

**THE PREVALENCE OF BURNOUT AND ITS  
ASSOCIATED FACTORS AMONG DOCTORS AND  
NURSES UNDER JOHOR BAHRU DISTRICT  
HEALTH OFFICE DURING COVID-19 PANDEMIC**

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DURING COVID-19 PANDEMIC**

**by**

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## LIST OF SYMBOLS

%	Percentage
=	Equal to
Z	Z score
$\Delta$	Precision of estimation
n	Number of subjects
m	Ratio between groups
$\alpha$	Alpha
$\beta$	Beta
$\geq$	Greater than or equal to
$\leq$	Less than and equal to
<	Less than
>	More than
&	And

## **LIST OF ABBREVIATIONS**

CBI	Copenhagen Burnout Inventory
CI	Confidence Interval
DHO	District Health Office
IHR	International Health Regulation
MBI	Maslach Burnout Inventory
MOH	Ministry of Health
OLBI	Oldenburg Burnout Inventory
OR	Odds ratio
PFA	Psychological First Aid
PPE	Personal protective equipment
WHO	World Health Organization

## ABSTRAK

### **PREVALEN DAN FAKTOR-FAKTOR YANG BERKAITAN LESU UPAYA (BURNOUT) DI KALANGAN DOKTOR DAN JURURAWAT PEJABAT KESIHATAN DAERAH JOHOR BAHRU SEMASA PANDEMIK COVID-19**

*Latar Belakang:* Lesu upaya telah muncul sebagai epidemik dalam kalangan golongan yang bekerja di seluruh dunia terutamanya dalam sektor penjagaan kesihatan. Sindrom pekerjaan ini telah menjadi semakin ketara dalam kalangan pekerja dalam sektor penjagaan kesihatan apabila pandemic COVID-19 melanda dunia dalam bentuk yang melangkaui jangkaan mana-mana pihak. Cabaran pandemik yang belum pernah terjadi ini telah memberi tekanan kepada sistem penjagaan kesihatan yang mana telah menjejaskan kesejahteraan para pekerja terutamanya dalam kalangan doktor dan jururawat memandangkan mereka membentuk sebahagian besar kakitangan penjagaan kesihatan. Walaubagaimanapun, masih terdapat kekurangan dapatan daripada hasil kajian yang melihat kepada beban lesu upaya dan faktor-faktor yang berkaitan dengannya dalam kalangan doctor dan jururawat atau mana-mana pekerja penjagaan kesihatan terutamanya mereka yang bekerja di bawah Pejabat Kesihatan Daerah yang merupakan tulang belakang kepada kesihatan awam dalam pengurusan pandemik.

*Objektif:* Kajian ini bertujuan untuk menentukan prevalen lesu upaya dalam kalangan doktor dan jururawat di bawah Pejabat Kesihatan Daerah Johor Bahru semasa pandemic COVID-19 dan juga faktor-faktor yang berkaitan termasuklah daripada aspek sosiodemografik, kriteria pekerjaan, dan faktor gaya hidup.

**Metodologi:** Ini adalah kajian hirisan lintang yang telah dijalankan bermula pada bulan Januari 2021 sehingga Mei 2021. Pengumpulan data dibuat menggunakan borang soal selidik yang diisi sendiri oleh responden dan kemudiannya dianalisa secara diskriptif bagi mengira prevalen lesu upaya dalam kalangan mereka. Kemudian, Regresi Logistic Berganda telah digunakan untuk menentukan faktor-faktor yang berkaitan dengan lesu upaya,

**Keputusan:** Kadar respon dalam kajian ini adalah sebanyak 95.3 % yang mana seramai 346 responden telah diambilkira. Sejumlah 74 (21.4 %) orang daripada mereka mengalami lesu upaya. Sebanyak 47.7 % doktor mengalami lesu upaya manakala hampir kurang daripada 10.0 % jururawat melaporkan lesu upaya. Umur purata responden adalah 35.42 dan majoriti adalah perempuan (97.1%), berbangsa Melayu (78.9 %), sudah berkahwin (82.7 %), mempunyai anak (73.7 %) dan bekerja sebagai jururawat. Faktor-faktor yang berkaitan dengan lesu upaya (burnout) adalah umur (Adjusted OR 0.94, 95 % CI 0.89, 0.99), kategori pekerjaan (Adjusted OR 10.26, 95 % CI 5.50, 19.16) dan tempoh jam tidur dalam sehari (Adjusted OR 0.61, 95% CI 0.44, 0.85).

