



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Psychological impact of COVID-19 on emergency department healthcare workers in a tertiary care center during a national economic crisis

Moustafa Al Hariri, PhD^a, Bachar Hamade, MD MSc^b, Maya Bizri, MD MPH^c, Oday Salman, MD^a, Hani Tamim, PhD^d, Nour Al Jalbout, MD^{e,*}

^a Department of Emergency Medicine, American University of Beirut Medical Center, Beirut, Lebanon

^b Emergency Services Institute, Department of Intensive Care and Resuscitation, Cleveland Clinic Foundation, Cleveland, OH, United States of America

^c Department of Psychiatry, American University of Beirut Medical Center, Beirut, Lebanon

^d Department of Internal Medicine, American University of Beirut Medical Center, Beirut, Lebanon

^e Department of Emergency Medicine, Massachusetts General Hospital, Boston, MA, United States of America

ARTICLE INFO

Article history:

Received 20 August 2021

Received in revised form 7 October 2021

Accepted 30 October 2021

Keywords:

COVID-19

Topic:

Burnout

Anxiety

Psychological impact

Healthcare workers

Emergency department

ABSTRACT

Background: Since the declaration of the novel Corona Virus Disease (COVID-19) as a global pandemic by the World Health Organization, frontline healthcare workers (HCWs) and staff in the Emergency Departments (ED) started experiencing feelings of anxiety and fear from the projected exponential spread and the potential burden on the healthcare system and infrastructure. In Lebanon, major local factors contributing to this fear were the rapid escalation of COVID-19 cases across the country, the lack of preparedness, and the shortage of personal protective equipment, in addition to the evolving economic crisis and financial restrictions. This study aims to investigate the immediate psychological impact of the COVID-19 outbreak on ED staff working in a hospital environment in relation to their household income.

Methods: Self-reported cross-sectional survey was delivered to the frontline staff working at the Department of Emergency Medicine of AUBMC in Beirut, Lebanon. General demographic characteristics, scores of Generalized Anxiety Disorder 7 (GAD-7), scores of Patient Health Questionnaire 9 (PHQ-9), and scores of Burnout Measure-Short (BMS) version were collected.

Results: 74 HCWs (49.6%) participated in the study. The mean age for participants was (31.78 ± 9.49). More than half of the participants were nurses and more than 70% reported a monthly salary of less than 2000 USD. The household income was negatively associated with the participants' scores on the GAD-7 and PHQ-9, but not the BMS. Previous mental health diagnosis was positively associated with the PHQ-9 and BMS scores, while seeking mental health care was negatively associated with the PHQ-9 and BMS scores.

Conclusion: At our tertiary care center in a low-income, low resource country amidst the COVID-19 pandemic, the HCWs reported marked psychological disturbances on different scales. In particular, the financial burden was associated with increased anxiety and clinical depression, but was not associated with burnout.

© 2021 Elsevier Inc. All rights reserved.

1. Background

In January 2020, the World Health Organization (WHO) declared a novel coronavirus outbreak causing Corona Virus Disease (COVID-19)

Abbreviations: WHO, World Health Organization; AUBMC, American University of Beirut Medical Center; ED, Emergency Department; CDC, Center for Disease Control; PPE, Personal Protective Equipment; HCWs, Healthcare Workers; JCI, Joint Commission International; CAP, College of American Pathologists; ACGME-I, Accreditation Council for Graduate Medical Education – International; GAD-7, General Anxiety Disorder; BMS, Burnout Measure – Short questionnaire; PHQ-9, Patient Health Questionnaire-9.

* Corresponding author at: Department of Emergency Medicine, Massachusetts General Hospital, 55 Fruit Street, Boston, MA, United States of America.

E-mail addresses: ma147@aub.edu.lb (M. Al Hariri), hamadeb@ccf.org (B. Hamade), mb112@aub.edu.lb (M. Bizri), os25@aub.edu.lb (O. Salman), htamim@aub.edu.lb (H. Tamim), naljalbout@mgh.harvard.edu (N. Al Jalbout).

and considered it a public health emergency of international concern. With its exponential spread across countries, the WHO considered COVID-19 a global pandemic on March 11, 2020 [1]. To date (October 6, 2021), 235,673,032 confirmed cases of COVID-19 have been reported globally. The total number of deaths secondary to COVID-19 has reached 4,814,651 cases [2].

In Lebanon, the first case of COVID-19 was diagnosed on February 21, 2020. Since then, there has been steep growth in the daily number of cases of COVID-19. To date (October 6, 2021), Lebanon has officially registered 627,722 confirmed cases and 8997 deaths [3].

On March 10, 2020, the American University of Beirut Medical Center (AUBMC) started performing COVID-19 PCR testing, rendering the Emergency Department (ED) at AUBMC the frontline recipient of COVID-19 suspected cases, testing between 80 and 200 cases per day

during the study period. Given the uncertainty of the mode of disease spread early on, conflicting data from WHO and Center for Disease Control (CDC), the global shortage of personal protective equipment (PPE), and the large number of infected healthcare workers (HCWs) internationally, frontline staff in the ED began experiencing feelings of anxiety from the projected spread and disease burden [14]. Additional factors, such as the observed high lethality in neighboring countries, and the daily change of infection control protocols and public health recommendations, heightened the perception of personal danger and feelings of apprehension among staff. This is in addition to the fear of carrying the disease home, as well as the social stigmatization of HCWs as vectors for the disease.

