

# Prevalence and Predictors of Anxiety, Depression, and Insomnia among Healthcare Workers in Dhaka City amid COVID-19 Pandemic

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## Research note

**Keywords:** Anxiety, depression, and Insomnia, COVID-19, Dhaka city, healthcare workers, predictors

**Posted Date:** November 10th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-101990/v1>

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**Version of Record:** A version of this preprint was published on May 4th, 2021. See the published version at <https://doi.org/10.1016/j.heliyon.2021.e06985>.

## Abstract

**Objective:** The purpose of the study was to investigate the prevalence of anxiety, depression, and insomnia symptoms, and identify predicting factors among healthcare workers (HCW) of the Dhaka city in Bangladesh during the COVID-19 outbreak. The Generalized Anxiety Disorder 2-item, the Patient Health Questionnaire 9-item depression module, the Insomnia Severity Index were used to measure anxiety, depression and insomnia symptoms, respectively.

**Results:** We found the prevalence of anxiety, depression and insomnia symptoms among HCW 20.7%, 26.5% and 44.2% respectively. Three regression models were run to identify the predictors of anxiety, depression and insomnia. Model 1 suggested that the singular marital status ( $\beta = -0.178$ ,  $p = 0.011$ ), occurrence of chronic disease ( $\beta = -0.132$ ,  $p = 0.025$ ), and financial difficulty ( $\beta = -0.163$ ,  $p = 0.005$ ) were the risk factors of anxiety. From model 2, it was found that the risk factors of depression were singular marital status ( $\beta = 0.254$ ,  $p < 0.001$ ) and financial difficulty ( $\beta = 0.198$ ,  $p = 0.001$ ). Final model revealed that the risk factors of insomnia were gender ( $\beta = -0.151$ ,  $p = 0.008$ ), singular marital status ( $\beta = -0.165$ ,  $p = 0.016$ ), financial difficulty ( $\beta = 0.213$ ,  $p < 0.001$ ) and occupation ( $\beta = -0.125$ ,  $p = 0.029$ ).

## Introduction

The high morbidity and mortality rates of the Coronavirus disease (COVID-19) has created a large negative psychological impact and mental health problems globally [1, 2]. The sudden onset of the COVID-19 pandemic has also contributed to a large pressure amongst healthcare workers (HCW) around the world [3]. Besides, many HCW has also died for COVID-19 [4]. The rapidly increasing work burden, scarcity of personal protective equipment, and high risk of contracting the disease have made the situation worse [5, 6]. Unlike the normal population, HCW are forced to continue their duties amid the COVID-19 pandemic to run the healthcare services for both COVID and non-COVID patients potentially causing enormous psychological distress [7, 8]. Such adverse psychological health outcomes can reach an extreme level. Consequently, some cases of suicide committed by HCW due to COVID-19 related stress already have been reported [9].

A systematic review and meta-analysis suggested that the prevalence of anxiety, depression, and insomnia symptoms among HCW during this pandemic were 23.2%, 22.8%, and 38.9% respectively [10]. Bangladesh, a developing country, faces a severe burden of COVID-19, which has overwhelmed the health care facilities available. According to WHO, the overall COVID-19 attack rate-AR (the total number of cases divided by the total population) in Bangladesh was 2,173 per million, particularly, in Dhaka city, the per million AR rate was 23,337 as of October 05, 2020 [11]. Understandably, the death rate among the general population and HCW is also higher in Dhaka than in other cities in Bangladesh. The high workload, continuous exposure, risk of infection, safety concerns for family members, and, ethical decisions regarding rationing resources amongst patients potentially threatens the mental health of HCW currently working both in COVID and Non-COVID settings. Thus, the study aimed to measure the prevalence and identify predicting factors associated with generalized anxiety, depression, and insomnia symptoms (three common mental health problems) among multi-professional HCW currently working in clinical settings in the Dhaka city area.

