

# The Prevalence and Work-Related Factors of Burnout Among Public Health Workforce During the COVID-19 Pandemic

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**Objective:** To examine the prevalence of burnout and its work-related factors among public health providers (PHP) during the COVID-19 pandemic. **Methods:** We surveyed 366 PHP in May 2021 on their burnout, demographic, and work-related characteristics. Logistic regression analyses were conducted to identify associated factors. **Results:** 45% PHP reported burnout. Higher PHP burnout was associated with younger age (AOR 0.96, 95% CI 0.93–0.99), prolonged COVID-19 involvement (AOR 2.35, 95% CI 1.16–4.72), as well as perceiving medium (AOR 2.10, 95% CI 1.27–3.48) and high emotional demand (AOR 4.45, 95% CI 1.67–11.77), low (AOR 2.10, 95% CI 1.27–3.48) and medium (AOR 4.18, 95% CI 1.64–10.59) role clarity, medium job satisfaction (AOR 3.21, 95% CI: 1.11–9.29), and low organisational justice (AOR 3.32, 95% CI 1.51–7.27). **Conclusions:** Improving job content and organisational characteristics may be key to reducing PHP burnout.

**Keywords:** burnout, COVID-19, frontline healthcare workers, pandemic, public health providers, work-related factor

**B**urnout, a term introduced in the early 1970s by psychoanalyst Freudenberg, is increasingly being recognised globally as a major occupational health concern.<sup>1</sup> Defined as a protracted response to persistent emotional and interpersonal pressure encountered in the workplace,<sup>2</sup> it is a multidimensional syndrome comprising emotional exhaustion and disengagement from work.<sup>3</sup> Among professions, healthcare workers (HCW) seem to be particularly at risk for burnout.<sup>4</sup> This may have significant negative personal repercussions such as psychological and physical ill-health, as well as important organisational consequences including

job dissatisfaction, absenteeism, reduced job performance, poor quality of care, and impaired patient safety.<sup>5,6</sup>

Since December 2019, COVID-19 has rapidly spread worldwide and the cumulative number of cases has reached an alarming number of 218,205,951 as of 2<sup>nd</sup> September 2021.<sup>7</sup> HCW, key players in the management of the pandemic COVID-19, are now at an even greater risk of burnout. This is evidenced by an increased prevalence of burnout among HCW during the COVID-19 pandemic compared to the pre-pandemic era. Prior to the COVID-19 pandemic, the global prevalence of burnout among HCW was estimated to range between 11%<sup>8</sup> to 60%<sup>9</sup> in hospital settings and 25%<sup>10</sup> to 35%<sup>11</sup> in public health settings. However, studies have revealed that the COVID-19 pandemic increased the prevalence of burnout among HCW by up to 80% in some countries with high case count at the time the study was conducted.<sup>12</sup> Frontline HCW (FLHCW) especially are exposed to increased work strain for various reasons, including having to work under stressful situations due to rapidly changing guidelines, the inevitability of deployment to new settings and high-risk areas, the deficiency of technical and human resources, and the fear of transmitting COVID-19 infections to their family members after work.<sup>13,14</sup>

Given the psychological impact of the COVID-19 pandemic on HCW, there has been growing interest in exploring burnout and its associated factors among HCW. Burnout studies among HCW have been conducted in various settings, including hospital settings where HCW are primarily concerned with the care of critically ill patients with COVID-19, and the public health settings where HCW are mainly focused on containment activities including surveillance, active case identification, contact screening, and quarantine.<sup>15</sup> However, little is known with regards to burnout among HCW who operate in the public health settings compared to those working in hospital settings.<sup>16</sup> A recent systematic review on burnout among healthcare providers of COVID-19 included twelve studies, almost all of which sampled HCW from hospital settings.<sup>17</sup> This is unfortunate as recent studies showed that higher proportions of burnout and severe burnout were found among public health service providers compared to clinical care providers.<sup>18</sup>

Moreover, limited studies have explored the influence of work-related factors as potential modifiable determinants of burnout among FLHCW during the COVID-19 pandemic. The few studies that included work-related factors as variables of interest, in fact utilised single-item questions to briefly assess factors such as working hours per week, frequency of handling COVID-19 patients, job position, working duration, and perceived psychosocial support received at work.<sup>19–21</sup> The importance of key workplace psychosocial factors such as job factors (job demand, emotional demand, recognition, and role clarity), organisational factors (leadership and justice), interpersonal factors (supervisor and peer support, and job satisfaction), and work-life balance factors (work-family conflict and family-work conflict) in relation to burnout among FLHCW during COVID-19 pandemic have not been established. Thus, this study aimed to measure the prevalence of burnout among FLHCW working in the public health setting and to explore its associated sociodemographic and work-related factors of burnout.