Importantly, Lebanon was facing a challenging and unprecedented economic crisis. Amidst the COVID-19 pandemic, the Lebanese financial sector suffered from an exponential devaluation of the local currency [5]. Subsequently, the workers in the Lebanese industries lost between 61.5% to 84.7% of the value of their salaries compared to USD, thus reducing the workers' purchasing power. Specifically, the healthcare sector endured capital control and restrictions on utilizing their bank deposits for purchases of essential basic supplies.

The SARS outbreak in 2003 revealed that HCWs are at risk of experiencing an immediate psychological impact, including feelings of anxiety and sometimes post-traumatic stress disorder, affecting occupational productivity [6–8]. On March 12, 2020, WHO initiated online education on the psychosocial considerations during the COVID-19 outbreak [9], with a specific section dedicated to HCWs. With experience from SARS, and WHO's early awareness campaigns on mental health during COVID-19, there was a need to evaluate the current psychological burden of COVID-19 among ED HCWs and staff in order to identify areas for possible prevention and intervention, especially in a region of continuous conflict and economic uncertainties. This will be vital in planning for future outbreaks of emerging infectious diseases.

The aim of this study was to investigate the immediate psychological impact on all ED staff working in a tertiary care hospital environment in Lebanon during the COVID-19 outbreak in conjunction with an ongoing national economic crisis, as related to their household income.

2. Methods

2.1. Study design and population

This study was a self-reported cross-sectional survey of all staff working at the Department of Emergency Medicine of AUBMC in Beirut, Lebanon. AUBMC is a 330-bed tertiary care center and is recognized as one of the leading medical centers in Lebanon and the Middle East North Africa region. It is internationally accredited by the Joint Commission International (JCI), Magnet®, College of American Pathologists (CAP), and the Accreditation Council for Graduate Medical Education – International (ACGME-I). The AUBMC ED consists of a 36-bed clinical area and handles a patient census of around 48,000 visits per year, of which 72% are adult patients.

The study population consisted of 149 HCWs who responded to the online survey questions via LimeSurvey between May and July 2020. HCWs included attending physicians, house staff physicians, residents, registered and practical nurses, registration personnel, and clerks working in the ED. All participants consented to participate in the study. We elected to adopt a convenience sampling technique by targeting all the HCWs in the department of emergency medicine at AUBMC. The institutional review Board at AUB approved the conduct of this study under the IRB ID SBS-2020-0169.

2.2. Measurements and variables

The survey included basic demographic information of the participants: age, gender, marital status, presence of elderly or children at home, occupation, education, years in current occupation, working

hours per week, and full-time vs. part-time. In addition, we surveyed participants for the outcome of psychological impact using the following assessment tools screening for anxiety, burnout, and depression, respectively: General Anxiety Disorder (GAD-7) questionnaire [10], Burnout Measure- Short questionnaire (BMS) [11], and Patient Health Questionnaire-9 (PHQ-9) questionnaire [12].

We used the English version of these assessment tools, as English is the primary language used at our institution. The questions of the GAD-7 and PHQ-9 tools have four responses. "Not at all" was assigned a score of "0", "Several days" was assigned a score of "1", "More than half of the days" was assigned a score of "2", and "Nearly every day" was assigned a score of "3" [10,12]. The questions of the BMS tool have seven responses. "Never" was assigned a score of "1", "Almost never" was assigned a score of "2", "Rarely" was assigned a score of "3", "Sometimes" was assigned a score of "4", "Often" was assigned a score of "5", "Very often" was assigned a score of "6", and "Always" was assigned a score of "7" [11]. Cut-off scores of 10 or more were used to define cases at high risk for depression by PHQ-9 [13], and generalized anxiety by GAD-7 [10], while a cut-off score of 4 was used to indicate a high level of exposure to burnout by BMS [11]. The participant's monthly income was selected to stratify the population into two groups (<\$2000 or ≥ \$2000). The minimum monthly wage in Lebanon was around \$466 during the study period [14,15]. The 2000\$ income cut-off was selected based on the reported average wages of HCWs in Lebanon during 2020 and based on a previous study by Kassak et al. that surveyed the Lebanese physicians registered in the Lebanese Order of Physicians, showing an average salary of more than \$1800 with a median around \$1300 [14,16].

2.3. Statistical analysis

All statistical analyses were performed using IBM SPSS 24©. Characteristics and demographics were described and reported as mean ± standard deviation for continuous variables, and frequency and percentage for categorical variables. As applicable, Chi-Square and Fisher exact tests were used to assess the association between the categorical variables and the outcome at the bivariate level. *t*-test was used to assess the association between the continuous variables and the outcome at the bivariate level. Linear regression was used to assess the association of the predictors with the values of the scores of the three tools (GAD-7, PHQ-9, and BMS) used in this study.

