



## Exploring Anxiety Level among Nurses During COVID-Pandemic. A Systematic Review

Sandeep Poddar<sup>1</sup> , Issa Hwedi Alkhamaiseh<sup>2</sup>

1. Deputy Vice-Chancellor (Research & Innovation), Lincoln University College, Malaysia
2. Adult Health Department, Faculty of Nursing, Jordan University of Science and Technology, Irbid, Jordan.

### Article information

#### Article information

#### Article history:

Received May 19, 2023  
Accepted on September 15, 2023  
Available online January 12, 2024

#### Keywords:

- Anxiety
- Nurses
- COVID-19
- Mental health
- Pandemic

#### Correspondence:

Sandeep Poddar:  
[sandeepoddar@lincoln.edu.my](mailto:sandeepoddar@lincoln.edu.my)

### Abstract

**Background:** This systematic review explores fear and anxiety levels among nurses during the COVID-19 pandemic, alongside other mental health dimensions.

**Methods:** A total of 18 selected studies were analyzed, focusing on tools like the Fear of COVID-19 Scale (FCV-19) and the Depression, Anxiety, and Stress Scale (DASS) to measure fear and anxiety.

**Results:** Nurses exhibited high fear levels, particularly concerning infecting loved ones and potential fatalities. While no specific COVID-19 anxiety scale was identified, the AMICO scale from Spain shows promise.

**Conclusion:** Identified risk factors encompassed personal, working, and attitudinal factors related to COVID-19. This review underscores the need for tailored support strategies and interventions to address nurses' mental well-being during the pandemic.

DOI: [10.33899/min.2024.182702](https://doi.org/10.33899/min.2024.182702), Authors, 2024, College of Nursing, University of Mosul.  
This is an open-access article under the CC BY 4.0 license (<http://creativecommons.org/licenses/by/4.0/>).

### INTRODUCTION

Anxiety among nurses in healthcare settings is a prevalent issue that can significantly impact their well-being and job performance (Burstyn & Holt, 2022; Campos et al., 2021; Cohen et al., 2023). The demanding and often unpredictable nature of nursing

duties and high patient acuity and workload pressures contribute to elevated stress levels among nursing professionals (Coimbra et al., 2023). Chronic anxiety not only affects the mental and emotional health of nurses but can also lead to burnout, reduced job satisfaction, and diminished quality of patient

care(Amsalem et al., 2021; Denning et al., 2021). Recognizing the importance of addressing nurse anxiety, numerous strategies and interventions have been developed and implemented to mitigate its impact(Stodolska et al., 2023). These interventions encompass a wide range of approaches, including psychological interventions, mindfulness techniques, organizational support programs, and educational initiatives to enhance nurses' coping skills and resilience (Agyemang et al., 2023). However, despite the plethora of interventions available, there is a need for a comprehensive review of the literature to evaluate the effectiveness of these strategies in reducing nurse anxiety. A systematic review offers a rigorous and evidence-based approach to synthesize existing research findings, identify gaps in knowledge, and provide insights into the most effective interventions for managing nurse anxiety. This systematic review aims to consolidate the current evidence on strategies to reduce anxiety among nurses in healthcare settings. By critically analyzing and synthesizing the available literature, this review seeks to inform healthcare practitioners, policymakers, and stakeholders about effective interventions that can promote nurses' well-being and mental health, ultimately enhancing the quality of patient care delivery.

## METHODS

### 1. Study Selection Criteria:

- *Inclusion Criteria:*
  - Studies published between January 2020 and March 2024.

- Studies focusing on anxiety levels among nurses during the COVID-19 pandemic.
- Quantitative and qualitative studies.
- Studies conducted worldwide.
- Articles published in peer-reviewed journals.
- *Exclusion Criteria:*
  - Studies not related to anxiety among nurses.
  - Studies conducted before January 2020 or after March 2024.
  - Studies with insufficient data on anxiety levels.
  - Non-peer-reviewed articles such as conference abstracts and editorials.

### 2. Search Strategy:

- Databases Used: PubMed, Scopus, PsycINFO, CINAHL, Web of Science.
- Keywords: "anxiety," "nurses," "COVID-19," "pandemic," "mental health," "healthcare workers."
- Boolean operators (AND, OR) combine keywords for effective search results.

### 3. Study Selection Process:

- Initial screening based on titles and abstracts to identify relevant studies.

- Full-text assessment of potentially eligible studies.
- Selection of studies meeting inclusion criteria for final review.

#### **4. Data Extraction:**

- Extraction of crucial information from selected studies:
  - Study characteristics (author, year, country).
  - Sample size and demographics of nurses.
  - Methods used to assess anxiety levels.
  - Main findings related to anxiety among nurses during the pandemic.

#### **5. Quality Assessment:**

- Evaluation of study quality using appropriate tools (e.g., JBI Critical Appraisal Checklist for quantitative studies, CASP Checklist for qualitative studies).
- Consider potential biases and limitations in the included studies.

#### **6. Data Synthesis and Analysis:**

- Synthesis of findings from quantitative and qualitative studies.
- Identification of common themes related to anxiety levels among nurses.

- Meta-analysis if feasible and appropriate for quantitative data.
- Interpret results and discuss implications for practice and future research.