**Kesimpulan:** Prevalen lesu upaya (*burnout*) di kalangan doktor dan jururawat di bawah Pejabat Kesihatan Daerah Johor Bahru semasa pandemic COVID-19 adalah agak merisaukan. Golongan ini perlu disasarkan untuk mengelakkan sebarang kemerosotan kepada kesejahteraan pekerjaan mereka yang akan menjejaskan penyampaian perkhidmatan penjagaan kesihatan dan akhirnya kepada usaha dalam mengekang pandemic ini. Intervensi pada masa akan datang perlu difokuskan kepada kumpulan muda, doktor dan mereka yang mengalami kekurangan tidur.

## ABSTRACT

### THE PREVALENCE OF BURNOUT AND ITS ASSOCIATED FACTORS AMONG DOCTORS AND NURSES UNDER JOHOR BAHRU DISTRICT HEALTH OFFICE DURING COVID-19 PANDEMIK

**Background:** Burnout has emerged as an epidemic in working population worldwide especially in the healthcare sector. This occupational syndrome has become more significant among healthcare workers as the pandemic of COVID-19 hit the world in a way that no one could ever imagine. The unprecedented challenges of this pandemic have put a lot of strain on the healthcare system compromising the well-being of our healthcare workers especially doctors and nurses as they constitute the largest part of healthcare workforce. However, there were still a paucity of evidence that looked into the burden of burnout and its associated factors among doctors and nurses or other healthcare workers in general particularly among those who worked under District Health Office, which is a backbone of public health in managing the pandemic.

**Objectives:** This study aims to determine the prevalence of burnout among the doctors and nurses under Johor Bahru District Health Office during COVID-19 pandemic as well as its associated factors which include sociodemographic factors, employment characteristics and lifestyle factors.

**Methodology:** This is a cross-sectional study conducted from January 2021 until May 2021. Data was collected using self-administered questionnaire which then analysed descriptively to calculate the prevalence of burnout among the study population.



Subsequently, multiple logistic regression was applied to determine the factor associated with burnout.

**Result:** A response rate of this study is 95.3 % where 346 respondents were included. A total of 74 (21.4 %) of them developed burnout. 47.7 % of doctors reported burnout whereas slightly below 10.0 % of nurses report similar outcome. The mean age of respondents was 35.42 and majority were female (97.1 %), Malays (78.9 %), married (82.7 %), being blessed with children (73.7 %), and worked as nurse (68.5 %). Factors that associated with burnout were age (Adjusted OR 0.94, 95 % CI 0.89, 0.99), job category (Adjusted OR 10.26, 95 % CI 5.50, 19.16) and average hours of sleep per day (Adjusted OR 0.61, 95% CI 0.44, 0.85).

**Conclusion:** The prevalence of burnout among doctors and nurses under Johor Bahru District Health Office during COVID-19 is quite worrying. These population should be targeted to avoid further deterioration of their occupational well-being which can compromise the healthcare services delivery and ultimately the effort to curb the pandemic. Future intervention should focus on younger age, doctors, and those with lack of sleep.

**Keywords :** burnout, doctors, nurses, healthcare worker, COVID-19

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

#### 1.1.1 Burnout and health care workers

The World Health Organization (WHO) in 2019 included burnout in the International Classification of Diseases (ICD) 11. The newly revised version highlighted that burnout is no longer a medical condition, instead it is now regarded as an occupational phenomenon or syndrome that resulted from chronic workplace stress that has not been successfully managed (WHO, 2019). It is further characterised by three elements - emotional exhaustion, depersonalization which often described as feeling of mental distance or disengagement toward one's job and the third element is reduced professional productivity or efficiency (Maslach & Leiter, 2016). Looking backward, burnout was initially conceptualized in 1970s by Herbert Freudenberger, a German born American psychologist. The concept was then expanded by Maslach and friend into six domain-workload, control, reward, community, fairness and value followed by the development of multidimension of burnout inventory called Maslach Burnout Inventory (MBI) which allow for the evaluation and quantification of burnout (Vinnikov *et al.*, 2019).

