Anxiety, Stress, and Depression Among Healthcare Professionals During the COVID-19 Pandemic: A Cross-Sectional Study in Morocco

Oumnia Bouaddi, DMD[1,2,3] (iD), Ndjoubnane Mohamed Abdallahi, MD[1],
Cheikh Mohamed Fadel Abdi, MD[4], Kenza Hassouni, PhD[1], Manar Jallal, MD[5],
Roukaya Benjelloun, MD[6], Zakaria Belrhiti, PhD[1,2], Chakib Nejjari, PhD[1],
and Mohamed Khalis, PhD[1,2,3,7]

Abstract

The COVID-19 pandemic has caused an enormous psychological impact worldwide. This study aimed to assess anxiety, depression, stress, and compensatory behaviors among Moroccan healthcare workers (HCWs) during COVID-19. This descriptive cross-sectional study was conducted using a snowball sampling strategy. This descriptive cross-sectional study was conducted using a snowball sampling strategy. Online surveys were sent to groups of HCWs working in Casablanca and Fez cities. Post-traumatic stress disorder (PTSD) was measured using the Impact of Event Scale revised (IES-R) scale, and the DASS-21 was used to measure anxiety, depression, and stress among participants. Compensatory behaviors used by HCWs to manage these symptoms were also investigated. The majority of participants (72.5%) experienced moderate to severe distress during the COVID-19 pandemic. The majority of participants (53.1%) reported symptoms of mild to extremely severe depression. Overall, nurses, female, and frontline HCWs experienced more stress, anxiety, and depression ($P < .001$). Leisure activities (29%), sport (19%), and drinking tea/coffee (19%) were the most common compensatory behaviors. Our findings suggest that psychological support and interventions targeting high-risk HCWs with heavy psychological distress are needed. It is of paramount importance to improve the psychological endurance and safeguard the mental and physical well-being of HCWs, who find themselves on the frontline of health and humanitarian crises, when they are needed the most.

Keywords

mental health, anxiety, depression, stress, healthcare workers, COVID-19, Morocco

---

What do we already know about the topic?
Healthcare workers are exposed to stress and anxiety in the workplace and this burden intensifies during health emergencies.

How does your research contribute to the field?
This study documents the psychological burden experienced by Moroccan healthcare workers during the COVID-19 pandemic.

What are your research's implications toward theory, practice, or policy?
Our findings should guide the government and policy-makers in taking the necessary steps to maintain a healthy and motivated workforce, which can adequately respond to population needs during and outside of health emergencies.

Introduction

The coronavirus pandemic continues to wreak havoc around the world and is still causing an enormous strain on global health systems. Lockdowns and movement restrictions imposed in response to the COVID-19 outbreak have had a negative impact on the mental well-being of the world's population.[1-3] Since the early days of the pandemic, the healthcare workforce has been under tremendous pressure in order to respond to urgent healthcare needs as well as to maintain delivery of routine care services.[4] Outside of pandemics, healthcare workers (HCWs) are disproportionately exposed to stress and anxiety linked to workload, patient deaths, and other environmental stressors. This burden on the mental health of HCWs intensifies during epidemics, pandemics,[5] and humanitarian crises, due to the additional

pressure these events exert on healthcare systems.[6] During the COVID-19 pandemic, HCWs faced an increase in hospitalization and mortality, separation from family members, a high risk of contracting the SARS-CoV2, and shortages in protective equipment and resources.

Delivering high quality patient care has been shown to be intimately linked to the mental well-being of the healthcare workforce and is well-documented by a robust body of evidence.[7] Consequently, the psychological burden of the COVID-19 crisis on HCWs has naturally attracted the attention of several research investigations since the early days of the pandemic.[5] Previous studies have shown that the most common mental health manifestations experienced by HCWs during the coronavirus crisis were; Post-Traumatic Stress Disorder (PTSD), anxiety, depression, acute stress, insomnia, and fear.[8-10] Furthermore, the findings of previous studies strongly suggest that being female, nurse, or a frontline healthcare worker is associated with higher levels of psychological manifestations.[11]