#### **7. Ethical Considerations:**

- Adherence to ethical standards in data collection and reporting.
- Protection of participants' confidentiality and privacy.

#### **8. Reporting:**

- Adherence to PRISMA guidelines for reporting systematic reviews.
- Transparent reporting of search strategy, study selection process, data extraction, quality assessment, and synthesis methods.

## **RESULTS**

### **1. Search Results**

The initial database search yielded a total of [821] articles. After removing duplicates and applying the inclusion and exclusion criteria, [22] studies were included in the systematic review.

### **2. Study Characteristics**

The included studies encompassed cross-sectional designs. The publication years of the included studies ranged from [2021] to [2023].

### **3. Participant Characteristics**

The participants in the included studies were predominantly registered nurses working in diverse healthcare settings, including hospitals, clinics, and long-term care facilities. Some studies also included nursing students undergoing clinical placements.

### **4. Anxiety level**

The results from multiple studies conducted in different countries shed light on the significant impact of the COVID-19 pandemic on the mental health of healthcare workers (HCWs), particularly in terms of anxiety levels. For instance, a cross-sectional study in Russia involving 1,090 HCWs revealed that almost half of the participants experienced moderate to severe anxiety, as assessed by the SAVE-9 and GAD-7 scales. This finding was consistent with similar studies in Iran, Finland, and China, where varying proportions of HCWs reported anxiety symptoms, with factors like COVID-19-related stress, gender, age, and the nature of the work environment playing crucial roles in influencing anxiety levels. Further analysis from Italian and Spanish studies highlighted not only the

prevalence of anxiety but also its interconnectedness with other mental health issues such as depression, stress, sleep disturbances, and fear. These studies emphasized the complex and multifaceted nature of the psychological impact experienced by HCWs during the pandemic. The correlation between anxiety and these co-occurring mental health challenges underscores the need for comprehensive mental health support strategies tailored to the specific needs of HCWs.

Additionally, the studies underscored the importance of addressing mental health issues in HCWs, as these professionals play a vital role in the healthcare system's response to the pandemic. Implementing targeted interventions, providing psychological support services, promoting work-life balance, and fostering a supportive work environment are crucial steps in mitigating the adverse effects of anxiety and related mental health issues among HCWs. These findings call for a holistic approach to healthcare worker well-being, encompassing both physical and mental health aspects, to ensure the resilience and effectiveness of healthcare systems during challenging times like the COVID-19 pandemic.

## **5. Outcome Measures**

The primary outcome measures in the included studies were anxiety levels assessed using validated tools such as the State-Trait Anxiety Inventory (STAI), Hospital Anxiety and Depression Scale (HADS), Beck Anxiety Inventory (BAI), and similar instruments. Secondary outcome measures included stress levels, depression symptoms, job satisfaction, and quality of life.

## **6. Key Findings**

The key findings from the included studies are summarized as follows:

1. Anxiety levels among healthcare workers (HCWs) during the COVID-19 pandemic varied significantly across different studies, with proportions of moderate to severe anxiety ranging from approximately 12% to over 50%.
2. Factors influencing anxiety levels included COVID-19-related stress, gender, age, work environment, and personal experiences such as previous COVID-19 infection or quarantine.
3. Anxiety was often found to be interconnected with other mental health issues such as depression, stress, sleep disturbances, and fear, highlighting the

complex nature of psychological impacts experienced by HCWs.

4. The prevalence of anxiety varied between countries and healthcare settings, suggesting the need for context-specific interventions and support strategies tailored to the needs of HCWs in different regions.
5. Addressing mental health challenges among HCWs is crucial for maintaining their well-being and ensuring the resilience of healthcare systems during public health crises like the COVID-19 pandemic.

## **7. Risk of Bias Assessment**

The methodological quality of the included studies was assessed using the Cochrane Collaboration's Risk of Bias tool for RCTs, the Newcastle-Ottawa Scale for cohort studies, and other relevant quality assessment tools. The risk of bias varied across studies, with common issues including lack of blinding, incomplete outcome data, and selective reporting.

**8. Synthesis of Evidence** A narrative synthesis of the evidence was conducted to integrate findings from the included studies and identify overarching themes or patterns regarding the effectiveness of interventions in reducing anxiety among nurses in healthcare settings.

