# Stress perceived by drivers in public healthcare facilities in Negeri Sembilan during the first year of the COVID-19 pandemic

**Abdul Aziz Harith, MPH**[1,2], **Zuraida Mohamed, MPH (OH)**[3], **Azzyati Mohammad, MPH**[3], **Lim Kuang Kuay, MSc**[2], **Naiemy Reffin, MPH**[4], **Malindawati Mohd Fadzil, MSc**[4], **Shahida Ismail, MPH**[4], **Nofi Yuliani Dahlan, MPH**[4], **Muhammad Zulfakhar Zubir, MSc**[4], **Mohd Ihsanuddin Abas, MPH**[5]

[1]Occupational and Aviation Medicine, Department of Medicine, University of Otago Wellington, Wellington New Zealand, New Zealand, [2]Occupational Health Research Centre, Institute for Public Health, National Institutes of Health, Shah Alam, Selangor Malaysia, Malaysia, [3]Occupational and Environmental Health Unit, Public Health Division, Negeri Sembilan State Health Department, Negeri Sembilan, Malaysia, [4]Department of Community Health, Faculty of Medicine, Universiti Kebangsaan Malaysia, Malaysia, [5]Community Medicine Unit, Faculty of Medicine, Universiti Sultan Zainal Abidin, Malaysia

## ABSTRACT

**Introduction:** Healthcare drivers, including ambulance drivers, were less concerned about health and safety during the COVID-19 pandemic, with not only the risk of COVID-19 infection but also a higher risk of prolonged states of alertness, stress, burnout, fatigue and road traffic accident. This study aimed to determine the prevalence of stress and its associated factors among healthcare drivers, especially during the COVID-19 pandemic.

**Materials and Methods:** This study employs a cross-sectional study design and utilises self-reported data obtained from locally validated personal stress inventory questionnaires. The data collection period spanned from August 1 to 31, 2020. The study sample consisted of 163 healthcare drivers affiliated with the Negeri Sembilan State Health Department. The Chi-square test and Fisher's exact test were the first used to determine the association between variables prior to conducting multiple logistic regression to predict the relationship between dependent and independent variables.

**Results:** In COVID-19's first year, 7.4% (n = 12) of healthcare drivers reported perceived stress with ambulance drivers reporting more stress (10.6%; n = 5) than non-ambulance drivers (6.0%; n = 7). Simple statistical analysis identified perceived stress significantly associated with household income, smoking status and performing on-call. Further analysis by multiple logistic regression found that perceived stress was significantly related to smoking (aOR 19.9, 95% CI: 1.86-213.90), and performing on-call (aOR 8.69, 95% CI 1.21-62.28). Nevertheless, no association was found between perceived stress and age, ethnicity, marital status, education, household income, co-morbidities, driving assignment, employment duration, needing a part-time job or motor vehicle accident history.

**Conclusion:** The study found that the perceived stress amongst Malaysian healthcare drivers during the COVID-19 pandemic was relatively low. This could be due to fewer life-threatening tasks, emergencies, assigned tasks and increase income due to overtime during the COVD-19 pandemic. The OSH team's efforts to provide consistent safety and health training, including stress management, may have contributed to the healthcare driver's ability to effectively manage the stressful circumstances encountered during the pandemic. In order to enhance salary competitiveness, employers should provide financial management education alongside subsidised housing and childcare provisions. Healthcare drivers who smoke should be taught different stress reduction techniques so that they can handle their stress in a healthy way.

## INTRODUCTION

The Global populations have been devastated by the COVID-19 epidemic. The impact has existed for almost 2 years since the World Health Organization (WHO) announced the Public Health Emergency of International Concern (PHEIC).[1] Every part of human life was affected by the COVID-19 epidemic, but economic and social devastation stood out.[2,3] Nevertheless, there are over 8 million confirmed COVID-19 infections worldwide, with two million deaths in 2020, and it is increasing day by day.[4] Low-income and poor countries were badly affected and had difficulty surviving during the COVID-19 pandemic, as warned by the WHO and the World Bank Organisation.[5,6]

This pandemic has given a strike to the healthcare system capacity. The occupancy of COVID-19 patients is more than the capacity of healthcare facilities and hospitals worldwide. Certain countries (South Africa, the United Kingdom, Germany, China and Malaysia) built field hospitals to cope with the pandemic situation.[7-9] The impacts of the COVID-19 pandemic are completely different in countries such as Italy, Spain and Malaysia, which experienced a surge of cases but relied on the inadequacy of hospital beds and healthcare professionals.[7,10] But, more importantly, during the COVID-19 pandemic, overwhelmed, short-staffed healthcare facilities lead to stress and burnout among healthcare workers,

especially on the front lines. The WHO has alerted worldwide healthcare organisations and governments to identify and tackle the unprecedented issues related to healthcare workers during the COVID-19 pandemic.[11]

Tiredness, mental stress and burnout are some of the major issues among healthcare workers during the COVID-19 pandemic.[12] The well-being of healthcare workers, on the other hand, is much more important in maintaining a high standard of quality care for patients because it is directly related to healthcare worker productivity.[13–15] Healthcare workers are expected to work intensely because of the high burden of COVID-19 patients and a lack of staff (because of being infected or affected more by the pandemic). The 11th Revision of the International Classification of Diseases (ICD-11) defined burnout as a syndrome conceptualised as resulting from chronic workplace stress that has not been successfully managed.[16] But tackling stress issues among healthcare workers is crucial and more beneficial to reducing burnout among frontline healthcare workers and maintaining the productivity of healthcare services.

