RESEARCH ARTICLE

Mental health burden and predictors among Egyptian healthcare workers during the COVID-19 pandemic [version 1; peer review: awaiting peer review]

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Abstract

Background: The coronavirus disease 2019 (COVID-19) pandemic is known to have negatively affected the physical and mental well-being of healthcare workers. Estimating such a burden in a limited-resource setting may be essential in the ongoing fight against the pandemic. This research aims to assess the prevalence of mental health problems, that is, depression and anxiety, among healthcare workers during the COVID-19 pandemic in Egypt and their associated factors and predictors. Methods: A cross-sectional study was conducted through an online survey to screen for anxiety using the Generalized Anxiety Disorder (GAD-7) score and depression using the Patient Health Questionnaire (PHQ-9) score among healthcare workers in direct or indirect contact with COVID-19 cases. Results: Analysis of participants' responses showed that 36.7% suffered from depression, while 30.7% had moderate to severe anxiety. Independent predictors of depression were feeling unsure or dissatisfied with one's income (AOR =8.87 and 8.51, respectively), working exclusively in private or governmental hospitals (AOR = 8.15 and 5.1, respectively), and serving in central or insurance hospitals (AOR = 2.21). Meanwhile, independent predictors of anxiety were working in governmental hospitals (AOR = 5.87), working duration from 5 to 10 years (AOR = 4.65), and suffering from other comorbidities (AOR = 2.18). Working as a nurse was a protective factor against anxiety (AOR = 0.36). Conclusions: The COVID-19 pandemic considerably affected the mental well-being of health care workers in Egypt. Income, type of hospital, working duration, and other comorbidities were the main predictors of health care workers' mental health. Examining the mental burden of the pandemic on health care workers is important.
so that current and future crises can be managed better.

**Keywords**

Keywords: Healthcare workers, Mental health, Anxiety, COVID-19, Depression, Egypt

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Introduction

Since the outbreak of coronavirus disease 2019 (COVID-19) in China, the public has struggled against it in terms of resources. Critical resources in this battle include healthcare workers (HCWs) as well as their well-appreciated efforts all the way down. Acknowledging their work against dynamic factors in the COVID era, researchers became concerned with their mental health and the extent to which they deal with all of this. Protecting HCWs from the adverse psychological effects of the pandemic is critical (Albott et al., 2020).

There is much doubt surrounding the epidemiological features, clinical presentation, natural history, and rapid transmission character of COVID-19. All these lead to an increased occurrence of psychological problems, such as fear and anxiety, in the general population. HCWs who deal directly or indirectly with suspected or confirmed COVID cases are prone to both high-risk infection and mental health problems (Elbay et al., 2020).

Throughout the world, the public is being informed about the physical effects of COVID-19 infection and ways to prevent exposure and manage its symptoms. However, the effects of this pandemic on one’s mental health have not been studied at length. Because all efforts are focused on understanding the epidemiology, transmission patterns, clinical features, and management of the COVID-19 outbreak, little attention has been paid to its impact on one’s mental health and strategies to prevent stigmatization (Javed et al., 2020).

Understanding how the current pandemic affects mental health is also important in preparation planning. Some research papers have recently covered the psychological impact of COVID-19 and its associated mental health disorders that affect HCWs (Raudenská et al., 2020; Manchia et al., 2022).

The Egyptian healthcare system is extremely variable (governmental versus private), crowded, and generally under-resourced. Assessing the magnitude of mental health problems in such a limited-resource setting may be essential in the ongoing fight against the pandemic. Studies that measure the psychological impact of the pandemic on Egyptian HCWs remain limited. Hence, the objective of the current research is to examine the prevalence of depression and anxiety and recognize their associated factors and predictors among HCWs during the pandemic.

Methods

Study design and settings

This cross-sectional online survey was conducted from March to June 2021.