Several other scales are also available to measure burnout such as Copenhagen Burnout Inventory (CBI). CBI is free and consists of a single dimension which only explore the element of exhaustion but is further divided into three aspects – personal, work and client related burnout. Another alternative method is Oldenburg Burnout Inventory (OLBI) which is also free to use and cover two dimensions of burnout which

are depersonalization and exhaustion. A more expanded version of exhaustion has been explored in OLBI which include physical and cognitive aspects.

Due to availability of various measurement of burnout, it has facilitated public health provider to determine the burden of burnout. Burnout has emerged as an epidemic in working population which imposed a huge impact not only towards one's personal life but also to the organization they belong to as well as to the service delivery. In healthcare sector, due to its constantly changing environment, amalgamated by highly demanding and stressful working condition making the healthcare worker more vulnerable to burnout as compared to general population (Portoghese *et al.*, 2014). From economic perspective, it was reported that, alarmingly, the yearly cost spent on the management of burnout has surpassed \$300 billion globally (Bretland & Thorsteinsson, 2015). This is partly contributed by absenteeism, desire to resign from work, self-decline, worsening of family situation, and having discernment of oneself making medical error as shown in a study conducted among healthcare professional in Spain (Suñer-Soler *et al.*, 2014). In United States, approximately one in seven clinicians had considered suicide where more than 400 of them had actually committed suicide each year (Stehman *et al.*, 2019). Several studies have indicated that, among healthcare worker, doctors and nurses appear to suffer burnout more than their colleagues (Siau *et al.*, 2018; Leszczyński *et al.*, 2019; Moukarzel *et al.*, 2019)

### **1.1.2 COVID-19 pandemic and healthcare workers**

Coronavirus disease 2019 which is widely known as COVID-19 is an infectious disease attributed to a novel coronavirus known as severe acute respiratory syndrome coronavirus two (SARS-CoV-2). It belongs to the same group of viruses that

responsible for the outbreak of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome coronavirus (MERS-CoV) in 2002 and 2013 respectively. It was initially known as 2019-nCoV, following the discovery of an outbreak of respiratory illness among people in City of Wuhan, one of the province in China. Not until the end of December 2019, the outbreak was formally reported to the WHO and approximately one month after that, following the second meeting of International Health Regulation (IHR) Emergency Committee, COVID-19 had been declared as a public health emergencies of international concern (PHEIC) considering its extraordinary potential as a public health risk across the continents (WHO, 2020b). In Malaysia, there was no exception; the 25th January 2020 marked the emergence of the first wave of COVID-19 outbreak when four Chinese citizens who were initially identified as close contact to a positive case in Singapore, enter Malaysia through Bangunan Sultan Iskandar (BSI), in Johor were also tested positive. Up until now (as of 9<sup>th</sup> June 2021), there were a total of 633,891 confirmed cases reported to Malaysia Crisis Preparedness and Response Centre (CPRC) with mortality rate of 0.57 (Ministry of Health Malaysia, 2021)

During pandemic, burnout become more significant among healthcare worker especially doctors and nurses as they constitute the largest part of workforce. This workplace syndrome stemmed from disparity between resources and demand, coupled with increasing social tension (Devi, 2020; Emanuel *et al.*, 2020) and is further complicated by heavy workload, rapidly evolving guidelines, redeployment of staff into new or high risk setting and worrying on possibility of bringing infection back to family members or friends at home (Tan *et al.*, 2020). The unprecedented challenges of COVID-19 pandemic revealed several gaps in our public health system (WHO, 2020a). IHR 2005, on the other hand highlighted the importance of having a robust

public health system and measure for countries' preparedness by reinforcing the border control in addition to strengthening the core capacities in surveillance and response (WHO, 2007). However, the integral part of this robustness is to ensure the well-being of the healthcare workers (Cuff & Forstag, 2019).