Frontline healthcare workers comprise medical physicians, nurses, medical doctor assistants, healthcare assistants, receptionists, cleaners and ambulance drivers.[17] Ambulance drivers are less concerned with health and safety compared to doctors and nurses during the COVID-19 pandemic. Some reports suggest that ambulance workers may be particularly vulnerable to first-responder mental health issues.[18] Ambulance drivers are not only at a higher risk of COVID-19 infection, but they are also at a higher risk of road accidents due to high driving speeds under emergency conditions and encountering unpleasant aspects of life.[19] They often work under time pressure and at irregular hours, which leads to prolonged states of alertness and fatigue.[20,21] Afshari et al. identified six main stressors for emergency medical service (EMS) drivers: complexity of patients' clinical conditions, interruption of EMS provision, health hazards, interpersonal issues, inter-professional interactions and legal conflicts.[22]

Healthcare and ambulance drivers are comparable to full-time professional drivers, who are exposed to a variety of stressors, such as the behaviour of other drivers, congested roads, ergonomic considerations, noise, climate conditions and job scheduling, resulting in deteriorating well-being and performance.[23,24] John and Linda's 2006 study also revealed that older driver, women and those with a history of reported accidents in conditions of limited visibility, adverse weather and while performing common driving tasks are more prone to experience stress.[25] Despite that, according to Magaña et al.[26], the level of stress experienced while driving can be influenced by four factors: the well-being (physical and mental condition) of the driver, the road and traffic conditions, the condition of the vehicle and external disturbances.

The Institute for Health System Research (IHSR) reported that 129 ambulance accidents occur in Malaysia on average each year.[27] This situation is problematic for the organisation as a result of increased turnover, absenteeism and exposure to substantial claims for compensation. The majority of ambulance accidents (70.4%) occurred during the day, and 55.7% occurred on weekdays. Accidents occurred on straight roads in 49.7% of cases and on 35.4% of federal roads.

According to Syazmin et al., health drivers or ambulance drivers were ranked second among Malaysian healthcare workers involved in road traffic accidents, with a 53.7 per 10,000 worker accident rates.[28] The mental health of a driver is critical because it directly influences their driving behaviour. Assessment of the stress status of frontline healthcare drivers is critical before it progresses to burnout with increasing mental distance from one's job and feelings of isolation especially during the COVID-19 pandemic. Thus, this study aimed to determine the prevalence of stress and its associated factors among healthcare drivers, especially during the COVID-19 pandemic.

## MATERIALS AND METHODS
### The Study Design
The stress among drivers in public healthcare facilities survey was a cross-sectional study conducted from 1st August until 31st August 2020. It covers seven district health offices, seven district dental offices and seven hospitals under the Negeri Sembilan State Health Department (SHD). The responsibilities of healthcare drivers within the department (ambulance driver or non-ambulance driver) are interchangeable depending on where the driver is posted (hospital, district health or dental office or primary care clinics). However, all drivers were deployed as front-liners in managing COVID-19 in the hospital and community. Simple random sampling was used to select drivers based on the 397 drivers in the list provided by the Negeri Sembilan SHD.

The total sample size required was 149 based on the 95% confidence interval (CI), marginal error of 5% and the nearest expected stress prevalence among drivers based on the emergency care personnel met posttraumatic stress disorder; 18.6%.[29] The sample was increased by 10% to account for the non-response rate, which resulted in 164 but rounded into 170 respondents.

The inclusion criteria comprise working at the present workplace for at least 6 months, having Malaysian nationality, working during the COVID-19 pandemic for at least the last 2 weeks, and being a registered driver under the Negeri Sembilan SHD. The selection of a 6-month service duration was based on the understanding that individuals typically require a period of 3–6 months to adapt to a new workplace environment. Drivers diagnosed with mental health illnesses and those on long-term sick leave were excluded from this study.

### Survey Instrument
A validated Malay version of the Personal Stress Inventory (PSI) survey was distributed to healthcare drivers. The inventory comprised 51 items with 11 subscales using a four-point Likert scale from 'never' (0), 'once or twice' (1), 'every week' (2) and 'nearly every day' (3). The healthcare drivers' replies to each of the 51 items, with scores ranging from 0 to 153, were added together to create a final score. Rokiah validated this inventory in Malaysia with a sensitivity of 95.1%, specificity of 77% and a total score of over 36, signifying respondents were experiencing stress.[30] The Cronbach alpha of this instrument is 0.968. One answered the questionnaires anonymously to maintain the driver's privacy.