3. Results

3.1. Description of the participants

Out of the 149 HCWs at the AUBMC ED, 74 (49.6%) completed the study survey. The participants' mean age was 31.78 ± 9.49 years, and males constituted 62.16% ($n = 46$). 59 participants (79.73%) completed medical or postgraduate education, and 45 participants (60.81%) were single. Physicians (attending and clinical associates) constituted 18.92% ($n = 14$), residents and house staff constituted 29.73% ($n = 22$), and nurses (registered, practical, and clerks) constituted 51.35% ($n = 38$) of the participants. Among the participants, 35.14% ($n = 26$) reported having an elderly at home, and 39.19% ($n = 29$) reported having children at home. 60.81% ($n = 45$) reported having less than 5 years of professional experience, 91.98% ($n = 68$) had full-time employment status, and 66.22% ($n = 49$) worked for at least 40 h per week. 5.41% ($n = 4$) of the participants reported being previously diagnosed with mental health problems and 6.76% ($n = 5$) previously sought mental health care (Table 1).

When comparing the characteristics of the participants according to their average monthly income (<\$2000 or ≥\$2000), the participants' age, occupation, and employment status were significantly different between the two groups (Table 1). The participants in the higher-income group were older (37.9 ± 12.44 vs. 29.36 ± 6.77 years, $p = 0.006$),

Table 1
Comparative characteristics of the study participants.

| | | Total (N = 74) | <\$2000 (n = 53) | ≥\$2000 (n = 21) | P value |
|---|---|----------------|------------------|------------------|---------|
| Age | Years | 31.78 ± 9.49 | 29.36 ± 6.77 | 37.9 ± 12.44 | 0.006 |
| Gender | Female | 28 (37.84) | 20 (37.74) | 8 (38.1) | 1.000 |
| | Male | 46 (62.16) | 33 (62.26) | 13 (61.9) | |
| Education | College level | 15 (20.27) | 13 (24.53) | 2 (9.52) | 0.206 |
| | Medical/Postgraduate | 59 (79.73) | 40 (75.47) | 19 (90.48) | |
| Marital status | Single | 45 (60.81) | 35 (66.04) | 10 (47.62) | 0.189 |
| | Married | 29 (39.19) | 18 (33.96) | 11 (52.38) | |
| Occupation | Attending Physician or Clinical associate | 14 (18.92) | 0 (0) | 14 (66.67) | <0.0001 |
| | Resident/house staff | 22 (29.73) | 18 (33.96) | 4 (19.05) | |
| | RN/PN/Clerk | 38 (51.35) | 35 (66.04) | 3 (14.29) | |
| Presence of Elderly (65 years) at home | Yes | 26 (35.14) | 17 (32.08) | 9 (42.86) | 0.425 |
| Presence of Children at home | Yes | 29 (39.19) | 20 (37.74) | 9 (42.86) | 0.793 |
| Years in Current Occupation | <5 year | 45 (60.81) | 35 (66.04) | 10 (47.62) | 0.189 |
| | ≥5 years | 29 (39.19) | 18 (33.96) | 11 (52.38) | |
| Employment Status | Full-time | 68 (91.89) | 53 (100) | 15 (71.43) | <0.0001 |
| | Part-time | 6 (8.11) | 0 (0) | 6 (28.57) | |
| Working hours per week | <40 h | 25 (33.78) | 16 (30.19) | 9 (42.86) | 0.414 |
| | ≥40 h | 49 (66.22) | 37 (69.81) | 12 (57.14) | |
| History of mental health diagnosis | Yes | 4 (5.41) | 3 (5.66) | 1 (4.76) | 1.000 |
| Prior seeking any mental health care (psychiatrist/psychologist/counseling) | Yes | 5 (6.76) | 3 (5.66) | 2 (9.52) | 0.618 |

physicians (66.67%, $p < 0.0001$), and were employed full time (71.43%, $p < 0.0001$).

3.2. Outcomes

Upon assessing the participants' responses to the GAD-7 tool, the higher-income group scored 2.65 points lower on the total score compared to the lower-income group (5.1 ± 2.36 vs. 7.75 ± 4.63 , $p = 0.002$) (Table 2). Additionally, the higher-income group scored significantly lower than the lower-income group on specific questions in GAD-7 such as “Being so restless that it's hard to sit still” (0.29 ± 0.56 vs. 0.68 ± 0.73 , $p = 0.016$), “Becoming easily annoyed or irritable” (0.76 ± 0.54 vs. 1.19 ± 1 , $p = 0.021$), and “Feeling afraid as if something awful might happen” (0.38 ± 0.5 vs. 1 ± 1 , $p = 0.009$). Moreover, our data showed that 32.08% of HCWs in the lower-income group scored more than 10 points on the GAD-7 tool (moderate to severe groups) compared to 4.76% of the HCWs in the higher-income group ($p = 0.015$).

