

# Impact of COVID-19 Pandemic on the Emotional Well-being of Healthcare Workers: A Multinational Cross-sectional Survey

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## ABSTRACT

**Background:** Coronavirus disease-2019 (COVID-19) in the last few months has disrupted the healthcare system globally. The objective of this study is to assess the impact of the COVID-19 pandemic on the psychological and emotional well-being of healthcare workers (HCWs).

**Materials and methods:** We conducted an online, cross-sectional, multinational survey, assessing the anxiety (using Generalized Anxiety Disorder [GAD-2] and GAD-7), depression (using Center for Epidemiologic Studies Depression), and insomnia (using Insomnia Severity Index), among HCWs across India, the Middle East, and North America. We used univariate and bivariate logistic regression to identify risk factors for psychological distress.

**Results:** The prevalence of clinically significant anxiety, depression, and insomnia were 41.4, 48.0, and 31.3%, respectively. On bivariate logistic regression, lack of social or emotional support to HCWs was independently associated with anxiety [odds ratio (OR), 3.81 (2.84–3.90)], depression [OR, 6.29 (4.50–8.79)], and insomnia [OR, 3.79 (2.81–5.110)]. Female gender and self-COVID-19 were independent risk factors for anxiety [OR, 3.71 (1.53–9.03) and 1.71 (1.23–2.38)] and depression [OR, 1.72 (1.27–2.31) and 1.62 (1.14–2.30)], respectively. Frontliners were independently associated with insomnia [OR, 1.68 (1.23–2.29)].

**Conclusion:** COVID-19 pandemic has a high prevalence of anxiety, depression, and insomnia among HCWs. Female gender, frontliners, self-COVID-19, and absence of social or emotional support are the independent risk factors for psychological distress.

**Keywords:** Anxiety, Depression, Healthcare workers, Insomnia, Psychological distress.

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## INTRODUCTION

Coronavirus disease-2019 (COVID-19) pandemic has rapidly gripped the globe, crippling the healthcare system in many countries. With the rise in workload and the risk of cross-transmission of infection to themselves, healthcare workers (HCWs) are going through huge psychological stress since the onset of the pandemic. The research during the 2003 severe acute respiratory syndrome (SARS) outbreak has shown higher levels of anxiety and stress among HCWs.<sup>1</sup> The studies so far in the COVID-19 pandemic are showing a higher risk of developing unfavorable mental health outcomes among HCWs.<sup>2,3</sup>

We thus designed a prospective multinational cross-sectional survey to assess the emotional and psychological impact of the COVID-19 pandemic, on the HCWs. The objective of the study is to find the prevalence of clinically significant anxiety, depression, and insomnia and factors contributing to psychological distress among HCWs.

## MATERIALS AND METHODS

### Study Design

We conducted a multinational, cross-sectional, web-based questionnaire survey over a period of 1 month from the mid of June to July 2020. The questionnaire was built to see the impact of the rapid growth of pandemic in the Indian subcontinent and other parts of the world. The questionnaire was forwarded to all levels of HCWs actively working in the hospital, via e-mail and/or social media. The participation was entirely voluntary, and consent was

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implied while attempting the survey questionnaire. This approval of the ethics and research committee was taken from the primary investigator's hospital before the start of the study.

### Survey Questionnaire

We segregated the questionnaire into five sections. The first section included participant's demographic characteristics including any preexisting mental illness. The information on working place in

the hospital [frontline HCW (doctor or nurse) vs nonfrontline HCW (allied health worker, administrator, researcher)], area of working (high risk or low risk), infection with SARS coronavirus 2 (SARS-CoV-2) in HCWs and any family member or close relative was also collected. Sections two and three comprised of screening tools for anxiety [Generalized Anxiety Disorder (GAD) scale] and depression [Centre for Epidemiologic Studies Depression (CES-D) scale]. Section four assessed insomnia using the Insomnia Severity Index (ISI) scale. Finally, section five was prepared to assess the respondent's subjective assessment of the pandemic. The participants were allowed to enter their comments wherever appropriate, in the provided free space. The availability of social and emotional support is considered an important factor in mental health. However, as this is difficult to measure, we asked a direct question to participants on the availability of social and emotional support based on their perception.