## Materials And Method

### Study design and participants:

A cross-sectional study was conducted among HCW in Dhaka city, Bangladesh. Five hundred HCW was invited conveniently to take part in an online survey from June 6 to July 6, 2020. Four hundred ninety subjects filled the questionnaire giving an 81.8% response rate. However, we only included HCW who are currently working in a clinical setting in the Dhaka city area. Subjects who were previously and/or currently tested positive for COVID-19, pregnant female, HCW retired from their job, and currently not working were excluded. Considering the inclusion and exclusion criteria, we found 294 eligible data for analysis. Informed consent from all the participants was taken before starting the interview. Institutional Review Board of North South University, Bangladesh prospectively approved the study project.

### Measurements

### Sociodemographic, clinical, and occupational data:

Detail data on sociodemographic, and clinical factors such as age, gender, marital status, family size, and family member aged above 50 years, resident type, presence of chronic disease, and maintaining isolation were taken. Occupation, technical job title, service category, and current working position were also recorded. Participants were also asked to answer yes/no questions to provide information on whether they were facing financial difficulties due to the impact of COVID-19.

### Anxiety disorder:

The Generalized Anxiety Disorder 2-item (GAD-2) was used to identify participants with general anxiety. GAD-2 in the screening of depression is a valid and frequently used scale, and a cutoff point  $\geq 3$  is recommended [12, 13].

### Depression symptoms:

The Patient Health Questionnaire 9-item depression module (PHQ-9) was used to measure depressive symptoms. A scale ranging from 0 to 3 was used to score each of the nine items. The total score ranges from 0 to 27. The total score suggests different levels of depressive symptoms: minimal/no depression (0–4), mild (5–9), moderate (10–14), severe (15–21), and very severe (22–27). However, in this study, cut-off point  $\geq 10$  was used to classify participants as having depressive symptoms [14, 15].

### Insomnia symptoms:

Finally, to measure the severity of insomnia the Insomnia Severity Index (ISI) was used. Each item is wretched on a 0–4 scale, and the total score ranges from 0 to 28. A cumulative score of  $\geq 8$  is considered as having symptoms of insomnia [16, 17]. A higher score suggests more intense insomnia symptoms.

## **Data analysis:**

Descriptive analysis was done to reveal the statistics of sociodemographic, economic, clinical, and occupation-related factors of the participants. Continuous variables were presented in mean and standard deviation while the categorical variables were displayed in number and percentage.

To find out associated factors with anxiety, depression, and Insomnia symptoms, univariate analysis has been performed. All significant levels were set at 0.05 alphas in this study.

Three multiple regression models were run to assess the predictability of the sociodemographic, economic, clinical, and occupational factors that were statistically significant in the univariate analysis. GAD-2, PHQ-9, and ISI scores were used as dependent variables for the first, second, and third regression model, respectively. The Statistical Package for the Social Science (SPSS) software version 20.0, SPSS Inc., Chicago, IL, USA was used for the present study.

## **Results**

### **Descriptive data:**

The participants had a mean age of 28.86 (SD = 5.5) years. 43.5% of subjects were female. Among all the participants, 27.9% were medical doctors, 9.5% dentists, 37.4% physiotherapists, 9.5% nurses, and 15.7% medical technologists. Besides, 17% of subjects had a chronic disease, 55.8% faced financial problems. Table 1 displays the full result. However, the Cronbach's alpha value for the items of GAD-2, PHQ-9, and ISI in this study was 0.7, 0.8, and 0.9, respectively, which indicates an excellent internal consistency through out the study.