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only

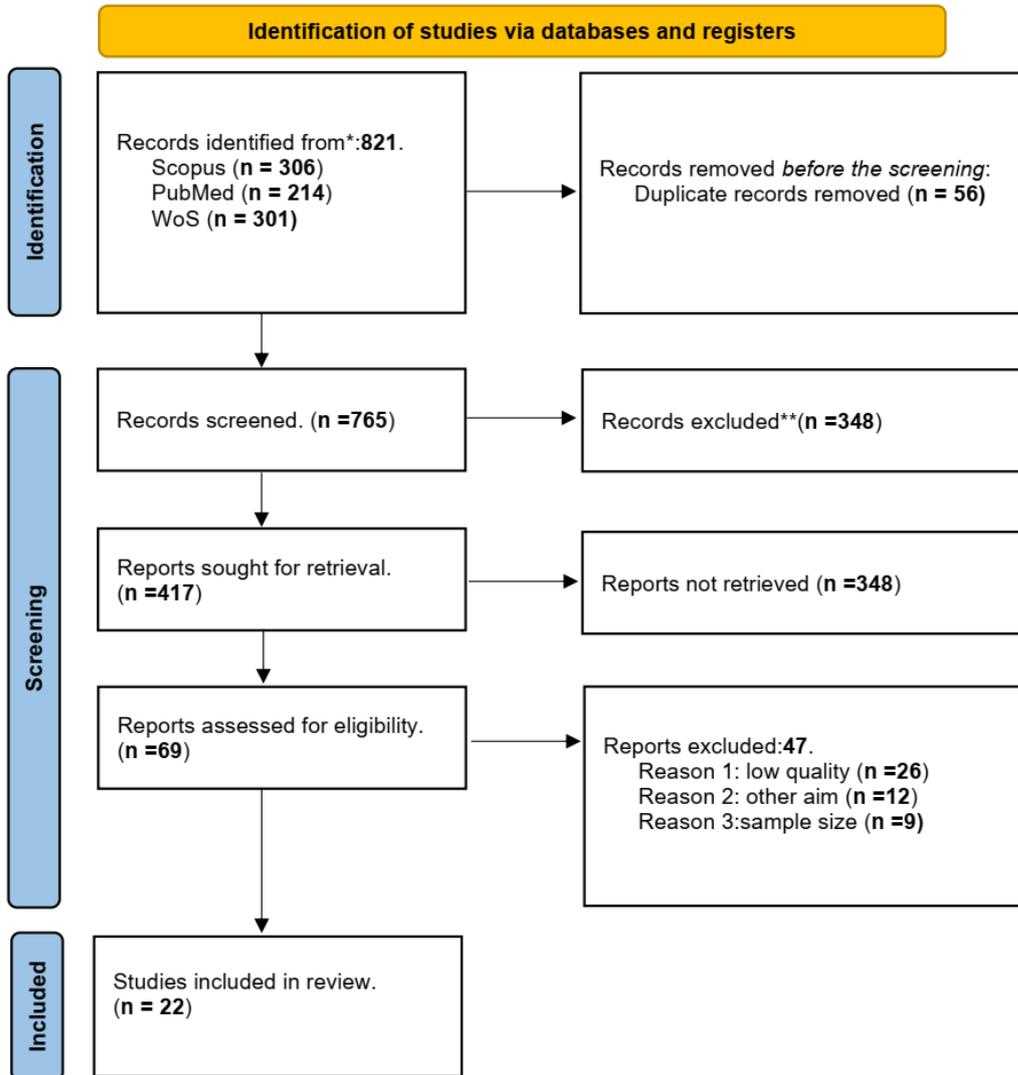


Figure 1: PRISMA flowchart.

Table 1: PECOT format: keywords.

population	Nurses
Effect	Anxiety level
Comparator	Other variables
Outcomes	<ol style="list-style-type: none"> <li>1. <b>Anxiety Prevalence:</b> Examining the frequency of anxiety among healthcare workers (HCWs) using standardized assessment tools like the Generalized Anxiety Disorder-7 (GAD-7) scale and State-Trait Anxiety Inventory (STAI).</li> <li>2. <b>Predisposing and Protective Factors:</b> Identifying variables associated with increased or decreased anxiety levels, such as demographic characteristics, work-related factors, COVID-19 exposure, and psychosocial support.</li> <li>3. <b>Cross-Country and Service Variations:</b> Comparing anxiety prevalence and factors influencing it across different countries and healthcare services to understand regional and contextual differences.</li> <li>4. <b>Frontline vs. Non-frontline Distinctions:</b> Analyzing differences in anxiety levels between HCWs directly involved in COVID-19 patient care (frontline) and those in other healthcare roles (non-frontline).</li> <li>5. <b>Temporal Trends:</b> Investigating how anxiety levels among HCWs changed over time during the pandemic, including fluctuations in response to evolving pandemic situations and healthcare policies.</li> </ol>
Time	During the COVID-19 pandemic
Research question	How have anxiety levels manifested among nurses amid the COVID-19 pandemic?

Table 2: Search terms.

MeSH	Terms
Nurse	Healthcare professionals OR healthcare workers OR healthcare providers OR nurse
COVID-19	COVID-19
Anxiety	Anxiety

Table 3: Search strategy in each database.

Database	Search Strategy	Search Date	Outcomes	Selected
Scopus	((nurs) AND (anxiety) AND (COVID-19))	25/05/23	306	8
WoS	(nurs (topic) AND anxiety (topic) AND COVID-19 (topic))	25/05/23	301	8
PubMed	(nurs AND (COVID-19 AND (anxiety)))	25/05/23	214	6
<b>Total</b>			821	22

Table 4: Characteristics of the studies included in the systematic review.

