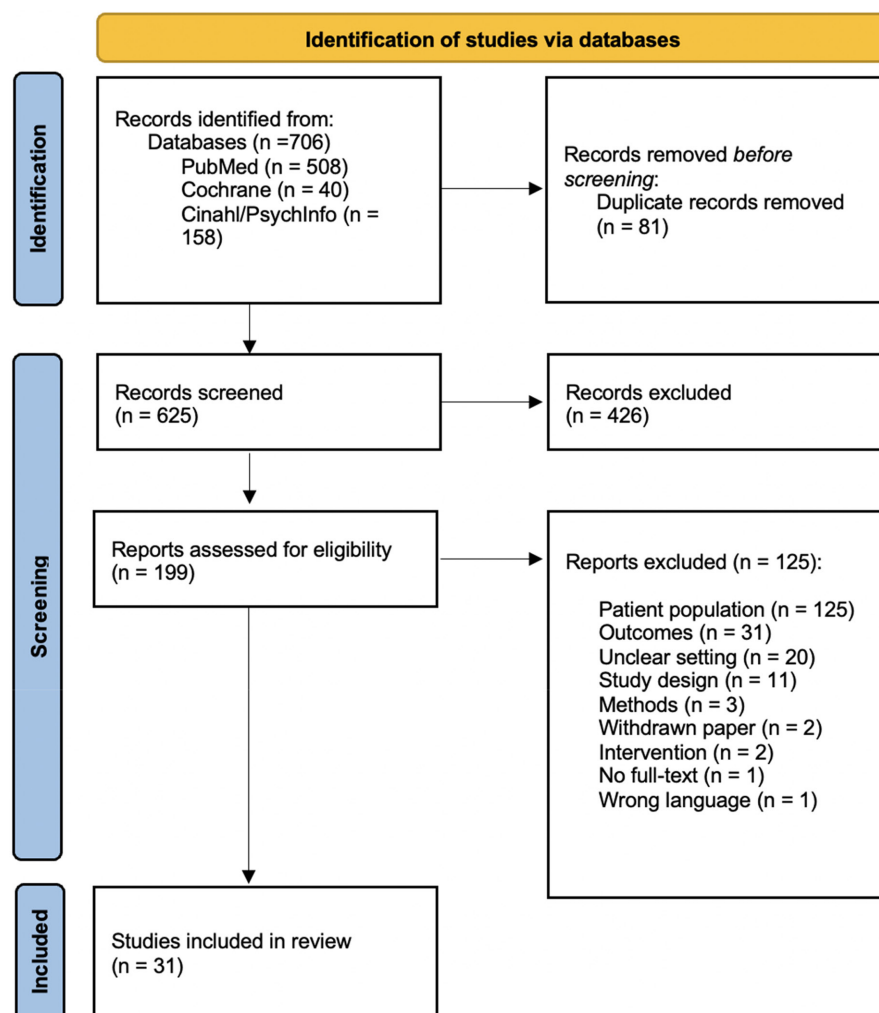


FIGURE 1 PRISMA flow diagram

TABLE 2 General characteristics and quality appraisal of the included studies

Author and year (Country)	Data collection period. Year 2020	Setting	Reported outcomes	Sample size	Quality appraisal ^a
An et al. (2020) (China)	March 15–March 20	Hospital (ED)	Depression	1103	7/8
Azoulay et al. (2020) (France)	April 20–May 21	Hospital (ICU)	Anxiety, depression, peritraumatic dissociation	498	8/8
Bahadır-Yılmaz and Yüksel (2020) (Turkey)	April 25–May 7	Hospital (COVID)	Anxiety	1457	7/8
Balay-odao et al. (2021) (Saudi Arabia)	April–June	Hospital	Anxiety, depression	281	8/8
Cai et al. (2020) (China)	January 29–February 2 & February 26–February 28	Hospital	Anxiety, depression, PTSD, insomnia	1330	8/8
Chen et al. (2021) (China)	July 29–August 9	Hospital	Anxiety, depression	1803	7/8
Crowe et al. (2021) (Canada)	May	Hospital (ICU)	Anxiety, depression, PTSD	109	8/8 ^b
Doo et al. (2021) (South Korea)	October 5–October 20	Hospital (COVID)	Anxiety, depression	128	7/8
Gül and Kılıç (2021) (Turkey)	July–September	Hospital (operating room)	Anxiety	192	7/8
He et al. (2021) (China)	January 28–February 11	Hospital (women's and children's)	Anxiety, depression	1934	8/8
Heesakkers et al. (2021) (Netherlands)	August 28–September 20	Hospital (ICU)	Anxiety, depression, PTSD	726	8/8
Hu et al. (2020) (China)	February 13–February 24	Hospital (COVID)	Anxiety, depression	2014	8/8
Juan et al. (2020) (China)	February 1–February 14	Hospital	Anxiety, depression, PTSD	261	8/8
Labrague and De los Santos (2020) (Philippines)	April 25–May 25	Hospital	Anxiety	325	8/8
Lasalvia et al. (2020) (Italy)	April 21–May 6	Hospital	Anxiety, depression, PTSD	783	8/8
Leng et al. (2021) (China)	March 11–March 18	Hospital	PTSD	90	7/8
Lian et al. (2021) (China)	January–March	Hospital (operating room)	Anxiety	133	7/8
Mo et al. (2021) (China)	February	Hospital (COVID)	Anxiety	200	7/8
Morawa et al. (2021) (Germany)	April 20–July 5	Hospital	Anxiety, depression	1275	7/8
Naldi et al. (2021) (Italy)	April 27–May 1	Hospital (COVID)	Anxiety, PTSD	469	8/8
Pouralizadeh et al. (2020) (Iran)	April 7–April 12	Hospital	Anxiety, depression	441	8/8
Seçuk Tosun et al. (2021) (Turkey)	August 1–September 14	Primary Health Care	Anxiety	170	7/8
Shen et al. (2020) (China)	March 3–March 10	Hospital (COVID)	Anxiety, insomnia	643	7/8
Simonetti et al. (2021) (Italy)	February–April	Hospital	Anxiety, insomnia	1005	8/8