Study population

Participants were health care workers (HCWs) from different public and private hospitals within Mansoura City. Inclusion criteria were health care workers actively involved in patient care during COVID-19, while there were no exclusion criteria. A nonprobability sampling method was used to recruit the participants. A total of 313 respondents anonymously completed the electronic online survey.

Sample size

Sample size calculation was based on the prevalence of anxiety and depression among HCWs during the COVID-19 pandemic (18%) (Pappa et al., 2020). The calculated sample size of this study was 227 HCWs, using the following formula (Daniel and Cross, 2018): 

\[ n = \frac{Z^2 \cdot \hat{p} \cdot (1-\hat{p})}{d^2}, \]

where \( Z = 1.96 \) for 95% confidence interval, \( \hat{p} = \text{expected prevalence (18%)} \), and \( d = \text{precision (margin of error)} = 0.05 \). The sample size was increased by 10% for a total of at least 250 HCWs allowing for no responders and dropouts.

Data collection

The questionnaire was designed on Google Forms and delivered through an online link among HCW groups in Egypt. Distribution of the links was done through emails and WhatsApp messages to the group members. Online data collection was the most feasible for this period because of the lockdown, and it also has the advantage of obtaining information from a large and wider geographical audience. The self-administered, anonymous data collection form was designed electronically in Arabic language using a secure and password-protected platform. The data collection form was piloted on a subsample of participants before wider dissemination; informed consent was obtained from participants at the outset of the survey. The collected data were password-protected and saved in a secured research drive available only to the research team. A predesigned self-administered questionnaire was created after wide-ranging literature analysis and based on related studies (Grace et al., 2005; Khalid et al., 2016; Lai et al., 2020; Sehsah et al., 2021). It contained the following sections: personal data including sex, age, marital status, highest educational degree, and whether the participants had children; occupational data including specialty, current job position, income, and place of work; health-related data including presence of physical/mental illness and smoking; degree of involvement in the current pandemic;
and mental health assessment using the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder (GAD-7) Questionnaire given in Arabic language.

**Psychometric tools (to screen for depression and anxiety outcomes):**

a. **Patient Health Questionnaire (PHQ-9):** The PHQ-9 is a screening tool used by medical professionals as a diagnostic instrument for depression, especially during the lockdown related to the COVID-19 outbreak. It is a depression module that scores each of the nine DSM-IV criteria as “0” (not at all) to “3” (nearly every day). Depression severity is classified as none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). Depression screening in adults resulted in 61% sensitivity and 94% specificity (Kroenke et al., 2001). PHQ has excellent internal consistency reliability (Cronbach’s alpha = 0.857) (AlHadi et al., 2017).

b. **Generalized Anxiety Disorder (GAD-7)** (Mossman et al., 2017): The GAD-7 is a mental health evaluation model aimed at anxiety severity. It is a questionnaire administered to patients in the clinical environment. The subject is prompted to recall their behavior in the past two weeks, and seven criteria are accompanied by a scale describing the frequency of anxiety symptoms exhibited two weeks before evaluation. The scale consists of “Not at all” (0 points), implying the subject has not experienced anxiety symptoms in the two-week period; “Several days” (1 point), meaning the subject has experienced symptoms on some days (seven or less); “More than half the days” (2 points), in which the subject has experienced symptoms for more than seven days; and “Nearly every day” (3 points), implying that symptoms were experienced almost every day for two weeks. Each of the seven questions can be rated from 0 to 3 based on the scale introduced above. Therefore, the overall GAD-7 score ranges between 0 and 21 (0 - no anxiety, 21 - severe anxiety). GAD-7 has excellent internal consistency reliability (Cronbach’s alpha = 0.79–0.91) (Williams, 2014). The Arabic version was validated and had acceptable psychometric properties (AlHadi et al., 2017).

