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Psychological factors associated with the spread of Coronavirus disease 2019 (COVID-19) among nurses working in health sectors in Saudi Arabia

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Abstract

Purpose: To assess psychological symptoms in terms of depression, anxiety, and impact of an event associated with the spread of Coronavirus disease 2019 (COVID-19) among nurses working in health sectors in Saudi Arabia and to investigate the relationship between the demographic variables of nurses and psychological symptoms.

Design and Methods: A cross-sectional descriptive correlation design using an electronic questionnaire.

Finding: Of the 1,265 nurses who completed the study, nearly three-quarters (74%) reported minimal or mild depression. The majority of participants reported minimal or mild symptoms of anxiety and impact of an event.

Practice Implications: Provides an introductory and evidence-based study for governments, policymakers, other stakeholders, and nurse educators of the current situation, and suggests possible enhancements and strategies to improve psychological health.

KEYWORDS
anxiety, Coronavirus disease 2019, depression, impact of an event, nurses

1 | INTRODUCTION

At the end of December 2019, Wuhan city in China reported an uncommon type of pneumonia produced by Coronavirus disease 2019 (COVID-19), which has since spread nationally and internationally.[1] The World Health Organization (WHO) stated that COVID-19 had become pandemic and a cause for international concern at an urgent meeting on January 30, 2020.[2] According to the Ministry of Health (MOH) in Saudi Arabia, there are 3,159 new confirmed cases of COVID-19 that have been declared in the Kingdom, bringing the total number to 226,486 cases, of which 61,309 cases are active. Of these, 2,220 cases are critical, whereas the health condition of the remaining individuals is stable. In addition, the total number of confirmed COVID-19 cases worldwide has reached 12,287,550.[3]

Globally, the COVID-19 pandemic is putting health systems under strain. The escalating demand for health services and on healthcare workers has overwhelmed many health systems, meaning that they are unable to work efficiently.[4]

> *"The best defense against any outbreak is a strong health system," stated WHO Director-General Tedros Adhanom Ghebreyesus. "COVID-19 is revealing how fragile many of the world's health systems and services are, forcing countries to make difficult choices on how to best meet the needs of their people."*[2]

WHO[4] issued guidelines to assist countries to sustain the necessary health services during the COVID-19 pandemic, highlighted their efforts to preserve the stability of the services provided, and created strategies to ensure the maximum benefit for the population, despite limited resources. Healthcare providers need to comply with the highest standard of precautions, particularly in hygiene practices

and the delivery of satisfactory personal protective supplies and equipment. This requires good planning and cooperation between the administrators of health facilities and governments.

In Saudi Arabia, health services are delivered through three chief providers: The MOH linkage of primary healthcare centers and hospitals, which are located all over the country; governmental institutions; and the private sector. In Saudi Arabia, there are about 415 governmental hospitals and 127 private hospitals, with 270 of them under the authority of the MOH. In 2014, the healthcare staff included 9,304 physicians (3 per 10,000 inhabitants), 18,136 nurses (5.9 per 10,000 inhabitants), and 9,690 allied health workers.[5]

Efficient and well-equipped health systems are very important to ensure reasonable health services during emergencies. Saudi Arabia recognized the risks and challenges following the announcement of the emergence of the COVID-19 pandemic, making preliminary and proactive decisions and taking impressive strict precautionary actions. Moreover, the Saudi MOH has prepared 34 hospitals throughout the Kingdom with over 80,000 beds, 8,000 Intensive Care Unit (ICU) beds, and 2,000 isolation rooms. It has also continuously supplied healthcare facilities with infection-preventing medical equipment.[6]

Globally, the psychological health of healthcare providers in general, and of nurses in particular, has been challenged in the COVID-19 pandemic. Several earlier studies revealed that healthcare providers suffer from adverse psychological disorders, such as anxiety and fear. Depression is one of the dominant disorders and is often seen among healthcare workers.[7] Nurses must wear an N95 mask and heavy protective garments, making it much harder for them to carry out procedures than under regular circumstances. These factors, alongside the fear of being infectious, could increase the chances of nurses experiencing negative psychological symptoms.

Psychological health is "The condition of the mind that shows whether someone is feeling happy, able to work, etc…" (Cambridge Dictionary).[8] Moreover, psychological health includes normal behavioral, emotional, and social development in an individual. It is usually acquired in society and through daily events and interactions. Worldwide, the healthcare systems in many countries acknowledge the significance and value of psychological health in the provision of care, because it supports positive coping mechanisms and reduces the symptoms of stress and depression.[4]

Psychological problems, including anxiety, depression, and posttraumatic symptoms, have led to a decrease in overall wellbeing during the COVID-19 pandemic. Wang et al.[9] revealed that after pandemics many healthcare professionals (nurses, doctors, and paramedics) experience recurrent mental and psychological health distress rather than physical harm. Nurses are the healthcare professionals who spend the most time with patients. For this reason, nursing is the most appropriate profession to provide care.