(Continues)

TABLE 2 (Continued)

Author and year (Country)	Data collection period. Year 2020	Setting	Reported outcomes	Sample size	Quality appraisal ^a
Sun et al. (2021) (China)	February 20–March 2	Hospital (COVID)	Anxiety, depression	170	8/8
Tiete et al. (2021) (Belgium)	April 17–May 25	Hospital (COVID & non-COVID)	Anxiety, depression, insomnia	468	8/8
Wang et al. (2021) (China)	February 20–March 20	Hospital	Depression, insomnia	562	8/8
Xiong et al. (2020) (China)	February 16–February 25	Hospital (non-COVID)	Anxiety, depression	231	8/8
Zhan et al. (2020) (China)	March 3–March 10	Hospital	Anxiety, depression	2667	7/8
Zheng, Zhou, Fu, et al. (2021) (China)	January 27–February 3	Hospital	Anxiety, depression	3228	8/8
Zheng, Zhou, Qiu, et al. (2021) (China)	March 6–March 9	Hospital (paediatric)	Anxiety, depression	617	8/8

aJoanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional studies.

bAppraisal of the evidence performed only on the quantitative part of the study.

3.7 | Data synthesis

Following systematic review guidelines (Page et al., 2021), the literature was synthesized using descriptive synthesis that presented the characteristics of the included studies and the prevalence of the selected variables, i.e. anxiety, depression, insomnia and/or PTSD experienced by nurses working during the COVID-19 pandemic.

4 | RESULTS

4.1 | Study characteristics

The general characteristics of the studies are presented in Table 2. Most of the studies were conducted in China (16), followed by Italy (3) and Turkey (3). The remaining studies were conducted in Saudi Arabia, the Philippines, South Korea, Iran, Canada, Belgium, the Netherlands, Germany and France.

Most studies were conducted in hospitals or frontline settings, with only one study being conducted in a primary care setting (Selçuk Tosun et al., 2021); none of the included studies were conducted in nursing homes.

Most of the included studies aimed to describe or measure the impact of the COVID-19 pandemic on the mental burden of nurses. In addition, the studies researched possible associated factors that contributed to the results.

In relation to the designs of the included articles, quantitative cross-sectional descriptive studies were the most common ($n = 30$), with one being a mixed methodology study (Crowe et al., 2021), for which only the quantitative data were used for this review.

Concerning the sampling, the number of nurses included in the studies ranged from $N = 90$ to $N = 3228$ (average = 816.36 nurses).

The population consisted mainly of nurses working in hospital settings during the COVID-19 pandemic in different countries. No notable differences were found in sociodemographic factors among the included studies, with most participants being middle-aged (35–50 years) females.

Concerning the data collection period, most studies analysed the impact of COVID-19 on nurses working during the first wave in each respective country, roughly encompassing the period from January 2020 until May 2020. Of the 31 studies included in this review, 25 were performed during that time frame. Four studies (Balay-odao et al., 2021; Chen et al., 2021; Gül & Kılıç, 2021; Selçuk Tosun et al., 2021) were performed during 2020, from June to August, and only two studies (Doo et al., 2021; Heesackers et al., 2021) were carried out in the last third of 2020, from September until the end of the year. Studies that were conducted across two periods were classified based on the period during which most of the study took place (from January to May 2020, which was the first wave of the pandemic). There was no single study identified in this review that collected data during 2021.

