

Table 1 Univariate analysis of personal and occupational characteristics, anxiety, depression, stress and insomnia among healthcare workers in Arab countries during the COVID-19 pandemic (n = 2879)

Characteristics	Anxiety N=1407, 48.9%		Depression N = 1456, 50.6%		Stress N = 1192, 41.4%		Insomnia N = 2075, 72.1%	
	N (%)	P	N (%)	P	N (%)	P	N (%)	P
Gender								
Female	938 (52.7)	<0.001	885 (49.7)	0.228	712 (40.0)	0.048	1232 (69.2)	<0.001
Male	469 (42.7)		571 (52.0)		480 (43.7)		843 (76.8)	
Age category, yr								
20–29	228 (48.4)	<0.001	260 (55.2)	<0.001	210 (44.6)	<0.001	363 (77.1)	<0.001
30–39	816 (54.7)		816 (54.7)		673 (45.1)		1147 (76.9)	
40–49	265 (42.4)		274 (43.8)		224 (35.8)		408 (65.3)	
≥ 50	98 (33.7)		106 (36.4)		85 (29.2)		157 (54.0)	
Marital status								
Married	948(47.4)	0.015	978 (48.9)	0.006	812 (40.6)	0.176	1400 (70.0)	<0.001
Single	459(52.3)		478 (54.4)		380 (43.3)		675 (76.9)	
Children								
Yes	905(48.0)	0.228	936(49.7)	0.213	776 (41.2)	0.80	1327 (70.4)	0.007
No	497(50.4)		514(52.1)		411 (41.7)		741 (75.2)	
Living with family during COVID-19								
Yes	1041(49.6)	0.162	11109 (52.9)	<0.01	943 (45.0)	<0.01	1541 (73.5)	0.005
No	361(46.7)		341(44.1)		244 (31.6)		527 (68.2)	
Profession								
Physicians	440(53.7)	0.001	519 (63.3)	<0.001	462 (56.3)	<0.001	669 (81.6)	<0.001
Nurses	637(48.7)		563 (43.0)		422 (32.3)		872 (66.7)	
Others	330(43.9)		374 (49.8)		308 (41.0)		534 (71.1)	
Smoking status								
Never smoked	1035(48.5)	<0.01	1042 (48.8)	<0.01	831 (38.9)	<0.01	1482 (69.4)	<0.01
Previous smoker	113(50.2)		113 (50.2)		92 (40.9)		170 (75.6)	
Smoking as before COVID-19	110(43.7)		131 (52.0)		115 (45.6)		202 (80.2)	
Smoking less than before COVID-19	51(43.2)		63 (53.4)		57 (48.3)		93 (78.8)	
Smoking more during COVID-19	72(72.0)		79 (79.0)		75 (75.0)		96 (96.0)	
Started smoking after COVID-19	6(75.0)		6 (75.0)		6 (75.0)		7(87.5)	
Working hours								
≤ 20	121(45.3)	0.463	125 (46.8)	0.017	111 (41.6)	0.484	183 (65.5)	0.005
21–44	644(49.5)		696 (53.5)		554 (42.5)		977 (75.0)	
≥ 45	642(49.0)		635 (48.5)		527 (40.2)		915 (69.8)	
Working experience, yr								
1–5	278 (54.2)	<0.001	291 (56.7)	<0.001	246 (48.0)	<0.001	393 (76.6)	<0.001
6–10	403 (50.9)		416 (52.5)		350 (44.2)		602 (76.6)	
11–15	365 (51.2)		365 (51.2)		289 (40.5)		535 (75.0)	
> 15	361 (41.9)		384 (44.6)		307 (35.7)		545 (63.3)	
Type of hospital								
Tertiary	717 (48.9)	0.953	695 (47.4)	0.001	539 (36.8)	<0.001	1011 (69.0)	<0.001
Secondary	690 (48.8)		761 (53.9)		653 (46.2)		1064 (75.3)	
COVID-19 hospitals								
Yes	963 (50.8)	<0.01	952 (50.2)	0.589	772 (40.7)	0.299	1337 (70.5)	0.01
No	444 (45.2)		504 (51.3)		420 (42.7)		738 (75.1)	