Upon evaluating the responses of the participants to the PHQ-9 tool, the higher-income group scored 2.5 points lower on the total score compared to the lower-income group (5.24 ± 3.7 vs. 7.74 ± 4.95 , $p = 0.022$) (Table 3). Additionally, the higher-income group scored significantly lower than the lower-income group on specific questions in PHQ-9 such as “Trouble concentrating on things, such as reading the newspaper or watching television?” (0.33 ± 0.66 vs. 0.81 ± 0.96 , $p = 0.018$) and “Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?” (0.05 ± 0.22 vs. 0.26 ± 0.59 , $p = 0.025$). Moreover, our data showed that 32.08% of HCWs in

the lower-income group scored more than 10 on the PHQ-9 tool (moderate to severe groups) compared to 9.52% of the HCWs in the higher-income group, though the difference was not statistically significant ($p = 0.074$).

Upon assessing the participants' responses to the BMS tool, the higher-income group scored 2.63 points lower on the total score compared to the lower-income group (32.33 ± 11.7 vs. 34.96 ± 11.95), though the difference was not statistically significant (Table 4). Additionally, our data did not show any statistically significant difference in the participants' responses to any BMS question. Importantly, our data showed that 42.86% of HCWs in the lower-income group were categorized in the burnout category compared to 49.06% of the HCWs in the higher-income group, though the difference was not statistically significant ($p = 0.797$).

4. Discussion

All ED HCWs at a tertiary care center in a low-resource country were surveyed to assess the direct psychological impact of COVID-19 on their wellbeing, during an unprecedented national economic crisis. The results of this survey showed a negative association between HCWs' psychological health and COVID-19 in relationship to the household income. The scores on the anxiety and depression scales (GAD-7 and PHQ-9) were statistically significantly higher among participants in the lower-income group working during the COVID-19 outbreak.

During the 2020 COVID-19 pandemic, Lebanon faced a tragic economic crisis that led to the devaluation of the current currency (Lebanese pound- LBP) from 1505 LBP per dollar to a range of 3900 to 9800

Table 2
Comparative responses of the participants to the GAD-7 tool questions. The participants were asked to rate their responses to the various questions in relation to the past 2 weeks.

| GAD7 questions | Total (N = 74) | <\$2000 (n = 53) | ≥\$2000 (n = 21) | P value | |
|---|----------------------------|------------------|------------------|------------|-------|
| Feeling nervous, anxious, or on edge | 1.04 ± 0.82 | 1.15 ± 0.89 | 0.76 ± 0.54 | 0.065 | |
| Not being able to stop or control worrying | 0.92 ± 0.84 | 1.02 ± 0.84 | 0.67 ± 0.8 | 0.104 | |
| Worrying too much about different things | 1.36 ± 0.93 | 1.43 ± 0.99 | 1.19 ± 0.75 | 0.258 | |
| Trouble Relaxing | 1.22 ± 0.88 | 1.28 ± 0.95 | 1.05 ± 0.67 | 0.234 | |
| Being so restless that it's hard to sit still | 0.57 ± 0.7 | 0.68 ± 0.73 | 0.29 ± 0.56 | 0.016 | |
| Becoming easily annoyed or irritable | 1.07 ± 0.91 | 1.19 ± 1 | 0.76 ± 0.54 | 0.021 | |
| Feeling afraid as if something awful might happen | 0.82 ± 0.93 | 1 ± 1 | 0.38 ± 0.5 | 0.009 | |
| GAD-7 score | 7.00 ± 4.27 | 7.75 ± 4.63 | 5.1 ± 2.36 | 0.002 | |
| GAD-7 categories | Mild anxiety | 56 (75.68) | 36 (67.92) | 20 (95.24) | 0.015 |
| | Moderate and sever anxiety | 18 (24.3) | 17 (32.1) | 1 (4.8) | |

Table 3

Comparative responses of the participants to the PHQ-9 tool questions. The participants were asked to rate their responses to the various questions in relation to the past 2 weeks.

| PHQ-9 questions | Total (N = 74) | <\$2000 (n = 53) | ≥\$2000 (n = 21) | P value |
|---|-------------------------------|------------------|------------------|------------|
| Little Interest or pleasure in doing things? | 0.91 ± 0.85 | 1.02 ± 0.89 | 0.62 ± 0.67 | 0.067 |
| Feeling down, depressed or hopeless? | 0.85 ± 0.68 | 0.92 ± 0.68 | 0.67 ± 0.66 | 0.14 |
| Trouble falling or staying asleep or sleeping too much? | 1.15 ± 1.02 | 1.21 ± 1.06 | 1 ± 0.89 | 0.432 |
| Feeling tired or having little energy? | 1.23 ± 0.8 | 1.3 ± 0.85 | 1.05 ± 0.67 | 0.179 |
| Poor appetite or overeating? | 1.05 ± 0.98 | 1.11 ± 1.01 | 0.9 ± 0.89 | 0.412 |
| Feeling bad about yourself – or that you are a failure or have let yourself or your family down? | 0.69 ± 0.84 | 0.77 ± 0.89 | 0.48 ± 0.68 | 0.173 |
| Trouble concentrating on things, such as reading the newspaper or watching television? | 0.68 ± 0.91 | 0.81 ± 0.96 | 0.33 ± 0.66 | 0.018 |
| Moving or speaking so slowly that other people could have noticed? Or so fidgety or restless that you have been moving a lot more than usual? | 0.27 ± 0.48 | 0.32 ± 0.51 | 0.14 ± 0.36 | 0.096 |
| Thoughts that you would be better off dead, or thoughts of hurting yourself in some way? | 0.2 ± 0.52 | 0.26 ± 0.59 | 0.05 ± 0.22 | 0.025 |
| PHQ-9score | 7.04 ± 4.74 | 7.74 ± 4.95 | 5.24 ± 3.7 | 0.022 |
| PHQ-9 categories | | | | 0.074 |
| | Mild depression | 55 (74.32) | 36 (67.92) | 19 (90.48) |
| | Moderate to severe depression | 19 (25.68) | 17 (32.08) | 2 (9.52) |