4.2 | Studied variables and instruments used

Anxiety was the most prevalent studied variable, being studied in 28 out of the 31 studies. Depression was a variable in 21 studies, PTSD was a variable in eight studies, and last, insomnia was a variable in five studies. Table 3 shows the prevalence of the four mental health variables analysed in the included studies. The results for these variables were reported in different formats among studies. Some studies presented the overall prevalence of mild-to-severe symptoms, and others detailed the prevalence of symptoms based on intensity (normal, mild, moderate and severe) (see Table 3).

TABLE 3 Prevalence of the mental health outcomes analysed in the studies

	Outcomes			
	Anxiety	Depression	PTSD	Insomnia
An et al. (2020)	-	43.61% (95% CI: 40.68–46.54%) <ul style="list-style-type: none"> Mild: 305 (27.7%) Moderate: 96 (8.6%) Moderate-to-severe: 58 (5.3%) Severe: 23 (2.1%) 	-	-
Azoulay et al. (2020)	50%	31.6%	34%	-
Bahadir-Yilmaz and Yüksel (2020)	Mean 51.51 ± 9.94 (>45 anxiety)	-	-	-
Balay-odao et al. (2021)	<ul style="list-style-type: none"> Normal: 231 (82.2%) Moderate: 105 (37.4%) Mild: 19 (6.8%) Severe: 34 (12.1%) Extreme: 21 (7.5%) 	<ul style="list-style-type: none"> Normal: 155 (51.2%) Moderate: 66 (23.5%) Mild: 55 (19.5%) Severe: 16 (5.7%) 	-	-
Cai et al. (2020)	<p>Outbreak period:</p> <ul style="list-style-type: none"> Normal: 376 (53%) Mild: 249 (35.1%) Moderate-severe: 84 (11.8%) <p>Stable period:</p> <ul style="list-style-type: none"> Normal: 381 (61.4%) Mild: 201 (32.4%) Moderate-severe: 39 (6.3%) 	<p>Outbreak period:</p> <ul style="list-style-type: none"> Normal: 335 (47.2%) Mild: 265 (37.4%) Moderate-severe: 109 (15.4%) <p>Stable period:</p> <ul style="list-style-type: none"> Normal: 333 (53.6%) Mild: 219 (35.3%) Moderate-severe: 69 (11.1%) 	<p>Outbreak period:</p> <ul style="list-style-type: none"> Normal: 525 (74%) Abnormal: 184 (26%) <p>Stable period:</p> <ul style="list-style-type: none"> Normal: 501 (80.7%) Abnormal: 120 (19.3%) 	<p>Outbreak period:</p> <ul style="list-style-type: none"> Normal: 436 (61.5%) Mild: 207 (29.2%) Moderate-severe: 66 (9.3) <p>Stable period:</p> <ul style="list-style-type: none"> Normal: 373 (60.1%) Mild: 176 (28.3%) Moderate-severe: 72 (11.6%)
Chen et al. (2021)	29.8%	22%	-	-
Crowe et al. (2021)	<ul style="list-style-type: none"> Normal: 35 (32.1%) Mild: 28 (25.7%) Moderate: 16 (14.7%) Severe: 6 (5.5%) Extremely severe: 23 (21.1) Missing: 1 (0.9%) 	<ul style="list-style-type: none"> Normal: 49 (42.2%) Mild: 16 (14.75) Moderate: 29 (26.6%) Severe: 7 (6.4%) Extremely severe: 10 (9.2%) Missing: 1 (0.9%) 	<ul style="list-style-type: none"> No PTSD: 28 (25.7%) Concern: 25 (23%) Probable: 14 (12.8%) Significant: 41 (37.6%) Missing: 1 (0.9%) 	-
Doo et al. (2021)	<p>COVID</p> <ul style="list-style-type: none"> Normal: 35 (54.7%) Mild: 10 (15.6%) Moderate: 12 (18.8%) Severe: 7 (10.9%) <p>NON-COVID</p> <ul style="list-style-type: none"> Normal: 47 (73.4%) Mild: 10 (15.6%) Moderate: 6 (9.4%) Severe: 1 (1.6%) 	<p>COVID</p> <ul style="list-style-type: none"> Normal: 22 (34.4%) Mild: 19 (29.7%) Moderate: 12 (18.8%) Moderately severe: 5 (7.8%) Severe: 6 (9.4%) <p>NON-COVID</p> <ul style="list-style-type: none"> Normal: 37 (57.8%) Mild: 15 (23.4%) Moderate: 11 (17.2%) Moderately severe: 1 (1.6%) Severe: 0 (0%) 	-	-
Gül and Kılıç (2021)	<ul style="list-style-type: none"> No/minimal: 54 (28.1%) Mild: 58 (30.2%) Moderate: 47 (24.5%) Severe: 33 (17.2%) 	-	-	-
He et al. (2021)	<ul style="list-style-type: none"> No: 1367 (70.7%) Mild: 402 (20.8%) Moderate: 121 (6.3%) Severe: 44 (2.2%) 	<ul style="list-style-type: none"> No: 1495 (77.3%) Mild: 312 (16.1%) Moderate: 80 (4.2%) Moderately severe: 33 (1.7%) Severe: 14 (0.7%) 	-	-