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**Clinical significance:** Almost half of public health providers (PHP) working during the COVID-19 pandemic perceived burnout. Higher PHP burnout was associated with prolonged COVID-19 involvement, and perceiving high emotional demand, low role clarity, low job satisfaction, and low organisational justice. Improving job content and organisational characteristics may be key mitigating strategies.

**Ethical Considerations and Disclosures:** This study was approved by the Medical Research and Ethics Committee, Ministry of Health (NMRR-20-3097-55263 [IIR]) and UiTM Research Ethics Committee (REC/04/2021 [MR/198]) and conducted in accordance to the 1964 Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

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## METHODS AND MATERIALS

### Sample

A multicentre cross-sectional study was conducted in ten District Health Offices (DHO) in Johor, while Malaysia was at the peak of the COVID-19 pandemic situation (October 8 – present).<sup>22</sup> The state of Johor was chosen as:

1. it is one of the most populous state in Malaysia, with 3.8 million (11.6%) citizens;<sup>23</sup> and
2. it has high burden of COVID-19 cases,<sup>24</sup> with a cumulative case of 44,626 following the third wave, that is from September 2020 till April 2021.<sup>25</sup>

In addition to that, HCW in Johor are also involved in border screening activities for COVID-19.<sup>26</sup> Following ethical approval [(NMRR-20–3097–55263 [IIR]) and (REC/04/2021 [MR/198])], permission to conduct the study was granted for all ten DHO. In the present study, FLHCW was defined as any medical officer, nurse, allied healthcare professional, administrative or managerial staff, and support staff who were involved in the care of COVID-19 cases in public healthcare services.<sup>13</sup> Any FLHCW working in the ten Johor DHO during the COVID-19 pandemic who understood the Malay language and was agreeable to participate in the study was included. Those with pre-existing mental health issues, on medical leave or maternity leave were excluded from the study. The pre-existing mental health issues were determined from HCW's previous DASS-21 screening done under the Non-Communicable Disease Unit, Johor State Health Department (JSHD), as well as the self-reported mental health disorder stated by the study participants in one section of the study instrument. The study participants were selected from the source population via stratified random sampling, in which the source population was stratified by job positions and a sample of  $n = 508$  was drawn and included in the study (Supplementary Table, <http://links.lww.com/JOM/B27>). The sample size was determined using OpenEpi calculator version 3 based on an estimated 6500 HCW working in Johor DHO,<sup>27</sup> burnout prevalence of 51.4% among FLHCW working during COVID-19 pandemic,<sup>12</sup> alpha of 0.05, power of 80%, and a non-response of 40%.<sup>28</sup>

### Data Collection

Data was collected via a self-administered online study questionnaire, given the Movement Control Order (MCO) imposed in Johor at the time of data collection in response to the COVID-19 pandemic.<sup>29</sup> The study questionnaire was recast in Google Form format, with a participant information sheet and electronic consent form attached to the first part. The study questionnaire was designed to be anonymous with no collection of identifying information and participation in the study was on a voluntary basis, which was emphasized to study participants. Selected study participants' telephone numbers and email addresses registered with the JSHD were retrieved and participants were invited to participate in the study via WhatsApp application and email. The invitation contained a link that directed study participants to the study consent form. Study participants who ticked "no" on the consent form ended the session immediately, while only those who ticked "yes" would proceed to the next section. In the consent form, it was also mentioned that should burnout be identified among study participants, with their permission (ie. those who ticked "yes"), they would be referred to their respective district counsellor. Periodic reminders at day three, seven, and fifteen of data collection were sent to all study participants using a standardised reminder format via WhatsApp broadcast private messaging. Data collection began on 3rd May 2021 and ended on 18th May 2021.