### Scales Used for Psychological Assessment

We used three scales to assess psychological distress among HCWs

- **GAD Scale:** We used the GAD-2 and GAD-7 scale to assess the level of anxiety. GAD-7 is a self-administered, seven-item scale, with a cutoff score of 8 (sensitivity 92% and specificity 76%) developed for the screening of anxiety.<sup>4,5</sup> The scale is validated for use in the heterogeneous population.<sup>6,7</sup> GAD-7 performs moderately well at detecting three common anxiety disorders, panic disorder (sensitivity 74% and specificity 81%), social anxiety disorder (sensitivity 72% and specificity 80%), and post-traumatic stress disorder (sensitivity 66% and specificity 81%).<sup>8</sup> GAD-2 is a simpler version of GAD-7, consisting of the first two items of GAD-7 scale, with reported good sensitivity of 76% and specificity of 81% at a cutoff score of 3.<sup>7-9</sup> We used both the scores as the scoring is done with the same questionnaire.
- **CES-D Scale:** CES-D is one of the most widely used instruments in clinical medicine and psychiatric epidemiology for diagnosing depression, using a 20-item scale, phrased as self-statements, with ratings on a 4-point Likert scale (ranging from 0–3). Participants can rate how often each item relates to them over the course of the week. Four items that assess the positive response (e.g., “during the past week I enjoyed life”) are reverse coded.<sup>10</sup> The cutoff score of 16 is validated for clinically meaningful depressive symptoms among caregivers.<sup>11</sup>
- **ISI Scale:** The ISI is one of the most widely used screening tools for insomnia, in both community and primary care settings.<sup>12</sup> It is designed to assess the nature, severity, and impact of insomnia. A cutoff score of 10 is validated (86.1% sensitivity and 87.7% specificity) for the screening of insomnia in the general population.<sup>12,13</sup>

### Statistical Methods

The continuous variables were expressed as means (standard deviation) and medians (ranges). The categorical variables were expressed in counts and percentages. Clinical comparison of factors was done using Fisher's exact or chi-square test for categorical variables. The odds ratio (OR) [95% confidence intervals (CI)], univariate and bivariate logistic regression was used for assessing factors related to the presence of anxiety, depression, and insomnia in HCWs. The *p*-value less than 0.05 was taken as significant. The statistical software IBM SPSS (version 26.0 Armonk, New York: IBM Corp.) was used for analysis.

## RESULTS

In 4 weeks, we received 1,088 responses, of which 72 were incomplete, and two of them were not working at the time of the survey. We included 1,004 completed questionnaires in the final analysis (Fig. 1).

### Demographics (Table 1)

The median age of the participating HCWs was 39 (22–80) years and 42.6% were in the age-group of 31–40 years (Fig. 2). Of the total, 54.4% of the participants were males [median age 40 (22–80) years] and 45.6% females [median age 39 (22–74) years] (Fig. 2A). The HCWs across the globe participated in the survey; however, the most (89.1%) were from India (Supplement Table 1). Among the participating doctors, 32.9% were working in high-risk areas [intensive care unit (ICU) and emergency room (ER)] and 10.5% in low-risk areas (ward and flu clinics). Among frontline nurses, 2.3% were working in high-risk areas (ICU and ER) and 1.4% working in low-risk areas (ward and flu clinics). About 52.9% of respondents were nonfrontline workers, including 33% of doctors (Fig. 2B) (Supplement Table 2).

Thirty-four (3.4%) responders declared that they suffered from some preexisting mental illness, and 1.7% did not prefer to answer this question (Table 1). About 22.9% of the respondents had suspected or confirmed COVID-19, with about half of them (11.9%) quarantined because of exposure to an infected person and the rest were isolated or hospitalized due to symptomatic COVID-19 (11.1%) (Supplement Table 3). And 13.1% of responders had one or more of their family members affected by the illness, of which 1.3% lost a family member or a dear one due to COVID-19 (Supplement Table 4).

### Assessment of Psychological Distress

The clinically significant anxiety as assessed by the GAD-2 (using cutoff score 3), and GAD-7 (using cutoff score 8) was present in 358 (35.7%) and 416 (41.4%) of the respondents, respectively (Fig. 2). The depression (using CES-D score cutoff 16) and insomnia (using ISI score cutoff 10) were present in 482 (48%) and 690 (68.7%) respondents, respectively (Fig. 3).