(Continues)

TABLE 3 (Continued)

	Outcomes			
	Anxiety	Depression	PTSD	Insomnia
Heesakkers et al. (2021)	27%	18.6%	22.2%	-
Hu et al. (2020)	<ul style="list-style-type: none"> Mild: 545 (27.1%) Moderate: 221 (11.0%) Severe 67 (3.3%) 	<ul style="list-style-type: none"> Mild: 661 (32.8%) Moderate: 194 (9.6%) Severe 23 (1.1%) 	-	-
Juan et al. (2020)	<ul style="list-style-type: none"> None: 180 (69%) Mild: 72 (27.6%) Moderate-severe: 9 (3.4%) 	<ul style="list-style-type: none"> None: 185 (70.9%) Mild: 61 (23.4%) Moderate-severe: 15 (5.7%) 	<ul style="list-style-type: none"> Subclinic: 152 (58.2%) Mild: 81 (31%) Moderate-severe: 28 (10.7%) 	-
Labrague and De los Santos (2020)	37.8%	-	-	-
Lasalvia et al. (2020)	63% severe	33% severe	65% severe	-
Leng et al. (2021)	-	-	Clinically significant 5.6%	-
Lian et al. (2021)	3%	-	-	-
Mo et al. (2021)	31.79 ± 7.32 (>45 anxiety)	-	-	-
Morawa et al. (2021)	19%	21.6%	-	-
Naldi et al. (2021)	<ul style="list-style-type: none"> Normal: 105 (22.4%) Mild: 126 (26.9%) Moderate: 116 (24.7%) Severe: 122 (26%) 	-	<ul style="list-style-type: none"> Normal: 168 (35.8%) Mild: 79 (16.8%) Moderate: 39 (8.3%) Severe: 183 (39%) 	-
Pouralizadeh et al. (2020)	<ul style="list-style-type: none"> No: 117 (26.5%) Mild: 153 (34.7%) Moderate: 87 (19.7%) Severe: 84 (19.0%) 	<ul style="list-style-type: none"> No: 128 (29%) Mild: 148 (33.6%) Moderate: 88 (20.0%) Moderately severe: 47 (10.7%) Severe: 30 (6.8%) 	-	-
Selçuk Tosun et al. (2021)	<ul style="list-style-type: none"> State [48.71 (±11.07)] and trait [46.89 (±7.94)] anxiety indicating a moderate level of anxiety 	-	-	-
Shen et al. (2020)	<ul style="list-style-type: none"> Mild: 22%-38% (95% CI) Severe: 1.2%-2.4% (95% CI) 	-	-	41.5%
Simonetti et al. (2021)	<ul style="list-style-type: none"> Very low: 4 (0.4%) Low: 657 (65.37%) Moderate: 334 (33.23%) High: 10 (1%) 	-	-	<ul style="list-style-type: none"> Low quality 761 (75.72%) Good quality 244 (24.28%)
Sun et al. (2021)	<ul style="list-style-type: none"> Normal: 70% Mild: 11.2% Moderate: 17.6% Severe: 1.2% Extremely severe: 0 	<ul style="list-style-type: none"> Normal: 92.9% Mild: 6.5% Moderate: 0.6% Severe: 0 Extremely severe: 0 	-	-
Tiete et al. (2021)	<ul style="list-style-type: none"> Normal: 172 (36.8%) Mild: 58 (12.4%) Moderate: 129 (27.6%) Severe: 57 (11.1%) Extremely severe: 52 (11.1%) 	<ul style="list-style-type: none"> Normal: 216 (46.2%) Mild: 118 (25.2%) Moderate: 84 (17.9%) Severe: 30 (6.4%) Extremely severe: 20 (4.3%) 	-	<ul style="list-style-type: none"> Absence: 128 (27.4%) Subthreshold: 171 (36.5%) Moderate: 132 (28.2%) Severe: 37 (7.9%)
Wang et al. (2021)	-	50.9%	-	6.0 (4.0-7.0)
Xiong et al. (2020)	<ul style="list-style-type: none"> Mild: 64 (28.7%) Moderate: 19 (8.5%) Severe: 8 (3.6%) Extremely severe: 0 	<ul style="list-style-type: none"> Mild: 44 (19.7%) Moderate: 11 (4.9%) Severe: 3 (1.3%) Extremely severe: 1 (0.5%) 	-	-

TABLE 3 (Continued)