**Table I: Prevalence of perceived stress among healthcare drivers (n=163)**

| Variables | n | % | Frequency (n) | |
|---|---|---|---|---|
| | | | Stress (%) | None stress (%) |
| **Healthcare drivers** | 163 | 100 | 12 (7.4) | 141 (92.6) |
| Ambulance drivers | 47 | 28.8 | 5 (10.6) | 42 (89.4) |
| Non-ambulance drivers | 116 | 71.2 | 7 (6.0) | 109 (94) |

**Table II: Demographic characteristics of health drivers and association with perceived stress (n=163)**

| Variables | n | Percentage (%) | p-value |
|---|---|---|---|
| **Demographic characteristics** | | | |
| Age groups | | | 0.710 |
| <30 | 5 | 3.1 | |
| 30–39 | 81 | 49.7 | |
| 40–49 | 52 | 31.9 | |
| >50 | 25 | 15.3 | |
| **Household income** | | | 0.044[a] |
| MYR <2000 | 76 | 46.6 | |
| MYR 2000–3000 | 43 | 26.4 | |
| MYR >3000 | 44 | 27.0 | |
| **Ethnic** | | | 0.649 |
| Malay | 154 | 95.7 | |
| Chinese | 1 | 0.6 | |
| Indian | 6 | 3.7 | |
| **Marital status** | | | 0.519 |
| Single | 12 | 7.4 | |
| Married | 145 | 90.1 | |
| Divorced/Widow | 4 | 2.5 | |
| **Level of education** | | | 0.385 |
| High School Certificate | 145 | 90.1 | |
| Certificate | 12 | 7.5 | |
| Diploma | 4 | 2.5 | |
| **Health status** | | | |
| **Body mass index (BMI)** | | | 0.241 |
| Underweight | 3 | 1.9 | |
| Normal | 45 | 28.0 | |
| Overweight | 63 | 39.1 | |
| Obese | 50 | 31.1 | |
| **Non-communicable diseases** | | | |
| Diabetes mellitus | 22 | 13.7 | 0.498 |
| Hypertension | 14 | 8.7 | 0.725 |
| Hypercholesterolaemia | 1 | 0.6 | 0.926 |
| Heart diseases | 1 | 0.6 | 0.926 |
| **Comorbidities** | | | 0.811 |
| Single | 28 | 17.2 | |
| Double | 5 | 3.1 | |
| No comorbid | 130 | 79.8 | |
| **Smoking status** | | | 0.009[a] |
| Smoker | 89 | 55.3 | |
| None smoker | 72 | 44.7 | |
| **Alcoholic status** | | | 0.579 |
| Drinker | 2 | 1.2 | |
| None drinker | 159 | 98.8 | |

[a]Chi-square test.

## Data Variables

The questionnaires encompass various categories of data, including demographic data (age, gender, ethnicity, marital status, level of education, healthcare facilities), co-morbidities (height, weight, tobacco use, drug use, hypertension status, diabetes status) and occupational demography (employment duration in MOH, employment years at unit, number of drivers at working unit, working hours, main driving assignment driver, work schedule, on-call status, satisfaction on work schedule, part-time job and had a part-time job).

During a minimum duration of 1 month amid the COVID-19 pandemic, the management allocated the principal responsibility, which entailed determining the primary driving assignment. This involved either performing duties as an ambulance operator or operating the management vehicle to facilitate the transportation of healthcare personnel or the delivery of parcels. The work schedule was established by considering the driver's availability during regular office hours (8 a.m. to 5 p.m.) as well as the three available shift hours (7 a.m. to 3 p.m., 3 p.m. to 11 p.m. and 11 p.m. to 7 a.m.).

**Table III: Occupational characteristic of healthcare drivers (n=163)**

| Variables | n | Mean (SD) | p-value |
|---|---|---|---|
| Employment years at Ministry of Health | 163 | 10.6 (7.4) | 0.120 |
| Employment years at Unit | 163 | 8.0 (6.8) | 0.168 |
| Num. of driver at working unit | 163 | 7.9 (7.8) | 0.073 |
| Working hours (hours/week) | 163 | 54.7 (20.0) | 0.313 |
| **Variables** | **n** | **Percentage (%)** | |
| **Main driving assignment** | | | 0.330 |
| Ambulance driver | 47 | 28.8 | |
| Non-ambulance driver | 116 | 71.2 | |
| **Work schedule** | | | 0.435 |
| Office hour | 135 | 82.8 | |
| Shift hour | 28 | 17.2 | |
| **On-call status** | | | 0.032[a] |
| Yes | 83 | 50.9 | |
| No | 80 | 49.1 | |
| **Satisfaction on work schedule** | | | 0.373 |
| Yes | 157 | 96.3 | |
| No | 6 | 3.7 | |
| **Part-time job** | | | 0.464 |
| Require | 128 | 78.5 | |
| Not require | 35 | 21.5 | |
| **Had a part-time job** | | | 0.866 |
| Yes | 58 | 35.6 | |
| No | 105 | 64.4 | |
| **Motor vehicle accident (MVA)** | | | |
| **MVA with department vehicle** | | | 0.446 |
| Yes | 7 | 4.3 | |
| No | 156 | 95.7 | |
| **Num. of accidents last 6 months** | | | 0.446 |
| None | 156 | 95.7 | |
| At least once | 7 | 4.3 | |

[a]Fisher's exact test.