Lai et al.[10] carried out a cross-sectional study involving 1,257 participants: They reported an elevated incidence of mental health symptoms among healthcare providers who cared for patients with COVID-19 in China, namely, depression (50.4%), anxiety (44.6%), insomnia (34.0%), and distress (71.5%). They revealed that the causes of psychological problems might include feelings of susceptibility or failure of control, concerns regarding personal health, the spread of the virus and the health of family members and others, modification in work procedures, and continuous quarantine.

In this serious situation, healthcare providers are in the front line and dealing directly with the diagnosis and care of patients with COVID-19, which puts them at risk of psychological health problems. The continuing escalation of confirmed and suspected cases of COVID-19, the overwhelming workload, the reduction of personal protection equipment, and the shortage of some drugs, may contribute to the negative psychological symptoms experienced by healthcare providers. Previous studies[10,11] revealed that a notable proportion of healthcare providers suffer from an increase in psychological problems, including anxiety, depression, and stress.

Furthermore, Liu et al.,[12] in their study in China during the COVID-19 pandemic, reported that the prevalence of anxiety was 12.5%. They also reported that medical staff experienced symptoms of anxiety, particularly those who had direct contact with confirmed and suspected cases. Moreover, Sun et al.[13] measured the level of impact of an event for 442 participants in China. They found that the general impact of the pandemic on health-workers was at a mild level and that older and quarantined health-workers had an elevated negative impact of events. In addition, the majority of healthcare providers working in isolation departments in hospitals did not obtain any training for providing mental health care.[14]

Unfortunately, to our knowledge, and after an extensive search in a number of databases, there are no studies related to this issue in Saudi Arabia. The current study is unique and provides a new body of knowledge and evidence about psychological factors in terms of depression, anxiety, and the impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia.

1.1 | Significance of research

Today, psychological factors are considered an essential part of the health and quality of life of an individual. WHO has stressed the importance of a person's physical, psychological, social, and spiritual well-being. Also, there is an increasing acknowledgment within the healthcare system of the value and importance of psychological health in the provision of care and a demonstrated positive association between psychological health, individual healthcare outcomes, and quality of life.

Psychological health problems are currently occurring among healthcare providers who come into direct contact with patients with confirmed or suspected COVID-19. However, in Saudi Arabia, there has to date been no study to assess the psychological factors associated with the spread of COVID-19 among nurses. This study will provide significant evidence to promote the psychological well-being of nurses.

We provide an introductory and evidence-based study for governments, policymakers, other stakeholders, and nurse educators about the current situation, detail any potential enhancements, and suggest strategies to improve psychological health. This study could also be used as a baseline for additional assessment of psychological

factors among nurses during pandemics. Training programs to increase positive psychological health are very important, and integrating them into the curriculum is a vital process. Furthermore, the outcomes of this study could provide a platform for future policies and guidelines on how to help nurses cope with and adjust to critical conditions. Specific aims include decreasing the risk of nurses developing negative psychological symptoms, improving well-being, and encouraging preventive activities both in Saudi Arabia and more extensively in other developing countries in the region.

1.2 | Research questions

- What are the psychological symptoms in terms of depression, anxiety, and the impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia?
- Is there a relationship between the demographic variables of nurses and their psychological symptoms in terms of depression, anxiety, and impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia?
- What factors have psychological effects associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia?

1.3 | Research purposes

The purposes of this study were to assess psychological effects in terms of depression, anxiety, and the impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia and to investigate the relationship between the demographic variables of nurses and their psychological effects.

1.4 | Research design

A cross-sectional descriptive correlation design using an electronic questionnaire.

1.5 | Population and setting

The target population was all nurses from various governmental and private hospitals in various cities in Saudi Arabia.

1.6 | Sampling technique

This study adopted a nonprobability convenience sampling technique to engage participants who met the inclusion criteria. Nurses from hospitals were invited to voluntarily participate in the study by filling in an electronic questionnaire. The researcher sent the link to the questionnaire to nurses at hospitals during the data collection period and asked them to participate in the study and to send the link to their colleagues.

1.7 | Inclusion and exclusion criteria

The accessible population met the following inclusion criteria: Nurses who worked in healthcare sectors in Saudi Arabian hospitals and who had agreed to participate were eligible to take part in the study. There were no specific criteria for excluding participants regarding their characteristics (i.e., age, gender, etc.).

1.8 | Sample size

The sample size is a necessary part of the research design and has a considerable effect on the validity and significance of the results.[15] In this study, to calculate the required sample size and avoid the risk of having a type II error, the sample size was considered using the G*Power software program.[16] After inserting the significance level ($\alpha = 0.050$), the power $(1 - \beta) = 0.80$, and the medium effect size (Cohen's d) = 0.40.