LBP per dollar during the study period [5]. The majority of the workers in the Lebanese industries, including the majority of the surveyed participants, continued to receive their salaries in LBP. Therefore, the participants in this study had lost between 61.5% to 84.7% of the value of their salaries compared to USD, thus reducing their purchasing power.

The healthcare facilities in Lebanon also suffered restrictions on mobilizing their capital deposited in banks for healthcare supplies, which led to a reduced ability to purchase personal protective equipment essential for the safe management of COVID-19 patients. As other hospitals in Lebanon, the ED at AUBMC lacked an adequate number of negative pressure rooms for the proper isolation of COVID-19 positive patients; this constituted a major burden on HCWs, who felt vulnerable and exposed while fighting COVID-19. While the financial situation had a major contribution to the above-mentioned burden on the HCWs, the rapid exponential increase in the COVID-19 positive cases had its toll on our study participants. During the study period, Lebanon was observing the first wave of COVID-19 cases. The number of the COVID-19 confirmed cases increased from 729 accumulated cases on April 30, 2020 (before the initiation of the study) to 4549 accumulated cases on July 31, 2020 (at the end of this study) (Fig. 1). AUBMC was among the first medical centers in the country to receive COVID-19 suspected patients to diagnose and treat. The majority of the COVID-19 suspected patients at AUBMC presented to the ED for initial workup and management. During the study period, the AUBMC ED treated 6746 patients, among which 2146 (31.8%) were suspected of having COVID-19 (underwent a COVID-19 RNA PCR testing), and 55 patients (2.6%) were COVID-19 confirmed cases.

We investigated which of the participants' characteristics could predict the scores on the utilized tools (Table 5). Using GAD-7, our data

showed that 24.32% of the HCWs displayed moderate to severe symptoms of anxiety due to COVID-19, which is comparable to the prevalence of COVID-19 related anxiety (23.21%) of HCWs (n = 6968) reported in a meta-analysis of 12 studies conducted in China and Singapore [17]. Our GAD-7 score linear regression results showed that the household income ($\beta = -2.66, p = 0.015, 95\% \text{ CI} [-4.78, -0.54]$) was the only significant predictor for GAD-7 scores in our sample. Zhou et al. surveyed 606 frontline HCWs in China to assess psychological disturbances due to the COVID-19 outbreak. This study reported a trend of association between family income and anxiety symptoms in the participants, although the association did not reach statistical significance ($p = 0.08$) [18]. Zhu et al. surveyed more than 5000 frontline HCWs in China to assess psychological disorders in response to COVID-19. Their results showed that “Living with family members” and “Have history of mental disorders” are associated with higher odds of anxiety. Our data failed to show an association with these variables potentially due to the low number of HCWs who had elderly family members in their homes. Moreover, unlike our findings, the results of Zhu et al. showed that a higher percentage of the participants in the higher-income group reported anxiety compared to those in the lower-income group [19]. While Huang et al. surveyed 2250 HCWs in China who reported a high anxiety score that was associated with younger age (<35 years of age), our data did not show an association between age and anxiety scores [20].

With respect to the PHQ-9 score, 25.68% of the HCWs in our study exhibited moderate to severe symptoms of depression due to COVID-19, which is higher than the prevalence of depression (22.8%) of the HCWs (n = 6968) reported in a meta-analysis of 10 studies conducted in China and Singapore [17]. Additionally, Lai et al. reported that the odds of reporting depression among the 1257 surveyed HCWs in China were 52% more among the frontline HCWs than the other HCWs [21]. It is worth noting that the participants in the lower-

Table 4

Comparative responses of the participants to the BMS tool questions. The participants were asked to rate their responses to the various questions in relation to the past 2 weeks.