	Outcomes			
	Anxiety	Depression	PTSD	Insomnia
Zhan et al. (2020)	39.81%	54.65%	-	-
Zheng, Zhou, Fu, et al. (2021)	<ul style="list-style-type: none"> • Mild: 463 (14.3%) • Moderate: 94 (2.9%) • Severe: 28 (0.9%) 	<ul style="list-style-type: none"> • Mild: 728 (22.6%) • Moderate: 317 (9.8%) • Severe: 62 (1.9%) 	-	-
Zheng, Zhou, Qiu, et al. (2021)	<ul style="list-style-type: none"> • Normal: 416 (67.4%) • Abnormal: 201 (32.6%) • Mild: 52 (8.4%) • Moderate: 90 (14.6%) • Severe: 29 (4.7%) • Extremely severe 30 (4.9%) 	<ul style="list-style-type: none"> • Normal: 522 (84.6%) • Abnormal: 95 (15.4%) • Mild: 43 (7%) • Moderate: 39 (6.3%) • Severe: 6 (1%) • Extremely Severe: 7 (1.1%) 	-	-

A variety of instruments (see Table 4) were used in the included studies to measure anxiety, depression, PTSD and insomnia.

4.3 | Anxiety

The included studies used seven specific instruments to measure anxiety (see Table 4) and two other scales (Depression, Anxiety and Stress Scale-21 (DASS-21); and Hospital Anxiety and Depression Scale (HADS)) that combined anxiety with other variables such as depression and stress.

The prevalence of anxiety symptoms ranged from 3% to 99.6% (average, 42.64%) for studies that presented their results with percentages. The prevalence of moderate-to-severe anxiety symptoms was 29.55%. The lowest scores were found for operating room nurses in China (data collected from January to March 2020) (Lian et al., 2021). The highest scores were found for hospital workers in Italy during the first wave (data collected from February to April 2020) (Simonetti et al., 2021).

Among the studies with the lowest rates of anxiety, two studies reported a prevalence of less than 20%. Zheng, Zhou, Qiu, et al. (2021), who conducted a study in a hospital setting in China from January to February 2020, reported a prevalence of anxiety of 18.1% (14.3% mild, 2.9% moderate and 0.9% severe), and a study with data collected in German hospitals reported an overall prevalence of anxiety of 19% in nurses (Morawa et al., 2021).

Regarding the highest prevalence rates, a study conducted in Italy with COVID hospital nurses during April and May 2020 reported a prevalence of anxiety symptoms of 77.6% (26.9% mild; 24.7% moderate; and 26% severe) (Naldi et al., 2021). Another study conducted in Iran in April 2020 reported a prevalence of overall anxiety symptoms of 73.5% among hospital workers (Pouralizadeh et al., 2020). Last, Gül and Kılıç (2021), who conducted a study in Turkey during July and August 2020 with operating room workers, reported a prevalence of anxiety symptoms of 71.9% among nurses (30.2% mild; 24.5% moderate; and 17.2% severe).

Intermediate prevalences (30%–40%) were found in Chinese studies in COVID and non-COVID treating hospitals (He et al., 2021; Hu et al., 2020; Xiong et al., 2020). In these studies, moderate-to-severe levels of anxiety were established between 8.5% and 14.3%. In addition, a study conducted in a primary care setting in Turkey from August to September 2020 (second wave of the pandemic) reported state and trait anxiety scores that were above average [48.71 ± 11.07 & 46.89 ± 7.94 , respectively], indicating a moderate level of anxiety among nurses and midwives (Selçuk Tosun et al., 2021). Another study in a Turkish hospital reported the mean total of the Self-Rating Anxiety Scale (SAS) score of 51.51 ± 9.94 , indicating a high level of anxiety among nurses (Bahadır-Yılmaz & Yüksel, 2020). In contrast, a study from Wuhan reported a SAS score of 31.79 ± 3.32 (Mo et al., 2021), indicating a lower level of anxiety experienced by Chinese nurses.

4.4 | Depression

To measure depression, four instruments were used: the Patient Health Questionnaire-9 (PHQ-9), Self-Rating Depression Scale (SDS), Depression, Anxiety and Stress Scale-21 items (DASS-21) and Hospital Anxiety and Depression Scale (HADS).

From the studies included in this review, the average prevalence of mild-to-severe depression symptoms was 38.79%, and the average prevalence of moderate-to-severe depression was 22.9%. The lowest depression rates were reported by Sun et al. (2021) at a COVID-19 hospital in China, with a prevalence of mild or moderate depressive symptoms of 7.1% and no severe or extremely severe symptoms. The highest rates were reported by Pouralizadeh et al. (2020), with an overall prevalence of 71% (33.6% mild; 30.7% moderate; and 6.8% severe depression) during the first wave of COVID (April 2020) at a hospital in Iran.