In order to achieve this, in Malaysia, District Health Office (DHO) plays a critical role at the ground level to close the gap in the public health system by executing strategies outlined by MOH according to the requirement and recommendation by IHR 2005. DHO also serves as an umbrella for the primary health care services; a collaborative partnership between primary care and public health providers (Ramli *et al.*, 2019). The main activities in managing COVID-19 coordinated by DHO are screening at point of entry (POE), active and passive cases detection, making referral to the hospital, contact tracing, sampling, testing, managing quarantine station, home surveillance, activation of operational room, infection control, vaccination as well as involvement in interagency collaboration.

## **1.2 Problem statement & Study rationale**

The first wave of COVID-19 outbreak in Malaysia started as early as 25<sup>th</sup> January 2020 and as of the 9<sup>th</sup> June 2021, there were total of 633, 891 confirmed cases reported to the CPRC with mortality rate of 0.57 % (MOH, 2021). The ongoing and continuous spread of COVID-19 has presenting a ripe breeding ground for developing burnout among our healthcare workers. As discussed earlier, if burnout is failed to be recognized and addressed, it will cause a detrimental effect to the whole healthcare system, from the staffs to patients and ultimately compromise the overall services and organization.

Internationally, the studies on burnout among doctors and nurses or even healthcare worker in general during COVID-19 pandemic are fairly well conducted especially in the hospital setting. However, to the best of author's knowledge at this point of time, in Malaysia, there remains a relative paucity of evidence on the prevalence of burnout and its associated factor among doctors or/and nurses during COVID-19 pandemic. Therefore, the lack of recent local evidence reinforces the urgent need to conduct the study to look into and utilize findings on the prevalence and factors associated with burnout especially among those working outside the hospital setting such as in primary health care and public health services.

Moving forward, this study will be able to determine the baseline prevalence of burnout among doctors and nurses under Johor Bahru DHO during pandemic. The establishment of factors associated with it from sociodemographic, employment and lifestyle aspect can contribute towards better planning and implementation of preventative measure in the current event and future pandemic.

This study only focus on doctors and nurses as they constitute the largest proportion of total staffs under Johor Bahru DHO. However, researcher did acknowledged the workload and burden facing by other healthcare workers especially during COVID-19 pandemic such as Assistant Environmental and Health Officer (AEHO), Assistant Medical Officer (AMO), pharmacists, laboratory technologists. Therefore, findings from this study will hopefully further justify the need for research involving more healthcare workers from various job category.

### **1.3 Research Questions**

1. What is the prevalence of burnout among doctors and nurses under Johor Bahru DHO during COVID -19 pandemic?
2. What are the factors associated with burnout among doctors and nurses under Johor Bahru DHO during COVID-19 pandemic?

### **1.4 Research Objective**

Research objectives for this study were divided into general and specific objectives.

#### **1.4.1 General objective**

To study the prevalence of burnout and its associated factor among doctors and nurses under Johor Bahru DHO during COVID-19 pandemic?

#### **1.4.2 Specific objectives**

1. To determine the prevalence of burnout doctors and nurses under Johor Bahru DHO during COVID-19 pandemic.
2. To determine associated factors of burnout among doctors and nurses under Johor Bahru DHO during COVID-19 pandemic.

### **1.5 Research Hypothesis**

Burnout is associated with sociodemographic and employment characteristics as well as lifestyle factors of doctors and nurses under Johor Bahru DHO during COVID -19 pandemic.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Epidemiology of burnout

The study on prevalence has been encouraged since decades ago as it is beneficial to inform not only the researchers but also stakeholders who involve in guidelines and policy making therefore facilitate the identification of priorities in healthcare through health economic modelling and assessment of possible interventions (Harder, 2014).