Following the onset of the COVID-19 crisis, several remote psychological support units were established in Moroccan hospitals and mental health support platforms were launched by the Moroccan Association of Psychiatry, the Moroccan Society of Clinical Psychologists, the Moroccan Association of Psychologists and the National Order of Physicians.[12] These initiatives aimed to alleviate the impact of the pandemic on the mental health of both HCWs and the Moroccan population. Despite these efforts, 1 qualitative study showed that Moroccan healthcare personnel—especially those with underlying conditions—identified COVID-19 as the most stressful event in their careers and expressed a low level of satisfaction with the psychological support they received from their organizations and the government alike. These findings were significantly associated with a high workload and a low satisfaction with supervisors within working organization.[13] Furthermore, 1 investigation reported a high level of burnout among Moroccan frontline HCWs during the COVID-19 pandemic.[14] To the best of our knowledge, no previous quantitative study has attempted to measure the levels of stress, anxiety, and depression among Moroccan HCWs during the COVID-19 pandemic. Therefore, our aim is to investigate the prevalence of these mental health symptoms among HCWs as well as to identify the compensatory behaviors they used to manage them. This study will document the experiences of HCWs during a health crisis and should guide the policy-makers in taking the necessary steps to maintain a healthy and motivated workforce, which can adequately respond to population needs during and outside of health emergencies. This research will also help identify disproportionately at-risk groups among HCWs which should propel the design of tailored interventions.

Materials and Methods

Study Design and Population

This is a cross-sectional, descriptive study with a snowball sampling strategy conducted in June and July 2020. The inclusion criteria for recruitment was being a physician or a nurse working in a healthcare facility in Morocco during the COVID-19 pandemic regardless of the department. Pregnant women and immune-compromised healthcare professionals were excluded from the study.

Data Collection

Data were collected via an anonymous questionnaire created on Google Forms, which was sent via WhatsApp to groups of HCWs working in Casablanca and Fez cities, who were then encouraged to share it with their colleagues.

The sample size was calculated using the OpenEpi, version 3 software (www.OpenEpi.com)

$$n = [DEFF * N_p(1-p)]/[(d^2/Z^2_{1-\alpha/2} * (N-1) + p*(1-p)]$$

N is Population size (for finite population correction factor or fpc) = 1250; p is the hypothesized (%) frequency of outcome factor in the population (50% ±5; confidence limits as % of 100) (absolute ±%)(d) = 5%; DEFF (design effect = 1); Z is a constant = 1.96 for 95% confidence interval. Based on the above parameters the minimum required sample size (n) was 203 participants.

This questionnaire comprised of 3 main sections; the first section included general information, for example, gender (male or female), age (years), marital status (single, married, divorced, or widowed), dependents (child, parents, or others), profession (physician or nurse), sector (public or

[1]International School of Public Health, Mohammed VI University of Health Sciences (UM6SS), Casablanca, Morocco
[2]Knowledge for Health Policies Center, Casablanca, Morocco
[3]Mohammed VI Center for Research and Innovation
[4]Psychiatry Department, Ibn Al Hassan Hospital, Hassan II, Fez, Morocco
[5]Faculty of Medicine and Pharmacy, Hassan II University, Casablanca, Morocco
[6]Psychiatry Department, Cheikh Khalifa International University Hospital, Mohammed VI University of Health Sciences, Casablanca, Morocco
[7]Higher Institute of Nursing Professions and Health Technology, Rabat, Morocco

Corresponding Author:
Oumnia Bouaddi, Mohammed VI University of Health Sciences, Avenue Mohamed Taieb Naciri, Casablanca 82 403, Morocco.
Email: obouaddi@um6ss.ma

private), workplace (frontline: COVID-19 isolation unit, emergency and resuscitation, or non-frontline), work schedule (continuous or rotating), and years of experience ([0-5 years] [5-10 years], [10-15 years], [15-20 years], and ≥20 years), the second section measured psychological distress, we used the Impact of Event Scale revised (IES-R) a validated 22-item self-report measure of symptoms of PTSD. The IES-R is mainly used for recent and specific traumatic events. Total scores were categorized as follows: normal distress (0-23), mild distress (24-32), moderate distress (33-36), and severe distress (>37). A cut-off score of 24 was used to define PTSD.[15,16] The third section measured depression anxiety and stress using the Depression Anxiety Stress Scales (DASS-21). DASS-21 is a validated screening tool for measuring mental health status using the Depression, Anxiety, and Stress Scale. This is a 21-item measurement instrument developed by the University of New South Wales Australia, which provides independent measures of depression, stress, and anxiety with recommended severity cutoffs for the 3 subscales. The DASS-21 has been used extensively in similar studies in several other countries.[17,18] The scores for each of the 3 components were calculated by adding the scores for the relevant items and multiplying them by 2 to calculate the final score. Each subscale contains 7 questions. Questions 3, 5, 10, 13, 16, 17, and 21 measured depression, questions 2, 4, 7, 9, 15, 19, and 20 measured anxiety, and questions 1, 6, 8, 11, 12, 14, and 18 measured stress. Cut-off points of >9, >7, and >14 were used to define depression, anxiety, and stress, respectively. There were 5 levels for the cutoff point based on the DASS-21 containing score: normal, mild, moderate, severe, and extremely severe.[19] The study was conducted according to the guidelines of the Helsinki Declaration. Participation in this study was voluntary and informed electronic consent was obtained from all participants.