Other studies with low prevalence rates included a study conducted in a paediatric hospital in China during the beginning of the first wave (January to February 2020) of the pandemic, with a depression symptom prevalence of 15.4% (7% mild; 6.3% moderate; 1%

TABLE 4 Instruments used to measure the mental health variables analysed in the studies

Anxiety	Depression	PTSD	Insomnia
<ul style="list-style-type: none"> • Depression, Anxiety and Stress Scale-21 (DASS-21) • Hospital Anxiety and Depression Scale (HADS) • Self-Rating Anxiety Scale (SAS) • General Anxiety Disorder-7 (GAD-7) • State-Trait Anxiety Inventory—Form Y (STAI-Y) • General Anxiety Disorder-2 (GAD-2) • State-Trait Anxiety Inventory (STAI) • Beck Anxiety Inventory (BAI) • COVID-19 Anxiety Scale (CAS) 	<ul style="list-style-type: none"> • Patient Health Questionnaire-9 (PHQ-9) • Self-Rating Depression Scale (SDS) 	<ul style="list-style-type: none"> • Impact of the Event Scale—Revised (IES-R) • Self-reporting PTSD scale—Civilian (PCL-C) • Impact of the Event Scale-6 (IES-6) • Peritraumatic Dissociative Experiences Questionnaire (PDEQ) 	<ul style="list-style-type: none"> • Insomnia Severity Index (ISI) • Pittsburgh Sleep Quality Index (PSQI) • Athens Insomnia Scale (AIS)

severe; and 1.1% extremely severe) (Zheng, Zhou, Qiu, et al., 2021). Heesakkers et al. (2021), in an ICU setting in the Netherlands in 2020, reported an overall prevalence of depressive symptoms of 18.6% among nurses.

The following studies reported the highest depression prevalence rates: a study conducted in an ICU setting in Canada in May 2020 (56.9% overall and 42.2% moderate-to-severe) (Crowe et al., 2021); a study conducted in October 2020 with COVID hospital workers in South Korea (65.7% overall and 29.7% mild, 18.8% moderate, 7.8% moderate-severe and 9.4% severe) (Doo et al., 2021); and a study conducted in a hospital setting in China in March 2020 (54.65% mild to severe depression) (Zhan et al., 2020). Three other studies reported a prevalence of depressive symptoms greater than 50% among nurses (Cai et al., 2020; Tiete et al., 2021; Wang et al., 2021).

Four studies were carried out in China in hospital settings during February and March 2020 and reported intermediate levels of depression between 22% and 44%, with moderate-to-severe levels being between 6% and 16% (An et al., 2020; He et al., 2021; Hu et al., 2020; Xiong et al., 2020).

4.5 | Posttraumatic stress disorder (PTSD)

To measure PTSD, the included studies used four instruments: Impact of the Event Scale—Revised (IES-R), Self-reporting PTSD scale—Civilian (PCL-C), Impact of the Event Scale-6 (IES-6) and Peritraumatic Dissociative Experiences Questionnaire (PDEQ).

The average prevalence of PTSD was 39.06%, ranging from 5.6% to 73.4%. In addition, the prevalence of moderate-to-severe symptoms was 29.8%. The highest rates were found by Crowe et al. (2021) in an ICU setting in Canada, with 73.4% of the nurses reporting symptoms, including 37.6% showing significant PTSD symptoms (Crowe et al., 2021). The second highest rates were reported by Lasalvia et al. (2020) for a hospital setting in Italy from April to May 2020, with a prevalence of severe PTSD symptomatology of 65% among nurses. Another Italian study conducted in a COVID hospital during the first wave of the pandemic (April to May 2020) reported that 64.2% of the nurses exhibited PTSD symptoms, with 37.3% corresponding to moderate-to-severe symptomatology (Naldi et al., 2021).

A study conducted in February 2020 with hospital workers in China reported a prevalence of 41.8%, with moderate-to-severe PTSD accounting for 10.7% (Juan et al., 2020). A French study investigated the prevalence of PTSD among ICU nurses from April to May 2020 and found that 34% showed symptoms compatible with the disorder (Azoulay et al., 2020). A study conducted with hospital workers in China during January and February 2020 reported a prevalence of 26% during an acute COVID-19 outbreak and a prevalence of 19.3% during a stable period of the pandemic (Cai et al., 2020). A study conducted by Heesakkers et al. (2021) in the Netherlands from August to September 2020 also investigated PTSD rates among ICU nurses and found a prevalence of 22.2%.

The remaining study, and the one with the lowest rates, was conducted in a hospital setting in China during the first wave of the pandemic, reporting a prevalence of clinically significant PTSD of 5.6% (Leng et al., 2021).

4.6 | Insomnia

To measure insomnia, the following three instruments were used: Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI) and Athens Insomnia Scale (AIS).

All the studies that analysed the prevalence of insomnia among nurses ($n = 5$) were carried out in a hospital setting during the first wave of the pandemic, with an average prevalence of 53.60% (40.66% for moderate-to-severe symptoms) for studies that presented their results as percentages.