The prevalence of burnout among healthcare workers varies across countries depending on the setting, profession and its location. In a hospital based study conducted during COVID- 19 pandemic, the prevalence of burnout among healthcare workers ranging from 26.1% to 55.3% (Azoulay *et al.*, 2020; Khalafallah *et al.*, 2020; Matsuo *et al.*, 2020; Dobson *et al.*, 2021; Tsan *et al.*, 2021). For example, a study done in one tertiary hospital in Tokyo in April 2020 had found that 31.4 % of its healthcare workers from various departments who were involved in managing COVID-19 cases suffered from burnout (Matsuo *et al.*, 2020). This finding was quiet similar to the study conducted in major tertiary hospitals in Melbourne, Australia between April 2020 and May 2020 . About one third of total respondents which include medical doctor, nurses, allied health and non-clinical staff developed burnout (Dobson *et al.*, 2021).

In different setting, the prevalence of burnout among primary healthcare workers in the western region of Iran was 52.9 % where doctors were found to be two times more likely to develop burnout (Zarei *et al.*, 2019). Among general practitioners (GP) in Huabei Province, China, the prevalence of burnout was at a very lower side which was 2.46 % only. Both studies were conducted prior to COVID-19 pandemic.



There are limited studies of burnout can be found among healthcare workers in Malaysia especially during COVID-19. One study looking at the prevalence of burnout among clinicians in anaesthesia department in Malaysia during COVID-19 pandemic which showed 55.3 % of them had burnout (Tsan *et al.*, 2021). Similar findings can be observed in a study conducted among healthcare workers in emergency department in teaching hospital in Malaysia where burnout was identified in 51.3 % of total respondents (Zakaria *et al.*, 2021). Another recently published study with larger population targeted all healthcare workers in Malaysia had found that more than half of them developed burnout in which pharmacists, doctors, nurses, assistance medical officer, health inspectors, medical laboratory technologists and radiographers were among those with higher prevalence of burnout in at least two sections of CBI (Roslan *et al.*, 2021). The same study also compared the prevalence of burnout according to work setting where they found healthcare workers under the purview of DHO had the highest prevalence (63.5 %) of burnout followed by private clinic (60.0 %), medical laboratories (56.4 %), health clinics (54.5 %) and hospital (52.4 %).

## **2.2 Factors associated with burnout**

Apart from the prevalence of burnout, many studies worldwide had concurrently investigated its associated factors as these findings could contribute towards informing decision making to prevent burnout as well as to improve the well-being of those who suffered from it by identifying leverage points that could be worked upon so that appropriate control measures could be instituted.

### 2.2.1 Sociodemographic factors

Sociodemographic factors of healthcare workers such as age, gender, marital status and number of children have been found in previous studies to be associated with burnout. Younger age was shown to be more likely to develop burnout as compared to older age in various studies, both locally and internationally. In an online study using CBI, conducted during COVID-19 pandemic among healthcare workers in Malaysia, after adjusted for several other factors, those with age below 40 years old were more likely to develop personal burnout with odds ratio (OR) of 1.55 (95 % confidence interval (CI) 1.05, 2.27) while for patient-related burnout the OR reported was 1.86 (95 % CI 1.03, 3.39) (Roslan *et al.*, 2021).

Studies conducted elsewhere also consistent with these association between age and burnout. In Spain, in a cross sectional study among healthcare professionals who were actively involved in COVID-19 pandemic, age between 51 to 60 years old were 43.0 % less likely to develop burnout as compared to those aged between 20-30 years old (95% CI 0.34, 0.94) (Torrente *et al.*, 2021). Similar finding can be found in a global online survey among intensivists of European Society of Intensive Care Medicine (ESICM) facing the COVID-19 outbreak (HR 0.98/year [0.97-0.99]) (Azoulay *et al.*, 2020).

Looking backward prior to COVID-19 pandemic, several studies also demonstrated similar findings with regards to association between age and burnout. In a study conducted in Erzurum, Turkey using MBI, doctors in primary health care aged 29 years old or less were found to have a higher risk of depersonalization and lower professional efficacy (OR 2.28, 95% CI 1.52, 4.92) as compared to those aged 40 years old and over (Aras *et al.*, 2018). In Poland, after controlling for

sociodemographic and occupational factors, with every one year increases in age, the risk of burnout among healthcare workers in Emergency department decreased accordingly (OR 0.49, 95% CI -0.78, -0.21) (Leszczyński *et al.*, 2019).