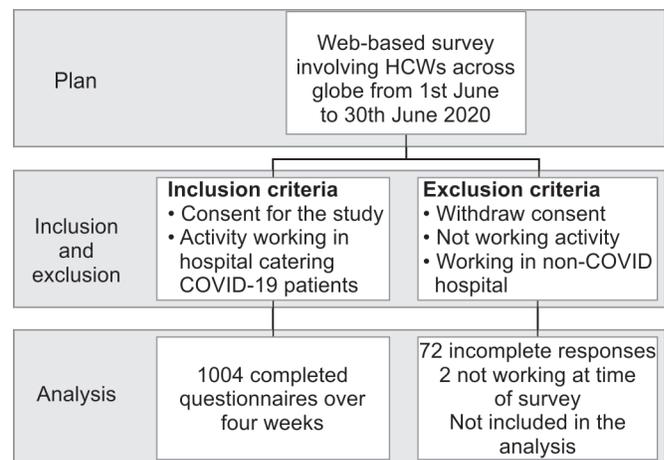


Fig. 1: Flow diagram on the study enrollment

**Table 1:** Demographic characteristics of responders

Demographic variable		Number (%)
<b>Gender</b>	Male	546 (54.4)
	Female	458 (45.6)
<b>Age-group (years)</b>	21–30	154 (15.3)
	31–40	428 (42.6)
	41–50	265 (26.4)
	51–60	101 (10.1)
	61–70	46 (4.6)
	71–80	10 (1.0)
<b>Regional distribution</b>	India	895 (89.1)
	Middle East	37 (3.7)
	North America	49 (4.9)
	Others	23 (2.3)
<b>Level of work</b>	Frontline workers	473 (47.1)
	Nonfrontline workers	531 (52.9)
<b>Any preexisting mental illness?</b>	Yes	34 (3.4)
	No	953 (94.9)
	Prefer not to say	17 (1.7)
<b>Whether sufficient social or emotional support available?</b>	Yes	705 (70.2)
	No	130 (12.9)
	Not sure	169 (16.8)

**Supplementary Table 2:** Position of work in the hospital

Position of work of HCWs in hospital	Number	%
Administrator—not in contact with patients but involved in planning	36	3.6
Allied HCWs, working in COVID area (physiotherapy, radiologist, laboratory, technicians, etc.)	66	6.6
Allied specialties, working in non-COVID area (physiotherapy, radiologist, laboratory, technicians, etc.)	37	3.7
Doctors working in non-COVID area	331	33.0
Frontliner nurse, working in ER and ICU	23	2.3
Frontline doctor, working in COVID ward and flu clinic	106	10.6
Frontline doctor, working in ER and ICU	330	32.9
Frontline nurse, working in COVID ward and flu clinic	14	1.4
Nurses working in non-COVID area	9	0.9
Other	50	5.0
Researcher	2	0.2
<b>Total</b>	<b>1004</b>	<b>100.0</b>

**Supplementary Table 1:** Countries of current residence/work of respondents

Country	Number	%
India	895	89.1
United Arab Emirates	35	3.5
Canada	28	2.8
United States of America	21	2.1
Australia	6	0.6
Bangladesh	2	0.2
Germany	2	0.2
Ireland	1	0.1
Malaysia	1	0.1
Maldives	1	0.1
Nigeria Africa	1	0.1
Oman	2	0.2
Singapore	5	0.5
United Kingdom	4	0.4
<b>Total</b>	<b>1004</b>	<b>100.0</b>

**Univariate Analysis of Factors Affecting Psychological Symptoms in HCWs**

- Age-groups affected (Tables 2 and 3)  
Anxiety was higher in the HCWs of younger age. When analyzed by the GAD-2 scale, the age-group 31–40 years had the highest number of respondents with anxiety (44.4%) followed by age-group 41–50 years (24.9%). Using a GAD-7 scale, 31–40 age-group HCWs had statistically significant anxiety (44%) as compared to other age-groups ( $p = 0.001$ ). The clinically significant depressive symptoms ( $p = 0.001$ ) and insomnia ( $p = 0.000$ ) were

also statistically significant (highest) in the same age-group of 31–40 years.

- Affection of symptoms as per gender (Tables 2 and 3)  
The clinically significant anxiety was significantly higher in females as compared to male HCWs (GAD-2,  $p = 0.027$ ; and GAD-7,  $p = 0.003$ ). The clinically significant depressive symptoms and insomnia were also higher in the female HCWs, with statistical significance ( $p = 0.000$  and  $p = 0.031$ , respectively).
- Comparison of psychological impact between frontline and other HCWs (Tables 2 and 3)  
The anxiety (GAD-2,  $p = 0.011$  and GAD-7,  $p = 0.005$ ) and clinically significant depressive symptoms ( $p = 0.002$ ) were higher in frontline workers, with statistical significance.  
The frontline HCWs also had a higher level of insomnia (as compared to nonfrontline HCWs) and again the difference was statistically significant ( $p = 0.000$ ).
- Relation of psychological distress to preexisting mental illness (Tables 2 and 3)  
The clinically significant anxiety symptoms were statistically significantly lower in patients, with preexisting mental illness (GAD 2,  $p = 0.009$ ; GAD 7,  $p = 0.012$ ). The clinically significant depressive symptoms, however, were statistically significantly higher in HCWs with preexisting mental illness, ( $p = 0.001$ ). Similarly, insomnia was also higher in HCWs with preexisting mental illness (but without statistical significance,  $p = 0.205$ ).
- Comparison with presence or absence of emotional or social support (Tables 2 and 3)  
About 13% of the respondents had no emotional or social support at their workplace or home and about 16.8% were not sure about their support system (Table 1). The anxiety, as well as depression, was significantly higher in the group of HCWs who had no support system. The severity of anxiety and insomnia was also higher in the group of HCWs without support, with statistical significance ( $p = 0.00$ ).