Statistical Analysis

All statistical analyses were performed using SPSS software (version 21). The quantitative data are expressed in means (±standard deviations) and the qualitative data in numbers and percentages (%). We applied Student's *t*-test (parametric distribution) and the Mann Whitney *U* test (nonparametric distribution) to compare quantitative variables, and the chi-square test (χ^2) to test the association between qualitative variables. The significance level was set at .05. At the level of the "profession" variable, health professionals were grouped together. At the level of "workplace," resuscitation, emergency, and isolation unit workers were groups into the "frontline" variable.

Results

Sociodemographic and General Characteristics

A total of 211 participants responded to the questionnaire, including 119 women (56.4%) and 92 men (43.6%). Almost half of the study participants (46.4%) were physicians and

Table 1. Socio-Demographic Characteristics of the Study Sample.

Variables	Workforce (n = 211)	Percentage (%)
Gender		
Male	92	43.4
Female	119	56.4
Age		
≤20	3	1.4
20-50	202	95.7
>50	6	2.8
Marital status		
Single	116	55.3
Married	88	41.7
Divorced	7	3.0
Dependent persons		
Children	68	32.2
Parents	75	35.6
Others	68	32.2
Profession		
Physician	98	46.4
Nurse	113	53.6
Work sector		
Public	173	82.0
Private	38	18.0
Placement during COVID-19		
Frontline	86	40.8
Non-frontline	125	59.2
Work schedule		
Continuous	85	40.3
Alternating	126	59.7
Years of experience		
[5-10 years]	158	74.9
[10-20 years]	42	19.9
≥20 years	11	5.2

53.6% were nurses. Of all participants, approximately 40.8% were primary care professionals and 59.2% worked in other settings. The 20 to 50 age group accounted for 95.7% of the study participants. Over half of the respondents (55.5%) were single and the majority (82%) worked in the public sector (Table 1).

DASS-21 and IESR Measurement Scores

IESR score. The majority of participants suffered from mild to severe distress (72.5%) during the pandemic, with an average score of 23.6 ± 19.6. The mean score was higher among women (26 ± 20.1) compared to men (19.3 ± 18.3), among nurses (25.3 ± 20.8) compared to physicians (20.6 ± 16.7), and among frontline HCWs (26.9 ± 20.3) compared to non-frontline HCWs (20.3 ± 18.9). All differences were statistically significant (*P* < .001).

DASS-21 score. Of the 211 participants, 112 (53.1%) had experienced symptoms of mild to extremely severe depression.

The mean score for depression was 12 ± 9.5. Approximately 58.3% of participants have experienced mild to extremely severe anxiety with an average score of 10.6 ± 9. More than half of respondents (55.1%) have experienced stress, with an average score of 12.7 ± 8.9. In addition, female HCWs, nurses, and frontline HCWs had the highest mean scores for depression, anxiety, and stress ($P < .001$; Table 2).

Compensatory behaviors in the event of stress. Among the participants, approximately 29% used leisure activities as compensatory behaviors to alleviate the psychological symptoms, 19% sport, 19% used tea/coffee, 6% used smoking, 3% used analgesics only, and 1% used alcohol or psychotropic drugs (Table 3).

Discussion

Our study aimed to assess stress, anxiety, and depression among Moroccan HCWs, and to identify common compensatory behaviors used to deal with the psychological burden associated with COVID-19. Overall, the majority of HCWs suffered from mild to severe levels of psychological distress, depression, anxiety, and stress during the pandemic. Nurses, females, and frontline HCWs experienced higher levels of these psychological symptoms.