1.9 | Instrument

The first section of the questionnaire was concerned with demographic characteristics: Gender (male or female), age (years), nationality, marital status, having children, live with old age (more than 60 years), educational level, years of experience, geographic location (place of residence), and hospital type (public, private). Participants were asked whether they were directly providing nursing care to patients who had confirmed or suspected COVID-19 and dealing with family members of patients who had confirmed COVID-19.

The second section assessed psychological factors in terms of depression, anxiety, and the impact of an event for all participants using the 9-item Patient Health Questionnaire (PHQ-9), the 7-item Generalized Anxiety Disorder (GAD-7), and the 22-item Impact of Event Scale-Revised (IES-R). These instruments were applied in the original version (English version) as the majority of nurses in Saudi Arabia are expatriates and English is their native language. The questionnaire was sent to three nurses to ensure that there were no ambiguities. The nurses reported that all items appeared clear and easy to understand. The time needed to complete the questionnaires was according to the convenience of participants.

A self-administered instrument for diagnosing common mental disorders is PHQ. It provides a total score in the range of 0–27, scoring each of the 9-item criteria between "0" (*not at all*) and "3" (*nearly every day*). The total scores of the tool are interpreted as follows: Normal (0–4), mild depression (5–9), moderate depression (10–14), and severe depression (15–27). It is a well-validated

screening instrument and has good internal consistency (Cronbach's $\alpha = 0.851$).[7] Cronbach's α of this tool in the present study was 0.86.

To diagnose anxiety, we asked participants to rate the frequency of anxiety symptoms in the previous 2 weeks using the 7-item GAD-7 questionnaire. It uses a Likert scale ranging from "0" (*not at all*) to "3" (*nearly every day*). The final score ranges from 0 to 21 and is interpreted as follows: Normal (0–4), mild anxiety (5–9), moderate anxiety (10–14), and severe anxiety (15–21). The GAD-7 demonstrates excellent predictive validity and reliability (Cronbach's $\alpha = 0.911$).[17] The internal consistency of the tool in the present study was 0.90.

The 22-item IES-R is very useful in evaluating the effect of everyday life stress and traumas. It ranges from 0 to 88 and is interpreted as follows: normal (0–8), mild distress (9–25), moderate distress (26–43), and severe distress (44–88). Test–retest reliability ranges from 0.89 to 0.94.[18] The internal consistency of the tool in the present study was 0.97.

To distinguish symptoms of major depression, anxiety, and the impact of an event, the cutoff scores were 10, 10, and 26, respectively. Participants who had scores higher than the cutoff scores were described as having severe symptoms of these disorders.

1.10 | Ethical considerations

This study complied with the principles of the Declaration of Helsinki. Permission to conduct the study was obtained from a specifically constituted research ethics committee, the Local Committee of Bioethics at Jouf University (Dated April 20, 2020/No 05-0841). A self-reported Google form of an electronic questionnaire was disseminated. The questionnaire detailed the purpose and significance of the study, and a letter assured the participants of confidentiality. No personal identification data were collected, so the participants' anonymity is assured. The cover letter noted that participation was voluntary, without any indirect or direct effects, and that the data collected would be utilized only in the current study. Moreover, it included contact data for the researcher to allow participants to ask questions regarding the study. The link was disseminated as a message via mobile phone and social media groups. Finished and put forward an electronic questionnaire, proposed participants' consent to participants.[15] Furthermore, participants were asked to pass on the link to their colleagues for maximal participation. Data collection was performed from the end of April 2020 until the middle of June 2020.

1.11 | Data analysis

The data were coded and analyzed using IMS SPSS Statistics version 23 (IBM). Data analysis includes descriptive statistics to describe nurses' demographics and levels of depression, anxiety, and impact of an event (means ± standard deviation) for continuous variables, and numbers and percentages for categorical variables). Spearman's correlation coefficient was used to explore the significant relationships between participants' demographic characteristics and psychological symptoms. Moreover, to determine the potential risk factors that affect psychological symptoms among nurses, a binary logistic regression analysis was performed. A result was considered to be statistically significant when two-tailed $p < 0.05$.

2 | RESULTS

2.1 | Participants' demographic characteristics

The demographic characteristics of the 1,265 nurses who finished the study are shown in Table 1. Nurses participated from all regions of Saudi Arabia: Western Region (Makkah, Jeddah, Taif, and Madinah); Northern Region (Hail, Aljouf, Tabouk, and Arar); Southern Region (Assir, Jazan, Najran, and Baha); Central Region (Riyadh and Qassim); and Eastern Region (Dammam, Jubail, and Hassa). The majority of participants were from the Central Region (60%). More than four-fifths of the participants were female (87%) and half of the participants (50.9%) were in the 31–40-years age group. Most of the participants (84.1%) were non-Saudis. The level of education was divided into four categories: Diploma degree, bachelor's degree, master's degree, and Ph.D. holders. Close to three-quarters of the participants (72.2%) had a bachelor's degree. More than half of the nurses were married (61.9%), more than half had children (56.1%), and lived with old age (more than 60 years) (16.1%). Less than half of the participants (45.5%) had more than 10 years of experience. Nearly all participating nurses working in a public government hospital (94.9%).