### Instruments

The study questionnaire comprised 3 sections. Section I comprised of 10 single-item questions assessing sociodemographic

and work-related factors (age, gender, ethnicity, marital status, having children or not, education level, underlying medical problems, job category, job position, task type, and duration of involvement with COVID-19 management). Section II consisted of the Malay translated and validated Copenhagen Psychosocial Questionnaire (BM-COPSOQ) published by Isha, Javaid<sup>30</sup> based on the original COPSOQ developed by Kristensen, Hannerz<sup>31</sup> to assess psychosocial factors at work. The BM-COPSOQ comprises 97 items on a 5-point Likert scale assessing 5 domains of work-related factors, namely demands at work, work organization and job contents, interpersonal relations and leadership, work individual interface, value at the workplace level, as well as health and wellbeing. It has been shown to have adequate convergent and discriminant validity as well as internal consistency and composite reliability.<sup>30</sup> Finally, Section III consisted of the Malay translated and validated Oldenburg Burnout Inventory (BM-OLBI), which was published by Mahadi, Chin<sup>32</sup> and developed by Demerouti and Bakker<sup>33</sup> to measure two dimensions of burnout, that is exhaustion and disengagement. The BM-OLBI comprises 9 items on a 4-point Likert scale and has adequate face validity as well as internal consistency and composite reliability indices.<sup>32</sup>

### Study Variables

Study variables were categorised as following. For the BM-OLBI, a mean score of 2.25 or more was considered as exhausted and a mean score of 2.10 or more was considered as disengaged, and participants who were categorised as exhausted and disengaged were considered to be burnout as published by Peterson, Demerouti.<sup>34</sup> Work-related factors measured by BM-COPSOQ (organisational justice, organisational leadership, job demand, recognition, emotional demands, role clarity, job satisfaction, job insecurity, peer support, supervisor support, work-family conflict, and family-work conflict) were categorised into "low", "medium" or "high" level, based on the categorisation published by Sundstrup, Hansen.<sup>35</sup> For the duration of involvement in COVID-19 management, the data was categorised into two groups; involvement in COVID-19 for six months or less, and for more than six months, as published by Mosolova, Sosin.<sup>36</sup> Zone status was determined based on the COVID-19 cases distribution updates as reported by National Crisis Preparedness and Response Center (CPRC), Ministry of Health Malaysia. Districts are categorised into 4 categories according to the number of active COVID-19 cases in a 14-day period, including:

1. "green zone" for district with 0 case;
2. "yellow zone" for district with 1 to 20 cases;
3. "orange zone" for 21 to 40 cases; and
4. "red zone" for more than 40 active COVID-19 cases.<sup>37</sup>

### Data Analysis

Statistical analyses were performed using the IBM SPSS Statistics 26.0 software package. Initial data analysis included assessment of missingness and influential data, and model checking for logistic regression. Next, total scores were computed and items were reverse scored where applicable. Data was then categorised as previously described. Following that, the prevalence of burnout was estimated and described in percentage and 95% confidence interval (CI). To describe the characteristics of study participants, descriptive statistics were performed using mean and standard deviations (SD) for continuous data and frequency and percentage for categorical data. To investigate the possible associations between sociodemographic and work-related factors of burnout, simple logistic regression analysis was performed and the crude odds ratio (COR) with 95% CI was estimated. Variables that were significant at a  $P$ -value of less than 0.25 as well as potential confounders including age, gender, job position, and duration of involvement in COVID-19 management were entered into a multiple logistic regression analysis

to predict the final independent factors, and the adjusted odds ratio (AOR) with 95% CI was estimated. Model fitness was assessed using the Hosmer–Lemeshow goodness-of-fit test, with a *P*-value of less than 0.05 taken as an indication of poor fit.

## RESULTS

Initial data analysis suggested that missingness for items were less than 5% and missing completely at random, and thus ignorable. Cook's influential statistic indicated that there were no outliers. Logistic regression model diagnostic revealed that all assumptions were met as:

1. the dependent variable was binary, which was the appropriate structure for logistic regression;
2. multi-collinearity analysis revealed that all variables had an acceptable variance inflation factor (VIF < 10); and
3. residual-versus-fitted plot showed that linearity in the transformed expectations was observed.