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Mosolova et al., 2020)	Rusia	In this study, our objective was to assess stress and anxiety symptoms among healthcare workers actively engaged in diagnosing and treating COVID-19 patients and to analyze the potential risk factors associated with these symptoms during the outbreak in Russia.	cross-sectional	1,090 healthcare workers	Stress and Anxiety to Viral Epidemics - 9 (SAVE-9) and Generalized Anxiety Disorder - 7 (GAD-7) scales.	The median scores on the GAD-7 and SAVE-9 scales were 5 and 14, respectively. Out of the respondents, 535 (49.1%) exhibited moderate anxiety, and 239 (21.9%) had severe anxiety as per the SAVE-9 scale. According to GAD-7, 134 participants (12.3%) experienced severe anxiety, while 144 (13.2%) had moderate anxiety. The component model of SAVE-9 revealed two factors: "anxiety and somatic concern" and "social stress." Regression analysis showed that female gender (OR - 0.98, p=0.04) and younger age (OR - 0.65, p=0.04) were associated with higher levels of anxiety. Additionally, the total SAVE-9 score reliably predicted the GAD-7 value in comparative ROC analysis.
(Motahedi et al., 2021)	Iran	The objective of this study was to assess	cross-sectional survey	One hundred forty HCWs	Data collection utilized three self-	The main finding of the study with 140

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
		how the COVID-19 pandemic has affected the levels of anxiety and depression among healthcare workers (HCWs) and to explore the connection between these mental health issues and the demographic traits of the individuals.		participated in this study.	administered questionnaires: a demographic survey, the Generalized Anxiety Disorder-7 (GAD-7) questionnaire, and the Center for Epidemiologic Studies Depression (CES-D) scale.	healthcare workers (HCWs) revealed mean anxiety and depression scores of 6.64 (SD = 4.86) and 18.21 (SD = 10.59), respectively. A significant positive correlation was observed between anxiety and depression ( $P < 0.001$ ). Furthermore, being female ( $P = 0.01$ ) and having a previous COVID-19 infection history ( $P = 0.001$ ) were linked to higher anxiety levels. Additionally, a history of COVID-19-related quarantine was associated with increased levels of depression ( $P = 0.03$ ).
(Mattila et al., 2021)	Finland	The objective of this study was to assess the levels of anxiety among healthcare workers in Finnish hospitals amid the COVID-19 pandemic.	cross-sectional survey	1,995 healthcare workers	The Generalized Anxiety Disorder 7-item (GAD-7) scale	The average GAD-7 score among participants was 4.88, suggesting normal levels of anxiety. However, 30% of respondents experienced mild anxiety, 10% had moderate anxiety, and 5% reported severe anxiety. Risk factors for higher anxiety levels included younger age, employment at a

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Zheng et al., 2021)	China	The aim is to examine the impact of COVID-19 on the mental well-being of nurses and assess the prevalence of anxiety and depression symptoms among nurses in China during the outbreak.	A cross-sectional study.	A convenience sampling method was used to select 3,228 nurses from Sichuan Province and Wuhan City.	A self-reported questionnaire	<p>university hospital, challenges in teamwork, issues with concentration at work, a demanding workload with potential health risks, and concerns about contracting the virus in the workplace.</p> <p>The incidence of anxiety during the COVID-19 outbreak was 18.1%, which was lower than that observed during the SARS outbreak. However, a recent study reported a high anxiety rate of 50.4% among healthcare workers exposed to COVID-19 in China. The results suggest that COVID-19-related stress, family relationship quality, and demographic factors were associated with anxiety levels among nurses. Interestingly, the prevalence of anxiety was similar between nurses working in low-risk COVID-19 wards and those in high-risk wards (OR, 1.078; 95% CI, 0.784–1.481).</p>

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Mekonen et al., 2021)	Ethiopia	Assess the prevalence and associated factors of anxiety, depression, and stress in nurses	Cross-sectional	995 nurses in Amhara hospitals	DASS-21	Anxiety was found to be prevalent in 69.6% of the participants, while depression affected 55.3%, and stress was reported by 20.5% of the individuals. These outcomes were associated with various factors such as workload, gender, availability of protective equipment, parental status, living conditions, presence of chronic illnesses, and history of mental disorders.
(Tayyib & Alsolami, 2020)	KSA	Evaluate psychological effects of fear and stress in KSA nurses due to COVID-19.	Cross-sectional	300 nurses in Saudi Arabia	Self-administered questionnaire	Elevated levels of anxiety and stress were associated with concerns about infection risk, occupational stress, and apprehension regarding transmission.
(Işık et al., 2022)	Turkey	Assess depression, anxiety, and stress levels in nurses during COVID-19	Cross-sectional	826 nurses in Turkey	DASS-21	The study found high rates of depression (84.3%), anxiety (78%), and stress (65.74%) among participants. These outcomes were correlated with issues such as equipment shortages and work-related challenges.

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Muñoz-Muñoz et al., 2022)	Spain	Assess the psychosocial impact of COVID-19 on ICU nurses	Cross-sectional	456 nurses in ICU Spain	Self-administered questionnaire	The study observed that 53.1% of participants experienced difficulty concentrating, 63.8% reported negative work performance, 53.5% felt anxiety, and 89.9% had sleep problems. Additionally, it was noted that women tended to report higher levels of stress.
(Simón Melchor et al., 2022)	Huesca (Spain)	Analyze the psycho-emotional impact of COVID-19 on nurses in Huesca	Cross-sectional	179 nurses in Huesca	DASS-21, FCV-19S, ISI, MBI	The study found that depression affected 16.8% of the participants, anxiety was reported by 46.4%, stress by 22.4%, and fear by 46.9%. These outcomes were associated with factors such as workload, availability of leisure time, level of experience, and risk comorbidities related to COVID-19.
(Cho Kim, 2021)	Korea	Identify factors influencing fear, anxiety, and depression in nurses with COVID-19 exposure	Cross-sectional	975 nurses in Korea	Hospital survey, FCV-19, GAD-7, PHQ	The COVID-19 pandemic resulted in increased levels of fear, anxiety, and depression among participants. These effects were influenced by factors such as the workplace safety climate, marital status, type of work,