**Ethics and consent**

Ethical approval was obtained from the Institutional Research Board, Faculty of Medicine, Mansoura University (reference number R.21.12.1567.R1.R2) on 25 January 2021. The participants provided written informed consent electronically after being briefed on the purpose of the study and before data were collected. Those who agreed to participate completed the submission process. The data were kept confidential in accordance with the revised Helsinki Declaration of Biomedical Ethics.

**Data management and statistical analysis**

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 20 (IBM, SPSS Statistics, New York, USA). Descriptive analysis was adopted to present summary statistics such as mean, median, standard deviation (SD), and interquartile range (IQR) for numerical variables using significance tests including the Mann–Whitney U test (for independent samples). Qualitative data were expressed using frequencies and percentages, while chi-square test was used to examine statistical associations. A P-value of < 0.05 was considered statistically significant. Binary stepwise logistic regression analysis was utilized to predict independent variables of depression and anxiety. Significant predictors in univariate analysis were entered into the regression model utilizing forward Wald method/Enter. Adjusted odds ratios and their 95% confidence interval were calculated.

**Results**

A total of 313 HCWs were included in the current analysis. Only the fully completed forms were delivered to the researchers and used in the analysis so there is no information about participants who may have withdrawn. Table 1 shows that 36.7% of HCWs during the COVID-19 pandemic suffered from depression as diagnosed by PHQ-9. Depression severity varied from moderate (20.1%) to moderately severe and severe (8.3% for both). This caused difficulty for 89.1% of the participants to work, take care of things at home, or even get along with other people, which varied from “somewhat difficult,” “very difficult” to “extremely difficult” (29.0%, 37.0%, and 23.2% respectively). Similarly, the GAD-7 questionnaire revealed that 30.7% suffered from anxiety with nearly equal percentages for moderate and severe degrees. For 85.3% of the participants, anxiety led to difficulty performing work, taking care of things at home, or even getting along with other people, with degrees varying from “somewhat difficult,” “very difficult,” to “extremely difficult” (31.3%, 38.0%, and 16.0%, respectively).

As shown in Table 2, the mean age of HCWs was 32.1±7.7 years with nearly half of them aged 30 to 40. The majority were females (78.3%), married (70.9%), had children (72.5%), and from urban areas (59.3%), with only 19.2% satisfied with their income. Approximately 2.2% of the HCWs were smokers, and 21.7% had one or more comorbidities, mainly hypertension and diabetes. Bivariate analysis was performed to identify demographic, behavioral, and health factors associated with depression or anxiety during the COVID-19 pandemic (Table 2). Depression was more frequent in
### Table 1. Prevalence of psychological problems among healthcare workers during the COVID-19 pandemic (n=313).

| Characteristics                  | Prevalence   |
|----------------------------------|--------------|
| **PHQ-9 scores, depression groups** |              |
| None (0–4)                       | 70 (22.4%)   |
| Mild depression (5–9)             | 128 (40.9%)  |
| Moderate depression (10–14)       | 63 (20.1%)   |
| Moderately severe depression (15–19) | 26 (8.3%)   |
| Severe depression (20–27)         | 26 (8.3%)    |
| **PHQ-9 scores, depression groups** |              |
| None (0–9)                       | 198 (63.3%)  |
| Depression (≥10)                 | 115 (36.7%)  |
| **If you checked any PHQ-9 problem, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?** | |
| Not difficult at all              | 15 (10.9%)   |
| Somewhat difficult                | 40 (29.0%)   |
| Very difficult                    | 51 (37.0%)   |
| Extremely difficult               | 32 (23.2%)   |
| **GAD-7 scores, anxiety groups**  |              |
| None (0–4)                       | 90 (28.8%)   |
| Mild anxiety (5–9)                | 127 (40.6%)  |
| Moderate anxiety (10–14)          | 49 (15.7%)   |
| Severe anxiety (15–21)            | 47 (15.0%)   |
| **GAD-7 scores, anxiety groups**  |              |
| None (0–9)                       | 217 (69.3%)  |
| Anxiety (≥10)                    | 96 (30.7%)   |
| **If you checked any GAD-7 problem, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?** | |
| Not difficult at all              | 44 (14.7%)   |
| Somewhat difficult                | 94 (31.3%)   |
| Very difficult                    | 114 (38.0%)  |
| Extremely difficult               | 48 (16.0%)   |

PHQ-9, Patient Health Questionnaire; GAD-7, Generalized Anxiety Disorder.