### Sociodemographic Characteristics of Study Participants

The overall response rate of the study was 72% ( $n = 366$ ). The sociodemographic characteristics of study participants are outlined in Table 1. Study participants had a mean age of  $35.5 \pm 7.4$  years and were mainly composed of female (73.1%) and Malay (87.5%) participants. A majority (72.4%) had children and were married (79.6%). In terms of educational background, the majority received tertiary education (71.7%). More than half of the study participants have no underlying medical problems (59.0%).

### Work-related Characteristics of Study Participants

Paramedics made up more than half of the study participants (52.2%), followed by support staff (27.4%) and professionals (19.8%). Study participants were largely comprised of nurses (50.3%), followed by the medical officers (17.7%), and medical assistants (11.7%). Most of the study participants were involved in fieldwork (82.1%). Almost all of the study participants were working in red zones (98.6%), and 86.6% of them had been involved

for more than six months in COVID-19 pandemic management. Majority of the study participants perceived medium levels of job demand (68.9%), emotional demand (47.3%), recognition (63.4%), role clarity (50.0%), organisational leadership (80.3%), supervisor support (46.2%), job insecurity (52.8%), job satisfaction (55.2%), work-family conflict (91.3%), family-work conflict (80.1%), and organisational justice (79.0%). On the other hand, a majority of them perceived low levels of peer support (65.6%). None of the study participants perceived low levels of job demand (Table 2).

### Exhaustion, disengagement and burnout among study participants

93.7% study participants were disengaged, while 46.4% of them were exhausted. The prevalence of burnout among study participants was 44.5% (95% CI: 43.5%–45.5%) (Table 3).

### Predictors of burnout among study participants

In the univariate analysis, 18 variables showed significant associations with burnout at level of significance 0.25. They include age, ethnicity, marital status, having children, job categories, duration of involvement in COVID-19 management, job demand, emotional demand, recognition, role clarity, organisational leadership, supervisor support, peer support, job insecurity, job satisfaction, work-family conflict, family-work conflict, and organisational justice (Table 4). After controlling for potential confounders, six variables emerged as significant predictors of burnout among study participants. They include age, duration of involvement in COVID-19 management, emotional demand, role clarity, job satisfaction, and organisational justice. Older study participants (AOR: 0.96; 95% CI: 0.93, 0.99) had lower odds of burnout compared to those who were younger, and those involved in COVID-19 management for more than six months (AOR: 2.38; 95% CI: 1.13, 4.98), those perceiving medium (AOR: 2.18; 95% CI: 1.29, 3.68) and high (AOR: 5.38; 95% CI: 1.84, 15.69) levels of emotional demand, low (AOR: 1.99; 95% CI: 1.15, 3.42) and medium (AOR: 4.11; 95% CI: 1.58, 10.68) levels of role clarity, medium level of job satisfaction (AOR 3.21; 95% CI: 1.11, 9.29), and low levels of organisational justice (AOR 3.32; 95% CI: 1.51, 7.27) had increased odds of burnout compared to their counterparts.

## DISCUSSION

The present study examined the prevalence of burnout among FLHCW in Johor DHO during the COVID-19 pandemic and explored the sociodemographic and work-related factors associated with it. Based on the analysis of a multicentre stratified random sample in Johor ( $n = 366$ ), our findings demonstrated a substantial burden of burnout among FLHCW working in the public health setting. Significant associations were found between age, duration of involvement in COVID-19 management, emotional demand, role clarity, job satisfaction, organisational justice, and burnout.

The prevalence of burnout observed among public health FLHCW amid the COVID-19 pandemic in this study was 45%. This is comparable to the findings published by Roslan, Yusoff<sup>19</sup> and Apaydin, Rose,<sup>38</sup> who reported that 50% of Malaysian HCW and 43% of American HCW working in similar settings experienced burnout respectively. In contrast, Lu, Zhang,<sup>18</sup> Baptista, Teixeira,<sup>39</sup> and Stone, Kintziger<sup>40</sup> reported a higher prevalence of burnout among Chinese public health providers (58%), Portuguese primary care physicians (69%), and American public health workforce (66%) respectively. While the variation in prevalence may partly reflect the differences in COVID-19 burden in different regions and pandemic wave, a systematic review on burnout among physicians have indicated that the variability in prevalence estimates of burnout may also be attributed to variation in burnout definitions and assessment methods.<sup>41</sup> This is evident from the low prevalence of burnout reported by HCW working in high COVID-19 burden