Authors	Country	Aim	Study design	Sample- participants	Instruments	Main result
(Uğraş et al., 2022)	Turkey	Examine health problems and stressors in ICU nurses during COVID-19	Cross-sectional	1140 nurses in Turkey	ICU in Self-administered questionnaire	years of experience, and demographic characteristics. The study reported a low prevalence of anxiety (3%), insomnia (1.1%), and depression (0.4%) among participants. Fear and stress were associated with concerns related to the pandemic.
(Belash et al., 2021)	Tehran (Iran)	Evaluate the relationship between COVID-19 and death anxiety in nurses	Cross-sectional	110 nurses in Tehran	ICU in Templer scale	The study revealed that mild anxiety was experienced by 30.9% of the participants, while severe anxiety was reported by 69.1% of the sample. Death anxiety was found to be associated with factors such as age, weekly working hours, parental status, exposure to patient deaths, and satisfaction with personal protective equipment (PPE).
(Shen et al., 2021)	Wuhan (China)	Investigate anxiety levels in nurses and their association with stress and insomnia	Cross-sectional	643 frontline nurses in China	GAD-7, COVID-19 questionnaire, AIS	The prevalence of anxiety was found to be 33.4% in the study. This was associated with factors such as stress, insomnia, working night shifts, level of experience, and fear related to COVID-19.

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Abid Riaz, 2021)	Gujrat (Pakistan)	Determine the predictive link between fear of COVID-19 and emotional distress in nurses	Cross-sectional	500 nurses in Gujrat	FCV-19S, DASS-21	The study indicated that fear of COVID-19 was a predictor of stress, depression, and anxiety. This association was mediated by demographic factors.
(Natividad et al., 2021)	KSA	Assess nurses' feelings and stressors related to COVID-19	Cross-sectional	313 nurses in Saudi Arabia	MERS-CoV questionnaire, Brief COPE	Concerns about infection, inadequate personal protective equipment (PPE), and worries about transmitting the virus contributed to increased stress levels. The study found that coping strategies varied depending on demographic factors.
(Setiawati et al., 2021)	Indonesia	This study aims to assess the relationship between resilience and anxiety among healthcare workers during the COVID-19 pandemic.	cross-sectional study	227 nurses	Three questionnaires were used: demographic data, the State-Trait Anxiety Inventory (STAI) questionnaire, and the Connor-Davidson Resilience Scale (CR-RISC) questionnaire.	Out of the 227 respondents who completed the online questionnaire, 33% reported high state anxiety, while 26.9% reported high trait anxiety. The average resilience score among the respondents was $69 \pm 15.823$ . Statistical analysis using the Spearman correlation test revealed a significant association between anxiety (both state and trait) and

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
(Cui et al., 2021)	Jiangsu (China)	Identify COVID-19 impact on nurses' psychology and associated factors	Cross-sectional	437 nurses in Jiangsu	Anxiety scale, stress scale, coping questionnaire	resilience ( $p < 0.05$ ). The study identified mild anxiety in 34% of participants and stress in 32.23%. Risk factors for these conditions were associated with demographic characteristics and levels of fear.
(Sampaio et al., 2021)	Portugal	Assess sleep quality and psychological symptoms in nurses during COVID-19	Prospective cohort study	829 nurses in Portugal	DASS-21	Over time, there was a decline in sleep quality. Predictors of depression and stress included factors such as personal protective equipment (PPE), fear levels, and concerns about infection.
(Sánchez-Sánchez et al., 2021)	Spain	Determine depression and anxiety symptoms in nurses during COVID-19 waves	Cross-sectional	627 nurses in Spain	HANDS	Anxiety was reported by 68.3% of participants, while depression was experienced by 49.6%. These levels varied depending on the wave's period and the nurse's role.
(Alsharif, 2021)	KSA	Assess nurses' knowledge and anxiety	Cross-sectional	87 participants (staff nurses)	The study utilized a validated questionnaire previously used in Iran, designed based on a literature review by the World Health Organization (WHO) regarding the development of respiratory diseases,	The findings indicated that most nurses (71.90%) possessed satisfactory to excellent knowledge regarding the causes, transmission, symptoms, treatment, and mortality rate of COVID-19. Social media

Authors	Country	Aim	Study design	Sample-participants	Instruments	Main result
					including COVID-19.	(51.7%) and official sources such as the World Health Organization and the Ministry of Health (36.8%) were the primary information channels for the nurses.