### Table 2. Demographic, behavioral, and health characteristics of healthcare workers by psychological status (n = 313).

| Characteristics | Depression p-value | Anxiety p-value |
|----------------|--------------------|-----------------|
| **Age (years)** |                    |                 |
| Mean ± SD      | 32.1 ± 7.7         | 32.0 ± 7.1      | 0.922 | 31.5 ± 6.2 | 0.811 |
| <30            | 113 (36.1%)        | 41 (36.3%)      | 0.959 | 32 (28.3%)  | 0.296 |
| 30–40          | 164 (52.4%)        | 60 (36.6%)      |       | 56 (34.1%)  |       |
| >40            | 36 (11.5%)         | 14 (38.9%)      |       | 8 (22.2%)   |       |
| **Gender**     |                    |                 |
| Male           | 68 (21.7%)         | 17 (25.0%)      | 0.023 | 24 (35.3%)  | 0.350 |
| Female         | 245 (78.3%)        | 98 (40.0%)      |       | 72 (29.4%)  |       |
Table 2. Continued

| Characteristics          | Depression | p-value | Anxiety | p-value |
|--------------------------|------------|---------|---------|---------|
| Marital status           |            |         |         |         |
| Single                   |            |         |         |         |
| Single                   | 67 (21.4%) | 29 (43.3%) | 0.449 | 20 (29.9%) | 0.968 |
| Married                  | 222 (70.9%) | 78 (35.1%) | 69 (31.1%) | 0.798 |
| Divorced/separated       | 24 (7.7%) | 8 (33.3%) | 7 (29.2%) |         |
| Children                 |            |         |         |         |
| No                       | 86 (27.5%) | 36 (41.9%) | 0.248 | 24 (27.9%) | 0.514 |
| Yes                      | 227 (72.5%) | 79 (34.8%) | 69 (31.1%) | 0.798 |
| Number of children       | 2.4 ± 0.8  | 2.4 ± 0.8 | 0.929 | 2.2 ± 0.8 | 0.018 |
| Residence*               |            |         |         |         |
| Rural                    | 70 (40.7%) | 29 (41.4%) | 0.223 | 21 (30.0%) | 0.514 |
| Urban                    | 102 (59.3%) | 33 (32.4%) | 26 (25.5%) |         |
| Income satisfaction      |            |         |         |         |
| Satisfied                | 60 (19.2%) | 5 (8.3%) | <0.001 | 15 (25.0%) | 0.542 |
| Not sure                 | 84 (26.8%) | 39 (46.4%) | 28 (33.3%) |         |
| Not satisfied            | 169 (54.0%) | 71 (42.0%) | 53 (31.4%) |         |
| Smoking                  |            |         |         |         |
| No                       | 306 (97.8%) | 114 (37.3%) | 0.430 | 92 (30.1%) | 0.207 |
| Yes                      | 7 (2.2%) | 1 (14.3%) | 4 (57.1%) |         |
| Comorbidity              |            |         |         |         |
| No                       | 245 (78.3%) | 91 (37.1%) | 0.780 | 78 (31.8%) | 0.396 |
| Yes                      | 68 (21.7%) | 24 (35.3%) | 18 (26.5%) |         |
| Comorbidity              |            |         |         |         |
| Hypertension             | 30 (44.1%) | 7 (23.3%) | 0.067 | 4 (13.3%) | 0.029 |
| Diabetes                 | 20 (29.4%) | 4 (20.0%) | 0.088 | 1 (5.0%) | 0.010 |
| Tumor                    | 3 (4.4%) | 0 (0.0%) | 0.547 | 0 (0.0%) | 0.560 |
| CVD                      | 2 (2.9%) | 0 (0.0%) | 0.536 | 0 (0.0%) | >0.99 |
| Others                   | 42 (61.8%) | 20 (47.6%) | 0.007 | 17 (40.5%) | 0.001 |

P, probability; SD, standard deviation; CVD, cardiovascular disease.
*Only 172 participants completed the question of residence.