**TABLE 1.** Sociodemographic Characteristics of Study Participants ( $n = 366$ )

Variables	Mean (SD) or <i>n</i> (%)
Age	35.5 (+7.4)
Gender	
Female	269 (73.5)
Male	97 (26.5)
Ethnicity	
Malay	322 (88.0)
Chinese	11 (3.0)
Indian	16 (4.4)
Others	17 (4.6)
Marital status	
Single	75 (20.5)
Married	291 (79.6)
Having children	
Yes	265 (72.4)
No	101 (27.6)
Education level	
Primary education	3 (0.8)
Secondary education	99 (27.0)
Tertiary education	264 (72.1)
Underlying medical problems	
Yes	144 (39.3)
No	222 (60.7)

**TABLE 2.** Work-Related Characteristics of Study Participants (n = 366)

Variables	Mean (SD) or n (%)
Job category	
Professional	73 (19.8)
Paramedic	192 (52.2)
Support staff	101 (27.4)
Job position	
Medical specialist	2 (0.5)
Medical officer	65 (17.7)
Medical assistant	43 (11.7)
Nurse	185 (50.3)
Environment Health Officer (PKP)	4 (1.1)
Assistant Environment Health Officer (PPKP)	32 (8.7)
Public Health Assistant (PKA)	7 (1.9)
Health Care Assistant (PPK)	20 (5.4)
Public Assistant (PA)	3 (0.8)
Health driver	5 (1.4)
Task Type	
Field work	302 (82.1)
Administrative	64 (17.4)
Zone status	
Red (9 districts)	363 (98.6)
Yellow (1 district)	3 (0.8)
Duration of involvement in COVID-19 management	
≤6 months	49 (13.4)
>6 months	317 (86.6)
Job demand	
Low	0
Medium	252 (68.9)
High	114 (31.1)
Emotional demand	
Low	161 (44.0)
Medium	173 (47.3)
High	32 (8.7)
Recognition	
Low	118 (32.2)
Medium	232 (63.4)
High	16 (4.4)
Role clarity	
Low	42 (11.5)
Medium	183 (50.0)
High	141 (38.5)
Organizational leadership	
Low	17 (4.6)
Medium	294 (80.3)
High	55 (15.0)
Supervisor support	
Low	44 (12.0)
Medium	169 (46.2)
High	153 (41.8)
Peer support	
Low	240 (65.6)
Medium	107 (29.2)
High	19 (5.2)
Job insecurity	
Low	9 (2.5)
Medium	197 (53.8)
High	160 (43.7)
Job satisfaction	
Low	27 (7.4)
Medium	202 (55.2)
High	137 (37.4)
Work-family conflict	
Low	12 (3.3)
Medium	334 (91.3)
High	20 (5.5)
Family-work conflict	
Low	22 (6.0)
Medium	293 (80.1)
High	51 (13.9)
Organizational justice	
Low	14 (3.8)
Medium	289 (79.0)
High	63 (17.2)

countries, including the study published by Conti, Fontanesi,<sup>42</sup> in which 26% of Italian HCW experienced burnout during the first COVID-19 pandemic peak period. Nevertheless, the findings published by Lu, Zhang<sup>18</sup> indicate that HCW working in public health settings may be more likely to experience burnout compared to HCW working in hospital settings, as 58% of public health service providers and 47.6% of clinical care providers were found to be burnout in their study. They suggested this to be due to a higher workload, more administrative tasks, and low distributive justice of work for those working in the public health settings.<sup>18</sup>

It was observed in the present study that older FLHCW had 4% lower odds of burnout compared to their younger counterparts. This finding is supported by previous systematic reviews<sup>43</sup> and studies.<sup>16,18,19,39,44</sup> In line with the Job Demands-Resources (JD-R) model,<sup>3</sup> this has been suggested to be because younger workers' lesser work experience, network support, and work autonomy reduces their ability to cope with the demands of the job, predisposing them to burnout.<sup>18,45</sup> In addition to that, junior HCW has been reported to have higher contact history with COVID-19 patients on the frontline compared to senior HCW.<sup>46</sup> This may have led to considerable psychological distress as direct contact with COVID-19 patients and fear of infection have been identified as significant predictors of burnout.<sup>12,19,47</sup>