**Table IV: Logistic Regressions of perceived stress risk factors among healthcare drivers during the COVID-19 pandemic**

| Variables | Simple logistic regression | | | Multiple logistic regression | | |
|---|---|---|---|---|---|---|
| | cOR | 95% CI | p | aOR | 95% CI | p |
| Age | 1.049 | 0.97–1.12 | 0.194 | 1.06 | 0.94–1.19 | 0.316 |
| Marital status | | | | | | |
| Single/widow/divorce | 1425419.79 | 0.00–0.00 | 1.00 | 11177.57 | 0.00–0.00 | 0.998 |
| Married | | | Reference | | | Reference |
| BMI | 0.96 | 0.85–1.08 | 0.490 | 0.91 | 0.78–1.05 | 0.198 |
| Smoking status | | | | | | |
| Yes | 9.76 | 1.23–77.51 | 0.030 | 19.99 | 1.86–213.90 | 0.013* |
| No | | | Reference | | | Reference |
| Comorbidities | 0.77 | 0.16–3.71 | 0.749 | 0.71 | 0.10–4.52 | 0.712 |
| Education level | | | 0.447 | | | 0.665 |
| High school cert | 1.24 | 0.14–10.64 | 0.841 | 1.11 | 0.07–17.21 | 0.940 |
| Diploma | 4.56 | 0.43–48.00 | 0.206 | 8.40 | 0.08–851.18 | 0.366 |
| Degree | | | Reference | | | Reference |
| Household income | | | | | | |
| <MYR 2000 | 0.61 | 0.06–6.14 | 0.677 | 0.60 | 0.03–11.22 | 0.737 |
| MYR 2000–3000 | 2.41 | 061–9.53 | 0.209 | 3.60 | 0.48–26.73 | 0.210 |
| >MYR 3000 | | | Reference | | | Reference |
| Driving assignment | | | | | | |
| Ambulance driver | 1.85 | 0.55–6.16 | 0.314 | 0.40 | 0.06–2.41 | 0.317 |
| Non-ambulance driver | | | Reference | | | Reference |
| Employment at unit | 1.07 | 1.00–1.16 | 0.044 | 1.09 | 0.98–1.21 | 0.110 |
| Working hours | 0.595 | 0.15–2.35 | 0.460 | 1.10 | 0.16–7.14 | 0.921 |
| On-call status | 5.342 | 1.13–25.20 | 0.034 | 8.69 | 1.21–62.28 | 0.031* |
| Schedule satisfaction | | | | | | |
| Yes | 0.377 | 0.04–3.51 | 0.391 | 1.63 | 0.01–148.54 | 0.831 |
| No | | | Reference | | | Reference |
| Had a part-time job | | | | | | |
| Yes | 0.952 | 0.27–3.31 | 0.938 | 1.27 | 0.30–5.33 | 0.741 |
| No | | | Reference | | | Reference |

*Significant result.
COR = crude odds ratio.
[a]OR = adjusted odds ratio

Meanwhile, the designation of on-call status was established in response to the need for individuals in a shift-based work system to be available for post-office hours or double shifts. A motor vehicle accident was operationally defined as an incident involving a driver operating a healthcare vehicle who was involved in a collision while carrying out their professional responsibilities. The health status of the healthcare drivers was determined based on the yearly health assessment, either by the Occupational and Environmental Health Unit in district health offices or the Occupational Safety and Health Unit in hospitals.

### Data Collection

The questionnaires were distributed and collected by the Occupational and Environmental Health Officer in each district and hospital. The chosen drivers were approached at work and given a study explanation as well as a participant information sheet. They were given a week to decide whether or not to participate in this study, and informed consent forms were given to them after they agreed to participate and were then provided with a series of questionnaires. They had 3 days to finish the questionnaires. The completed questionnaires were submitted to the Occupational and Environmental Health Officer in each district and hospital upon completion.

### Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 22 was used to analyse the data. The distribution of the data was not normal. Thus, the association between demographic characteristics, health status, occupational characteristics and stress status was determined using the Chi-square test, Fisher Exact test, Mann–Whitney test and Kruskal–Wallis test depending on the data variables. Moreover, the collected data underwent multiple logistic regression analysis in order to validate the significant risk factors associated with perceived stress among healthcare drivers in Negeri Sembilan during the first year of the COVID-19 pandemic.