Table 3. Occupational and professional characteristics of healthcare workers by psychological status (n = 313).

| Characteristics          | Depression | p-value | Anxiety | p-value |
|--------------------------|------------|---------|---------|---------|
| Professional category    |            |         |         |         |
| Physician                | 99 (31.6%) | 36 (36.4%) | 0.884 | 26 (26.3%) | 0.043 |
| Nurse                    | 164 (52.4%) | 62 (37.8%) | 47 (28.7%) |         |
| Technician/other         | 50 (16.0%) | 17 (34.0%) | 23 (46.0%) |         |
| Healthcare sector        |            |         |         |         |
| Governmental             | 224 (71.6%) | 91 (40.6%) | 0.004 | 76 (33.9%) | 0.004 |
| Private                  | 50 (16.0%) | 19 (38.0%) | 17 (34.0%) |         |
| Both                     | 39 (12.5%) | 5 (12.8%) | 3 (7.7%) |         |
| Hospital type            |            |         |         |         |
| University               | 60 (19.2%) | 14 (23.3%) | 0.017 | 19 (31.7%) | 0.667 |
| Central/insurance        | 175 (55.9%) | 75 (42.9%) | 56 (32.0%) |         |
| Health unit              | 17 (5.4%) | 3 (17.6%) | 3 (17.6%) |         |
| Others                   | 61 (19.5%) | 23 (37.7%) | 18 (29.5%) |         |
females than males (40.0% vs. 25.0%, \( p = 0.023 \)) and those with hypertension, diabetes, and other comorbidities (p-value reached significance only with other comorbidity). Meanwhile, depression was less frequent among those satisfied with their income (8.3% compared to >40% in other groups). Anxiety was more frequent among those with hypertension, diabetes, and other comorbidity (\( p = 0.029, p = 0.010, \) and \( p = 0.001 \), respectively) but negatively associated with number of children (\( p = 0.018 \)).

Regarding occupational characteristics (Table 3), about half of the participants (52.4%) were nurses. The majority worked in governmental health sectors (71.6%) and insurance hospitals (55.9%) and were directly exposed to COVID-19 as frontline HCWs (59.1%). More than one-third (37.5%) had worked for more than 10 years. Depression was frequent among HCWs within governmental sectors (40.6%) and insurance hospitals (4.9%) and with indirect exposure to COVID-19 patients (46.1%) with statistically significant differences compared to other groups with p values 0.004, 0.017, and 0.004 respectively. Similarly, anxiety was more prevalent among technicians and other HCWs (46%), private-sector HCWs (34%), and HCWs with career durations ranging from 5 to 10 years (43.4%) with statistically significant differences compared to other groups.

Multivariate analysis was performed to identify independent predictors of depression and anxiety (Table 4). Independent predictors of depression were being unsure or dissatisfied with one’s income (AOR = 8.87 and 8.51, respectively), working only in private or governmental hospitals (AOR = 8.15 and 5.1, respectively), and employed in central or insurance hospitals (AOR = 2.21). Meanwhile, independent predictors of anxiety were working in governmental hospitals (AOR = 5.87), working duration from 5 to 10 years (AOR = 4.65), and suffering from other comorbidities (AOR = 2.18), while working as a nurse was identified as a protective factor against anxiety (AOR = 0.36).