In addition to demographic data, information was gathered about whether the participants had provided care for patients who had confirmed or suspected COVID-19 and dealt with a family member for a patient who had confirmed COVID-19. Seven hundred nurses (55.3%) did not provide care for patients who had confirmed COVID-19. However, 749 nurses (59.2%) provided care for patients who had suspected COVID-19. About 20.6% of the participants dealt with a family member for a patient who had confirmed COVID-19.

2.2 | Level of depression, anxiety, and impact of an event among nurses

The levels of depression, anxiety, and impact of an event among nurses are shown in Table 2. Of the 1,265 nurses who completed the study, about 74% ($n = 936$) reported minimal or mild depression, whereas 25.9% ($n = 329$) reported moderate or severe depression. The mean total depression score was 6.89 ($SD = 5.88$).

Regarding anxiety level, the majority of participants (81.5%) reported minimal or mild symptoms, whereas 18.5% ($n = 234$) reported moderate or severe anxiety. The mean total anxiety score was 5.92 (SD = 5.21). Furthermore, regarding the impact of an event level, the majority of participants, 82.1% ($n = 1,039$), reported minimal or mild psychological impact, whereas 17.9% ($n = 226$) reported moderate or severe psychological impact. The mean was 19.28 ($SD = 18.10$).

TABLE 1 The demographic characteristics of the nurses ($N = 1,265$)

Variables	*N* (%)	*M* (*SD*)
Age (years)		
20–25	52 (4.1)	28.83 (5.29)
26–30	267 (21.1)	
31–40	644 (50.9)	
>40	302 (23.9)	
Gender		
Male	164 (13.0)	
Female	1,101 (87.0)	
Nationality		
Saudi	201 (15.9)	
Non-Saudi	1,064 (84.1)	
Marital status		
Single	456 (36)	
Married	783 (61.9)	
Divorced	16 (1.3)	
Widow	10 (0.8)	
Do you have children?		
Yes	710 (56.1)	
No	555 (43.9)	
Do you live with old age?		
Yes	204 (16.1)	
No	1,061 (83.9)	
Educational level		
Diploma	288 (22.8)	
Bachelor	913 (72.2)	
Master's degree or higher	64 (5.1)	
Years of experience		
≤1	54 (4.3)	
2–5	240 (19.0)	
6–10	396 (31.3)	
>10	575 (45.5)	
Type of hospital		
Public Government	1,201 (94.9)	
Private	64 (5.1)	
Do you provide care for patients who have confirmed COVID-19?		
Yes	338 (26.7)	
No	700 (55.3)	
Maybe	227 (17.9)	
Do you provide care for patients who have suspected COVID-19?		
Yes	749 (59.2)	
No	332 (26.2)	
Maybe	184 (14.5)	
Do you deal with family members of the patients who have confirmed COVID-19?		
Yes	261 (20.6)	
No	796 (62.9)	
Maybe	208 (16.4)	

Abbreviations: *M*, mean; *N*, frequency; *SD*, standard deviation; %, percent.

TABLE 2 Level of depression, anxiety, and impact of an event among nurses working in health sectors in Saudi Arabia ($N = 1,265$)

Variables	*N*	%	*M* (*SD*)
Depression			6.89 (5.88)
Minimal	511	40.4	
Mild	425	33.6	
Moderate	184	14.5	
Severe	145	11.4	
Anxiety			5.92 (5.21)
Minimal	636	50.3	
Mild	395	31.2	
Moderate	123	9.7	
Severe	111	8.8	
Impact of event			19.28 (18.10)
Minimal psychological impact	877	69.3	
Mild psychological impact	162	12.8	
Moderate psychological impact	33	2.6	
Severe psychological impact	193	15.3	

Abbreviations: *M*, mean; *N*, frequency; *SD*, standard deviation; %, percent.

2.3 | The relationship between demographic variables and psychological factors in terms of depression, anxiety, and impact of an event among nurses

Spearman's correlation coefficient was utilized to explore the significant relationships between participants' demographic characteristics and psychological symptoms, as presented in Table 3. Gender, type of hospital, and providing care for patients with confirmed COVID-19 were not statistically significant with levels of depression, anxiety, and impact of an event during the COVID-19 pandemic. However, Saudi nationality, younger age, single and married status, live with a person of older age (older than 60 years), fewer years of experience, providing care for patients with suspected COVID-19, and dealing with a family member for a patient with confirmed COVID-19 had statistically significant relationships with levels of depression, anxiety, and impact of an event. In addition, having children was statistically significant for levels of depression and anxiety: $r = 0.158$, $p < 0.001$ and $r = 0.085$, $p < 0.002$, respectively. Moreover, a higher level of education was significant for levels of depression ($r = 0.143$, $p < 0.001$).

