

## **Psychological Impact of COVID-19 on Healthcare Workers in a Tertiary Care Hospital, Karachi Pakistan**

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### **Abstract**

**Background:** After the outbreak of coronavirus disease in 2019, healthcare workers have encountered an unprecedented level of workload and pressure. In Pakistan, little is known about its mental impact on the health care personnel and perceived stressors. This research aims to explore the psychological impact of COVID-19 on healthcare workers at one of the leading referral centers in Pakistan's highest COVID-19 burden city, Karachi.

**Methodology:** A cross-sectional study was conducted inviting HCWs including doctors and nurses posted in COVID-19 intensive care unit (ICU) and emergency department. Mental health was measured on the Depression, Anxiety and Stress Scale (DASS 21). Binary logistic regression was used to model depression against its predictors. Odds ratios and 95% CIs were reported.

**Results:** A total of 202 HCWs participated in the study. Most were nurses (59%) while physicians were 41%. Among the respondents, 95 (47.3%) had symptoms of depression, 72 (35.8%) had anxiety and 122 (60.7%) had stress. Simple logistic regression revealed that female gender, younger age, nurses, less work experience, long duty hours, direct contact with a COVID-19 positive patient, working in the COVID-19 ICU, having anxiety and stress are associated with depression. Advance logistic regression showed that female gender, being nurse, long duty hours, anxiety and stress were associated with depression.

**Conclusion:** Although the presence of depression, anxiety and stress is high in doctors and nurses working with COVID-19 patients, certain characteristics associated with mental health problems were brought into the limelight. Emotional and psychological support, incentives to appreciate the work and prompt identification and treatment of any mental health condition may decrease the burden on the HCWs in such public health emergencies.

**Keywords:** COVID-19; Stress; Depression; Mental Health; Healthcare Workers

## Introduction

In late December 2019, an infectious respiratory illness with no identifiable etiology was detected in a cluster of 41 patients associated with the “Huanan seafood and wet animals” market in the Wuhan City, Hubei province of China [1]. On January 7, 2020, this disease was designated as Severe Acute Respiratory Syndrome (SARS-CoV2) caused by a beta coronavirus also named as Corona Virus Disease of 2019 (COVID-19) [2]. Later, on March 11, the World Health Organization (WHO) declared pandemic alert owing to extremely contagious strain of COVID-19 that could pass from human to human via virus-laden respiratory droplets [3].

The clinical symptoms of COVID-19 vary from mild flu-like manifestations including fever, cough, and shortness of breath to more severe illness of respiratory failure, cytokine storm and multi-organ failure ultimately leading to death. However, not all individuals infected with coronavirus developed symptoms [4,5]. Stringent preventive public health measures are the only way to prevent the spread of COVID-19 [6]. As of 3<sup>rd</sup> December 2020, a global number of confirmed cases has surpassed 65,094,445 and 1,504,095 of deaths have been reported worldwide [7]. In Pakistan, on February 26, 2020, a traveler from, Iran was identified as the first confirmed case and until today Pakistan has reported total 406,810 confirmed cases and 8,205 deaths due to coronavirus [8,9].

COVID-19 has led to a huge mortality and exposed inefficiencies in health systems throughout the world, while challenging human potential beyond expectations [10]. The overwhelming number of cases coupled with limited resources for management, a constant fear of infecting oneself and family leading to physical isolation, watching dear ones lose the battle against the disease and watching patients die in isolation are some of the challenges being faced by this frontline workforce. These unusual experiences have the potential to induce stress, anxiety, depression and other mental health problems which not only affect the healthcare workers (HCWs) attention, judgment and decision-making capabilities but also jeopardize the overall healthcare system’s fight against COVID-19 [11,12]. Similar experiences were reported from the previous epidemics of SARS-CoV in 2003, MERS-CoV in 2015 and Ebola epidemics [13-15]. This suggests that the HCWs involved in treating patients with COVID-19 are extremely vulnerable to mental health problems and that such a traumatic experience may have long term psychological implications.