Table 1  
Descriptive data of socio-demographic, clinical, financial, and occupation-related factors:

Factors	Mean (SD)	n (%)	Range
Age	28.86 (5.5)		19–50
<i>Gender</i>			
Male		164 (55.8)	
Female		128 (43.5)	
Others		2 (0.7)	
<i>Marital status</i>			
Never married		152 (51.7)	
Married		140 (47.6)	
Others		2 (0.7)	
Number of family member living with	4.31 (1.9)		0–13
<i>Family member age over 50 years</i>			
Yes		183 (62.2)	
No		111 (37.8)	
<i>Resident type</i>			
Rented		128 (43.5)	
Own		132 (44.9)	
Government/free quarter		12 (4.1)	
Hostel/Mess		22 (7.5)	
<i>Chronic disease</i>			
Yes		50 (17.0)	
No		244 (83.0)	
<i>Isolation from family member</i>			
Yes		89 (30.3)	
No		205 (69.7)	
<i>Facing financial problem</i>			
Yes		168 (55.8)	
No		130 (44.2)	
<i>Occupation</i>			
Medicine		82 (27.9)	
Dental		28 (9.5)	
Physiotherapy		110 (37.4)	
Nursing		28 (9.5)	
Medical Technology		46 (15.7)	
<i>Technical title</i>			
Senior		87 (19.6)	
Intermediate		172 (58.5)	
Junior		35 (11.9)	
<i>Employer</i>			
Medical college		69 (23.5)	
General Hospital		29 (9.9)	
Clinic		56 (19.0)	

Factors	Mean (SD)	n (%)	Range
Private chamber		66 (22.4)	
Others		74 (25.2)	
<i>Service categories</i>			
Government		48 (16.3)	
Private		167 (56.8)	
Self-employed and others		79 (26.9)	
<i>Current working position</i>			
Frontline		12 (4.1)	
Second-line		31 (10.5)	
General duties		138 (46.9)	
Working from home		113 (38.4)	
GAD-2 score	1.54 (1.52)		0–6
PHQ-9 score	6.75 (5.0)		0–27
ISI score	7.69 (6.1)		0–28

### Factors associated with anxiety, depression and insomnia symptoms:

We found the prevalence of anxiety, depression, and insomnia symptoms among HCW in Dhaka city currently working in the clinical settings 20.7%, 26.5% and 44.2% respectively. However, univariate analysis found that the age group was associated with PHQ-9 ( $X^2 = 15.287$ ,  $p = 0.002$ ) and ISI ( $X^2 = 17.588$ ,  $p = 0.001$ ) scores. A higher number of females reportedly suffered from anxiety ( $X^2 = 7.755$ ,  $p = 0.021$ ), depression ( $X^2 = 6.645$ ,  $p = 0.038$ ) and insomnia symptoms ( $X^2 = 9.229$ ,  $p = 0.010$ ) than their male counterparts. Being single was also associated with higher prevalence rate of anxiety ( $X^2 = 10.121$ ,  $p = 0.001$ ), depression ( $X^2 = 16.042$ ,  $p = < 0.001$ ) and insomnia symptoms ( $X^2 = 13.985$ ,  $p = < 0.001$ ). The HCW those were facing financial problems due to COVID-19 impacts had reported more frequently about depression ( $X^2 = 11.036$ ,  $p = 0.001$ ) and insomnia symptoms ( $X^2 = 21.222$ ,  $p = < 0.001$ ). Table 2 presents the full results of univariate analysis.

Table 2  
univariate analysis: Socio-demographic, clinical, financial and occupation-related factors and anxiety, depression, and insomnia