Of the five studies, an Italian study carried out by Simonetti et al. (2021) reported the worst outcomes, with 75.72% of nurses reporting poor sleep quality (data collected from February to April 2020). A study conducted in Belgium found an overall prevalence of moderate and severe symptoms of 72.4% and 36.1%, respectively (Tiete et al., 2021). Furthermore, a study conducted in China by Shen et al. (2020) found a prevalence of sleep disturbances of 41.5%. A study conducted from January to February 2020 by Cai et al. (2020) in China found that 38.5% of nurses exhibited sleep disturbances. In a study by Wang et al. (2021), the mean PSQI score was 6.0, indicating poor sleep quality among nurses.

5 | DISCUSSION

This review found high rates of anxiety, depression, PTSD and insomnia among nurses who worked during the COVID-19 pandemic. Depression was the least prevalent disorder, with a prevalence of 38.79%, with a similar prevalence of PTSD (39.06%). Similarly, the overall prevalence of anxiety was 42.64%. The most impaired aspect of nurses' wellness was insomnia, with a prevalence of 53.6% in the few studies that analysed this outcome.

Overall, the studies conducted in China seemed to have lower rates of all outcomes, whereas studies conducted in Western countries, especially those conducted in Italy, one of the countries that was hit the hardest during the first wave of the pandemic, showed increased rates of the disorders studied by this review (Lasalvia et al., 2020; Simonetti et al., 2021). Among the selected studies, there were no studies from the USA, Latin American countries or other European countries, such as Spain or the United Kingdom, where the pandemic has had a great impact (World Health Organization, 2022). The latest journalistic news from these contexts reflects similar or even higher levels of impact on mental health among nurses, considering the pressure exerted on their health systems (Cafe, 2021; Diario de Navarra, 2021).

The few studies that were conducted in specific settings, such as operating rooms (Gül & Kılıç, 2021; Lian et al., 2021) or women's and children's hospitals (He et al., 2021), also seemed to have lower prevalence rates than did studies conducted in inpatient hospital settings and/or with adult populations.

The results obtained from this review on the mental health of nurses who have worked during the COVID-19 pandemic are similar to the data reported by an umbrella review of meta-analyses on the impact among different HCWs on the prevalence of anxiety (24.94%) and depression (24.83%) (Sahebi et al., 2021). For sleep disturbances, a meta-analysis on the subject indicated that the prevalence of insomnia among HCWs on the frontline of the COVID-19 pandemic was approximately 38% (Serrano-Ripoll et al., 2021), consistent with the prevalence found among nurses in this review. In contrast, in a meta-analysis, Saragih et al. (2021) reported prevalence rates higher than those found in our review for posttraumatic stress disorder (49%), anxiety (40%) and depression (37%) among HCWs during the COVID-19 pandemic. According to the authors, among the different HCWs, nurses exhibited the highest levels of affectation for all variables due to their workplace conditions, being female, and having limited access to personal protective equipment.

One of the specific aims of this review was to compare the mental health of nurses by the level of care (primary care, secondary care and tertiary care). However, this was not possible in this review because the evidence found in the primary care setting and community health centres and nursing homes was poor. Only one study was carried out in a primary care setting; the study was conducted in Turkey during the second wave of the pandemic and showed moderate levels (state [48.71 (\pm 11.07)] and trait [46.89 (\pm 7.94)]) of anxiety among nurses and midwives in this setting (Selçuk Tosun et al., 2021). No other psychological variables were analysed in that study, and solution-focussed thinking skills were suggested as possible means

to improve anxiety outcomes (Selçuk Tosun et al., 2021). No studies were found regarding anxiety, depression, PTSD and/or insomnia among nurses who worked in nursing homes during the COVID-19 pandemic. This lack of data points to an urgent need for research into the mental health of nurses responsible for caring for older people in community care homes because the impact of the pandemic on nursing homes has been significant (Davidson & Szanton, 2020).

Furthermore, even though most of the studies were conducted during the first wave of the pandemic (from March to May 2020), those that were carried out during subsequent waves showed similar outcomes, either demonstrating that different regions have been hit harder by the pandemic during different periods or highlighting the continuity of the pandemic and the subsequent impact on the mental health of nurses. It is expected that with the ongoing waves of the pandemic, resulting in further work overload, the mental impact on nurses will worsen.