The findings of this study also suggested that FLHCW who have been involved in COVID-19 management for over six months had at least twice the odds of having burnout compared to FLHCW involved for less than six months. This is consistent with previous literature.<sup>36</sup> FLHCW who reported burnout described their high workloads, longer working hours, uncertainties caused by the pandemic, challenging work-family balance, and stretched workplace relationships as their sources of burnout.<sup>18,19</sup> Chronic exposure to these elements in the workplace would increase FLHCW's perception of burnout, in line with the JD-R model<sup>3</sup> which describes burnout as a response to chronic emotional and interpersonal stressors. Indeed, exhaustion, a central component of burnout, appears to be a major symptom with prolonged involvement in COVID-19 management.<sup>19</sup>

Pertaining to job content, FLHCW who perceived medium and high levels of emotional demand and low and medium levels of role clarity at work during the COVID-19 pandemic had higher odds of burnout compared to those who perceived low levels of emotional demand and high levels of role clarity. This was similarly reported by Cotel, Golu<sup>38</sup> and Salahian, Oreizi.<sup>49</sup> This may be because the JD-R model<sup>3</sup> identifies psychological demands as central aspects of work in relation to the development of strain, exhaustion, and ultimately burnout among workers.<sup>50</sup> Both emotional demand and role ambiguity require sustained effort on the part of FLHCW during the COVID-19 pandemic management, and therefore incurs psychological cost in the form of burnout.<sup>50</sup> Indeed, Zapf<sup>51</sup> indicated that emotional dissonance can predispose one to developing emotional exhaustion, whereas role ambiguity may lead to role strain and low morale.<sup>52</sup>

It was also observed in the present study that FLHCW who perceived low to medium levels of job satisfaction were more prone

**TABLE 3.** Exhaustion, Disengagement and Burnout Among Study Participants (n = 366)

Variables	Mean BM-OLBI scores (SD)	No, n (%)	Yes, n (%)
Disengagement	2.43 (0.23)	24 (6.6)	342 (93.4)
Exhaustion	2.13 (0.48)	196 (53.6)	170 (46.4)
Burnout		203 (55.5)	163 (44.5)

Burnout is operationally defined as having mean score of 2.25 or more for exhaustion and mean score of 2.10 or more for disengagement.