Pakistan’s fragile health care system is struggling with the burden of COVID-19. Accounts of vandalism at hospitals involved in the care of COVID-19 patients and blaming the HCWs for the situation affect the morale of our HCWs [16]. These incidents on a background of extreme exhaustion due to professional and emotional demands may incite or worsen psychological ill health among these warriors. Therefore, this study intends to focus on the presence of depression, anxiety and stress among HCWs including doctors and nurses at one of the largest COVID-19 management centers, The Indus Hospital in the country’s worst hit city, Karachi. This study will help in exploring the associated factors of such mental health problems among HCWs in this pandemic and their use of coping strategies for prevention and management in the future.

## Materials and Methods

### Study setting and population

A cross-sectional study was conducted, from April 2020 to July 2020 after obtaining the ethical approval from the Institutional Review Board (IRD\_IRB\_2020\_04\_003). Study data were collected and managed using REDCap (Research Electronic Data Capture) tools hosted at The Indus Hospital (TIH), Karachi, Pakistan [17]. A survey, with unique links for each HCW, was designed to assess the mental health of consultants, postgraduate trainees, medical officers and nurses who worked in high risk areas (COVID Intensive care unit (ICU) and emergency department). These unique links were for a single time use only, if technical errors occurred during the data collection or the respondents had trouble accessing the questionnaire, they were prompted to contact the institutional REDCap support. Weekly reminders were sent to the participants who provided consent but did not respond.

### Study tool

Prior to the commencement of the survey, informed consent was taken from all participants. Mental well-being was measured on the validated Depression, Anxiety and Stress Scale (DASS 21) [18,19]. Further questions were adapted from a study by Khalid, *et al.* [20] for the hospital staff during the 2014 MERS-COV epidemic. The final tool was composed of 5 sections. The first section of the questionnaire consisted of 7 basic demographic questions that explored participant’s designation, years of experience, duty hours and direct contact with either confirmed or suspected COVID 19 patients. The second section of the questionnaire consisted of the DASS-21 scale. The third section of the survey consisted of 7 questions that explored staff emotions during the COVID-19 outbreak. Rating was made on a series of four-point Likert scale. The fourth section evaluated 11 potentially stressful situations for HCWs. A similar Likert scale was adopted for rating the responses. Lastly, the fifth section consisted of 6 questions that looked at different personal coping strategies used by HCWs. This rated the strategies from zero (never used) to three (always used).

### Statistical analysis

Data was entered and analyzed using SPSS version 24.0. Mean ± Standard Deviation (SD) or Median (Inter Quartile Range, IQR) were computed for all quantitative variables where appropriate. All the categorical variables were presented as frequencies and percentages. Binary Logistic regression was run using depression, anxiety and stress as dichotomous outcome variables and assessing the best model using log likelihood. The forward selection method was used and p-value of < 0.25 was used for choosing variables for the multivariable model. Crude and adjusted Odds ratios and 95% CIs were reported. We used depression, anxiety and stress to build separate models but after assessing the 3 models, the one with depression as outcome best suited and explained the findings (model diagnostics and plausibility). Discussion with experts also revealed that stress may be a transient situation but a high burden of depression shows that stress and anxiety may have uncovered underlying borderline depression making it the most important outcome.

### Results

A total of 202 individuals out of 329 (response rate 61%) participated in the study. Females constituted 41% (n = 83) of the sample, with male comprised the other 59% (n = 119). The median age was 28 years (IQR = 26 - 30) and the most common age group was 20 to 30 years (n = 136, 41%). The participants were divided into two main categories i.e. physicians (41%) and nurses (59%) with the median years of experience being 3 years (IQR 1 - 28). Majority (57%) of the participants worked less than eight hours during the COVID-19 pandemic and placement was divided into the emergency department (67%) and COVID ICU (33%). 93% of the participants had direct contact with suspected COVID patients while 80% of the participants were attending to confirmed cases (Table 1). Of all participants, 95 (47.3%) had symptoms of depression, 72 (35.8%) anxiety and 122 (60.7%) stress (Figure). Overall, 33.3% of the participants did not show signs of stress, depression and anxiety while 27.9% showed signs of all the aforementioned.