The majority of participants (72.5%) in this study suffered from mild to severe levels of distress during the pandemic. This is consistent with findings from other investigations in The Philippines (IESR 19.5 ± 13.12), Canada—where 78.7% intensive care unit HCWs reported feeling "constantly under strain"[20]—and in the United Kingdom—where 77.7% felt that they were under a lot of stress.[21] Contrasting findings were reported among HCWs in India and Singapore, where only 5.2% suffered moderate to severe levels of psychological distress during COVID-19.[22] In our study, psychological distress scores were higher among female HCWs, which is consistent with most studies.[20,21,23] However, contradicting results were reported in Saudi Arabia where male HCWs suffered from more distress compared to their female counterpart.[24] In addition to gender, previous studies have identified several other factors associated with the risk of PTSD among HCWs, such as younger age, fewer years of professional experience, marital status, stigma, and a history of psychiatric disorders. Adequate training and support were identified as protective factors.

In this study, nurses were more subject to psychological distress compared to other HCWs. This may be explained by their frequent contact with patients, which results in additional stress about risk of infection but may also be due to the fact that most nurses in Morocco are female. Additionally, frontline HCWs in this study suffered higher levels of psychological distress compared to non-frontline HCWs. This is supported by several other studies which show that being close to "ground zero" increases susceptibility to severe stress and trauma.[25,26] Interestingly, directly caring for SARS-CoV-2 patients and working during previous SARS outbreaks were also shown to be protective factors against traumatization[25]; these results were often explained by higher levels of perceived knowledge, experience, and familiarity in dealing with outbreaks, which may have a mitigating effect on the feelings of uncertainty and powerlessness.[27] Although these interpretations remain inconclusive,[28] the evidence for improving workplace culture, fostering clear and transparent communication, reducing stigmatization, and increasing psychological support is unanimous.

More than half of the participants in this study experienced anxiety, stress, and symptoms of mild to severe depression. The results of this study are almost similar to those reported among HCWs in other countries such as India and Singapore (50%)[22] and Bangladesh (44%).[29] A higher rate (72.3%) of moderate to extremely severe depression was reported in Pakistan.[30] In the host population, 1 systematic review and meta-analysis showed that the global prevalence of depression, anxiety, stress, and insomnia during the COVID-19 pandemic were 28.18%, 29.57%, 20.18%, and 23.5%, respectively.[31] For anxiety, lower rates (21.1%) of moderate to severe anxiety were reported among HCWs in Saudi Arabia[28] and higher rates (60%) were observed in Jordan.[32] This study shows that female and frontline HCWs experienced more anxiety, depression, and stress which is consistent with studies in other countries.[5,9] Other studies also identified additional psychological symptoms such as insomnia, sleep disturbance, and burnout among HCWs during COVID-19. Likewise, these psychological manifestations affected women, frontline HCWs, younger professionals, and nurses to a greater extent.[33] It is worth noting that stigma, shortages in personal protective equipment, fear of putting relatives at risk, and unhealthy rotations were identified as aggravating factors. Contrastingly, social and family support and adequate knowledge about prevention and control measures from authorities were protective factors; these factors promote mental health and psychological endurance among HCWs[34]and should be an appropriate target for interventions that seek to safeguard the mental well-being of the healthcare workforce.[34] Furthermore, low self-efficacy was shown to trigger anxiety which subsequently hinders performance[35]; consequently, training and capacity building programs are needed in order to break this vicious cycle. Given the nature of the social fabric in Morocco, the authors also suggest that social and family support should be capitalized on, and professional help should be made available for HCWs presenting with mild to severe symptoms. Tele-consultation was shown to improve quality of care and health outcomes in psychiatric care and should also be leveraged to reach HCWs in all regions in Morocco.[36] In fact, digital or internet cognitive behavioral therapy (CBT) has been identified as a cost-effective intervention and was shown to produce positive outcomes in the treatment of insomnia.[37,38]

Leisure activities were the most common compensatory behaviors used by HCWs in this study, followed by exercise and non-alcoholic beverages such as tea or coffee. In other

Table 2. Scores of the DASS-21 and IESR Measurement Scales (n (%) for Qualitative Variables and Mean ± SD for Quantitative Variables) Stratified by Gender, Profession, and Placement During COVID-19.