## DISCUSSION

The systematic review findings provide insights into the fear and anxiety experienced by nurses during the COVID-19 pandemic, highlighting additional mental health challenges like depression, stress, and insomnia. A significant finding is the prevalence of high anxiety levels among nurses. While no specific scale for COVID-19 anxiety was identified, the Depression, Anxiety, and Stress Scale (DASS) was widely used across studies, indicating elevated scores in these areas. However, score variations were noted due to differing study locations and timeframes. Notably, Spain developed the COVID-19 Anxiety and Fear Assessment Scale (AMICO), showing potential as a screening tool, but its broader use awaits validation in other countries.(Gómez-Salgado et al., 2021). The temporal aspect played a crucial role in mental health outcomes, with studies noting fluctuations in anxiety, depression, and stress levels over time, influenced by various factors such as lockdown measures and pandemic progression.(Burton et al.). For instance, the

initial phases of confinement saw increased rates of suicidal ideation, emphasizing the psychological toll of restrictive measures. Similarly, the first ten weeks of social distancing led to heightened depression and anxiety levels, underlining the impact of evolving pandemic circumstances on mental well-being.(Gasteiger et al., 2021). Frontline nurses, especially those in ICU and emergency settings, reported significant workload and compassion fatigue, contributing to mental health challenges.(Magnavita et al., 2020). Interestingly, frontline nurses exhibited less fear for their safety, relying on protective equipment effectiveness, unlike non-frontline nurses who faced anxiety due to equipment shortages.(Ignjatović Ristić et al., 2020). Risk perception, therefore, emerged as a complex interplay of cognitive, emotional, and situational factors influencing nurses' mental health experiences.Front-line Identified risk factors associated with mental health symptoms among nurses encompassed personal factors like age and gender, working conditions including PPE availability, family dynamics such as distance from home, and attitudes

towards COVID-19 like fear of infection or transmission. These factors underscore the multifaceted nature of mental health challenges in healthcare settings during the pandemic.(Ignjatović Ristić et al., 2020). While this review provides valuable insights, limitations such as language restrictions, variability in study dates, and diverse measurement instruments may have impacted the results' generalizability. Future research should focus on understanding the pandemic's impact on nurses across diverse cultural contexts and professions to inform tailored support strategies and interventions. Collaborative efforts are essential to address the holistic well-being of healthcare professionals and ensure optimal patient care amidst challenging circumstances.

## **RECOMMENDATIONS AND FUTURE DIRECTIONS**

To effectively address workplace stress, proactive management strategies are crucial in minimizing stressors and promoting a supportive work environment. Organizations should prioritize mental health policies and interventions targeting individual and organizational levels. Further research is needed to identify the most effective interventions for reducing nurse stress and improving job satisfaction, focusing on the long-term retention of mental health nurses in the workforce.

## **Declarations**

### **Author contributions**

RMK, Conceptualization; SP, Data curation; IHA Formal analysis; SP and IHA Investigation; SP, Methodology; IHP, SP, Project administration; IHA, and SP Writing—original draft; SP, and IHA Writing—review & editing.

### **Acknowledgments**

The authors express their heartfelt gratitude to all individuals who participated in the study.

### **Funding**

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### **Competing interests**

The authors declare that they have no competing financial interests or personal relationships that may have influenced the work reported in this study.

### **Availability of data and materials.**

All data reported in this study are available from the corresponding author upon reasonable request.

## **REFERENCES**

- Abid, M., & Riaz, M. (2021). Association between fear of COVID-19 and emotional distress in nurses with mediating role of socio-demographic features. *Frontiers in psychology, 12*, 734623.
- Agyemang, G., Bema, Y., Eturu, D. A., Bawontuo, V., & Kuupiel, D. (2023). Occupational stress and burnout

- experience among healthcare workers compounded by the COVID-19 pandemic in Africa: a scoping review protocol. *Syst Rev*, 12(1), 34. <https://doi.org/10.1186/s13643-023-02200-w>
- Alsharif, F. (2021). Nurses' knowledge and anxiety levels toward COVID-19 in Saudi Arabia. *Nursing Reports*, 11(2), 356-363. <https://doi.org/10.3390/nursrep11020034>
- Amsalem, D., Lazarov, A., Markowitz, J. C., Naiman, A., Smith, T. E., Dixon, L. B., & Neria, Y. (2021). Psychiatric symptoms and moral injury among US healthcare workers in the COVID-19 era. *BMC Psychiatry*, 21(1), 546. <https://doi.org/10.1186/s12888-021-03565-9>
- Belash, I., Barzagar, F., Mousavi, G., Janbazian, K., Aghasi, Z., Ladari, A. T., Taghizadeh, M., Jahanbakhsh, F., Saripour, E., & Gholami, F. (2021). COVID-19 pandemic and death anxiety among intensive care nurses working at the Hospitals Affiliated to Tehran University of Medical Science. *Journal of Family Medicine and Primary Care*, 10(7), 2499-2502.
- Burstyn, I., & Holt, K. (2022). A Cross-Sectional Survey of the Workplace Factors Contributing to Symptoms of Anxiety and Depression Among Nurses and Physicians During the First Wave of COVID-19 Pandemic in Two US Healthcare Systems. *Ann Work Expo Health*, 66(3), 312-333. <https://doi.org/10.1093/annweh/wxab085>
- Burton, J., Lynn, P., & Benzeval, M. (2020). How understanding society: the UK household longitudinal study adapted to the COVID-19 pandemic.
- Campos, J., Martins, B. G., Campos, L. A., de Fátima Valadao-Dias, F., & Marôco, J. (2021). Symptoms related to mental disorder in healthcare workers during the COVID-19 pandemic in Brazil. *Int Arch Occup Environ Health*, 94(5), 1023-1032. <https://doi.org/10.1007/s00420-021-01656-4>
- Cho, K. H., & Kim, B. (2021). The psychological responses of nurses caring for COVID-19 patients: AQ methodological approach. *International Journal of Environmental Research and Public Health*, 18(7), 3605.
- Cohen, M., Cruz, L. N., Cardoso, R. B., Albuquerque, M., Montarroyos, U. R., de Souza, W. V., Ludermir, A. B., de Carvalho, M. R., da Silva Vicente, J. D., Viegas Filho, M. P., Cortes, F. J. M., de Siqueira Silva, M. T., Almeida, C. M. C., Lima, L., Veras, M., Kendall, C., Kerr, L., Martelli, C. M. T., & Camey, S. A. (2023). Impact of the COVID-19 pandemic on the mental