**TABLE 4.** Association of Sociodemographic and Work-Related Factors with Burnout Among Study Participants (*n* = 366)

Factors	COR (95% CI)*	P-value	AOR (95% CI)†	P-value
Age	0.95 (0.92, 0.98)	<0.01 <sup>b</sup>	0.96 (0.93, 0.99)	0.03 <sup>a</sup>
Gender				
Male	1.00 (ref)			
Female	0.96 (0.59, 1.53)	0.85		
Ethnicity				
Malay	1.00 (ref)			
Chinese	2.39 (0.69, 8.34)	0.17		
Indian	1.06 (0.39, 2.92)	0.91		
Others	4.45 (1.42, 13.93)	0.01 <sup>a</sup>		
Marital status				
Married	1.00 (ref)			
Single	1.55 (0.93, 2.58)	0.09		
Having children				
Yes	1.00 (ref)			
No	1.47 (0.93, 2.33)	0.09		
Education level				
Primary education	1.00 (ref)			
Secondary education	0.26 (0.02, 2.99)	0.28		
Tertiary education	0.46 (0.04, 5.17)	0.53		
Underlying medical problems				
No	1.00 (ref)			
Yes	1.19 (0.78, 1.82)	0.43		
Job categories				
Support staff	1.00 (ref)			
Professional	2.01 (1.09, 3.71)	0.03 <sup>a</sup>		
Paramedics	1.32 (0.80, 2.16)	0.27		
Job Position				
Medical Specialist	1.00 (ref)			
Medical Officer	0.25 (0.01, 8.56)	0.44		
Medical Assistant	1.43 (0.09, 23.8)	0.80		
Nurse	0.74 (0.04, 12.7)	0.84		
Environment Health Officer (EHO)	0.68 (0.04, 11.07)	0.79		
Assistant Environment Health Officer (AEHO)	3.00 (0.08, 107.45)	0.55		
Public Health Assistant (PHA)	0.68 (0.04, 11.95)	0.79		
Health Care Assistant (PCA)	0.54 (0.03, 9.99)	0.68		
Public Assistant (PA)	2.50 (0.10, 62.61)	0.58		
Health driver	0.50 (0.01, 19.56)	0.71		
Task type				
Administrative	1.00 (ref)			
Field work	0.89 (0.52, 1.53)	0.68		
Duration of involvement in COVID-19 management				
≤6 months	1.00 (ref)		1.00 (ref)	
>6 months	2.17 (1.17, 4.03)	0.01 <sup>a</sup>	2.35 (1.16, 4.72)	0.02 <sup>a</sup>
Job demand				
Medium	1.00 (ref)			
High	2.87 (1.82, 4.54)	<0.01 <sup>c</sup>		
Emotional demand				
Low	1.00 (ref)		1.00 (ref)	
Medium	2.76 (1.75, 4.33)	<0.01 <sup>c</sup>	2.10 (1.27, 3.48)	<0.01 <sup>b</sup>
High	7.27 (3.05, 17.35)	<0.01 <sup>c</sup>	4.45 (1.67, 11.77)	<0.01 <sup>b</sup>
Recognition				
Low	1.41 (0.89, 2.22)	0.13		
Medium	1.22 (0.42, 3.49)	0.72		
High	1.00 (ref)			
Role clarity				
Low	3.22 (1.99, 5.19)	<0.01 <sup>c</sup>	1.95 (1.13, 3.43)	0.01 <sup>a</sup>
Medium	8.22 (3.75, 18.02)	<0.01 <sup>c</sup>	4.18 (1.64, 10.59)	<0.01 <sup>b</sup>
High	1.00 (ref)		1.00 (ref)	
Organizational leadership				
Low	4.89 (1.54, 15.57)	0.01 <sup>a</sup>		
Medium	2.33 (1.23, 4.39)	0.01 <sup>a</sup>		
High	1.00 (ref)			
Supervisor support				
Low	2.87 (1.81, 4.55)	<0.01 <sup>c</sup>		
Medium	3.46 (1.73, 6.94)	<0.01 <sup>c</sup>		
High	1.00 (ref)			
Peer support				
Low	1.45 (0.92, 2.29)	0.11		

TABLE 4. (Continued)

Factors	COR (95% CI)*	P-value	AOR (95% CI)†	P-value
Medium	3.19 (1.17, 8.69)	0.02 <sup>a</sup>		
High	1.00 (ref)			
Job insecurity				
Low	1.00 (ref)			
Medium	0.93 (0.24, 3.57)	0.92		
High	0.39 (0.09, 1.49)	0.17		
Job satisfaction				
Low	2.48 (1.57, 3.93)	<0.01 <sup>b</sup>	1.49 (0.89, 2.50)	0.13
Medium	4.68 (1.94, 11.28)	<0.01 <sup>c</sup>	3.21 (1.11, 9.29)	0.03 <sup>a</sup>
High	1.00 (ref)		1.00 (ref)	
Work-family conflict				
Low	1.00 (ref)			
Medium	8.54 (1.09, 66.92)	0.04 <sup>a</sup>		
High	44.00 (4.32, 44.85)	<0.01 <sup>b</sup>		
Family-work conflict				
Low	1.00 (ref)			
Medium	0.84 (0.35, 2.02)	0.70		
High	2.02 (0.73, 5.57)	0.17		
Organizational justice				
Low	4.69 (2.35, 9.36)	<0.01 <sup>b</sup>	3.32 (1.51, 7.27)	<0.01 <sup>b</sup>
Medium	6.30 (1.82, 21.83)	<0.01 <sup>c</sup>	1.86 (0.45, 7.71)	0.39
High	1.00 (ref)		1.00 (ref)	

COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval; SE, standard error; *df*, degree of freedom.

\*COR estimates from simple logistic regression.

†AOR estimates from multiple logistic regression; assumptions of logistic regression have been met and the Hosmer and Lemeshow Goodness-of-fit test indicated good fit ( $P = 0.232$ ).

<sup>a</sup> $P < 0.05$ .

<sup>b</sup> $P < 0.01$ .