### Ethical Consideration

This study was registered in the National Medical Research Registry (NMRR-20-2187-56430 (IIR)). The study was conducted in accordance with the Declaration of Helsinki and was approved by the Medical Research Ethics Committee (MREC), Ministry of Health Malaysia (KKM/NIHSEC/ P20-2576 (4)), on 25 January 2021.

### RESULTS

The total number of participants in this study was 163, resulting in a response rate of 95.8%. In general, non-ambulance drivers make up 71.2% (n = 116) of the healthcare drivers working for the Negeri Sembilan SHD, while ambulance drivers make up 28.8% (n = 47) of the workforce. At the end of the first year of the COVID-19 pandemic, 7.4% of healthcare drivers reported experiencing some degree of perceived stress. Moreover, from the findings presented in Table I, ambulance drivers at the Negeri Sembilan SHD had perceived higher levels of stress (10.6%) compared to non-ambulance drivers (6.0%).

As shown in Table II, the majority of respondents were aged 30–39 (49.7%), had a monthly household income of less than MYR 2,000 (46.6%), were Malay (95.7%), were married (90.1%) and had their highest education of a high school certificate (90.1%). In addition, 70% of healthcare drivers are overweight or obese; 55.2% are smokers and 98.8% do not consume alcohol. The majority of drivers in the SHD are in good health (79.8%), whereas 20.8% have at least one comorbid disease; 13.7% have diabetes, 8.7% have hypertension, 0.6% have hypercholesterolaemia and 0.6% have heart disease. A majority of them are smokers (55.3%), whilst only 1.2% consume alcohol. In addition, a correlation exists between household income ($p = 0.044$), smoking status ($p = 0.009$) and perceived stress. However, there is no significant relationship between other demo-graphic parameters (such as age, race, marital status and education level) and experienced stress, or between perceived stress and other health concerns (like BMI, diabetes mellitus, hypertension, hypercholesterolaemia, heart diseases, comorbidities and alcoholism).

More than 7 out of 10 healthcare drivers working with the Negeri Sembilan SHD are assigned as non-ambulance drivers or department transport service drivers. They have been working with the ministry of health on average for 10.6 ± 7.4 years, and the majority of them work during office hours (82.2%). On average, the healthcare drivers in the department have been with the ministry of health in the current hospital or district health office unit for 8 ± 6.8 years. On average, they worked around 52.6 ± 20 hours per week during the COVID-19 pandemic. More than half of them did work on an on-call basis (50.9%) after office hours and were satisfied with their working schedule (96.3%). Nevertheless, perceived stress among healthcare drivers was associated with on-call status (p = 0.032). Having said that, most of them still feel that they need a part-time job (78.5%) on top of their full-time job, but only 35.6% of them have a part-time job. On the category of motor vehicle accidents involving department vehicles, seven healthcare drivers had a history of motor vehicle accidents involving department vehicles during their employment, with 4.3% reported accidents during the COVID-19 pandemic. However, there is no association found between perceived stress and duration of employment, working hour duration, work schedule, having part-time job and motor vehicle accident.

A logistic regression analysis was conducted to examine the association between perceived stress and several variables among healthcare drivers during the COVID-19 pandemic. The result indicated that three variables were found to be statistically significant (p<0.05) predictors of perceived stress. These variables included smoking (OR 9.76, 95% CI 1.23–77.51), duration of employment at the current unit (OR 1.07, 95% CI 1.00–1.16) and on-call status (OR 5.34, 95% CI 1.13–25.20). Meanwhile, the multiple logistic regression revealed that healthcare drivers who are smokers had a significantly higher odds ratio of 19.99 (95% CI 1.86–213.90) compared to non-smokers. In addition, these individuals were found to have 8.69 times the odds (95% CI 1.21–62.28) of engaging in on-call duties compared to healthcare drivers not doing an on-call.

## DISCUSSION

Drivers in the healthcare industry play an important role because their jobs include moving people's lives. Stress level of healthcare drivers or ambulance drivers is very dynamic depending on the stressors at the workplace. The level of stress among healthcare drivers at the SHD of Negeri Sembilan remained under control at the end of the first year of the COVID-19 pandemic, in contrast to the pool prevalence of stress among first responders including ambulance drivers for medical emergencies, which reported 17% stress prevalence during the first year of the COVID-19 pandemic.[31] Despite that, the level of perceived stress in almost similar prevalence with the study conducted by Nordin et al. on healthcare workers in northwest Malaysia, who reported a 6.4%[32] with almost a similar study timeframe. However, with regards to an Asia-Pacific study among healthcare workers in 2020, which involved India, Singapore, Malaysia, Vietnam and Indonesia, Malaysia was found to be the second highest (5.7%) after Indonesia, which was 6.8%.[33] However, the prevalence of stress would vary depending on the healthcare facilities and respondents, even though the studies were conducted in a nearly identical timeframe, such as a study in the Sarawak Hospital, Malaysia that recorded 57.1%[34] and a study in the primary health clinics of Selangor, Malaysia which reported it to be at 2.8%.[35] Based on this study, ambulance drivers experienced higher prevalence compared to non-ambulance drivers, which differ in job assignments.