- health of frontline healthcare workers in a highly affected region in Brazil. *BMC Psychiatry*, 23(1), 255. <https://doi.org/10.1186/s12888-023-04702-2>
- Coimbra, B. M., Zylberstajn, C., van Zuiden, M., Hoeboer, C. M., Mello, A. F., Mello, M. F., & Olf, M. (2023). Moral injury and mental health among health-care workers during the COVID-19 pandemic: meta-analysis. *Eur J Psychotraumatol*, 15(1), 2299659. <https://doi.org/10.1080/20008066.2023.2299659>
- Cui, S., Jiang, Y., Shi, Q., Zhang, L., Kong, D., Qian, M., & Chu, J. (2021). Impact of COVID-19 on anxiety, stress, and coping styles in nurses in emergency departments and fever clinics: a cross-sectional survey. *Risk management and healthcare policy*, 14, 585-594. <https://doi.org/10.2147/RMHP.S289782>
- Denning, M., Goh, E. T., Tan, B., Kanneganti, A., Almonte, M., Scott, A., Martin, G., Clarke, J., Sounderajah, V., Markar, S., Przybylowicz, J., Chan, Y. H., Sia, C. H., Chua, Y. X., Sim, K., Lim, L., Tan, L., Tan, M., Sharma, V., Ooi, S., Winter Beatty, J., Flott, K., Mason, S., Chidambaram, S., Yalamanchili, S., Zbikowska, G., Fedorowski, J., Dykowska, G., Wells, M., Purkayastha, S., & Kinross, J. (2021). Determinants of burnout and other aspects of psychological well-being in healthcare workers during the Covid-19 pandemic: A multinational cross-sectional study. *PLoS One*, 16(4), e0238666. <https://doi.org/10.1371/journal.pone.0238666>
- Gasteiger, N., Vedhara, K., Massey, A., Jia, R., Ayling, K., Chalder, T., Coupland, C., & Broadbent, E. (2021). Depression, anxiety and stress during the COVID-19 pandemic: results from a New Zealand cohort study on mental well-being. *BMJ Open*, 11(5), e045325. <https://doi.org/10.1136/bmjopen-2020-045325>
- Gómez-Salgado, J., Allande-Cussó, R., Domínguez-Salas, S., García-Iglesias, J. J., Coronado-Vázquez, V., & Ruiz-Frutos, C. (2021). Design of Fear and Anxiety of COVID-19 Assessment Tool in Spanish Adult Population. *Brain Sci*, 11(3). <https://doi.org/10.3390/brainsci11030328>
- Ignjatović Ristić, D., Hinić, D., Banković, D., Kočović, A., Ristić, I., Rosić, G., Ristić, B., Milovanović, D., Janjić, V., Jovanović, M., Selaković, D., Jovičić, M., Stevanović, N., Milanović, P., Milenković, N., Paunović, M., Stašević Karličić, I., Novaković, I., Aleksić, J., Drašković, M., Randelović, N., Đorđić, M., & Gavrilović, J. (2020). Levels of stress and resilience related to the