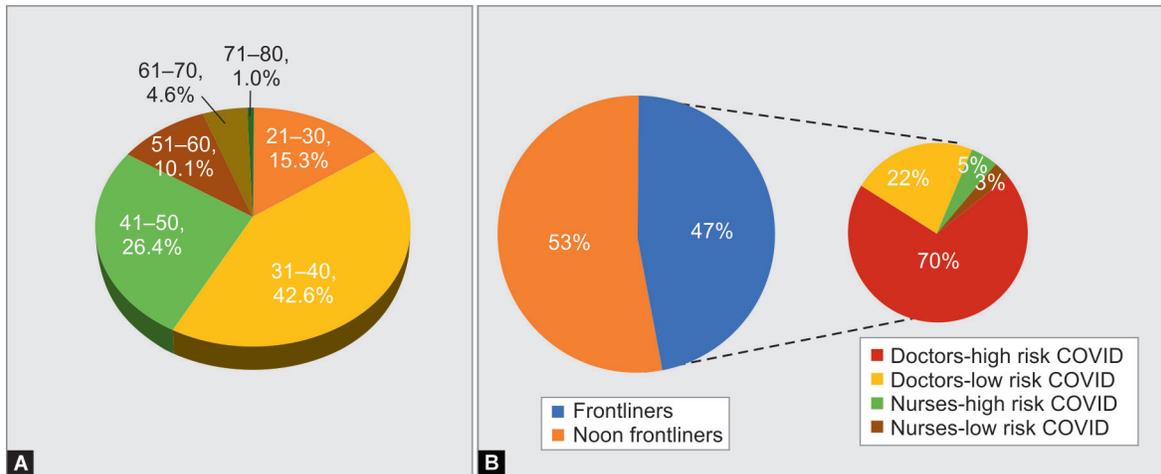


Fig. 2: Demographics of responders. (A) Age-group in years and distribution of responders in percentage; (B) Distribution of responders by their position of work

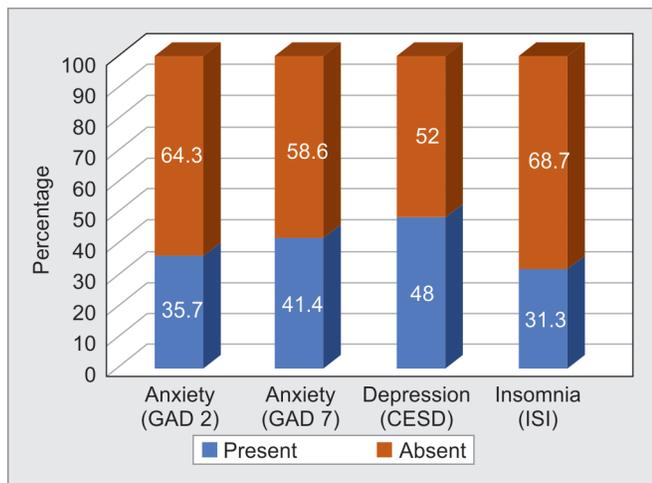


Fig. 3: Percentage of HCWs with psychological distress

Supplementary Table 3: Responders' self-illness with COVID-19

Statement	Statement	N (%)	Total
Illness/exposure of responder to COVID-19	Yes Had required intensive care admission due to COVID-19	1 (0.1%)	230 (22.9%)
	Hospitalized due to COVID-19	16 (1.6%)	
	Quarantined due to unprotected exposure from an infected person	119 (11.9%)	
	Self-isolation due to experiencing COVID-19 like symptoms/ diagnosis	94 (9.4%)	
No	None of the above	767 (76.4%)	774 (77.1%)
	Prefer not to say	7 (0.7%)	

N, number

Supplementary Table 4: Responder's family member or near ones with COVID-19

Variable	Statement	N (%)	Total
Family member or near one infected with COVID-19	Yes I have lost a family member or near one due to COVID-19	13 (1.3%)	132 (13.2%)
	Yes, diagnosed and quarantined or isolated due to COVID-19	48 (4.8%)	
	Yes, hospitalized due to COVID-19	56 (5.6%)	
	Yes, required intensive care admission due to COVID-19	15 (1.5%)	
	No None	872 (86.9%)	