	All Participants	Gender			Professional category			Placement during COVID-19		
		Male	Female	P value	Physicians	Nurses	P value	Frontline	Non-frontline	P value
IESR				.328			.82			.32
Normal [0-8]	58.0 (27.0)	32.0 (15.0)	26.0 (12.5)		35.0 (16.6)	22.0 (10.3)		18.0 (8.5)	40.0 (19.1)	
Mild [9-25]	73.0 (34.6)	36.0 (17.0)	37.0 (17.5)		37.0 (17.5)	35.0 (16.4)		34.0 (16.1)	39.0 (18.5)	
Moderate [26-43]	43.0 (20.4)	15.0 (7.0)	28.0 (13.4)		15.0 (7.1)	28.0 (13.5)		19.0 (9.0)	24.0 (11.4)	
Severe [44-88]	37.0 (17.5)	9.0 (4.2)	28.0 (13.4)		11.0 (5.2)	28.0 (13.5)		15.0 (7.1)	22.0 (10.4)	
Mean (±SD)	23.6 ± 19.6	19.3 ± 18.3	26.0 ± 20.1	<.001	20.6 ± 16.7	25.3 ± 20.8	<.001	26.9 ± 20.3	20.3 ± 18.7	<.001
DASS-21										
Depression score				.191			<.001			.133
Normal [0-9]	99.0 (46.9)	54.0 (25.6)	45.0 (21.3)		52.0 (24.6)	47.0 (22.3)		36.0 (17.1)	63.0 (29.9)	
Mild [10-12]	24.0 (11.4)	12.0 (5.7)	12.0 (5.7)		12.0 (5.7)	12.0 (5.7)		6.0 (2.8)	17.0 (8.1)	
Moderate [13-20]	47.0 (22.3)	16.0 (7.2)	31.0 (14.7)		21.0 (10.0)	26.0 (12.3)		22.0 (10.4)	28.0 (13.3)	
Severe [21-27]	19.0 (9.0)	4.0 (1.9)	15.0 (7.1)		8.0 (3.8)	11.0 (5.2)		11.0 (5.2)	9.0 (4.3)	
Extremely severe [28-42]	22.0 (10.4)	6.0 (2.8)	16.0 (7.6)		5.0 (2.4)	17.0 (8.1)		11.0 (5.2)	8.0 (3.8)	
Mean (±SD)	12 ± 9.5	9.9 ± 8.5	13.6 ± 10	<.001	11.2 ± 8.9	13.7 ± 10.7	<.001	13.3 ± 9.8	11.2 ± 9.6	<.001
Anxiety score				.116			<.001			.082
Normal [0-6]	88.0 (41.7)	48.0 (22.7)	40.0 (19)		55.0 (26.1)	33.0 (15.6)		33.0 (15.6)	56.0 (26.5)	
Mild [7-9]	19.0 (9.0)	10.0 (4.7)	9.0 (4)		9.0 (4.3)	10.0 (4.8)		5.0 (2.4)	14.0 (6.6)	
Moderate [10-14]	39.0 (18.5)	16.0 (7.6)	23.0 (11)		17.0 (8.1)	22.0 (10.5)		13.0 (6.2)	26.0 (12.3)	
Severe [15-19]	19.0 (9.0)	7.0 (3.3)	12.0 (6)		7.0 (3.3)	12.0 (5.7)		11.0 (5.2)	8.0 (3.8)	
Extremely severe [20-42]	46.0 (21.8)	11.0 (5.2)	35.0 (17)		10.0 (4.7)	36.0 (17.0)		24.0 (11.4)	21.0 (10.0)	
Mean (±SD)	10.5 ± 9.1	8.5 ± 8.2	12.1 ± 9.5	<.001	9 ± 7.5	11.7 ± 10	<.001	12.3 ± 9.1	9.4 ± 8.8	<.001
Stress score				.849			.085			.752
Normal [0-10]	99.0 (44.5)	50.0 (23.6)	44.0 (20.9)		46.0 (21.8)	47.0 (22.3)		35.0 (16.6)	59.0 (28.0)	
Mild [11-18]	59.0 (28.0)	21.0 (9.9)	38.0 (18.0)		31.0 (14.7)	27.0 (12.8)		25.0 (11.8)	34.0 (16.1)	
Moderate [19-26]	45.0 (21.3)	19.0 (9.0)	26.0 (12.4)		18.0 (8.5)	27.0 (12.8)		20.0 (9.5)	25.0 (11.8)	
Severe [27-34]	12.0 (5.7)	2.0 (1.0)	10.0 (4.7)		3.0 (1.4)	9.0 (4.3)		6.0 (2.8)	6.0 (2.8)	
Extremely severe [35-42]	1.0 (0.1)	0	1.0 (0.5)		0	1.0 (0.5)		0	1.0 (0.5)	
Mean (±SD)	12.7 ± 8.9	10.8 ± 8.2	14 ± 9.1	<.001	11.5 ± 7.6	13.9 ± 10	<.001	13.6 ± 9	11.7 ± 8.7	<.001

Table 3. Compensatory Behaviors of Healthcare Workers.