### Table 3. Continued

| Characteristics | Depression | p-value | Anxiety | p-value |
|-----------------|------------|---------|---------|---------|
| COVID-19 work status |            |         |         |         |
| Direct exposure | 185 (59.1%) | 56 (30.3%) | 0.004 | 49 (26.5%) | 0.054 |
| Indirect exposure | 128 (40.9%) | 59 (46.1%) |         | 47 (36.7%) |         |
| Working years |            |         |         |         |
| Mean ± SD | 9.1 ± 7.0 | 8.9 ± 6.2 | 0.902 | 9.0 ± 5.6 | 0.613 |
| <5 | 96 (30.8%) | 31 (32.3%) | 0.491 | 21 (21.9%) | 0.003 |
| 5–10 | 99 (31.7%) | 40 (40.4%) |         | 43 (43.4%) |         |
| >10 | 117 (37.5%) | 44 (37.6%) |         | 32 (27.4%) |         |

P, probability; SD, standard deviation.

### Table 4. Univariate and multivariate\(^*\) logistic regression analyses of potential predictors of depression and anxiety (n = 313).

|                         | Univariate analysis |           | Multivariate analysis |           |
|-------------------------|---------------------|-----------|-----------------------|-----------|
|                         | OR                  | 95% CI    | P-value               | OR        | 95% CI    | P-value   |
| Depression              |                      |           |                       |           |           |           |
| Female vs male          | 2.00                | 1.09–3.66 | 0.025                 |           |           |           |
| Income satisfaction     | <0.001              |           |                       |           |           |           |
| Not sure vs satisfied   | 9.53                | 3.47–26.20| <0.001                | 8.87      | 3.07–25.60| <0.001    |
| Not satisfied vs satisfied | 7.97            | 3.04–20.92| <0.001                | 8.51      | 3.12–23.20| <0.001    |
| Hypertension            | 0.49                | 0.21–1.19 | 0.115                 |           |           |           |
| Diabetes                | 0.41                | 0.13–1.26 | 0.119                 |           |           |           |
| Another comorbidity     | 1.68                | 0.88–3.24 | 0.119                 |           |           |           |
| Healthcare sector       | 0.009               |           | 0.004                 |           |           |           |
| Governmental vs both    | 4.65                | 1.75–12.35| 0.002                 | 5.10      | 1.84–14.10| 0.002     |
| Private vs both         | 4.17                | 1.39–12.51| 0.011                 | 8.15      | 2.08–31.96| 0.003     |
A detailed description of PHQ-9 items to assess depression severity (Table 5) showed that through several days of the week, more than half of the participants felt depressed or little pleasure with activities (59.1% and 54.6%, respectively). Approximately half of them felt tired or had little energy (52.4%), suffered from poor appetite or overeating (48.2%), and

Table 4. Continued

|                                | Univariate analysis |          | Multivariate analysis |          |
|--------------------------------|---------------------|----------|-----------------------|----------|
|                                | OR 95% CI           | P-value  | OR 95% CI             | P-value  |
| Hospital type                  | 0.021               |          | 0.044                 |          |
| Central/insurance vs university| 2.46 1.26–4.81      | 0.008    | 2.21 1.06–4.59        | 0.033    |
| Health unit vs university      | 0.70 0.18–2.81      | 0.619    |                       |          |
| Other hospitals vs university  | 1.99 0.90–4.39      | 0.089    |                       |          |
| Direct vs indirect COVID-19 exposure | 0.51 0.32–0.81 | 0.005    |                       |          |

*Multivariate logistic regression was done using backward elimination of all variables included in univariate analysis, with p-value < 0.1. OR, odds ratio; 95% CI, 95% confidence interval.