N, number

- Self-illness (Tables 2 and 3)  
HCWs who had themselves been infected or exposed to COVID-19 had significantly higher anxiety, depression, and insomnia (GAD-2,  $p = 0.008$ ; GAD-7,  $p = 0.001$ ; CES-D,  $p = 0.000$ ; ISI,  $p = 0.006$ ), respectively.
- The occurrence of COVID-19 in a family member or near one (Tables 2 and 3)  
The affection of a close family member by COVID-19 did not have a significant impact on the emotional and psychological well-being of the HCW.
- The presence of social and emotional support (Tables 2 and 3)  
The absence of any social and emotional support to HCWs was (statistical) significantly associated with anxiety, depression, and insomnia (GAD-2,  $p = 0.000$ ; GAD-7,  $p = 0.000$ ; CES-D,  $p = 0.000$ ; ISI,  $p = 0.000$ ) respectively.

### Logistic Regression of Factors Affecting Psychological Symptoms (Table 4)

We used bivariate logistic regression for significant factors of GAD-2, GAD-7, CES-D, and ISI. Most of the responders (89.1%) were

**Table 2:** Univariate analysis of factors affecting anxiety in HCWs

		GAD-2 (cutoff $\geq 3$ )				<i>p</i> value	GAD-7 (cutoff $\geq 8$ )				<i>p</i> value
		No anxiety		Anxiety			No anxiety		Anxiety		
		<i>N</i>	%	<i>N</i>	%		<i>N</i>	%	<i>N</i>	%	
<b>Age-group</b>	21–30	90	13.90	64	17.90	0.164	74	12.60	80	19.20	0.001
	31–40	269	41.60	159	44.40		245	41.70	183	44.00	
	41–50	176	27.20	89	24.90		155	26.40	110	26.40	
	51–60	71	11.00	30	8.40		73	12.40	28	6.70	
	61–70	31	4.80	15	4.20		33	5.60	13	3.10	
	71–80	9	1.40	1	0.30		8	1.40	2	0.50	
<b>Gender</b>	Male	368	57.00	178	49.70	<b>0.027</b>	343	58.30	203	48.80	<b>0.003</b>
	Female	278	43.00	180	50.30		245	41.70	213	51.20	
<b>Country group</b>	India	564	87.30	331	92.50	0.074	515	87.60	380	91.30	0.100
	Middle East	26	4.00	11	3.10		22	3.70	15	3.60	
	USA + Canada	38	5.90	11	3.10		37	6.30	12	2.90	
	Others	18	2.80	5	1.40		14	2.40	9	2.20	
<b>Mental illness</b>	No	617	95.50	353	98.60	<b>0.009</b>	561	95.40	409	98.30	<b>0.012</b>
	Yes	29	4.50	5	1.40		27	4.60	7	1.70	
<b>Frontline workers</b>	Yes	285	44.10	188	52.50	<b>0.011</b>	255	43.40	218	52.40	<b>0.005</b>
	No	361	55.90	170	47.50		333	56.60	198	47.60	
<b>Self-illness</b>	Yes	131	20.30	99	27.70	<b>0.008</b>	113	19.20	117	28.10	<b>0.001</b>
	No	515	79.70	259	72.30		475	80.80	299	71.90	
<b>Family illness</b>	Yes	82	12.70	50	14.00	0.567	71	12.10	61	14.70	0.232
	No	564	87.30	308	86.00		517	87.90	355	85.30	
<b>Emotional support</b>	Yes	507	78.50	198	55.30	<b>0.000</b>	482	82.00	223	53.60	<b>0.000</b>
	No	139	21.50	160	44.70		106	18.00	193	46.40	

*p* value less than 0.05 is significant is highlighted in bold

from the Indian subcontinent and only 3.4% HCWs reported any preexisting mental illness. To avoid statistical bias, both of these variables were excluded from the bivariate logistic regression. Female gender [OR, 1.37 (1.034–1.83),  $p = 0.028$ ], self-illness [OR, 1.71 (1.23–2.38),  $p = 0.001$ ] with COVID-19 and nonavailability of social or emotional support [OR, 3.81 (2.84–2.90),  $p = 0.000$ ] were independently associated with higher anxiety using GAD-7. These same factors were also independently associated with anxiety on the GAD-2 scale. Female gender [OR, 1.72 (1.27–2.31),  $p = 0.000$ ], self-illness [OR, 1.62 (1.14–2.30),  $p = 0.007$ ], and absence of social or emotional support [OR, 6.29 (4.50–8.79),  $p = 0.000$ ] were also independent risk factors for clinically significant depression symptoms. The independent risk factors for insomnia among HCWs were younger age [20–30 years, OR, 1.37 (0.27–6.90); 30–40 years, OR, 1.02 (0.27–6.90),  $p = 0.006$ ], frontline workers [OR, 1.68 (1.23–2.29),  $p = 0.001$ ], and absence of social or emotional support [OR, 3.79 (2.81–5.11),  $p = 0.000$ ].