| BMS questions | Total (N = 74) | <\$2000 (n = 53) | ≥\$2000 (n = 21) | P value |
|---------------------------|----------------|------------------|------------------|------------|
| Tired? | 4.49 ± 1.45 | 4.53 ± 1.44 | 4.38 ± 1.5 | 0.695 |
| Disappointed with people? | 3.22 ± 1.73 | 3.32 ± 1.77 | 2.95 ± 1.63 | 0.413 |
| Hopeless? | 4.32 ± 1.4 | 4.25 ± 1.33 | 4.52 ± 1.57 | 0.443 |
| Trapped? | 3.51 ± 1.75 | 3.53 ± 1.65 | 3.48 ± 2.02 | 0.909 |
| Helpless? | 3.31 ± 1.9 | 3.45 ± 1.84 | 2.95 ± 2.06 | 0.311 |
| Depressed? | 3.35 ± 1.38 | 3.43 ± 1.43 | 3.14 ± 1.24 | 0.417 |
| Physically weak/Sickly? | 3.15 ± 1.7 | 3.25 ± 1.72 | 2.9 ± 1.67 | 0.441 |
| Worthless/Like a failure? | 2.39 ± 1.6 | 2.47 ± 1.62 | 2.19 ± 1.57 | 0.5 |
| Difficulties sleeping? | 3.57 ± 2.03 | 3.83 ± 2.08 | 2.9 ± 1.76 | 0.077 |
| “I’ve had it”? | 3.01 ± 2.02 | 3.06 ± 2.08 | 2.9 ± 1.89 | 0.773 |
| BMS score | 34.22 ± 11.86 | 34.96 ± 11.95 | 32.33 ± 11.7 | 0.394 |
| BMS categories | | | | 0.797 |
| | No Burnout | 39 (52.7) | 27 (50.94) | 12 (57.14) |
| | Burnout | 35 (47.3) | 26 (49.06) | 9 (42.86) |

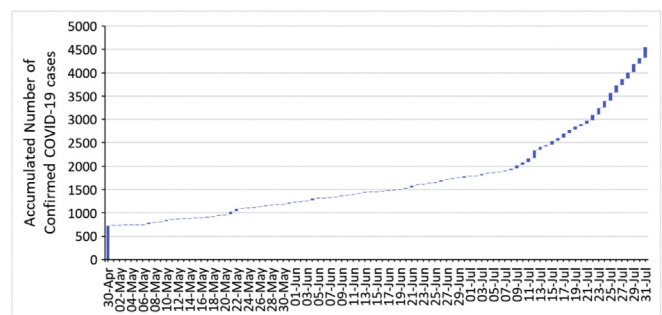


Fig. 1. Accumulated number of confirmed COVID-19 cases in Lebanon between May and July 2020. The data was extracted from the Lebanese Ministry of Public Health dashboard for “Monitoring of COVID-19 Infection in Lebanon” [3].

Table 5
Linear regression to assess the predictors of the scores on the psychological tools.

| Variable | GAD7 ^a | | | PHQ-9 ^b | | | BMS ^c | | |
|--------------------------------------|-------------------|-------|----------------|--------------------|-------|----------------|------------------|-------|-----------------|
| | B | p | 95% CI | B | p | 95% CI | B | p | 95% CI |
| Household income | -2.66 | 0.015 | [-4.78, -0.54] | -3.1 | 0.010 | [-5.43, -0.76] | 25.69 | 0.049 | [0.09, 51.29] |
| History of mental health diagnosis | | | | 13.82 | 0.008 | [3.72, 23.93] | | | |
| Prior seeking any mental health care | | | | -12.27 | 0.009 | [-21.4, -3.15] | -25.69 | 0.030 | [-48.76, -2.62] |
| Age | | | | | | | -0.25 | 0.079 | [-0.54, 0.03] |

^a Accounting for: Age, Gender, Education, Marital status, Occupation, Presence of Elderly (≥ 65 years) at home, Presence of Children at home, Years in Current Occupation, Employment Status, Working hours per week, History of mental health diagnosis, and Prior seeking any mental health care (psychiatrist/psychologist/counseling).

^b Accounting for: Age, Gender, Education, Marital status, Occupation, Presence of Elderly (≥ 65 years) at home, Presence of Children at home, Years in Current Occupation, Employment Status, and Working hours per week.

^c Accounting for: Gender, Education, Marital status, Occupation, Household income, Presence of Elderly (≥ 65 years) at home, Presence of Children at home, Years in Current Occupation, Employment Status, and Working hours per week.

income group of this study significantly scored higher on the last item of the PHQ-9 (suicidal ideation) compared to the higher-income group. This finding warrants timely interventions to ensure the safety of the HCWs.

Our linear regression results showed that household income ($\beta = -3.1, p = 0.01, 95\% \text{ CI } [-5.43, -0.76]$), a history of mental health diagnosis ($\beta = 13.82, p = 0.008, 95\% \text{ CI } [3.72, 23.93]$), and prior seeking of mental health care ($\beta = -12.27, p = 0.009, 95\% \text{ CI } [-21.4, -3.15]$) were significant predictors of PHQ-9 scores in our sample. The high β of these two associations is most likely due to the low number of participants who reported any “Mental Health diagnosis” or “Seeking of mental health care” in our sample (5.41% and 6.76%, respectively).

Zhou et al. surveyed 606 frontline HCWs in China to assess psychological disturbances due to the COVID-19 outbreak. This study reported a trend of association between family income and depressive symptoms in the participants, although the association did not reach statistical significance ($p = 0.07$) [18]. Zhu et al. surveyed more than 5000 frontline HCWs in China to assess psychological disorders in response to COVID-19. Their results showed that “Women” and “Have history of mental disorders” are associated with higher odds of depression. Our data failed to show an association between gender and depression scores in our population, which was in line with the findings of the Obeid et al. study assessing the depression prevalence among the Lebanese population [22].