Factor	GAD-2				PHQ-9				ISI			
	Yes (n/%)	No (n/%)	$\chi^2$	p-value	Yes (n/%)	No (n/%)	$\chi^2$	p-value	Yes (n/%)	No (n/%)	$\chi^2$	p-value
Total (294)	61 (20.7)	233 (79.3)			78 (26.5)	216 (73.5)			130 (44.2)	164 (55.8)		
<i>Age group</i>			4.282	0.233			15.287	0.002			17.588	0.001
18–25	25 (28.1)	64 (71.9)			34(38.2)	55 (61.8)			52 (58.4)	37 (41.6)		
26–30	23 (17.8)	106 (82.2)			34 (26.4)	95 (73.6)			56 (43.4)	73 (56.6)		
31–40	11 (17.7)	51 (82.3)			6 (9.7)	56 (90.3)			15 (24.2)	47 (75.8)		
>40	2 (14.3)	12 (85.7)			4 (28.6)	10 (71.4)			7 (50)	7 (50)		
<i>Gender</i>			7.755	0.021			6.645	0.038			9.229	0.010
Male	34 (20.7)	130 (79.3)			39 (23.8)	125 (76.2)			61 (37.2)	103 (62.8)		
Female	25 (65.8)	13 (34.2)			37 (28.9)	91 (71.1)			67 (52.3)	61(47.7)		
Others	2 (100)	0 (0.0)			2 (100)	0 (0.0)			2 (100)	0 (0.0)		
<i>Marital status</i>			10.121	0.001			16.042	< 0.001			13.985	< 0.001
Single	43 (27.9)	111 (72.1)			56 (36.4)	98 (63.6)			84 (54.5)	70 (45.5)		
Married	18 (12.8)	122 (87.1)			22 (15.7)	118 (84.3)			46 (32.9)	94 (67.1)		
<i>Family size</i>			0.584	0.747			0.655	0.721			1.364	0.506
Small	7 (16.7)	35 (83.3)			9 ( 21.4)	33 (78.6)			19 (45.2)	23 (54.8)		
Medium	43 (21.8)	154 (78.2)			54 (27.4)	143 (72.6)			83 (42.3)	114 (57.9)		
Large	11 (20)	44 (80)			15 (27.3)	40 (72.3)			28 (50.9)	27 (49.1)		
<i>Family member aged over 50 years</i>			0.363	0.547			1.470	0.225			0.254	0.614
Yes	40 (21.9)	143 (78.1)			53 (28.9)	130 (71.1)			83 (45.4)	100 (54.6)		
No	21 (18.9)	90 (81.1)			25 (22.5)	86 (77.5)			47 (42.3)	64 (57.7)		
<i>Resident type</i>			0.455	0.929			1.611	0.657			0.615	0.893
Rented	25 (19.5)	103 (80.5)			31 (24.2)	97 (75.8)			59 (46.1)	69 (53.9)		
Own	29 (22)	103 (78)			38 (28.8)	94 (71.2)			56 (42.4)	76 (57.6)		
Gov./Free	3 (25)	9 (75)			2 (16.7)	10 (83.3)			6 (50)	6 (50)		
Hostel/Mess	4 (18.2)	18 (81.8)			7 (31.8)	15 (68.2)			9 (40.9)	13 (59.1)		
<i>Chronic disease</i>			0.057	0.811			0.067	0.796			0.78	0.781
Yes	11(22)	39 (78)			14 (28)	36 (72)			23 (46)	27 (54)		
No	50 (20.5)	194 (79.5)			64 (26.2)	180 (73.8)			107 (43.9)	13756.1		
<i>Isolation from family member</i>			1.955	0.162			0.031	0.860			0.027	0.869
Yes	14 (15.7)	75 (84.3)			23 (25.8)	66 (74.2)			40 (44.9)	49 (55.1)		
No	47 (23.2)	156 (76.8)			55 (26.8)	150 (73.2)			90 (43.9)	115 (56.1)		
<i>Facing financial problem</i>			2.074	0.150			11.036	0.001			21.222	< 0.001
Yes	39 (23.8)	125 (76.2)			56 (34.1)	108 (35.9)			92 (56.1)	72 (43.9)		

Factor	GAD-2		PHQ-9		ISI	
No	22 (16.9)	108 (83.1)	22 (16.9)	108 (83.1)	38 (29.2)	92 (70.8)

Table 2  
(continue)