### Subjective Assessment of the Pandemic and Concerns of HCWs (Supplement Table 5)

The final section of the survey covered the concerns and worries of the HCWs during the pandemic. About 70% of the HCWs felt treating COVID-19 patients as part of their job responsibility, whereas 9.3% felt it otherwise. In regards to “workplace challenge,” the main concern was watching their fellow HCWs contracting COVID-19, followed by self-infection from SARS-CoV-2. Also, 9.2% of HCWs had a concern about insufficient or poor quality personal protective equipment (PPE). When asked about the “risk of infection,” 65%

of the HCWs were worried about the cross-transmission of the SARS-CoV-2 virus to their family members or friends. About 17% of respondents were worried about losing a near one or a family member due to SARS-CoV-2 infection. Only 12.5% of HCWs were worried about getting infected themselves. The main concern of HCWs on self-infection was complications secondary to infection, ICU admission, invasive mechanical ventilation (39.7%), and death (13.8%). Only 24.9% expressed no fret about getting infected with COVID-19.

And 1.8% expressed having thoughts of self-harm or suicidal intentions. However, only 6.9% of the HCWs felt that their intake of alcohol or nicotine had increased after the onset of the pandemic.

## DISCUSSION

This is the first large-scale multinational survey on the psychological impact of the COVID-19 pandemic on the HCWs of different backgrounds, with over 1000 responses. Stress is often described as an emotional burden or strain. Perception of stress usually causes anxiety and negative emotions like depression and sleep disturbances.<sup>1,2</sup> Hence, we chose different scales to assess the levels of clinically significant anxiety, depressive symptoms, and insomnia among the HCWs, to assess the psychological distress during the COVID-19 pandemic.

This prevalence of anxiety (41.4%), depression (48%), and insomnia (68.7%) was high among HCWs in this survey, and similar findings were reported from other surveys.<sup>1,2,14</sup> We found that being younger (<40 years), female gender, lack of emotional support,

**Table 3:** Univariate analysis of factors affecting depression and insomnia in HCWs

		CES-D (cutoff 16)				p value	ISI (cutoff ≥ 10)				p value
		No depression (<16)		Depression			No insomnia		Insomnia		
		N	%	N	%		N	%	N	%	
<b>Age-group</b>	21–30	48	9.20	106	22.00	<b>0.000</b>	81	11.70	73	23.20	<b>0.000</b>
	31–40	210	40.20	218	45.20		280	40.60	148	47.10	
	41–50	149	28.50	116	24.10		198	28.70	67	21.30	
	51–60	72	13.80	29	6.00		86	12.50	15	4.80	
	61–70	34	6.50	12	2.50		37	5.40	9	2.90	
	71–80	9	1.70	1	0.20		8	1.20	2	0.60	
<b>Gender</b>	Male	319	61.10	227	47.10	<b>0.000</b>	391	56.70	155	49.40	<b>0.031</b>
	Female	203	38.90	255	52.90		299	43.30	159	50.60	
<b>Country group</b>	India	454	87.00	441	91.50	<b>0.000</b>	610	88.40	285	90.80	0.327
	Middle East	15	2.90	22	4.60		29	4.20	8	2.50	
	USA + Canada	41	7.90	8	1.70		37	5.40	12	3.80	
	Others	12	2.30	11	2.30		14	2.00	9	2.90	
<b>Mental illness</b>	No	514	98.50	456	94.60	<b>0.001</b>	670	97.10	300	95.50	0.205
	Yes	8	1.50	26	5.40		20	2.90	14	4.50	
<b>Frontline workers</b>	Yes	222	42.50	251	52.10	<b>0.002</b>	291	42.20	182	58.00	<b>0.000</b>
	NO	300	57.50	231	47.90		399	57.80	132	42.00	
<b>Self-illness</b>	Yes	92	17.60	138	28.60	<b>0.000</b>	141	20.40	89	28.30	<b>0.006</b>
	No	430	82.40	344	71.40		549	79.60	225	71.70	
<b>Family illness</b>	Yes	69	13.20	63	13.10	0.945	98	14.20	34	10.80	0.142
	No	453	86.80	419	86.90		592	85.80	280	89.20	
<b>Emotional support</b>	Yes	455	87.20	250	51.90	<b>0.000</b>	550	79.70	155	49.40	<b>0.000</b>
	No	67	12.80	232	48.10		140	20.30	159	50.60	