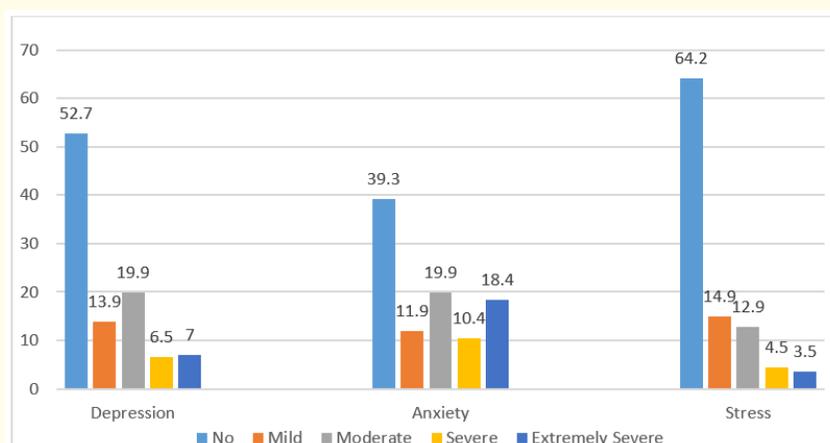


Figure 1: Percentages (%) of HCWs suffering from depression, anxiety and stress.

| Baseline Characteristics                                     | n (%)      |
|--|------------|
| Age (yr), median (IQR)                                       | 28 (26-30) |
| <b>Gender, n (%)</b>   |            |
| Male   | 119 (58.9) |
| Female   | 83 (41.1)  |
| <b>Job title, n (%)</b>                                      |            |
| Physician  | 83 (41.1)  |
| Nurses   | 119 (58.9) |
| <b>Duty hours, median (IQR)</b>                              | 8 (8,12)   |
| <b>Years of experience, median (IQR)</b>                     | 3 (1-28)   |
| <b>Place of work, n (%)</b>                                  |            |
| Emergency Department   | 134 (40.7) |
| COVID Unit   | 67 (59.3)  |
| <b>Direct contact with suspected COVID 19 patient, n (%)</b> |            |
| Yes  | 186 (92.5) |
| No   | 15 (7.5)   |
| <b>Direct contact with confirmed COVID 19 patient, n (%)</b> |            |
| Yes  | 160 (80.4) |
| No   | 39 (19.6)  |

**Table 1:** Baseline characteristics of HCWs.

When asked about various emotions while working during the COVID 19 pandemic, (Table 2) 35.8% of the HCWs felt appreciated by the hospital for being the frontline providers. 30.4% at no point expected any financial compensation and 64.1% never thought of quitting their jobs during this crisis. 46.8% of employees never felt being stigmatized for working directly with COVID patients, however, 28.2% felt that their workload had increased as compared to their colleagues working in other departments. Despite this, 48.7% never thought of changing their department to one with fewer chances of exposure.

| Feelings and emotions experienced   | Never, n (%) | Sometimes, n (%) | Often, n (%) | All the time, n (%) |
|---|--------------|------------------|--------------|---------------------|
| Appreciated by the hospital as a frontline provider   | 14 (7.3)     | 53 (27.5)        | 57 (29.5)    | 69 (35.8)           |
| Expected financial compensation by the hospital   | 58 (30.4)    | 46 (24.1)        | 39 (20.4)    | 48 (25.1)           |
| Thought of quitting the job because of exposure risk  | 125 (64.1)   | 33 (16.9)        | 19 (9.7)     | 18 (9.2)            |
| Felt avoided by employees not directly in contact with COVID-19 patient                               | 89 (46.8)    | 51 (26.8)        | 29 (15.3)    | 21 (11.1)           |
| Thought of working in a unit with no exposure of COVID-19   | 93 (48.7)    | 46 (24.1)        | 29 (15.2)    | 23 (12.0)           |
| Felt that workload increased as compared to employees not working as a part of COVID-19 response team | 38 (20.2)    | 46 (24.5)        | 51 (27.1)    | 53 (28.2)           |

**Table 2:** Feelings and emotions experienced by HCWs during COVID-19.

Table 3 shows the main stressors identified by participants during COVID-19 times. Most of them fear transmitting COVID-19 to their loved ones (55.1%). Seeing family or friends suffer from COVID 19 (52.8%) was another common stressor. Moreover, the irrational behavior of the public taking the pandemic casually and lack of compliance with social distancing cause severe stress in 50% of the participants.