Concerning the instruments used, a certain level of variability can be observed (see Table 4). To assess anxiety, nine different tools were used among the 31 studies analysed; notably, this variable was evaluated in most included studies ($n = 28$). The most frequently used instruments were the Self-Rating Anxiety Scale (SAS) and the Depression, Anxiety and Stress Scale-21 (DASS-21), which are widely used for clinical and research purposes at the international level and have good psychometric properties (Dunstan & Scott, 2018; Lee, 2020). In the study by Labrague and De los Santos (2020), the COVID-19 Anxiety Scale was used; this scale was designed by Lee (2020) to assess anxiety caused by COVID-19. Regarding depression, in addition to the DASS-21 already mentioned, most studies that evaluated depression used the Patient Health Questionnaire-9 (PHQ-9), which is extensively used as a screening tool, showing adequate psychometric properties (Costantini et al., 2021). In the eight studies that assessed PTSD, four different scales were used; the most used was the Impact of the Event Scale—Revised (IES-R). This scale has been widely used to assess the effects of the COVID-19 pandemic both among the general population (Cénat et al., 2021) and among HCWs (Carmassi et al., 2020). To measure insomnia, among the five studies that evaluated it, there were three different tools.

5.1 | Strengths and limitations of this review

In this review, a comprehensive search was conducted in the main health and nursing databases; the retrieved studies were published in various languages (English, French, German, Portuguese and Spanish) and across an extended time range, from the onset of the COVID-19 pandemic, i.e. January 2020 to September 2021, resulting in a high number of articles identified for this review. Other strengths of this review are the high level of rigour of the included studies when considering only those studies that presented all the items of the critical appraisal tools used based on the design of each study; the high number of participants included in this review; and the analysis of the four main variables (anxiety,

depression, PTSD and insomnia) among nurses. Furthermore, this review presents the measurement of the “direct” and “acute” impacts of a health emergency. Finally, the results of this review are considered a strength because they allow us to provide recommendations for practice and research. In any health service, we recommend assessing the impact of COVID-19 on the mental well-being of nurses and monitoring international policies for the improvement of nurses' working conditions. In terms of research, future studies are needed that include the assessment of the mental health of nurses working in different healthcare settings (hospitals, primary care, nursing homes, etc.).

Nevertheless, this review also has some limitations that need to be considered. Despite the large number of articles found, not having included grey literature may have left out publications of interest. One major limitation of this review is that the specific aim of comparing the mental health of nurses by level of care (primary care, secondary care and tertiary care) could not be addressed, as the included studies focussed primarily on hospital nurses, with only one study conducted in primary care and none conducted in a nursing home setting. In addition, most articles measured the mental health of professionals during the first wave (January–May 2020), with little data for successive waves and no data for 2021. This may have occurred because study results take time to be published, especially in the past year, when there has been a considerable increase in submissions to scientific journals and a lack of available reviewers due to the pandemic. Therefore, we recommend that future reviews should include studies from more healthcare settings and studies that present data collected during different waves of the pandemic. Importantly, most studies included in this review were conducted in China and reported lower prevalence rates for the variables studied, thus lowering the overall prevalence of the outcomes, i.e. the impact of the pandemic on the mental health of nurses. Another limitation of this review is the variety of instruments used in the included studies, a fact that should be considered when comparing and interpreting the results of the studies. Finally, given the nature of the studies included and the diversity of instruments used to measure the selected variables, it was not possible to carry out the meta-analysis of this review.

6 | CONCLUSION

This review highlights the mental health effects among nurses working in different parts of the world during the COVID-19 pandemic. It also highlights a gap in the literature: no studies were found that analyse the mental health of nurses by care level, such as primary care; such nurses are key to the management and care of citizens during the pandemic and have had to adapt to an avalanche of new cases of COVID-19. Especially striking is the lack of studies with nurses who work in nursing homes, considering that this setting has been substantially affected by COVID-19. Future studies are needed to address these gaps and provide a holistic view of the experiences of working during the COVID-19 pandemic and its negative impact on nurses' mental health.

7 | RELEVANCE STATEMENT

No review has specifically addressed the impact of the pandemic on the mental health of nurses exclusively, nor the level of care at which nurses perform their professional duties.

AUTHOR CONTRIBUTIONS

Cristina Garcia-Vivar, Irati Rodriguez-Matesanz, Leticia San Martin-Rodriguez, Paula Escalada-Hernandez, Nelia Soto-Ruiz, and Marta Ferraz-Torres—Made substantial contributions to the conception or design of the work; or the acquisition, analysis or interpretation of data; or the creation of new software used in the work. Cristina Garcia-Vivar, Irati Rodriguez-Matesanz, Leticia San Martin-Rodriguez, Paula Escalada-Hernandez, Nelia Soto-Ruiz, and Marta Ferraz-Torres—Drafted the work or revised it critically for important intellectual content. Cristina Garcia-Vivar, Irati Rodriguez-Matesanz, Leticia San Martin-Rodriguez, Paula Escalada-Hernandez, Nelia Soto-Ruiz, and Marta Ferraz-Torres—Approved the version to be published. Cristina Garcia-Vivar, Leticia San Martin-Rodriguez, Irati Rodriguez-Matesanz, Paula Escalada-Hernandez, Nelia Soto-Ruiz, and Marta Ferraz-Torres—Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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