2.4 | Univariable and multivariable analysis of the factors that affect the psychological factors of depression, anxiety, and impact of an event among nurses

To ascertain the degree and function of demographic variables on predicting the likelihood of psychological symptoms among nurses, binary logistic regressions after check assumptions were conducted.

TABLE 3 The relationship between nurse's demographic characteristics and psychological symptoms in terms of depression, anxiety, and the impact of an event among nurses working in health sectors in Saudi Arabia (N = 1,265)

		Depression	Anxiety	Impact of event
Age	Correlation coefficient	−0.220	−0.129	−0.134
	Sig. (2-tailed)	0.001**	0.001**	0.001**
Gender	Correlation coefficient	−0.044	−0.022	−0.052
	Sig. (2-tailed)	0.117	0.431	0.064
Nationality	Correlation coefficient	0.118	0.056	0.122
	Sig. (2-tailed)	0.001**	0.046*	0.001**
Marital status	Correlation coefficient	−0.178	−0.086	−0.085
	Sig. (2-tailed)	0.001**	0.002**	0.002**
Have children	Correlation coefficient	−0.158	−0.085	−0.048
	Sig. (2-tailed)	0.001**	0.002**	0.088
Live with person of old age (more than 60 years)	Correlation coefficient	−0.090	−0.066	−0.095
	Sig. (2-tailed)	0.001**	0.020*	0.001**
Educational level	Correlation coefficient	0.143	0.052	0.015
	Sig. (2-tailed)	0.001**	0.062	0.592
Years of experience	Correlation coefficient	−0.165	−0.084	−0.080
	Sig. (2-tailed)	0.001**	0.003**	0.004**
Type of hospital Provide care for patients with confirmed COVID-19	Correlation coefficient	0.018	0.012	0.041
	Sig. (2-tailed)	0.528	0.669	0.146
	Correlation coefficient	−0.034	−0.026	−0.034
	Sig. (2-tailed)	0.225	0.351	0.225
Provide care for patients with suspected COVID-19	Correlation coefficient	−0.119	−0.088	−0.100
	Sig. (2-tailed)	0.001**	0.002**	0.001**
Deal with family members for patient with confirmed COVID-19	Correlation coefficient	−0.087	−0.070	−0.083
	Sig. (2-tailed)	0.002**	0.013*	0.003**

Abbreviation: Sig., significance.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

To distinguish the symptoms of major depression, anxiety, and impact of an event, the cutoff scores were 10, 10, and 26, respectively. Participants who had scores higher than the cutoff score were characterized as having severe symptoms. The dependent variables were categorical with two categories based on cutoff score (i.e., having severe symptoms or not having severe symptoms).

In the bivariate analysis, no statistically significant differences existed in the percentage of nurses who had severe symptoms of depression, anxiety, and impact of an event during the COVID-19 pandemic according to their nationality, gender, having children, years of experience, type of hospital, marital status, and educational level. A multivariable logistic regression analysis was carried out after adjusting for the effect of potential confounders, and variables that significantly predicted having severe symptoms of depression, anxiety, and impact of an event among nurses working in health sectors in Saudi Arabia are presented in Table 4.

The overall model for demographic variables in predicting the likelihood of severe depression as the predictor variable was statistically significant, $\chi^2(23) = 106.863$, $p < 0.001$, with an R^2 of demographic variables accounting for 81% of the variance in depression levels. Model fitness was checked with the Hosmer Lemeshow test, $\chi^2(8) = 4.078$, $p = 0.850$; consequently proportional odds models were implemented. Age for 20–25 years (odds ratio [OR] 3.51, $p = 0.008$), 26–30 years (OR 3.35, $p < 0.001$), and 31–40 years (OR 2.49, $p < 0.001$) for depression. This undoubtedly explained that the strongest predictor of having severe symptoms of depression was younger age, because those who were 20–25 years were about 3.51 times more likely to have severe symptoms of depression than those of older age. Also, nurses who provided care for patients with confirmed COVID-19 variables had severe symptoms of depression (OR 0.55, $p = 0.009$) were 0.55 times than those who did not.

The overall model for demographic variables on the prediction of the likelihood of severe anxiety level as the predictor variable was statistically significant, $\chi^2(23) = 47.66$, $p = 0.002$, with an R^2 of demographic variables accounting for 37% of the variance in anxiety levels. Model fitness was checked with the Hosmer Lemeshow test, $\chi^2(8) = 10.04$, $p = 0.262$, and, therefore, proportional odds models were utilized. The strongest predictor of having severe symptoms of

TABLE 4 The factors that affect psychological symptoms in terms of depression, anxiety, and the impact of an event among nurses working in health sectors in Saudi Arabia (*N* = 1,265)