| Perceived stressors  | Not Stressed n (%) | Slightly Stressed n (%) | Moderately stressed n (%) | Highly Stressed n (%) |
|--|--------------------|-------------------------|---------------------------|-----------------------|
| Fear of transmitting COVID-19 to family or friends                       | 17 (9.1)           | 34 (18.2)               | 33 (17.6)                 | 103 (55.1)            |
| Family or friends suffering from COVID-19                                | 31 (21.5)          | 16 (11.1)               | 21 (14.6)                 | 76 (52.8)             |
| Seeing COVID-19 patients suffering and dying alone                       | 38 (21.3)          | 28 (15.7)               | 50 (28.1)                 | 62 (34.8)             |
| Visiting or working in COVID-19 isolation ward                           | 48 (14.6)          | 41 (22.2)               | 53 (28.6)                 | 43 (23.2)             |
| Not knowing the future of COVID-19 pandemic                              | 30 (15.8)          | 33 (17.4)               | 53 (27.9)                 | 68 (36.2)             |
| Lack of treatment options for COVID-19                                   | 30 (15.8)          | 33 (17.4)               | 53 (27.9)                 | 74 (38.9)             |
| COVID-19 related news on social media                                    | 41 (21.7)          | 44 (23.3)               | 49 (25.9)                 | 55 (29.1)             |
| Feeling unwell and fear of catching COVID-19                             | 46 (25)            | 55 (29.9)               | 39 (21.2)                 | 44 (23.9)             |
| Seeing colleague stressed or anxious                                     | 20 (10.2)          | 55 (27.9)               | 73 (37.1)                 | 49 (24.9)             |
| Getting tested for COVID-19 infection after exposure                     | 41 (24.6)          | 35 (21)                 | 44 (26.3)                 | 47 (28.1)             |
| Inadequate supply of PPE   | 85 (48)            | 32 (18.1)               | 37 (20.9)                 | 23 (13)               |
| Use of PPE uncomfortable during long work hours                          | 20 (10.5)          | 47 (24.7)               | 51 (26.8)                 | 72 (37.9)             |
| People taking the pandemic casually and not practicing social distancing | 14 (7.3)           | 29 (15.1)               | 53 (27.6)                 | 96 (50)               |

**Table 3:** Perceived stressors identified by HCWs during COVID-19 pandemic.

Table 4 gives insight into the coping strategies used by HCWs during the COVID-19 pandemic. 53.1% used prayer and holy books as a coping method while 24.7% used relaxation activities like arts, music, exercise and reading to cope with the stressful time. Almost half (51.8%) of the participants never used professional help to reduce stress.

| Coping Strategies  | Never, n (%) | Sometimes, n (%) | Often, n (%) | All the time, n (%) |
|--|--------------|------------------|--------------|---------------------|
| Relaxation activities e.g. arts, music, exercise, reading, gardening   | 38 (19.6)    | 72 (37.1)        | 36 (18.6)    | 48 (24.7)           |
| Connecting with friends and family while practicing social distancing  | 20 (10.4)    | 62 (32.3)        | 52 (27.1)    | 58 (17.6)           |
| Professional help to reduce stress via counselling                     | 100 (51.8)   | 41 (21.2)        | 31 (16.1)    | 21 (10.9)           |
| Kept your mind away from COVID-19 by staying extra busy in activities. | 52 (26.9)    | 63 (32.6)        | 41 (21.2)    | 37 (19.2)           |
| Avoided media news about COVID-19 and related fatalities               | 54 (28.3)    | 59 (30.9)        | 36 (18.8)    | 42 (22)             |
| Spiritual guidance by praying and reading Holy books.                  | 13 (6.8)     | 32 (16.7)        | 45 (23.4)    | 102 (53.1)          |

**Table 4:** Use of coping strategies during the COVID-19 pandemic.

Overall, nurses were more likely to suffer from anxiety compared to doctors ( $p < 0.05$ ). HCWs who came in contact with a confirmed COVID-19 patient were stressed compared to those who didn't come in direct contact ( $p < 0.05$ ).