Factor	GAD-2		PHQ-9				ISI					
	Yes (n/%)	No (n/%)	$\chi^2$	p-value	Yes (n/%)	No (n/%)	$\chi^2$	p-value	Yes (n/%)	No (n/%)	$\chi^2$	p-value
<i>Occupation</i>			11.941	0.018			1.574	0.813			1.482	0.830
Medicine	8 (9.8)	74 (90.2)			20 (24.4)	62 (75.6)			34 (41.5)	48 (58.5)		
Dental	8 (28.6)	20 (71.4)			10 (35.7)	18 (64.3)			14 (50)	14 (50)		
Physiotherapy	22 (20)	88 (80)			28 (28)	82 (82)			52 (47.3)	58 (52.7)		
Nursing	9 (32.1)	19 (67.9)			7 (25)	21 (75)			11 (39.3)	17 (60.7)		
Medical technology	14 (30.4)	32 (69.6)			13 (28.3)	33 (71.7)			19 (41.3)	27 (58.7)		
<i>Technical title</i>			10.441	0.005			3.601	0.165			3.786	0.151
Senior	10 (11.5)	77 (87.5)			18 (20.7)	69 (79.3)			33 (37.9)	54 (62.1)		
Intermediate	38 (22.1)	134 (77.9)			47 (27.3)	125 (72.7)			77 (44.8)	95 (55.2)		
Junior	13 (37.1)	22 (62.9)			13 (37.1)	22 (62.9)			20 (57.1)	15 (42.9)		
<i>Employer</i>			5.298	0.258			2.174	0.704			1.652	0.799
Medical college	12 (17.4)	57 (82.6)			17 (24.6)	52 (75.4)			27 (39.1)	42 (60.9)		
General hospital	10 (34.5)	19 (65.5)			9 (31)	20 (69)			12 (41.4)	17 (58.6)		
Clinic	13 (23.2)	43 (76.8)			15 (26.8)	41 (73.2)			24 (42.1)	32 (57.1)		
Private chamber	10 (15.2)	56 (84.8)			14 (21.8)	52 (78.8)			31 (47)	35 (53)		
Others	16 (21.6)	58 (78.4)			23 (31.1)	51 (68.9)			36 (48.6)	38 (51.4)		
<i>Service categories</i>			0.299	0.861			4.406	0.11			1.745	0.418
Government	10 (20.8)	38 (79.2)			11 (22.9)	37 (77.1)			18 (37.5)	30 (62.5)		
Private	33 (19.8)	134 (80.2)			39 (23.4)	128 (76.6)			73 (43.7)	94 (56.3)		
Self-employed	18 (22.8)	61 (77.2)			28 (35.4)	51 (64.6)			39 (49.3)	40 (50.7)		
<i>Current working position</i>			3.782	0.286			6.474	0.091			13.507	0.004
Frontline	2 (16.7)	10 (83.3)			3 (25)	9 (75)			5 (41.7)	7 (58.3)		
Second-line	5 (16.1)	26 (83.9)			8 (25.8)	23 (74.2)			10 (32.3)	21 (67.7)		
General duties	24 (17.4)	114 (82.6)			28 (20.3)	110 (79.7)			50 (36.2)	88 (63.8)		
Work from home	30 (26.5)	83 (73.5)			39 (34.5)	74 (65.5)			65 (57.5)	48 (42.5)		

## Predictors of anxiety, depression and insomnia symptoms:

Table 3 presents results of three regression models. In model 1, we found marital status ( $\beta = -0.178$ ,  $p = 0.011$ ), chronic disease ( $\beta = -0.132$ ,  $p = 0.025$ ), and financial difficulty ( $\beta = -0.163$ ,  $p = 0.005$ ) were the statistically significant risk factors for anxiety. Model 2 revealed that the marital status ( $\beta = 0.254$ ,  $p < 0.001$ ) and financial difficulty ( $\beta = 0.198$ ,  $p = 0.001$ ) statistically significantly predicted depression. In model 3, it was found that the gender ( $\beta = -0.151$ ,  $p =$

0.008), marital status ( $\beta = -0.165$ ,  $p = 0.016$ ), financial difficulty ( $\beta = 0.213$ ,  $p = < 0.001$ ) and occupation ( $\beta = -0.125$ ,  $p = 0.029$ ) were statistically significant risk factors for insomnia symptoms.