A detailed description of PHQ-9 items to assess depression severity (Table 5) showed that through several days of the week, more than half of the participants felt depressed or little pleasure with activities (59.1% and 54.6%, respectively). Approximately half of them felt tired or had little energy (52.4%), suffered from poor appetite or overeating (48.2%), and

Table 5. Responses of healthcare workers to PHQ-9 and GAD-7 questions (n=313).

|                                | Not at all | Several days | More than half the days | Nearly every day |
|--------------------------------|------------|--------------|-------------------------|------------------|
| PHQ-9                          |            |              |                         |                  |
| Little interest or pleasure in doing things? | 66 (21.1%) | 171 (54.6%) | 46 (14.7%)               | 30 (9.6%)       |
| Feeling down, depressed, or hopeless?   | 50 (16.0%) | 185 (59.1%) | 45 (14.4%)               | 33 (10.5%)      |
| Trouble falling or staying asleep, or sleeping too much? | 61 (19.5%) | 147 (47.0%) | 58 (18.5%)               | 47 (15.0%)      |
| Feeling tired or having little energy?   | 56 (17.9%) | 164 (52.4%) | 50 (16.0%)               | 43 (13.7%)      |
| Poor appetite or overeating?           | 78 (24.9%) | 151 (48.2%) | 60 (19.2%)               | 24 (7.7%)       |
| Feeling bad about yourself – or that you are a failure or have let yourself or your family down? | 121 (38.7%) | 119 (38.0%) | 40 (12.8%)               | 33 (10.5%)      |
| Trouble concentrating on things, such as reading the newspaper or watching television? | 101 (32.3%) | 132 (42.2%) | 41 (13.1%)               | 39 (12.5%)      |
| Moving or speaking so slowly that other people could have noticed? Or the opposite | 126 (40.3%) | 119 (38.0%) | 35 (11.2%)               | 33 (10.5%)      |
| Thoughts that you would be better off dead, or of hurting yourself in some way? | 191 (61.0%) | 81 (25.9%) | 20 (6.4%)                | 21 (6.7%)       |
had trouble falling or staying asleep or sleeping excessively (47%). Analysis of the seven GAD-7 questionnaire items revealed that through several days of the week, 58.1% felt nervous, anxious, or on edge, 52.1% worried excessively about different things, 44.4% were unable to stop or control worrying, and 43.8% had trouble relaxing.

Discussion
The current study investigated 313 HCWs in different hospitals during the COVID-19 pandemic to assess the prevalence and identify the predictors of depression and anxiety among them. Analysis of participants’ responses showed that 36.7% of HCWs suffered from depression during the COVID-19 pandemic as diagnosed by PHQ-9. The severity of depression varied from moderate (20.1%) to moderately severe and severe (8.3% for both). Similarly, the GAD-7 questionnaire responses revealed that 30.7% suffered from anxiety with nearly equal distributions for moderate and severe degrees. This was consistent with Aoun et al. (2020), an Egyptian study, which found 27.4% of HCWs had depression while 23.6% had moderate to severe anxiety during the COVID-19 pandemic in the Middle East. This also agrees with Pappa et al.’s findings in their systematic review of 13 studies, which identified prevalence rates of 22.8% for depression and 23.2% for anxiety (Pappa et al., 2020). While earlier studies found higher prevalence, 80.7% of physicians reported varying degrees of psychological distress (Sehsah et al., 2021) from 61% (Que et al., 2020) to 71.5% (Lai et al., 2020) among doctors in China. This variance in prevalence rates may be due to the variability of the study locations and time lapses since the start of the pandemic. This emphasizes the need for proper mental health screening for HCWs during the COVID-19 outbreak (Pappa et al., 2020; Chung JPY and Wai-Song, 2020).

To achieve the second study objective, a bivariate analysis was conducted (Table 2). Regarding demographic, behavioral, and health factors associated with mental health outcomes, depression was more frequent in females and those with hypertension, diabetes, and other comorbidities. Meanwhile, depression was less prevalent among those satisfied with their income. Also, while anxiety was more frequent among those with hypertension, diabetes, and other comorbidities, it was negatively associated with number of children. This is consistent with studies that have found a higher prevalence of anxiety among females (Aoun et al., 2020; Lai et al., 2020; Pappa et al., 2020). Other studies found that younger participants were more prone to psychological distress, which was not consistent with our results, as age was not an associated factor. In addition, Sehsah et al. found being currently unmatched, having no children, suffering from a chronic illness, and having only an MBBCh degree as associated factors. This conflict may be due to time lapse issues, as it was assumed at the start of the pandemic that all ages would be affected equally with infection, or the start of obligatory vaccination for all workers.