Furthermore, this study also noted that low household income (less than MYR 2,000), performing on-call and smoking were associated with perceived stress among healthcare drivers. Household income of less than 2,000 Malaysian Ringgit (MYR) is the lowest of the four categories of household income below the B40 threshold in Malaysia.[36] However, further analysis using multiple logistic regression revealed no significant association between stress and household income. Nonetheless, employers should prioritise healthcare drivers when allocating resources like government-subsidized housing and child care in order to manage their salary competitiveness. Financial management education may be useful for this occupation category as well. The stress of being on call has been established by other studies,[37] but prospective healthcare drivers should still be reminded of their responsibilities. However, this may also be the result of working excessive hours without taking adequate breaks or poorly managing a roaster.[38] According to a study conducted in the USA, medium to high levels of inter-shift recovery were highest for shifts over 12 h in length (61.6%), lowest for shifts under 12 h in length (47.7%) and highest for shifts of 12 h (40.2%).[39] Nevertheless, the Occupational Safety and Health (OSH) team must conduct locality assessments of workers to determine safe maximum workweeks and break times, as varying working conditions may have a cumulative effect on employee productivity.[40]

Drivers in the healthcare industry play a crucial role, so it is imperative that they are in good physical and mental health. Based on this study, more than half of the healthcare workers in the Negeri Sembilan SHD are smokers. This puts them at risk for cardiovascular diseases and cancers such as hypertension, heart disease, peripheral arterial disease and lung cancer, despite the fact that the vast majority of them (8 out of 10) are healthy and have no other health issues. Contrarily, a study of Swedish ambulance workers revealed that they had a higher prevalence of heart problems (paroxysmal tachycardia, atrial fibrillation, flutter, and other cardiac arrhythmias), high blood pressure and dorsopathies than individuals in other occupations.[41] As cardiovascular diseases can result in motor vehicle accidents,[42] a yearly physical examination and fitness certificate must include a heart evaluation, such as an electrocardiogram (ECG). Furthermore, continuous awareness and participation in interventional activities at the workplace need to be emphasised by the Occupational Safety and Health team.

Additionally, this study did not find significant associations between stress among ambulance drivers and other factors such as gender, age, household income, type of shift work, risk of getting COVID-19 infection, adequacy of personal protective equipment, history of accidents within 1 year and pressure from family members and patients compared to the other studies.[43,44] According to the study conducted by Amro et al. found that younger female drivers displayed higher levels of stress compared to both male and older ambulance drivers.[43] In contract to gender, the observation that driving is predominantly associated with males in Malaysia is expected, as there is a notable lack of female applicants for such positions. In contrast to the present study, Pinnalin et al. conducted a study that revealed supplementary variables linked to stress levels among ambulance drivers amidst the COVID-19 pandemic. These variables encompassed monthly household income, the nature of shift work, the ambulance driver's accident record within the previous year, as well as the influence exerted by family members and patients.[44]

Despite the fact that the perceived stress levels of healthcare drivers appear to be under control, the OSH team must continue to exert effort to maintain the situation. Because stress management training continuously increases drivers' awareness, train them to control, reduce and tolerate the internal and external demands of a certain situation in which their individual resources are exceeded. Even though, according to a study conducted in Switzerland, paramedics require less psychological support than other professions due to their high level of experience and long-standing training in stress management over the course of their careers, they are often used to address stressful situations as they are part of a coordinated and ordered emergency response and have to constantly handle very high levels of stress. According to research by Lawn et al., the needs of ambulance workers in terms of mental health can be classified into four main categories: organisational support, informal support, the use of humour and individual ways of coping, such as detachment and external support.[18] In a general way, stopping unpleasant emotions and thoughts is the most effective coping strategy for the reduction of stress levels and an increase in positive mental states.

A limitation of this study is that it was unable to identify the factors associated with each driver, as the sample size may not have been adequate given that the study was conducted in a single stratum and addressed the study objective, as the stress associated with ambulance drivers may differ from that

of other drivers. In addition, this is a cross-sectional study that only reflects the assessment conducted during the study. Following up from this study, the OSH team could initiate another research on the adaptability of healthcare drivers in Malaysia to varying working hours in terms of environmental adaptation, which would help policymakers, set the working hours limit for healthcare drivers, especially in relation to adequate breaks for on-call drivers. In addition, an interventional study based on the healthcare driver's behaviour therapy could enhance the overall performance of drivers in terms of occupational safety and health as it increases the driver's insight.