Table 3  
Multiple regressions predicting GAD-2, PHQ-9, and ISI scores from socio-demographic, clinical, financial, and occupation-related variables in the healthcare workers during COVID-19 pandemic (N = 294)

	GAD-2			F	P	PHQ-9			F	p	ISI			F	p
	Model 1					Model 2					Model 3				
Predictors	$\beta$	t	p	4.516	< 0.001	$\beta$	t	p	5.681	< 0.001	$\beta$	t	p	6.251	< 0.001
Age	-0.055	-0.736	0.462			-0.031	-0.423	0.672			-0.084	-1.158	0.248		
Gender	0.005	0.083	0.934			-0.096	-1.679	0.094			-0.151	-2.672	0.008**		
Marital status	-0.178	-2.560	0.011*			-0.254	-3.711	< 0.001**			-0.165	-2.433	0.016*		
Chronic disease	0.132	2.255	0.025*			0.064	1.109	0.268			0.065	1.134	0.258		
Financial difficulty	0.163	2.812	0.005**			0.198	3.463	0.001**			0.213	3.741	< 0.001**		
Occupation	0.038	0.645	0.519			-0.050	-0.861	0.390			-0.125	-2.189	0.029*		
Technical title	0.114	1.934	0.052			0.047	0.806	0.421			0.061	1.065	0.288		
Current working position	0.045	0.731	0.466			0.022	0.365	0.716			0.013	0.223	0.824		

\* $p < 0.05$ , \*\* $p < 0.01$

## Discussion

This study found a high prevalence of anxiety, depression, and insomnia symptoms among HCW in Dhaka city of Bangladesh working in clinical settings amid the COVID-19 pandemic. The prevalence was significantly higher amongst females and single HCW. The study suggested that marital status, chronic disease, financial difficulty, and occupation are the significant predictors of the three given mental health problems.

Previous studies conducted among HCW in Europe and other parts of the world amid the COVID-19 pandemic revealed that the female and single HCW had more frequently reported anxiety and depression symptoms [8, 18], which was similar to our study findings. A review also has shown that the prevalence of anxiety and depression among Asian female and single HCW during the COVID-19 pandemic was higher than their counterparts [19]. In line with the findings of other studies conducted during the pandemic among HCW [20, 21], we found a very high prevalence of insomnia; especially among the younger, female, and single HCW.

Results from our study also indicate that financial difficulties caused by the COVID 19 pandemic played a crucial role when predicting all three mental health problems of HCW we have measured. The mental health impact of financial issues among HCW during this pandemic time is yet to be evaluated elaborately, however, the previous study showed a highly significant association between financial hardship and mental health among Bangladeshi professionals [22]. Further evaluation is warranted to find in-depth predicting nature of the financial issues raised due to the COVID-19 pandemic to the mental health of sufferers.

## Conclusion

The study revealed a high prevalence of three common mental health problems among HCW working in clinical settings in Dhaka city. Being single and financial problems were the universal risk factors for anxiety, depression, and insomnia symptoms. Psychological and social support from both employer and community is required to overcome these burdens during the extraordinary events associated with the COVID-19 pandemic.

## Limitations

Limitations of cross-sectional studies cannot be ruled out in this research. On the other hand, we found the prevalence rate of anxiety and depression lower than the prevalence rate found in a study conducted in Bangladesh among first-year university students [14]. A longitudinal study monitoring and comparing the changes in the mental health status of HCW during the pandemic would provide better insights into the mental health status of the HCW working in the clinical settings. Besides, a larger sample size study to compare the mental health of frontline HCW with the rest is also warranted.