Potential association between gender and burnout had been previously research both during and prior to the COVID-19 pandemic. Regardless of differences in timeline, the findings were similar in some of international studies. A study in China conducted during COVID-19 pandemic among doctors, nurses and medical technicians demonstrated that there was a significant association between gender and burnout (Huo *et al.*, 2021). Another study conducted in Spain showed that female have almost two times higher odd to develop burnout compared to their male counterpart (OR 1.50 95% CI 1.04, 2.15) (Torrente *et al.*, 2021). In contrast, several studies elsewhere were either indicated that male gender was associated with burnout or there was no significant difference between gender with regards to the risk of burnout. A research carried out among emergency physician and nurses in Aseer Region, Saudi Arabia had found that male healthcare professionals were three time more likely to suffer from burnout, with OR of 2.76 and 95% CI between 1.06, 7.33 (Alqahtani *et al.*, 2019). Similar findings could be found in a study among doctors in the primary healthcare in Turkey where male doctors had a higher odds of becoming depersonalized which was one of component in burnout as compared to female (OR 2.20 95% CI 1.03, 4.66) (Aras *et al.*, 2018). However, both studies were conducted prior to COVID-19 pandemic. On the other hand, some local studies conducted prior to pandemic showed that there was no association between gender and burnout's risk (Siau *et al.*, 2018; Siti Hajar R & Huda BZ, 2018).

In term of ethnicity, most of our reviewed studies appeared to show that there were no association with the risk of developing burnout which include a cross-sectional multicentre study among doctors in Malaysian public hospital which explore the component of emotional exhaustion of burnout (Khoo *et al.*, 2017). Another local study that showed similar finding was a research conducted among nurses in tertiary hospital (Siti Hajar R & Huda BZ, 2018). Both of these studies conducted prior to COVID-19 pandemic. Despite this, in our study, we are still interested to investigate the association between gender and burnout to see whether pandemic has any influence on ethnicity in relation to the risk of burnout.

The risk of burnout for healthcare workers of different marital status had been explored by some local and international studies in the past both during and prior to COVID-19 pandemic. In an embedded mixed-method study among Malaysian healthcare workers showed that being single was associated with a higher odds of developing burnout, after adjusted for other factors in all three dimension of burnout in CBI which are personal, work and patient related burnout with the adjusted OR of 1.3 (95% CI 0.98, 1.75), 1.55 (95% CI 1.16, 2.06) and 1.60 ( 95% CI 1.12, 2.29) respectively (Roslan *et al.*, 2021). Similar findings could be observed in an international study conducted prior to the pandemic among healthcare workers who cared for patients with prolonged disorder of consciousness in China which revealed that being married was associated with lower risk of burnout compared to unmarried healthcare workers (Wang *et al.*, 2020). Another study that provided a consistent finding with aforementioned studies was a study by Zarei and friends in Iran which highlighted that single primary healthcare worker was three times more likely to develop burnout (OR 3.33, *p*-value 0.001) (Zarei *et al.*, 2019). Nevertheless, there were also considerable number of studies which reported no differences in term of marital

status with risk of burnout (Aras *et al.*, 2018; Siau *et al.*, 2018; Abu Zied *et al.*, 2020; Dinibutun SR, 2020; Huo *et al.*, 2021).

Association between risk of burnout and number of children cared by healthcare workers had also been researched upon by previously published studies. Local study that utilized CBI to measure burnout among Malaysia healthcare workers from all different work settings had found that having no children was significantly associated with all dimension of burnout illustrated in CBI even after adjusted for other demographic characteristics – adjusted OR 1.31 (95% CI 1.12, 1.93), 1.59 (95% CI 1.21, 2.10) and 1.76 (95% CI 1.24, 2.49) for personal, work and patient- related burnout respectively (Roslan *et al.*, 2021). A study conducted in Bangladesh prior to COVID-19 was also consistent with these findings where having more children was associated with 37.0 % and 1.0 % less likely to developed burnout among nurses and doctors respectively (Faruq *et al.*, 2020).