<sup>c</sup> $P < 0.001$ .

to developing burnout compared to those who perceived high levels of job satisfaction. This was similarly reported by Leskovic, Erjavec<sup>53</sup> and Alrawashdeh, Al-Tammemi.<sup>54</sup> Previous studies have shown that HCW who perceive dissatisfaction with particular job aspects were linked to a higher frequency of the manifestations of stress, including poor psychological and physical health, and poor relationships with colleagues and patients.<sup>55</sup> Indeed, work-related stress has been shown to be strongly correlated with job satisfaction as well as burnout.<sup>56</sup> Therefore, FLHCW who had prolonged exposure to work stressors may have developed work-related stress which culminated in a reduced sense of personal accomplishment and correspondingly job dissatisfaction, in line with the Maslach Burnout Model.<sup>57</sup>

Besides that, FLHCW who perceived low levels of organisational justice were observed to have 3.3 times the odds of burnout compared to those who perceived high levels of organisational justice. This is similar to the findings reported by Correia and Almeida<sup>58</sup> and Aghaei.<sup>59</sup> Research has shown that workers who believe that they are treated unfairly at work experience considerable distress that can result in withdrawal behaviours, such as disengagement, which is a salient feature of burnout.<sup>60</sup> This draws on the equity theory<sup>61</sup> and the cognitive appraisal model of stress<sup>62</sup> that suggests that injustice can lead to stress, which in turn leads to burnout.

The present study has some limitations. Firstly, the multi-centre cross-sectional study design, even though considered to be a cost-effective and practical approach, cannot determine risk factors and only estimates associated factors. Secondly, the study was conducted among FLHCW who were currently working during the COVID-19 pandemic and excluded those on medical leave. Thus, FLHCW who may be severely burnout to the point where they had to take medical leave or had left their job were unable to be captured in this study, which may have led to an underestimation of burnout prevalence. Thirdly, a nonresponse of approximately 28% may have influenced the representativeness of the findings. Finally,

residual confounding may have affected the association between factors and outcome in the present study as not all factors identified from the literature review could be examined due to resources limitations.

Despite the above limitations, there are strengths to this study. The study was carried out during the peak of COVID-19 cases in Johor, as evidenced by the number of districts classified as red zones during the study period. Thus, the study findings closely reflect the genuine impact of the COVID-19 pandemic on FLHCW. Moreover, care was taken to ensure the robustness of the study design and therefore the validity and reliability of data collected. This includes sampling from multiple study sites and using stratified random sampling to increase the external validity of study findings, using validated instruments and adjusting for potential confounders in the final statistical model to improve the internal validity of the study, as well as conducting a priori sample size calculation to ensure adequate study power.

## CONCLUSIONS

The findings of the present study indicate that burnout is a significant issue for FLHCW and that at least four in ten Malaysian FLHCW working in the public health setting perceives burnout. Considering that burnout is often underreported due to the stigma surrounding mental health and the culture of silence in medicine in which speaking up or seeking help to deal with work-related psychological issues is seen as a sign of weakness,<sup>63</sup> this is concerning. The findings of the present study also suggested that certain sociodemographic and work-related characteristics may be predictive of FLHCW's exposure to burnout. This implies a need for risk stratification to identify FLHCW who are most at risk of experiencing burnout so that early, targeted interventions can be initiated. In this regard, relevant stakeholders, including healthcare management and policymakers, must develop appropriate policies addressing job

content and organisational factors to address burnout among FLHCW, who serve as the backbone of our healthcare system. In addition to that, those identified as having burnout should be offered psychological first aid or enrolled in an employee assistance program. Investing in a robust public health workforce is critical for the response to COVID-19 and the long-term sustainability of public health preparedness and response.<sup>40</sup> Indeed, the significant costs of burnout should make addressing it a priority and in fact, according to Garton,<sup>64</sup> the costs of burnout prevention strategies at work are lower than the costs of burnout workers on organisations.

Future studies should include prospective studies that explore work-related antecedents of burnout to establish causality. Other than that, future studies should incorporate variables identified from previous studies that have not been examined among FLHCW in public health settings during the COVID-19 pandemic, such as organisational support,<sup>12</sup> and workplace bullying.<sup>65</sup> Future studies investigating interventions to reduce psychological harm or enhance individual resiliency, job content, and organisational protective factors should be evaluated for efficacy with case-control studies or ideally randomized-controlled trials.

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