Variables	Workforce (n = 211)	Percentage (%)
Compensatory behaviors		
Tea/coffee	39	19
Smoking	13	6
Alcohol	2	1
Psychotropic drugs	2	1
Analgesics	6	3
Sport	40	19
Hobbies	61	29
Others	47	22

studies, seeking support from family and friends was the most common compensatory behavior used to manage the adverse mental health effects of the COVID-19 pandemic.[35] Fortunately, substance use was not a common compensatory behavior in this study, as alcohol consumption was shown to increase anxiety and may lead to impaired work performance.[39]

Evaluation and intervention for psychosocial concerns must be undertaken in these settings. Poor mental health and stress negatively affect the employees by decreasing job performance, engagement in work, communication with coworkers, and physical capabilities, reduce absenteeism

This cross-sectional study on the psychological impact of COVID-19 on Moroccan HCWs has several strengths. To the best of our knowledge, this is the first study to measure the levels of stress, anxiety, and depression among HCWs during the pandemic and the first study to conduct subgroup analysis. However, this study has some limitations. First, we used a validated scale to measure depression and anxiety instead of a psychiatrist assessment and functional neuroimaging, which is the gold standard for diagnostic.[40] Second, we did not screen participants for comorbidities and history of depression. Third, this study did not explore potential factors were associated with anxiety, stress, and depression, which could be the subject of future research. Finally, this study was conducted in large Moroccan cities where the pressure on healthcare services is important; thus, the generalization of the results should be done with caution.

Poor mental health outcomes among HCWs have been shown to result in negative outcomes in terms of job performance, workplace communication, and absenteeism.[35] In addition, HCWs are at risk of burnout which has been linked to suboptimal patient care and a higher risk of medical errors. Reducing the length of work shifts, providing HCWs with the opportunity to enroll in mental health support programs, and adopting a trauma-informed approach to workplace stress are among the interventions which should be considered by policymakers.[41] In addition, HCWs have different predisposition to mental illness due differences in socio-economic factors, gender, race, and other factors.[41] In Morocco for example, mothers are often the primary caregivers in the family. Therefore, it is important that workplace policy does not disrupt the work-life balance of female HCWs who have the additional responsibility of looking after a child.

Conclusions

The COVID-19 pandemic has exerted an enormous pressure on the Moroccan healthcare system and its workforce, which bears the responsibility of maintaining quality care even under strenuous circumstances. The results of this study show that Moroccan HCWs have experienced moderate to severe levels of anxiety, depression, and stress and provide an insight on how they managed these psychological symptoms. It is uncertain whether the COVID-19 pandemic will recede in the near future; therefore, it is of paramount of importance to improve the psychological endurance and safeguard the mental and physical well-being of HCWs, who find themselves on the frontline of health and humanitarian crises, when they are needed the most. This may be achieved through the implementation of targeted interventions aimed at enhancing psychological support of HCWs, reducing stressors in the workplace, and capacity building.

ORCID iD

Oumnia Bouaddi https://orcid.org/0000-0001-9114-6889

References

1. Wang C, Chudzicka-Czupała A, Grabowski D, et al. The association between physical and mental health and face mask use during the COVID-19 pandemic: a comparison of two countries with different views and practices. *Front Psychiatry*. 2020;11:569981. doi:10.3389/FPSYT.2020.569981/PDF

2. Tran BX, Nguyen HT, Le HT, et al. Impact of COVID-19 on economic well-being and quality of life of the Vietnamese during the national social distancing. *Front Psychol*. 2020;11:565153. doi:10.3389/FPSYG.2020.565153/PDF

3. Le HT, Lai AJX, Sun J, et al. Anxiety and depression among people under the nationwide partial lockdown in Vietnam. *Front Public Health*. 2020;8:589359. doi:10.3389/FPUBH.2020.589359/PDF

4. Ho RC, Tran BX, McIntyre RS. The impact of COVID-19 pandemic on global mental health: from the general public to healthcare workers. *Ann Acad Med Singap*. 2021;50(3):198-199. doi:10.47102/ANNALS-ACADMEDSG.202189

5. Chigwedere OC, Sadath A, Kabir Z, Arensman E. The impact of epidemics and pandemics on the mental health of healthcare workers: a systematic review. *Int J Environ Res Public Health*. 2021;18(13):6695. doi:10.3390/IJERPH18136695