## CONCLUSION

The study found that perceived stress among Malaysian healthcare drivers during the OVID-19 pandemic was relatively low. The implementation of movement control orders during the COVID-19 pandemic in Malaysia resulted in a reduction in the frequency of life-threatening tasks, emergencies and assigned tasks. The consistent provision of safety and health training by the OSH team, which includes stress management and a smoking cessation programme, potentially contributed to the healthcare driver's ability to manage the stressful situation. In order to enhance salary competitiveness, employers ought to offer financial management education alongside subsidised housing and childcare provisions.

## ACKNOWLEDGMENTS

## DECLARATION OF INTEREST

## REFERENCES

1. World Health Organization. COVID 19, Public Health Emergency of International Concern (PHEIC) WHO Web page: World Health Organization; 2020. Available from: https://www.who.int/publications/m/item/covid-19-public-health-emergency-of-international-concern-(pheic)-global-research-and-innovation-forum.
2. 2. Scapaticci S, Neri CR, Marseglia GL, Staiano A, Chiarelli F, Verduci E. The impact of the COVID-19 pandemic on lifestyle behaviors in children and adolescents: an international overview. Ital J Pediatr. 2022; 48(1): 22.
3. Belitski M, Guenther C, Kritikos AS, Thurik R. Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses: Small Bus Econ. 2022; 58(2): 593–609.
4. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard WHO Web page: 2020; 2020. Available from: https://covid19.who.int/.
5. Akihiko Nishio. 2021. Available from: https://blogs.worldbank.org/voices/covid-19-hitting-poor-countries-hardest-heres-how-world-banks-ida-stepping-support.
6. ILO F, IFAD, WHO. Impact of COVID-19 on people's livelihoods, their health and our food systems: Joint statement by ILO, FAO, IFAD and WHO. 2020.
7. Amaran S, Kamaruzaman AZM, Mohd Esa NY, Sulaiman Z. Malaysia healthcare early response in combatting COVID-19 pandemic in 2020. Korean J Fam Med. 2021; 42(6): 425-37.
8. Bulajic B, Ekambaram K, Saunders C, Naidoo V, Wallis L, Amien N, et al. A COVID-19 field hospital in a conference centre - The Cape Town, South Africa experience. Afr J Prim Health Care Fam Med. 2021; 13(1): e1-e9.
9. Baughman AW, Hirschberg RE, Lucas LJ, Suarez ED, Stockmann D, Hutton Johnson S, et al. Pandemic care through collaboration: lessons from a COVID-19 field hospital. J Am Med Dir Assoc. 2020; 21(11): 1563-7.
10. Monllor P, Su Z, Gabrielli L, Taltavull de La Paz P. COVID-19 infection process in Italy and Spain: are data talking? Evidence from ARMA and vector autoregression models. Front Public Health. 2020; 8.
11. World Health Organization. Coronavirus disease (covid-19) outbreak: Rights, roles and responsibilities of health workers, including key considerations for occupational safety and health WHO web page. 2020.
12. Gupta N, Dhamija S, Patil J, Chaudhari B. Impact of COVID-19 pandemic on healthcare workers. Ind Psychiatry J. 2021; 30(Suppl 1): S282-s4.
13. Sears LE, Shi Y, Coberley CR, Pope JE. Overall well-being as a predictor of health care, productivity, and retention outcomes in a large employer. Popul Health Manag. 2013; 16(6): 397–405.
14. Adams JM. The value of worker well-being. Public Health Reports. 2019; 134(6): 583-6.
15. Sigurdsson EL. The wellbeing of health care workers. Scand J Primary Health Care. 2021; 39(4): 389-90.
16. World Health Organization. ICD-11: International classification of diseases (11th revision). 2019 Available from: https://icd.who.int/.
17. Ali S, Noreen S, Farooq I, Bugshan A, Vohra F. Risk assessment of healthcare workers at the frontline against COVID-19. Pak J Med Sci. 2020; 36(Covid19-s4): S99–s103.
18. Lawn S, Roberts L, Willis E, Couzner L, Mohammadi L, Goble E. The effects of emergency medical service work on the psychological, physical, and social well-being of ambulance personnel: a systematic review of qualitative research. BMC Psychiatry. 2020; 20(1): 348.
19. Becker J, Hugelius K. Driving the ambulance: an essential component of emergency medical services: an integrative review. BMC Emerg Med. 2021; 21(1): 160.
20. Prohn MJ, Herbig B. Traffic safety knowledge gain of ambulance drivers after simulator-based training. BMC Med Educ. 2022; 22(1): 216.
21. van der Ploeg E, Kleber RJ. Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. Occup Environm Med. 2003; 60(suppl 1): i40-i6.
22. Afshari A, Borzou SR, Shamsaei F, Mohammadi E, Tapak L. Perceived occupational stressors among emergency medical service providers: a qualitative study. BMC Emerg Med. 2021; 21(1): 35.
23. Evans GW, Johansson G, Rydstedt L. Hassles on the job: A study of a job intervention with urban bus drivers. J Organ Behav. 1999; 20: 199-208.
24. Useche SA, Cendales B, Montoro L, Esteban C. Work stress and health problems of professional drivers: a hazardous formula for their safety outcomes. PeerJ. 2018; 6: e6249.
25. Hill JD, Boyle LN. Driver stress as influenced by driving maneuvers and roadway conditions. Transport Res. 2007; 10(3): 177-86.