Univariate binary logistic regression analysis revealed that gender (female), being a nurse, increasing duty hours, direct contact with a COVID-19 patient, working in the COVID-19 ICU, having concomitant anxiety, suffering from stress, having less work experience and younger age have higher odds of developing depression (Table 5). The multivariable model revealed that females are twice as likely to develop depression (OR = 2.0: 95% CI = 0.9 - 4.5), nurses are 2.8 times more likely to develop depression (OR = 2.8: 95% CI = 0.9 - 8.7), someone suffering from anxiety is 17 times more likely to have depression (OR = 17.1: 95% CI = 6.5 - 44.9) while someone suffering from stress is 4 times more likely to have depression (OR = 4.2: 95% CI = 1.8 - 9.3) in the presence of other factors. Similarly, every one hour increase in duty hours increases the odds of developing depression by 30% among HCWs in the presence of other factors.

| Predictors of Depression  |           | Crude OR (95% CI) | Adjusted OR (95% CI) |
|---|-----------|-------------------|----------------------|
| Gender  | Male      | Ref               | Ref                  |
|   | Female    | 1.5 (0.8-2.6)     | 2.0 (0.9-4.5)        |
| Professional role   | Doctor    | Ref               | Ref                  |
|   | Nurse     | 1.7 (0.9-3.0)     | 2.8 (0.9-8.7)        |
| Duty hours  |           | 1.0 (0.9-1.1)     | 1.3 (1.0-1.6)*       |
| Direct contact with COVID-19 patient  | No        | Ref               | -                    |
|   | Yes       | 2.0 (0.9-4.1)     | -                    |
| Place of posting  | ED        | Ref               | -                    |
|   | COVID-ICU | 1.2 (0.7-2.2)     | -                    |
| Anxiety   | No        | Ref               | Ref                  |
|   | Yes       | 26.6 (11.1-63.6)  | 17.1 (6.5-44.9)*     |
| Stress  | No        | Ref               | Ref                  |
|   | Yes       | 9.1 (4.6-18.0)    | 4.2 (1.8-9.3)*       |
| Years of experience   |           | 0.9 (0.8-1.0)*    | -                    |
| Age (years)   |           | 0.9 (0.8-0.9)*    | -                    |
| *p < 0.05 (ED = Emergency department, COVID-ICU = Intensive Care Unit for COVID-19 patients only) |           |                   |                      |

Table 5: Predictors of depression among HCWs involved in care of COVID 19 patients.

### Discussion

Our study outlines the psychological impact and mental health of HCWs posted in the emergency and COVID-19 ICU. We measured the frequency of depression, stress and anxiety in the HCWs at a tertiary hospital in a low-income country. We found that stress was the most common mental health problem followed by depression and anxiety. HCWs identified to suffer from depression, anxiety and/or stress were offered professional support through group and individual therapy by the psychology services at The Indus Hospital, Karachi.

Several studies have been conducted in the last 6 months reporting the physical health, social, financial and mental impact of COVID-19 worldwide. Among, mental health indicators, most people have looked at depression, anxiety and stress among HCWs similar to our study. The first study on the COVID-19 psychological effect was conducted in China in the early period of the outbreak. The investigators found that among 1257 HCWs 50.4% reported symptoms of depression, 44.6% anxiety and 71.5% reported stress [21]. Similarly, a study conducted in Turkey to investigate anxiety, stress, and depression levels of physicians during the COVID-19 outbreak also found that 64.7% had symptoms of depression, 51.6% anxiety, and 41.2% had stress-related symptoms in the early period of the outbreak [22]. Our study showed stress symptoms to be the highest (60.7%) followed by depression (47.3%) and anxiety (35.8%).

Another longitudinal study conducted in April 2020 showed a baseline mean DASS-stress score of 7.74. The follow-up survey showed a similar score of 7.86. The results on the DASS-depression scale for both the surveys were noted to be 6.16 and 6.25 respectively [23]. Our findings showed that there were higher levels of stress (mean  $12.82 \pm 9.05$ ), anxiety (mean  $11.01 \pm 8.93$ ) and depression (mean  $10.69 \pm 9.43$ ) in Pakistan as compared to China. Moderate to severe psychological symptoms were reported amongst the HCWs in a recent multi-center study conducted in India and Singapore [24]. They found a difference in moderate to extremely severe depression (33.4% versus 5.3%), anxiety (48.7% versus 8.7%) and stress levels (28.9% versus 2.2%) in their study compared to ours.