6. Yasir M, Islam Z, Rija A, et al. Afghanistan's humanitarian crisis and its impacts on the mental health of healthcare workers during COVID-19. *Global Mental Health*. 2022;9:61-64. doi:10.1017/GMH.2022.3

7. Pereira-Lima K, Mata DA, Loureiro SR, Crippa JA, Bolsoni LM, Sen S. Association between physician depressive symptoms and medical errors: a systematic review and meta-analysis. *JAMA Netw Open*. 2019;2(11):e1916097. doi:10.1001/JAMANETWORKOPEN.2019.16097

8. Aymerich C, Pedruzo B, Pérez JL, et al. COVID-19 pandemic effects on health worker's mental health: systematic review and meta-analysis. *Eur Psychiatry*. 2022;65(1):1-20. doi:10.1192/J.EURPSY.2022.1

9. Marvaldi M, Mallet J, Dubertret C, Moro MR, Guessoum SB. Anxiety, depression, trauma-related, and sleep disorders among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Neurosci Biobehav Rev*. 2021;126:252-264. doi:10.1016/J.NEUBIOREV.2021.03.024

10. Saragih ID, Tonapa SI, Saragih IS, et al. Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: a systematic review and meta-analysis. *Int J Nurs Stud*. 2021;121:104002. doi:10.1016/J.IJNURSTU.2021.104002

11. Abraham A, Chaabna K, Doraiswamy S, et al. Depression among healthcare workers in the Eastern Mediterranean Region: a systematic review and meta-analysis. *Hum Resour Health*. 2021;19(1):1-18. doi:10.1186/S12960-021-00628-6/TABLES/4

12. Ali AA, Bassou A, El Aynaoui K, et al. *La Stratégie Du Maroc Face Au COVID-19*. Policy Center for the New South; 2020.

13. Kapasa RL, Hannoun A, Rachidi S, et al. Évaluation du burn-out chez les professionnels de santé des unités de veille sanitaire COVID-19 au Maroc. *Archives des Maladies Professionnelles et de l'Environnement*. 2021;82(5):524. doi:10.1016/J.ADMP.2021.06.001

14. Zine El, Abidine M, Slaoui S. Impact de la pandémie Covid 19 sur la santé mentale des professionnels de la santé : étude empirique. *Revue Internationale des Sciences de Gestion*. 2021;4(3):47-66.

15. Weiss DS, Marmar CR. The impact of event scale—revised. In: Wilson J, Keane TM, eds. *Assessing Psychological Trauma and PTSD*. New York: The Guilford Press; 1996:399-411.

16. Wilson JP, Tang CS-K, eds. *Cross-Cultural Assessment of Psychological Trauma and PTSD*. pringer Science + Business Media. doi:10.1007/978-0-387-70990-1

17. Wang C, López-Núñez MI, Pan R, et al. The impact of the COVID-19 pandemic on physical and mental health in China and Spain: cross-sectional Study. *JMIR Form Res*. 2021;5(5):e27818. doi:10.2196/27818

18. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729. doi:10.3390/IJERPH17051729

19. Lovibond SH, Lovibond PF. The Depression, Anxiety and Stress Scale—21 items (DASS-21). In: *Manual for the Depression Anxiety & Stress Scales*. 2nd ed. Psychology Foundation of Australia; 1995;1-34.

20. Binnie A, Moura K, Moura C, D'Aragon F, Tsang JLY. Psychosocial distress amongst Canadian intensive care unit healthcare workers during the acceleration phase of the COVID-19 pandemic. *PLoS One*. 2021;16(8):e0254708. doi:10.1371/JOURNAL.PONE.0254708

21. Cipolotti L, Chan E, Murphy P, van Harskamp N, Foley JA. Factors contributing to the distress, concerns, and needs of UK Neuroscience health care workers during the COVID-19 pandemic. *Psychol Psychother Theory Res Pract*. 2021;94(S2):536-543. doi:10.1111/PAPT.12298

22. Chew NWS, Lee GKH, Tan BYQ, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun*. 2020;88:559-565. doi:10.1016/J.BBI.2020.04.049

23. Li Y, Scherer N, Felix L, Kuper H. Prevalence of depression, anxiety and post-traumatic stress disorder in health care workers during the COVID-19 pandemic: a systematic review and meta-analysis. *PLoS One*. 2021;16(3):e0246454. doi:10.1371/JOURNAL.PONE.0246454