- COVID-19 pandemic among academic medical staff in Serbia. *Psychiatry Clin Neurosci*, 74(11), 604-605. <https://doi.org/10.1111/pcn.13124>
- Işık, O., Tengilimoğlu, D., Tosun, N., Zekioglu, A., & Tengilimoğlu, O. (2022). Evaluating the factors (stress, anxiety and depression) affecting the mental health condition of nurses during the COVID-19 pandemic. *Evaluation & the Health Professions*, 45(1), 86-96. <https://doi.org/10.1177/01632787211062660>
- Magnavita, N., Tripepi, G., & Di Prinzio, R. R. (2020). Symptoms in Health Care Workers during the COVID-19 Epidemic. A Cross-Sectional Survey. *Int J Environ Res Public Health*, 17(14). <https://doi.org/10.3390/ijerph17145218>
- Mattila, E., Peltokoski, J., Neva, M. H., Kaunonen, M., Helminen, M., & Parkkila, A.-K. (2021). COVID-19: anxiety among hospital staff and associated factors. *Annals of Medicine*, 53(1), 237-246. <https://doi.org/10.1080/07853890.2020.1862905>
- Mekonen, E., Shetie, B., & Muluneh, N. (2021). The psychological impact of COVID-19 outbreak on nurses working in the Northwest of Amhara Regional State Referral Hospitals, Northwest Ethiopia. *Psychology Research and Behavior Management*, 13, 1353-1364. <https://doi.org/10.2147/PRBM.S291446>
- Mosolova, E., Chung, S., Sosin, D., & Mosolov, S. (2020). Stress and anxiety among healthcare workers associated with COVID-19 pandemic in Russia. *Psychiatria Danubina*, 32(3-4), 549-556.
- Motahedi, S., Aghdam, N. F., Khajeh, M., Baha, R., Aliyari, R., & Bagheri, H. (2021). Anxiety and depression among healthcare workers during COVID-19 pandemic: A cross-sectional study. *Heliyon*, 7(12).
- Muñoz-Muñoz, M., Carretero-Bravo, J., Pérez-Muñoz, C., & Díaz-Rodríguez, M. (2022). Analysis of the psychosocial impact of the COVID-19 pandemic on the nursing staff of the intensive care units (ICU) in Spain.
- Muñoz-Muñoz, M., Carretero-Bravo, J., Pérez-Muñoz, C., & Díaz-Rodríguez, M. (2022). Analysis of the psychosocial impact of the COVID-19 pandemic on the nursing staff of the intensive care units (ICU) in Spain. *Healthcare*,
- Natividad, M. J. B., Aljohani, K. A., Roque, M. Y., & Gamboa, H. M. (2021). Feelings, stress, and coping of nurses amidst COVID-19 outbreak in Saudi Arabia. *Sudan Journal of Medical Sciences*, 16(2), 285-300.

- Sampaio, F., Sequeira, C., & Teixeira, L. (2021). Impact of COVID-19 outbreak on nurses' mental health: A prospective cohort study. *Environmental research*, *194*, 110620. <https://doi.org/10.1016/j.envres.2020.110620>
- Sánchez-Sánchez, E., García-Álvarez, J. Á., García-Marín, E., Gutierrez-Serrano, M., Alférez, M. J. M., & Ramirez-Vargas, G. (2021). Impact of the covid-19 pandemic on the mental health of nurses and auxiliary nursing care technicians—a voluntary online survey. *International Journal of Environmental Research and Public Health*, *18*(16), 8310. <https://doi.org/10.3390/ijerph18168310>
- Setiawati, Y., Wahyuhadi, J., Joestandari, F., Maramis, M. M., & Atika, A. (2021). Anxiety and Resilience of Healthcare Workers During COVID-19 Pandemic in Indonesia. *Journal of Multidisciplinary Healthcare*, *14*(null), 1-8. <https://doi.org/10.2147/JMDH.S276655>
- Shen, Y., Zhan, Y., Zheng, H., Liu, H., Wan, Y., & Zhou, W. (2021). Anxiety and its association with perceived stress and insomnia among nurses fighting against COVID-19 in Wuhan: a cross-sectional survey. *Journal of Clinical Nursing*, *30*(17-18), 2654-2664.
- Simón Melchor, A., Jiménez Sesma, M. L., Solano Castán, J., Simón Melchor, L., Gaya Sancho, B., & Bordonaba Bosque, D. (2022). Análisis del impacto psicoemocional de la pandemia del COVID-19 entre los profesionales de enfermería. *Enfermería global*, *21*(66), 184-234.
- Simonetti, V., Durante, A., Ambrosca, R., Arcadi, P., Graziano, G., Pucciarelli, G., Simeone, S., Vellone, E., Alvaro, R., & Cicolini, G. (2021). Anxiety, sleep disorders and self-efficacy among nurses during COVID-19 pandemic: A large cross-sectional study. *J Clin Nurs*, *30*(9-10), 1360-1371. <https://doi.org/10.1111/jocn.15685>
- Stodolska, A., Wójcik, G., Barańska, I., Kijowska, V., & Szczerbińska, K. (2023). Prevalence of burnout among healthcare professionals during the COVID-19 pandemic and associated factors - a scoping review. *Int J Occup Med Environ Health*, *36*(1), 21-58. <https://doi.org/10.13075/ijomeh.1896.02007>
- Tayyib, N. A., & Alsolami, F. J. (2020). Measuring the extent of stress and fear among Registered Nurses in KSA during the COVID-19 Outbreak. *Journal of Taibah University Medical Sciences*, *15*(5), 410-416.
- Uğraş, G. A., Yüksel, S., Dölek, E. K., Erden, S., & Şirin, K. (2022). Health problems

and reasons for stress of intensive care nurses during COVID-19. *Florence Nightingale Journal of Nursing*, 30(1), 55.

Zheng, R., Zhou, Y., Fu, Y., Xiang, Q., Cheng, F., Chen, H., Xu, H., Fu, L., Wu, X., Feng, M., Ye, L., Tian, Y., Deng, R., Liu, S., Jiang, Y., Yu, C., & Li, J.

(2021). Prevalence and associated factors of depression and anxiety among nurses during the outbreak of COVID-19 in China: A cross-sectional study. *Int J Nurs Stud*, 114, 103809. <https://doi.org/10.1016/j.ijnurstu.2020.103809>