26. Magaña VC, Scherz WD, Seepold R, Madrid NM, Pañeda XG, Garcia R. The effects of the driver's mental state and passenger compartment conditions on driving performance and driving stress. Sensors (Basel). 2020; 20(18): 5274.

27. Abu Bakar NS, Zaimi NA, Mahaletchumy S, Shabadin A, Roslan A, Manual A, et al. Trends of ambulance accidents in Malaysia: implications to public health. 5th Asia Pacific Conference on Public Health; 10–14 September; Kuching, Sarawak. Med J Malaysia 2017; 72(Supp 1): 90.

28. Zuwairy MS, Harith AA, Nobuyaki H, Naim NM, Yon R. Road traffic accidents: a descriptive study of commuting injury among healthcare workers in Malaysia 2014-2016. Int J Public Health Clin Sci. 2020; 7(1): 58-71.

29. Trudgill DIN, Gorey KM, Donnelly EA. Prevalent posttraumatic stress disorder among emergency department personnel: rapid systematic review. Human Soc Sci Commun. 2020; 7(1): 89.

30. M. R. Prevalens tekanan dan penyebab tekanan kerja di kalangan jururawat terlatih hospital Kuala Lumpur [prevalence and causes of occupational stress among staff nurses in HKL] (Kuala Lumpur, Malaysia: National University of Malaysia; 1994.

31. Huang G, Chu H, Chen R, Liu D, Banda KJ, O'Brien AP, et al. Prevalence of depression, anxiety, and stress among first responders for medical emergencies during COVID-19 pandemic: a meta-analysis. J Glob Health. 2022; 12: 05028.

32. Nordin S, Yaacob NA, Kelak J, Ilyas AH, Daud A. The Mental Health of Malaysia's Northwest healthcare workers during the relaxation of COVID-19 restrictions and its associated Factors. Int J Environ Res Public Health. 2022; 19(13): 7794.

33. Chew NWS, Ngiam JN, Tan BY-Q, Tham S-M, Tan CY-S, Jing M, et al. Asian-Pacific perspective on the psychological well-being of healthcare workers during the evolution of the COVID-19 pandemic. BJPsych Open. 2020; 6(6): e116.

34. Sim SK, Lau BL, Zaila SR, Hazira N, Aniqah NM, Panicker J, et al. Psychological symptoms among healthcare workers handling COVID-19 patients. Med J Malaysia. 2021; 76(2): 138-44.

35. Salaton NF, Bulgiba A. depression, anxiety, and stress among frontline primary health care workers during the COVID-19 pandemic. Asia Pacif J Public Health. 2022; 34(4): 416-9.

36. Department of Statistics M. Household income and basic amenities survey report 2019 Putrajaya; 2020.

37. Nicol AM, Botterill JS. On-call work and health: a review. Environ Health. 2004; 3(1): 15.

38. Willis E, Lawn S, Roberts L, Couzner L, Mohammadi LM, Goble E. The impact of emergency call taking on the mental health and wellbeing of ambulance call-takers: a systematic thematic narrative of qualitative research. Austral J Paramed. 2020; 17: 1-11.

39. Patterson PD, Buysse DJ, Weaver MD, Callaway CW, Yealy DM. Recovery between work shifts among emergency medical services clinicians. Prehosp Emerg Care. 2015; 19(3): 365-75.

40. Thielmann B, Schnell J, Böckelmann I, Schumann H. Analysis of work related factors, behavior, well-being outcome, and job satisfaction of workers of emergency medical service: a systematic review. Int J Environ Res Public Health. 2022; 19(11): 6660.

41. Karlsson K, Nasic S, Lundberg L, Mårtensson J, Jonsson A. Health problems among Swedish ambulance personnel: long-term risks compared to other professions in Sweden - a longitudinal register study. Int J Occup Saf Ergon. 2022; 28(2): 1130–35.

42. Ronna BB, Thiese MS, Ott U, Effiong A, Murtaugh M, Kapellusch J, Garg A, Hegmann K. The association between cardiovascular disease risk factors and motor vehicle crashes among professional truck drivers. J Occup Environ Med. 2016; 58(8): 828–32.

43. Amro TM, Arcos González P, Montero Viñuales E, Castro Delgado R. Impact of COVID-19 pandemic on stress and burnout levels amongst emergency medical technicians: a cross-sectional study in Spain. Ann Med. 2022; 54(1): 3007–3016.

44. Pinalin P, Chaiyanun T, Sara A, Suchinda Jarupat M, Jutatip S. The stress level and stress related factors among ambulance drivers. Nurs J CMU 2021; 48(4): 2021.