Nevertheless, our data showed that a history of mental health diagnosis is associated with higher depression scores. This finding is in line with the findings of Zhu et al. [19]. However, unlike our findings, Zhu et al. showed no difference in the percentages of the participants who reported depression in the higher or lower-income groups. On the other hand, Fergusson et al. and Pine et al. longitudinally investigated a cohort of patients and reported that a diagnosis of depression in the adolescent years of a subject is associated with depression in adulthood years [23,24]. In parallel, a systematic review and meta-analysis showed that mental health illnesses are among the risk factors for developing depression [25].

Our results revealed that prior seeking of mental care is associated with a lower score of PHQ-9. This can be explained by the fact that seeking mental health evaluation and treatment ensures control of symptoms and disease and lowers the scores. This is in line with a study by Schwenk et al. that assessed the responses of 1154 physicians. Participants in this study reported a delay in seeking mental care for physicians with minimal to mild depressions and their preference to self-care [26].

With respect to the BMS scores, 47.3% of our participants experienced burnout symptoms, which was comparable to the burnout levels of HCWs (between 44 and 45%) reported in a systematic review and meta-analysis of 15 RCTs and 37 cohort studies (3630 physicians) by West et al. but higher than the burnout levels of HCWs (40.1%) reported in a cross-sectional study by Macía-Rodríguez et al. [27,28]. The latter study pinpointed the association between burnout scores and PPE availability and overtime work compensation [27]. Our linear regression

results indicated that a history of mental health diagnosis ($\beta = 25.69, p = 0.049, 95\% \text{ CI } [0.09, 51.29]$) and prior seeking of mental health care ($\beta = -25.69, p = 0.03, 95\% \text{ CI } [-48.76, -2.62]$) were significant predictors of burnout scores. Similarly, the association between mental health illness and higher burnout was discussed by Baigent and Baigent [29]. Additionally, Dobson et al. investigated the predictors of burnout among HCWs in one of the major tertiary care centers in Melbourne, Australia. The results of their cross-sectional study showed that burnout was associated with “Past psychiatric history” of the participants [30]. As for seeking mental health care, our findings could be explained by the fact that previously seeking mental health care could help HCWs cope better with psychological stressors and subsequently lower their burnout score.

5. Limitations

Our study has some limitations. The study was a self-reported survey in a single center in Beirut, Lebanon. We elected to use this design to preserve the participants' social distancing and avoid exposure and virus spread, especially prior to the vaccine availability. Moreover, during our study period, multiple groups in the institution were sending various surveys to the AUBMC community, which might have caused survey fatigue resulting in a low response rate. Additionally, half of the participants were nurses, which is proportional to their representation in our department, and the majority of the participants were in the lower-income group which could have potentially skewed the results of our study. Finally, mental health is a culturally sensitive topic among the Lebanese population, which could have reduced the reporting rate on the various psychological scores.

6. Conclusions

While Lebanon was facing one of its most complex economic crisis, and amidst the COVID-19 pandemic, HCWs surveyed in a tertiary care center reported major psychological disturbances on multiple levels. The pandemic, faced with the additional financial burden, was a primary determinant of anxiety and depression scores, but not burnout scores. Therefore, strategic planning focusing on wellness programs in addition to creating a financial safety net is essential for assisting the frontline workers in coping with the impact of this unprecedented outbreak.

Funding source

Not applicable.

Credit authorship contribution statement

Moustafa Al Hariri: Data curation; Methodology; Formal analysis; Writing - original draft; Writing - review & editing. **Bachar Hamade**: Conceptualization; Methodology; Writing - original draft; Writing -

review & editing. **Maya Bizri**: Conceptualization; Methodology; Writing - original draft; **Oday Salman**: Data curation; Methodology; Writing - original draft; **Hani Tamim**: Methodology; Formal analysis; Writing - original draft; **Nour Al Jalbout**: Conceptualization; Data curation; Methodology; Supervision; Writing - original draft; Writing - review & editing.

Declaration of Competing Interest

MAH, BH, MB, OS, HT and NA report no conflict of interest with the original work presented below.

Acknowledgments

Not Applicable. All contributing parties were eligible for authorship status.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajem.2021.10.055>.