	Depression								Anxiety								Impact of event							
	Having severe symptom						95% CI for Exp(B)		Having severe symptom						95% CI for Exp(B)		Having severe symptom						95% CI for Exp(B)	
Predictor variables	Yes *N* (%)	No *N* (%)	*B*	SE	Sig.	Exp (B)	Lower	Upper	Yes *N* (%)	No *N* (%)	*B*	SE	Sig.	Exp (B)	Lower	Upper	Yes *N* (%)	No *N* (%)	*B*	SE	Sig.	Exp (B)	Lower	Upper
Age (years)																								
20–25	19 (36.5)	33 (63.5)	1.25	0.47	0.008**	3.51	1.38	8.93	12 (23.1)	40 (76.9)	0.82	0.52	0.117	2.27	0.815	6.36	22 (42.3)	30 (57.7)	0.67	0.44	0.124	1.97	0.830	4.67
26–30	81 (30.3)	186 (69.7)	1.21	0.32	0.001**	3.35	1.78	6.29	57 (21.3)	210 (78.7)	0.87	0.34	0.011*	2.40	1.22	4.70	91 (34.1)	176 (65.9)	0.61	0.28	0.032*	1.84	1.05	3.20
31–40	153 (23.8)	491 (76.2)	0.91	0.24	0.001**	2.49	1.55	4.00	106 (16.5)	538 (83.5)	0.50	0.24	0.039*	1.66	1.02	2.69	187 (29)	457 (71)	0.46	0.19	0.021*	1.58	1.07	2.34
>40	31 (10.3)	271 (89.7)	Ref						33 (10.9)	269 (89.1)							60 (19.9)	242 (80.1)						
Live with person of old age																								
Yes	60 (29.4)	144 (70.6)	0.27	0.20	0.17	1.3	.88	1.96	45 (22.1)	159 (77.9)	0.49	0.22	0.025*	1.64	1.06	2.52	78 (38.2)	126 (61.8)	0.35	0.18	0.05*	1.42	.987	2.04
No	224 (21.1)	837 (78.9)	Ref						163 (15.4)	898 (84.6)							282 (26.6)	779 (73.4)						
Provide care for patients with confirmed COVID-19																								
Yes	104 (30.8)	234 (69.2)	−0.11	0.22	0.60	0.89	.571	1.38	73 (21.6)	265 (78.4)	−0.15	0.25	0.541	0.858	0.526	1.40	122 (36.1)	216 (63.9)	−0.27	0.21	0.198	0.761	0.503	1.15
No	118 (16.9)	582 (83.1)	−0.58	0.22	0.009**	0.55	.363	0.862	90 (12.9)	610 (87.1)	−0.54	0.24	0.025*	0.579	0.359	.934	160 (22.9)	540 (77.1)	−0.65	0.20	0.001**	0.520	0.348	0.776
Maybe	62 (27.3)	165 (72.7)	Ref						45 (19.8)	182 (80.2)							78 (34.4)	149 (65.6)						
Provide care for patients with suspected COVID-19																								
Yes	196 (26.2)	553 (73.8)	0.19	0.24	0.42	1.2	0.758	1.94	138 (18.4)	611 (81.6)	−0.07	0.26	0.766	.925	.554	1.54	243 (32.4)	506 (67.6)	0.42	0.22	0.05*	1.53	0.990	2.37
No	53 (16)	279 (84)	−0.03	0.28	0.90	0.96	0.557	1.68	42 (12.7)	290 (87.3)	−0.15	0.30	0.609	.856	.471	1.55	76 (22.9)	256 (77.1)	0.25	0.25	0.324	1.28	0.779	2.13
Maybe	35 (19)	149 (81)	Ref						28 (15.2)	156 (84.8)							41 (22.3)	143 (77.7)						
Deal with family members for patient with confirmed COVID-19																								
Yes	88 (33.7)	173 (66.3)	0.30	0.24	0.21	1.3	0.839	2.17	64 (24.5)	197 (75.5)	0.62	0.27	0.025*	1.86	1.08	3.20	101 (38.7)	160 (61.3)	0.37	0.23	0.109	1.44	0.921	2.28
No	146 (18.3)	650 (81.7)	−0.08	0.22	0.68	0.91	0.595	1.40	113 (14.2)	683 (85.8)	0.26	0.25	0.288	1.30	0.798	2.13	202 (25.4)	594 (74.6)	0.13	0.20	0.524	1.14	0.762	1.70
Maybe	50 (24)	158 (76)	Ref						31 (14.9)	177 (85.1)							57 (27.4)	151 (72.6)						

Note: The level of depression, anxiety, and impact of events were the dependent variables.

Abbreviations: 95% CI, 95% confidence interval; *B*, unstandardized coefficient; Exp(B), standardized coefficient; *N*, frequency; Sig., significance; %, percent.

*Significant at the 0.05 level (2-tailed).

**Significant at the 0.01 level (2-tailed).

anxiety was age, because those who were 26–30 years (OR 2.40, $p = 0.011$) were about 2.40 times, and those who were 31–40 years (OR 1.66, $p = 0.039$) were about 1.66 more likely to have severe symptoms of anxiety than those of older age (over 40 years). In addition, nurses who provided care for patients with confirmed COVID-19 variables have severe symptoms (OR 0.57, $p = 0.025$) were 0.57 times than those who did not.