p value less than 0.05 is significant is highlighted in bold

**Table 4:** Bivariate logistic regression of factors affecting anxiety, depression, and insomnia in HCWs

Variables		GAD-7		GAD-2		CES-D		ISI	
		OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value
<b>Age</b>	71–80	1	0.373			1	<b>0.000</b>	1	<b>0.006</b>
	21–30	1.57 (0.31–7.89)				8.23 (0.94–72.42)		1.37 (0.27–6.90)	
	31–40	1.43 (0.29–6.94)				5.73 (0.67–49.05)		1.02 (0.27–6.90)	
	41–50	1.46 (0.30–7.12)				4.10 (0.48–35.41)		0.68 (0.14–3.34)	
	51–60	0.91 (0.18–4.62)				2.38 (0.27–21.15)		0.45 (0.09–2.38)	
	61–70	0.89 (0.16–4.89)				2.13 (0.22–20.24)		0.66 (0.12–0.37)	
<b>Gender</b>	Male	1	<b>0.028</b>	1	<b>0.059</b>	1	<b>0.000</b>	1	0.167
	Female	1.37 (1.04–1.83)		1.30 (0.99–1.72)		1.72 (1.27–2.31)		1.24 (0.91–1.68)	
<b>Frontline others</b>	Others	1	0.165	1	0.054	1	0.054	1	<b>0.001</b>
	Frontline workers	1.23 (0.92–1.64)		1.32 (1.00–1.74)		1.35 (1.0–1.84)		1.68 (1.23–2.29)	
<b>Self-illness</b>	No	1	<b>0.001</b>	1	<b>0.009</b>	1	<b>0.007</b>	1	0.144
	Yes	1.71 (1.23–2.38)		1.53 (1.11–2.12)		1.62 (1.14–2.30)		1.29 (0.92–1.81)	
<b>Emotional support</b>	Yes	1	<b>0.000</b>	1	<b>0.000</b>	1	<b>0.000</b>	1	<b>0.000</b>
	No	3.81 (2.84–3.90)		2.90 (2.18–3.86)		6.29 (4.50–8.79)		3.79 (2.81–5.11)	

p value less than 0.05 is significant is highlighted in bold

professional role as a frontline HCW had a significantly higher prevalence of psychological symptoms.

Female HCWs were significantly higher associated with clinically significant anxiety [OR, 3.71 (1.53–9.03)] and depression [OR, 1.72 (1.27–2.31)], as compared to their male counterparts. Lai et al. also reported female HCWs in Wuhan, China, had higher psychological

symptoms (anxiety, depression, and insomnia) as compared to males.<sup>2</sup> Self-illness with COVID-19 was an independent risk factor associated with anxiety [GAD-7: OR, 1.71 (1.23–2.38); GAD-2: 1.53 (1.11–2.12)] and depression [1.62 (1.14–2.30)]. A higher rate of depression and post-traumatic stress disorder was already being reported in COVID-19 patients.<sup>15</sup>



**Supplementary Table 5:** Concerns and worries about the COVID-19 pandemic

Concern	Statements	Number (%)
Main concern as one works in this COVID-19 pandemic	About my finances	102 (10.2%)
	About my own health	355 (35.4%)
	Insufficient/poor quality PPE	92 (9.2%)
	Social stigma from the society	76 (7.6%)
	watching colleagues/other HCWs contracting COVID-19	379 (37.7%)
Main worry about COVID-19	Getting COVID-19 yourself	125 (12.5%)
	Losing a family member or near one to COVID-19	171 (17.0%)
	Transmitting SARS-CoV-2 to a vulnerable person in your family	231 (23.0%)
	Transmitting the SARS-CoV-2 to your family or friends	413 (41.1%)
	I do not worry about any of the above	63 (6.3%)
Biggest worry if one contracts COVID-19 infection	Complications of the disease—requiring ICU or ventilator	399 (39.7%)
	Death	139 (13.8%)
	Isolation or quarantine	178 (17.7%)
	Loss of income	38 (3.8%)
	None	250 (24.9%)
Feel a sense of responsibility to take care of patients infected with SARS-CoV-2	I am not sure	205 (20.4%)
	No, I have a responsibility at home, and I would prefer to stay home.	93 (9.3%)
	Yes, it is my responsibility to treat such patients	706 (70.3%)
Change in intake of alcohol or nicotine since the onset of this pandemic	Decreased	115 (11.5%)
	I do not drink alcohol or nicotine	640 (63.7%)
	Increased	69 (6.9%)
	No change	156 (15.5%)
	Prefer not to say	24 (2.4%)
Any suicidal self-harm or thoughts since the onset of this pandemic	No	942 (93.8%)
	Not sure	27 (2.7%)
	Prefer not to say	17 (1.7%)
	Yes	18 (1.8%)