The current study reported the following occupational factors that favor the occurrence of depression: working in governmental sectors and insurance hospitals, being indirectly exposed to COVID-19 patients (Sehsah et al., 2021), having only MBBCh degree, currently working in Egypt, and with short (<15 years) work duration.

This study also performed multivariate analysis to identify independent predictors of depression and anxiety (Table 4): being unsure or dissatisfied with one’s income, employed only in private or governmental hospitals, and working in central or insurance hospitals. Fear of income loss because of being a COVID patient may explain this result. Furthermore, working in governmental hospitals from 5 to 10 years and suffering from other comorbidities were independent predictors of anxiety; meanwhile, working as a nurse was a protective factor against anxiety. The lack of personal protective equipment in Egyptian governmental hospitals during the pandemic (United Nations Industrial Development Organization (UNIDO), 2020) may explain why workers in this type of hospital suffer from anxiety or
depression. People with comorbidities are more prone to contract COVID infection, making them more anxious than others.

Psychological distress predictors differed across studies. Lai et al. (2020), in a Chinese study conducted with 1,257 HCWs in 34 hospitals, found that hospitals being in the province where the pandemic began and the position of HCW as frontline workers were independent risk factors affecting HCWs’ mental health outcomes. Meanwhile, another Egyptian study identified the following predictors: being female, having chronic disease, serving as frontline workers, and having fewer than 15 years of job experience (Sehsah et al., 2021).

Recent evidence from a rapid review of the impact of COVID-19 on the mental health of HCWs, as implications for supporting psychological well-being across 14 databases, suggested that female nurses with close contact with COVID-19 patients may have the most to gain from efforts aimed at supporting psychological well-being (De Kock et al., 2021).

Despite inconsistencies in the findings of previous studies, no groups should be ignored when addressing psychological well-being. While psychological interventions targeting higher resilience among individuals may be beneficial, it is evident that to build a resilient workforce, occupational and environmental factors must be addressed.

Therefore, we recommend further research and analysis of the psychological aspects of HCWs to alleviate their stress. Moreover, psychiatrists should be involved and closely screen all HCWs to improve mental health outcomes. Further studies should also be conducted to investigate the long-term psychological impact of the COVID-19 pandemic.

**Strengths and limitations**
The current study used well-standardized, validated tools to screen HCWs for mental health disorders as well as examine multiple modifiable and nonmodifiable variables using univariate and multivariate analyses. Nevertheless, some limitations should be acknowledged. One is that the cross-sectional design of the study did not allow for an analysis of causal relationships and long-term impacts of the pandemic; another is that the self-selected nonprobability sample may compromise generalizability.

**Conclusion**
The COVID-19 pandemic significantly affected the mental well-being of HCWs in Egypt, the main predictors of which were income, type of hospital, working duration, and other comorbidities. Evaluating the pandemic’s mental burden on HCWs is important to better manage the current pandemic and future crises of a similar nature.

**Data availability**

**Underlying data**
Harvard Dataverse: Replication Data for: Mental Health Burden and Predictors among Egyptian Healthcare Workers during the COVID-19 Pandemic, https://doi.org/10.7910/DVN/QM837K (El Sherbeny, 2022a).

This project contains the raw data file.

**Extended data**
Harvard Dataverse: Replication Data for: Mental Health Burden and Predictors among Egyptian Healthcare Workers during the COVID-19 Pandemic, https://doi.org/10.7910/DVN/FEJURS (El Sherbeny, 2022b).

This project contains the blank questionnaire and the data key.

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

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