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Characteristics	Anxiety N=1407, 48.9%		Depression N = 1456, 50.6%		Stress N = 1192, 41.4%		Insomnia N = 2075, 72.1%	
	N (%)	P	N (%)	P	N (%)	P	N (%)	P
Contact with COVID-19 cases								
Yes	528 (58.1)	<0.001	511 (56.2)	<0.001	435 (47.9)	<0.001	697 (76.7)	<0.001
No	879 (44.6)		945 (48.0)		757 (38.4)		1378 (69.9)	
Relative/friend with COVID-19								
Yes	534 (57.7)	<0.01	535 (57.8)	<0.01	429 (46.4)	<0.01	715 (77.3)	<0.01
No	852 (44.6)		898 (47.0)		764 (39.0)		1333 (69.7)	
Satisfied by hospitals safety measures								
Satisfied	426 (37.6)	<0.01	405 (35.7)	<0.01	316 (27.9)	<0.01	679 (59.9)	<0.01
Neutral	452 (52.3)		448 (51.9)		341(39.5)		642 (74.3)	
Not satisfied	524 (60.1)		597 (68.5)		530 (60.8)		747 (85.7)	
How likely you may get COVID-19								
Very unlikely	76 (30.0)	<0.01	73 (28.9)	<0.01	52 (20.6)	<0.01	109 (43.1)	<0.01
Unlikely	292 (35.5)		292 (35.5)		236 (28.7)		511 (62.2)	
likely	704 (53.7)		737 (56.3)		596 (54.5)		1044 (79.7)	
Very likely	312 (69.5)		329 (73.3)		289 (64.4)		384 (85.5)	
Feeling stigmatized								
Yes	637 (58.8)	<0.01	678 (62.6)	<0.01	567 (52.4)	<0.01	891 (82.3)	<0.01
No	765 (42.8)		772 (43.2)		620 (34.7)		1177 (65.9)	

Cutoff scores for anxiety (> 7), depression (> 9), stress (> 14) and insomnia (> 7).

aged < 40 years (68.2%), and nurses outnumbered (45.4%) physicians and other allied healthcare professionals. Of all participants, 50.9% worked in tertiary hospitals, and ~50% worked > 45 hours. More than 50% had work experience of 6–15 years, and about a third > 15 years. About two thirds of participants worked in hospitals equipped for treatment of COVID-19 patients (Supplementary Table 1).

Using the defined cutoffs of the DASS-21 and ISI revealed that anxiety, depression, stress and insomnia were identified in 48.9%, 50.6%, 41.4% and 72.1% of respondents, respectively. Distribution of these psychological outcomes was highest in LMICs, except for Palestine, where all the psychological outcomes and insomnia were lower than in most other countries regardless of economic status. For an example of an LMIC, in Egypt, the percentages of those positive for anxiety, depression, stress and insomnia were 65.0%, 69.0%, 58.0% and 87.0%, respectively, versus 43.0%, 36.0%, 24.0% and 60.0% in Saudi Arabia. In comparison to other Gulf countries, Saudi Arabia had the lowest prevalence of all the psychological outcomes and insomnia (Figure 2). The psychological outcomes and insomnia were substantially higher in countries with higher than lower case fatality rates (Supplementary Figure 2). It was common to have > 1 mental health problem; > 40% of physicians scored positive for 3 mental health disorders, compared to about 33% of nurses and allied HCWs. Multiple mental health disorders were more frequent among HCWs who had contact with COVID-19 cases (Supplementary Figure 3).

Table 1 shows distribution of anxiety, depression, stress and insomnia among all studied groups. All psychological outcomes and insomnia were more common in physicians; HCWs with direct contact with COVID-19 patients; HCWs with family members or friends diagnosed with COVID-19; HCWs not satisfied with hospital safety measures; HCWs who believed they were at high risk of acquiring COVID-19; HCWs who felt stigmatized by the community; and HCWs who smoked more during the pandemic. All the psychological outcomes and insomnia were significantly less frequent in HCWs who were married, aged \geq 50 years, and with work experience > 15 years. Stress and insomnia were significantly higher among male HCWs, while anxiety was significantly higher among female HCWs. Living with family was associated with a higher rate of depression, stress and insomnia. Insomnia and depression were lower among HCWs who worked \leq 20 hours/week. The prevalence of severe and very severe forms of anxiety, depression and stress and clinically severe insomnia was 21.2%, 17.9%, 16.6% and 9.7%, respectively. The severity of anxiety, depression, stress and insomnia was greater among HCWs who had contact with COVID-19 patients (Figure 1).

Adjusted analysis revealed that, anxiety, depression and stress were independently associated with feeling stigmatized, perceived higher risk of getting infection, dissatisfaction with hospital preventive measures, and working > 44 hours/week (Table 2). Also, the odds of anxiety, depression and stress were significantly higher