Another study used Beck anxiety inventory (BAI) to screen HCWs which showed that almost 40% of the participants reported various levels of anxiety [25]. This is similar to our study with 48.7% having anxiety (48.7%) but the majority of our participants fall in the extreme anxiety category (28.8%) while in the said study majority fell in the mild group (32%).

Overall, our results are comparable with studies globally. Firstly, similar to studies conducted in Iran, China and Turkey we found that females have higher odds of developing depression [21,22,25]. Similarly, the younger age group (less than 30 years) was strongly associated with depression compared to the older age group similar to what has been observed in Iran and Turkey [22,25]. Thirdly, symptoms of anxiety were more significant in nurses as compared to doctors. This finding was similar to multiple studies which suggest that nurses show high depression and anxiety [25,26]. This finding can be explained by the level of knowledge doctors have in general on the disease process compared to nurses [27]. Fourthly, we found that each hour increase in work leads to a 30% increase in the odds for depression. Prior studies have also suggested that increased work hours relate to negative psychological outcomes [23,25].

Interestingly, working in the COVID-19 ICU increases the crude odds of depression by 20% compared to working in the emergency department. This may be explained by the fact that in the ED a mixed patient population with a variety of symptoms is seen, reducing the psychological focus and anxiety. The ICU team is only looking at COVID-19 patients and hence the monotony of the situation increases the odds of having depression, although this finding was not significantly related to depression in the final model. Another interesting factor was direct contact with a COVID-19 patient which later became insignificant in the final model probably because most of the study population had direct contact with a COVID-19 patient and we couldn't detect the difference in the presence of other factors. Younger age and lesser work experience at the job were inversely related to depression on univariate analysis.

Another intriguing finding was that depression, stress and anxiety were closely related to each other and it seemed as the presence of one increases the odds of developing the other. This complex relationship needs to be further explored but for the sake of this paper, we made models with all 3 as outcome variables and found that the situation was best explained by taking depression as the outcome (using model fit criterion and plausibility). Since this was a cross-sectional analysis, we cannot comment on the temporality of the factors and maybe a follow-up study can help determine which one precedes the development of the others among depression, anxiety and stress. Similar co-prevalence of depression, anxiety, and stress has been quoted previously from Pakistan, Saudi Arabia and Egypt [28-30].

In conclusion, it is imperative to develop a national screening program for the assessment of the mental health of HCWs all over the country. These frontline warriors should be provided with mental health services for prevention, diagnosis and therapy so they can continue to serve the patients with optimum zeal.

### Recommendations

The health of HCWs should also be given due importance as they are vulnerable to fatigue, burnout and mental ill health. Our study documents a high burden of mental health issues among the HCWs working in COVID-19 areas. Therefore, it is essential to develop national and institutional strategies to overcome these additional challenges and save the frontline workforce from exhaustion and improve their productivity.

Open communication between the authorities and the public, rotation and limitation of shift hours among HCWs, provision of rest areas, frequent breaks, monetary incentives, proper training and reassurance in such a situation can reduce anxiety coming from the perceived uncertainty and unpredictability of the hazards involved. Catering to the psychological demands of health care professionals is also essential in these times. Administering timely and appropriate mental health support is crucial. This can be executed via mental health support hotlines, using television and social media as a positive communication tool for the masses, mobile application-based counseling or interventions and providing relief services by trained mental health professionals in the hospitals for healthcare professionals. Our study can help identify high risk groups to further focus the intervention.

### Conclusion

The findings from this study offer information about the mental health conditions, their severity, and contributing factors, hence it can be used to develop psychological interventions to counter with global health disasters like COVID-19. It can also act as a baseline for the evaluation, prevention, and management of the mental health of HCWs and sequentially help in the psychosocial rehabilitation of the affected individuals.

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