## Abbreviations

HCW= Healthcare Workers

WHO= World Health Organization

GAD= Generalized Anxiety Disorder

PHQ= Patient Health Questionnaire

ISI= Insomnia Severity Index

## Declarations

### Ethical approval:

We conducted the study according to the guidelines laid down in the Declaration of Helsinki and the Institutional Review Board (IRB) of North South University (NSU-IRB 4578) approved all procedures involving human subjects. Data participants gave informed consent to participate in this study by accessing the online survey. Patients or the public WERE NOT involved in the design, or conduct, or reporting, or dissemination plans of our research.

### Informed consent:

Online informed consent has been taken from all participants with full disclosure and purpose of the study. The voluntary nature of participation also has been disclosed before taking the interview.

### Consent to Publish:

Not applicable.

### Availability of data:

Data are available upon reasonable request. The data sets used and analyzed during the current study are available from the corresponding author on reasonable request.

### Conflict of interest:

The authors declare that they have no conflict of interests.

### Funding:

The study was not funded.

## Acknowledgments

All the authors acknowledge the participants for providing us the information to conduct the study. The authors also thank Farhana Rahman Moushumi, Email: [fatehamou22@gmail.com](mailto:fatehamou22@gmail.com) for helping in data collection.

### Author's contributions:

MA participated in study conception, design, formal statistical analysis, and coordination of the manuscript. ZU, NFA, MZH, MB, SAK, and AH reviewed and helped to draft the manuscript. ZU supervised the study. NFA edited English language usage, grammar, and spelling. All authors read and approved the final manuscript.

## References

1. Sasaki N, Kuroda R, Tsuno K, Kawakami N. Workplace responses to COVID-19 associated with mental health and work performance of employees in Japan. *J Occup Health* [Internet]. 2020 Jan 11 [cited 2020 Aug 9];62(1):e12134. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1002/1348-9585.12134>
2. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence [Internet]. Vol. 395, *The Lancet*. 2020 [cited 2020 Apr 6]. p. 912–20. Available from: <https://doi.org/10.1016/>
3. Hartmann S, Rubin Z, Sato H, O Yong K, Terashita D, Balter S. Coronavirus Disease 2019 (COVID-19) Infections Among Healthcare Workers, Los Angeles County, February–May 2020. *Clin Infect Dis* [Internet]. 2020 Aug 17 [cited 2020 Oct 5]; Available from: <https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa1200/5893141>
4. Gan WH, Lim JW, Koh D. Preventing Intra-hospital Infection and Transmission of Coronavirus Disease 2019 in Health-care Workers. *Saf Health Work* [Internet]. 2020 Jun 1 [cited 2020 Aug 29];11(2):241–3. Available from: [/pmc/articles/PMC7102575/?report=abstract](https://pubmed.ncbi.nlm.nih.gov/347102575/)