References

- [1] Organization WH. Coronavirus disease (COVID-19) weekly epidemiological update and weekly operational update. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>; 2020.
- [2] Organization WH. WHO Coronavirus disease (COVID-19) dashboard. <https://covid19.who.int/>; 2021. [accessed 12.01.2021].
- [3] Health MoP. Monitoring of COVID-19 infection in Lebanon. <https://www.moph.gov.lb/en/Media/view/43750/1/monitoring-of-covid-19-; 2020>.
- [4] Prevention CfDca. Coronavirus Disease 2019 (COVID-19). <https://www.cdc.gov/media/dpk/diseases-and-conditions/coronavirus/coronavirus-2020.html>; 2020.
- [5] Rate L. Dollar to LBP exchange rate today. <https://lirarate.com/>; 2021. [accessed 31/01/2021].
- [6] Maunder R. The experience of the 2003 SARS outbreak as a traumatic stress among frontline healthcare workers in Toronto: lessons learned. *Philos Trans R Soc Lond B Biol Sci.* 2004;359(1447):1117–25. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1693388/pdf/15306398.pdf>.
- [7] Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ.* 2003;168(10):1245–51. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC154178/pdf/20030513s00021p1245.pdf>.
- [8] Nickell LA, Crighton EJ, Tracy CS, Al-Enazy H, Bolaji Y, Hanjrah S, et al. Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. *CMAJ.* 2004;170(5):793–8. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC343853/pdf/20040302s00027p793.pdf>.
- [9] Organization WH. Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020. World Health Organization; 2020.
- [10] Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.* 2006;166(10):1092–7. <https://jamanetwork.com/journals/jamainternalmedicine/articlepdf/410326/oi60000.pdf>.
- [11] Malach-Pines A. The burnout measure, short version. *Int J Stress Manag.* 2005;12(1):78.
- [12] Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001;16(9):606–13. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1495268/pdf/jgim.01114.pdf>.
- [13] Levis B, Benedetti A, Thombs BD. Accuracy of patient health questionnaire-9 (PHQ-9) for screening to detect major depression: individual participant data meta-analysis. *BMJ.* 2019;365:11476. <https://doi.org/10.1136/bmj.11476>.
- [14] Kassak KM, Ghomrawi HMK, Osseiran AMA, Kobeissi H. The providers of health services in Lebanon: a survey of physicians. *Hum Resour Health.* 2006;4:4. <https://doi.org/10.1186/1478-4491-4-4>.
- [15] Fund IM. Lebanon and the IMF - International Monetary Fund. <https://www.imf.org/en/Countries/LBN#countrydata>; 2018.
- [16] Survey AS. Lebanon salary. [https://www.averagesalarysurvey.com/lebanon#:~:text=Average%20salary%20in%20Lebanon%20is,is%20LBP%2023%2C369%2C354%20\(Gross\); 2020](https://www.averagesalarysurvey.com/lebanon#:~:text=Average%20salary%20in%20Lebanon%20is,is%20LBP%2023%2C369%2C354%20(Gross); 2020). [accessed 31/01/2021].
- [17] Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun.* 2020;88:901–7. <https://doi.org/10.1016/j.bbi.2020.05.026>.
- [18] Zhou Y, Wang W, Sun Y, Qian W, Liu Z, Wang R, et al. The prevalence and risk factors of psychological disturbances of frontline medical staff in China under the COVID-19 epidemic: workload should be concerned. *J Affect Disord.* 2020;277:510–4. <https://doi.org/10.1016/j.jad.2020.08.059>.
- [19] Zhu Z, Xu S, Wang H, Liu Z, Wu J, Li G, et al. COVID-19 in Wuhan: immediate psychological impact on 5062 health workers. *MedRxiv.* 2020;02:20025338.
- [20] Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res.* 2020;288:112954. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7152913/pdf/main.pdf>.
- [21] Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open.* 2020;3(3):e203976-e. <https://doi.org/10.1001/jamanetworkopen.2020.3976>.
- [22] Obeid S, Lahoud N, Haddad C, Sacre H, Akel M, Fares K, et al. Factors associated with depression among the Lebanese population: results of a cross-sectional study. *Perspect Psychiatr Care.* 2020;56(4):956–67. <https://doi.org/10.1111/ppc.12518>.
- [23] Fergusson DM, Woodward LJ. Mental health, educational, and social role outcomes of adolescents with depression. *Arch Gen Psychiatry.* 2002;59(3):225–31. <https://jamanetwork.com/journals/jamapsychiatry/articlepdf/206141/yoa20394.pdf>.
- [24] Pine DS, Cohen E, Cohen P, Brook J. Adolescent depressive symptoms as predictors of adult depression: moodiness or mood disorder? *Am J Psychiatry.* 1999;156(1):133–5.
- [25] Cole MG, Dendukuri N. Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. *Am J Psychiatry.* 2003;160(6):1147–56.
- [26] Schwenk TL, Gorenflo DW, Leja LM. A survey on the impact of being depressed on the professional status and mental health care of physicians. *J Clin Psychiatry.* 2008;69(4):617–20. <http://www.psychiatrist.com/JCP/article/Pages/survey-impact-being-depressed-professional-status.aspx>.
- [27] Macía-Rodríguez C, Alejandro de Oña Á, Martín-Iglesias D, Barrera-López L, Pérez-Sanz MT, Moreno-Díaz J, et al. Burn-out syndrome in Spanish internists during the COVID-19 outbreak and associated factors: a cross-sectional survey. *BMJ Open.* 2021;11(2):e042966. <https://doi.org/10.1136/bmjopen-2020-042966>.
- [28] West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet.* 2016;388(10057):2272–81. [https://doi.org/10.1016/s0140-6736\(16\)31279-x](https://doi.org/10.1016/s0140-6736(16)31279-x).
- [29] Baigent M, Baigent R. Burnout in the medical profession: not a rite of passage. *Med J Aust.* 2018;208(11):471–2. <https://doi.org/10.5694/mja17.00891>.
- [30] Dobson H, Malpas CB, Burrell AJ, Gurvich C, Chen L, Kulkarni J, et al. Burnout and psychological distress amongst Australian healthcare workers during the COVID-19 pandemic. *Australas Psychiatry.* 2021;29(1):26–30. <https://doi.org/10.1177/1039856220965045>.