On the contrary, nurses who lived with an older person (older than 60 years) were significantly associated with severe symptoms of anxiety (OR 1.64, $p = 0.025$) was about 1.64 times than those who did not. Dealing with a family member of a patient with confirmed COVID-19 was significantly associated with severe symptoms of anxiety (OR 1.86, $p = 0.025$) and about 1.86 times higher than for those who did not.

The overall model for demographic variables on the prediction of the likelihood of severe impact of an event level as the predictor variable was statistically significant, $\chi^2(23) = 75.01$, $p < 0.001$, with an R^2 of demographic variables accounting for 58% of the variance in the impact of an event level. Model fitness was checked with the Hosmer Lemeshow test, $\chi^2(8) = 6.31$, $p = 0.613$, and accordingly proportional odds models were employed. The strongest predictor of having severe symptoms of the impact of an event was age because those who were 26–30 years (OR 1.84, $p = 0.032$) were about 1.84 times than those of older age (over 40 years).

Moreover, nurses who provided care for patients with confirmed COVID-19 were 0.52 times more likely to experience severe symptoms (OR 0.52, $p < 0.001$) than those who did not. On the contrary, nurses who lived with someone of older age (older than 60 years) were significantly associated with severe symptoms of the impact of an event (OR 1.42, $p = 0.05$), which was 1.42 times than those who did not. Moreover, nurses who provided care for patients who had suspected COVID-19 were significantly associated with severe symptoms of the impact of an event (OR 1.53, $p = 0.05$) were 1.53 times than those who did not.

3 | DISCUSSION

The COVID-19 pandemic has affected millions of people worldwide from December 2019 until the present. Owing to the alarming rate of the spread of COVID-19, medical professionals are implementing new strategies for treating and containing this disease. This is the first study to attempt to assess the psychological factors of depression, anxiety, and impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia and to investigate the relationship between nurses' demographic variables and psychological factors.

This study found that about three-quarters of the nurses had minimal or mild depression, whereas about one-quarter had moderate or severe depression. These results are higher than in Lai et al.[10] This might be explained by the fact that nurses in hospitals in Saudi Arabia experience heavy workloads due to the escalating number of confirmed and suspected cases, which leads to an increased psychological health burden.

Regarding anxiety levels, the study revealed that four-fifths of participants experienced minimal or mild symptoms of anxiety, whereas close to one-fifth experienced moderate or severe symptoms. These results are higher than in Lai et al.[10] and Liu et al.[12] This could be explained by the different assessment tools and differing times since the advent of COVID-19. By the time this study was performed, nearly one and a half months after the first COVID-19 patient was declared in Saudi Arabia, healthcare workers, especially nurses, had had adequate time to regulate caring for confirmed and suspected cases and to gain confidence in their responsibilities. Furthermore, the Saudi MOH was providing stricter and safer protective procedures to support healthcare providers, particularly nurses, to reduce anxiety.

Regarding the impact of an event, our study found that the majority of participants reported minimal or mild psychological impact, and 17.9% reported moderate or severe impact, which is congruent with the literature, demonstrating that 71.5% of participants reported symptoms of distress.[10] In addition, Sun et al.[13] found the impact of an event to be at a mild level among healthcare providers.

The current study revealed that younger age groups were significantly associated with a greater likelihood of having severe symptoms of depression, anxiety, and the impact of an event. These results are in agreement with Mukhtar.[19] In contrast, Sun et al.[13] found that the older the health workers, the higher the impact of event score. This may be explained by the fact that younger nurses have fewer years of experience. Thus, they have a lower ability to handle crisis and disaster situations than older nurses who have more years of experience. Therefore, it is important to train nurses about self-protection and provide information about the characteristics of a pandemic, ways in which the virus is transmitted, diagnostic criteria, and clinical treatment. Furthermore, psychological counseling, including crisis and distress management courses with positive coping techniques, was very significant in decreasing the psychological burden. It should also be ensured that high-quality communication and correct updates of data are disseminated to all staff and that nurses are rotated from higher-stress to lower-stress departments.

In addition, the analysis revealed that providing care for patients with confirmed COVID-19 was significantly associated with a higher probability of having severe symptoms of depression, anxiety, and the impact of an event. Moreover, providing care for patients who had suspected COVID-19 was significantly associated with severe symptoms of the impact of an event, about one and half times than those who did not. Dealing with a family member of a patient with confirmed COVID-19 was significantly associated with severe symptoms of anxiety, about near one and half times than those who did not. This is consistent with earlier research[10,12] which found that medical staff who were in direct contact with confirmed and suspected cases of COVID-19 were significantly associated with an elevated risk of depression, anxiety, and distress compared with those who had not had direct contact. The main significant variable was suspected cases, with high anxiety scores, compared with non-suspected cases. This may be explained by the fact that nurses who

are in direct contact with confirmed cases of COVID-19 have more hazardous exposure to themselves. Another reason could be related to the hazardous working conditions regarding infection; because of the pandemic, the high transmission rate, quickly worsening, and pathogenicity might have a direct negative impact on psychological symptoms associated with the spread of COVID-19 among nurses.