5. Herron JBT, Hay-David AGC, Gilliam AD, Brennan PA. Personal protective equipment and Covid 19- a risk to healthcare staff? *Br J Oral Maxillofac Surg* [Internet]. 2020 Jun 1 [cited 2020 Oct 5];58(5):500–2. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7152922/>
6. Barranco R, Ventura F. Covid-19 and infection in health-care workers: An emerging problem. *Med Leg J* [Internet]. 2020 Jul 22;88(2):65–6. Available from: <https://www.ncbi.nlm.nih.gov/books/>
7. Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* [Internet]. 2020 Aug 1 [cited 2020 Aug 30];88:559–65. Available from: <https://pubmed.ncbi.nlm.nih.gov/32330593/>
8. Di Tella M, Romeo A, Benfante A, Castelli L. Mental health of healthcare workers during the <scp>COVID</scp> -19 pandemic in Italy. *J Eval Clin Pract* [Internet]. 2020 Jul 25;(May):jep.13444. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/jep.13444>
9. Rahman A, Plummer V. COVID-19 related suicide among hospital nurses; case study evidence from worldwide media reports. *Psychiatry Res* [Internet]. 2020 Sep 1 [cited 2020 Oct 13];291:113272. Available from: </pmc/articles/PMC7331553/?report=abstract>
10. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun* [Internet]. 2020 Aug 1 [cited 2020 Aug 4];88:901–7. Available from: <https://doi.org/10.1016/j.bbi.2020.05.026>
11. Morbidity and Mortality Weekly Update (MMWU) N o 32 [Internet]. 2020 [cited 2020 Oct 9]. Available from: <https://www.who.int/news-room/commentaries/detail/estimating-mortality-from-covid-19>
12. Löwe B, Wahl I, Rose M, Spitzer C, Glaesmer H, Wingenfeld K, et al. A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord*. 2010 Apr 1;122(1–2):86–95.
13. Jordan P, Shedden-Mora MC, Lö We B. Psychometric analysis of the Generalized Anxiety Disorder scale (GAD-7) in primary care using modern item response theory. 2017 [cited 2020 Sep 21]; Available from: <https://doi.org/10.1371/journal.pone.0182162>
14. Islam S, Akter R, Sikder T, Griffiths MD. Prevalence and Factors Associated with Depression and Anxiety Among First-Year University Students in Bangladesh: A Cross-Sectional Study. *Int J Ment Health Addict* [Internet]. 2020 Mar 2 [cited 2020 Aug 18];1–14. Available from: <https://doi.org/10.1007/s11469-020-00242-y>
15. Kroenke K, Spitzer RL. The PHQ-9: A new depression diagnostic and severity measure [Internet]. Vol. 32, *Psychiatric Annals*. Slack Incorporated; 2002 [cited 2020 Aug 24]. p. 509–15. Available from: <https://www.healio.com/psychiatry/journals/psycann/2002-9-32-9/%7Bb9ab8f2c-53ce-4f76-b88e-2d5a70822f69%7D/the-phq-9-a-new-depression-diagnostic-and-severity-measure>
16. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of Insomnia and Related Social Psychological Factors Among Medical Staff Involved in the 2019 Novel Coronavirus Disease Outbreak. *Front Psychiatry* [Internet]. 2020 Apr 14;11:1. Available from: [www.frontiersin.org](http://www.frontiersin.org)
17. Morin CM, Belleville G, Bélanger L, Ivers H. The Insomnia Severity Index: Psychometric Indicators to Detect Insomnia Cases and Evaluate Treatment Response. *Sleep* [Internet]. 2011 May 1 [cited 2020 Aug 19];34(5):601–8. Available from: </pmc/articles/PMC3079939/?report=abstract>
18. Giusti EM, Pedrolì E, D’Aniello GE, Stramba Badiale C, Pietrabissa G, Manna C, et al. The Psychological Impact of the COVID-19 Outbreak on Health Professionals: A Cross-Sectional Study. *Front Psychol* [Internet]. 2020 Jul 10 [cited 2020 Aug 4];11:1684. Available from: <https://www.frontiersin.org/article/10.3389/fpsyg.2020.01684/full>
19. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic–A review. *Asian J Psychiatr* [Internet]. 2020 Jun 1 [cited 2020 Aug 27];51:102119. Available from: <https://doi.org/10.1016/j.ajp.2020.102119>
20. Muller AE, Hafstad EV, Himmels JPW, Smedslund G, Flottorp S, Stensland SØ, 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* [Internet]. 2020 Nov 1 [cited 2020 Sep 10];293:113441. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0165178120323271>
21. Qi J, Xu J, Li BZ, Huang JS, Yang Y, Zhang ZT, et al. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. *Sleep Med* [Internet]. 2020 Aug 1 [cited 2020 Aug 30];72:1–4. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1389945720302264>
22. Mamun MA, Akter S, Hossain I, Faisal MTH, Rahman MA, Arefin A, et al. Financial threat, hardship and distress predict depression, anxiety and stress among the unemployed youths: A Bangladeshi multi-city study. *J Affect Disord* [Internet]. 2020 Nov;276(July):1149–58. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0165032720324721>