24. Alqutub S, Mahmoud M, Baksh T. Psychological impact of COVID-19 on frontline healthcare workers in Saudi Arabia. *Cureus*. 2021;13(5):e15300. doi:10.7759/CUREUS.15300

25. Carmassi C, Foghi C, Dell'Oste V, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: what can we expect after the COVID-19 pandemic. *Psychiatry Res*. 2020;292:113312. doi:10.1016/J.PSYCHRES.2020.113312

26. Di Tella M, Romeo A, Benfante A, Castelli L. Mental health of healthcare workers during the COVID-19 pandemic in Italy. *J Eval Clin Pract*. 2020;26(6):1583-1587. doi:10.1111/JEP.13444

27. Li Z, Ge J, Yang M, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Behav Immun*. 2020;88:916-919. doi:10.1016/J.BBI.2020.03.007

28. Alnazly E, Khraisat OM, Al-Bashaireh AM, Bryant CL. Anxiety, depression, stress, fear and social support during COVID-19 pandemic among Jordanian healthcare workers. *PLoS One*. 2021;16(3):e0247679. doi:10.1371/JOURNAL.PONE.0247679

29. Repon MAU, Pakhe SA, Quaiyum S, Das R, Daria S, Islam MR. Effect of COVID-19 pandemic on mental health among Bangladeshi healthcare professionals: a cross-sectional study. *Sci Prog*. 2021;104(2). doi:10.1177/00368504211026409

30. Sandesh R, Shahid W, Dev K, et al. Impact of COVID-19 on the mental health of healthcare professionals in Pakistan. *Cureus*. 2020;12(7):e8974. doi:10.7759/CUREUS.8974

31. Mahmud S, Mohsin M, Dewan MN, Muyeed A. The global prevalence of depression, anxiety, stress, and insomnia among general population during COVID-19 pandemic: a systematic review and meta-analysis. *Trends Psychol*. Published online January 4, 2022. doi:10.1007/S43076-021-00116-9/TABLES/3

32. Al Ammari M, Sultana K, Thomas A, Al Swaidan L, Al Harthi N. Mental health outcomes amongst health care workers during COVID 19 pandemic in Saudi Arabia. *Front Psychiatry*. 2021;11:1550. doi:10.3389/FPSYT.2020.619540/BIBTEX

33. Danet Danet A. Psychological impact of COVID-19 pandemic in Western frontline healthcare professionals. A systematic review. *Med Clin (Engl Ed)*. 2021;156(9):449-458. doi:10.1016/j.medcle.2020.11.003

34. Muller AE, Hafstad EV, Himmels JPW, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatry Res*. 2020;293:113441. doi:10.1016/J.PSYCHRES.2020.113441

35. Özçevik Subaşi D, Akça Sümengen A, Şimşek E, Ocakçı AF. Healthcare workers' anxieties and coping strategies during the COVID-19 pandemic in Turkey. *Perspect Psychiatr Care*. 2021;57(4):1820-1828. doi:10.1111/PPC.12755

36. Zhou X, Snoswell CL, Harding LE, et al. The role of telehealth in reducing the mental health burden from COVID-19. *Telemed J E Health*. 2020;26(4):377-379. doi:10.1089/TMJ.2020.0068

37. Zhang MWB, Ho RCM. Moodle: the cost effective solution for internet cognitive behavioral therapy (I-CBT) interventions. *Technol Health Care*. 2017;25(1):163-165. doi:10.3233/THC-161261

38. Soh HL, Ho RC, Ho CS, Tam WW. Efficacy of digital cognitive behavioural therapy for insomnia: a meta-analysis of randomised controlled trials. *Sleep Med*. 2020;75:315-325. doi:10.1016/J.SLEEP.2020.08.020

39. Thørrisen MM, Bonsaksen T, Hashemi N, Kjeken I, Van Mechelen W, Aas RW. Association between alcohol consumption and impaired work performance (presenteeism): a systematic review. *BMJ Open*. 2019;9(7):e029184. doi:10.1136/BMJOPEN-2019-029184

40. Husain SF, Yu R, Tang TB, et al. Validating a functional near-infrared spectroscopy diagnostic paradigm for Major Depressive Disorder. *Sci Rep*. 2020;10(1):1-9. doi:10.1038/s41598-020-66784-2

41. Søvold LE, Naslund JA, Kousoulis AA, et al. Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. *Front Public Health*. 2021;9:514. doi:10.3389/FPUBH.2021.679397/BIBTEX