Participants who lived with someone of older age (older than 60 years) and had children were associated with more severe psychological symptoms than those who did not. This may be because nurses were anxious about the transmission of COVID-19 from the hospital and the consequences for the health of their family, leading to the majority of nurses feeling more anxious and the impact of an event in becoming infected with this disease. Thus, the nurses in this study are concerned about their personal life, especially those who have children and live with someone of older age, because this age group is more vulnerable to infectious disease. Furthermore, WHO[4] recommended promoting and monitoring work hours and applying undemanding schedules for nurses who are directly impacted or who have a family member affected by a stressful event. Also, time should be made for colleagues to offer social support to others.

The Saudi MOH has implemented a range of procedures to decrease the pressure and anxiety on nurses, such as decreasing the workload and work pressure by increasing the number of staff in specific departments, adhering to infection-control guidelines, and providing personal protective equipment. It has also established psychological crisis intervention groups to offer psychological services, including psychological counseling and the dissemination of reliable information about the COVID-19 pandemic. In addition, the MOH tweets and publishes on its Twitter page <<Of_You_I_Am_-Proud>>. Using this hashtag, it is possible to thank a health professional, express pride in their great efforts, and appreciate their sacrifices during the COVID-19 pandemic, with the aim of increasing their psychological well-being.[20]

3.1 | Recommendation

Findings from this study support further research to examine the long-term psychological factors associated with the spread of COVID-19 among nurses. Additional studies incorporating both quantitative and qualitative methods might help to expand and deepen explorations. A trial with more statistical power and longer-term follow-up could provide more conclusive evidence of the effect of the COVID-19 pandemic. Protecting all nursing staff from chronic anxiety and depression, which constitute a psychological health burden during the COVID-19 pandemic, will enable them to carry out their roles.

3.2 | Limitations

Even though this study presents much-appreciated findings and provides a significant contribution to the literature on the topic of study, various limitations are recognized. Using a nonprobability sampling method (convenience sampling) means that the sample may not be representative of all nurses. A randomized sample should be used in future studies. Also, the responses of the participants were subjective, and all the data in the questionnaire were self-responses. Consequently, reliable data from participants is needed. Moreover, the current study was not capable of assessing psychological factors at different times and different levels; therefore, investigations into long-term effects and follow-up are recommended. Finally, the current study implements a cross-sectional design that cannot conclude causality between factors and outcomes.

4 | CONCLUSION

The COVID-19 pandemic is an international health emergency that creates a challenge to the psychological status of healthcare providers and particularly nurses. The purposes of this study were to assess psychological factors in terms of depression, anxiety, and impact of an event associated with the spread of COVID-19 among nurses working in health sectors in Saudi Arabia, and to investigate the relationship between the demographic variables of nurses and psychological factors. In total, 1,265 nurses completed the study using an electronic questionnaire. Nearly three-quarters of participants (74%) reported minimal or mild depression. The majority of participants (81.5%) reported minimal or mild symptoms of anxiety. Furthermore, most participants (82.1%) reported minimal or mild impact of an event. The strongest predictors of having severe symptoms of depression, anxiety, and impact of an event were younger age and providing care for patients with confirmed COVID-19.

5 | IMPLICATIONS FOR NURSING PRACTICE

This study has attempted to investigate the effect of the spread of COVID-19 on psychological factors in terms of depression, anxiety, and the impact of an event. Moreover, it provides an introductory and evidence-based study for governments, policymakers, other stakeholders, and nurse educators about the current situation, any possible enhancements, and suggests strategies to improve psychological health.

This study can be used as a baseline for the additional assessment of psychological factors among nurses during the pandemic. Furthermore, administrators in hospitals should implement policies to improve psychological health, such as decreasing work hours, increasing the number of staff in specific departments, decreasing workload and work pressure, providing personal protective equipment, encouraging nurses to obey infection-control guidelines, offering social support, and providing psychological counseling.

In addition, the findings from this study emphasize the factors that have major impacts on psychological health and that need to be

taken into consideration when looking after nurses during a pandemic. Healthcare authorities and governments should proactively implement appropriate psychological intervention programs to prevent, alleviate, or treat psychological burdens. Furthermore, healthcare leaders can provide direct psychological health support to the affected nurses and strongly advocate for them in communities and organizations. These steps are essential to alleviate the burden on nurses and to enhance their inspiration and enthusiasm. Educators may also teach and coach future nurses to deal with the psychological health consequences of a pandemic, including depression, anxiety, and the effect of an event.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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