Frontline HCWs are usually vulnerable to the stress of work and the risk of nosocomial transmission of SARS-CoV-2.<sup>16</sup> Studies have reported a higher risk of anxiety, insomnia, and overall psychological problems among frontline HCWs and ICU staff of the hospital.<sup>16–18</sup> In our study, frontline HCWs had significantly higher anxiety (GAD-7:  $p = 0.005$ ), depression ( $p = 0.002$ ), and insomnia ( $p = 0.000$ ) as compared to nonfrontline HCWs. Further, working in the frontline was an independent risk factor for insomnia [OR, 1.68 (1.23–2.29)]. The absence of social and emotional support for HCWs was independently associated with higher anxiety [GAD-7: OR, 3.81 (2.84–3.90); GAD-2: OR, 2.90 (2.18–3.86)], depressive symptoms [OR, 6.29 (4.50–8.79)], and insomnia [OR, 3.79 (2.81–5.110)]. This was also recently reported in other studies, and the poor social support

during the COVID-19 pandemic is associated with psychological distress among HCWs.<sup>19–21</sup>

In our survey, 20.5, 76.4, and 41.2% of HCWs with preexisting mental illness reported anxiety (GAD-7 scale), depression, and insomnia despite treatment, respectively. Vindegaard et al. in a meta-analysis of published studies in COVID-19 reported worsening of symptoms in psychiatric patients.<sup>18</sup> However, to our surprise, anxiety was less in patients with previous mental illness. This may be because of statistical bias as preexisting mental illness was only reported by 3.4% of the participants. Also, the ongoing treatment for preexisting mental illness could be a reason for no increased anxiety in these patients. Despite the low numbers, clinically significant depressive symptoms were significantly higher in patients with preexisting mental illness ( $p = 0.002$ ).

We conducted a subjective assessment of the pandemic by HCWs using open-end statements. The interesting finding was that only 10% of HCWs were concerned about PPE. This indirectly reflects the adequate preparation during initial lockdown despite resource-limited settings of the Indian subcontinent. We also tried to assess the trepidation among HCWs about COVID-19. HCWs were concerned more about the transmission of SARS-CoV-2 to their family members as compared to their health and may be explained by general social and cultural values.<sup>21</sup> In the case of self-infection with COVID-19, the HCWs were mainly worried about serious complications of the disease (like the need for invasive mechanical ventilation and ICU stay). The uncertainty about the nature of disease progression and the absence of definitive treatment may be the major reasons for concern in the majority of HCWs. This may also lower feeling of self-responsibility (70%) while treating COVID-19 patients. The level of psychological distress also had an impact on the social behavior of HCWs with 7% reported an increase in the consumption of alcohol and tobacco. Only 1.8% of the responders had even thoughts of suicidal self-harm (with only 4.4% preferred not to comment on this questionnaire). This shows the gravity of the psychological distress on HCWs and demands an immediate and effective intervention with professional support.<sup>22,23</sup>

In this survey, we also obtained the respondents' perception of their mental stress. The primary concern was unable to stay with their family either to avoid nosocomial transmission of the virus or because of the social stigmata of COVID-19.<sup>23</sup> The absence of regular work hours, and the risk of nosocomial transmission with SARS-CoV-2, was the reason for emotional stress among HCWs. Many also expressed concern regarding financial uncertainty, and changing information on COVID-19 pandemic, as a cause of mental unrest and conflicts.

The strength of our survey includes the high number of responders of frontline HCWs, multinational reach, especially the two highest affected countries, India and the USA and the timing of the survey. The survey period coincided with the increasing cases of COVID-19 in India and may have mirrored the apprehension of the growing pandemic.

Our study has a few limitations. Firstly, we could not assess the disproportionate impact of the ethnicity, cultural, sociopolitical differences, and effect of age or designation of HCWs on psychological distress. Secondly, there was an over-representation of the participants from one country and a smaller number of nursing staff, which may affect the generalizability of the results. Thirdly, the level of stress was not evaluated among HCWs. Finally, this being a point prevalence study and needs follow-up to understand the complete impact of the pandemic.

## CONCLUSION

Our study concludes that the COVID-19 pandemic is causing a significant psychological upheaval among HCWs. Female gender, frontline workers, self-illness with COVID-19, and absence of social or emotional support are the independent risk factors associated with psychological distress among HCWs. We recommend robust screening programs and professional psychological support with appropriate interventions to address the emotional well-being of the HCWs during these challenging times.

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