### **2.2.2 Employment characteristics**

Potential association between job category and risk of burnout had been explored previously by several studies. During COVID-19 pandemic, a study conducted in a tertiary hospital in Tokyo, doctors were found to have a lower risk of developing burnout when compared to other profession such as nurses (OR 4.9, 95% CI 2.2, 11.2), medical laboratories technologist (OR 6.1, 95% CI 2.0, 18.5), radiological technologist (OR 16.4, 95% CI 4.3, 61.6) and pharmacist (OR 4.9, 95% CI 1.3, 19.2) (Matsuo *et al.*, 2020). Similar association could be observed in a study in China, where nurses were also found to have a higher odds (OR 2.14, 95 % CI 1.12, 4.10) of developing burnout compared to doctors (Huo *et al.*, 2021). Conversely, a study in Spain had found that being a physician was associated with higher risk of burnout even after

controlling for other factors (OR 1.64, 95% CI 1.11, 2.41) (Torrente *et al.*, 2021). Similar findings but conducted prior to the pandemic had found that physician had 1.72 times higher odds of developing burnout compared to other healthcare workers (Zarei *et al.*, 2019).

With regard to working experience, in some studies, less experience workers were more likely to suffer burnout when comparing to the more experience ones. For examples, in study conducted in Tokyo as mentioned earlier, more experience had an odds of 0.93 ( 95% CI of 0.89, 0.97) of having burnout (Matsuo *et al.*, 2020). Significant association between years of experience and risk of burnout had also been demonstrated in a study conducted in Saudi Arabia (Alsulimani *et al.*, 2021). In a study carried out in Spain, healthcare workers with more than 15 years-experience were found to have 0.62 chances of developing burnout (95 % CI 0.41, 0.94) (Torrente *et al.*, 2021). Healthcare workers in neurorehabilitation centre in China with less than five years working experience were also found to be associated with high risk of burnout (Wang *et al.*, 2020).

In term of association between duration of working hours and risk of burnout, most of the studies conducted during COVID-19 pandemic had demonstrated a positive association between these variables. For example, Huo *et al.*, in 2021 had found that healthcare workers with longer working hours have 1.35 times higher odd of having burnout (95 % CI 1.03, 1.77) compared to their counterparts (Huo *et al.*, 2021). Similarly, a study conducted among internists during pandemic in Spain also revealed that those who were continuously working over 24 hours shifts were at higher risk of burnout ( HR 1.61, 95% CI 1.09, 2.38) (MacÍa-Rodríguez *et al.*, 2021). A cross

sectional study in Saudi Arabia during similar timelines also found consistent finding with studies that previously described (Alsulimani *et al.*, 2021).

Existing literatures worldwide had also investigated the association between risk of burnout and availability of day-off or vacation among healthcare workers. A study in China that attempted to measure the risk of burnout among doctors and nurses in ICU department had indicated that having paid vacation was protective against risk of burnout (Hu *et al.*, 2021). Similar findings demonstrated in a study in Spain which showed healthcare workers with no holidays in the last six months had 1.36 times higher odds of developing burnout (95% CI 1.01, 1.84) (Torrente *et al.*, 2021).

Despite the paucity of evidences that highlighted an association between receiving psychological first aid (PFA) and the risk of burnout, many international organization and literatures still recommended the utilization of these supportive intervention to healthcare workers during pandemic as it provided them with a sense of control and safety by being able to help themselves fostering a short and long term adaptive mechanism in managing the unprecedented challenges of pandemic (World Health Organization, 2011). Furthermore, due to its simplicity, efficiency and readily adaptable (Gispen & Wu, 2018), PFA was believed to facilitate resilience among healthcare workers which was a critical component in reducing burnout (Savage *et al.*, 2008). In a rapid review and meta-analysis that exploring psychological effect of emerging outbreak experienced by healthcare professionals in term of its occurrence, prevention and management, about 14 literatures highlighted the importance of psychological intervention such as PFA (Kisely *et al.*, 2020).

### 2.2.3 Lifestyle factors

An association between burnout and lifestyle factors of healthcare worker had been explored by several studies in the past. Looking into duration of sleep and risk of burnout, a study conducted in tertiary hospital in Tokyo, Japan indicated that decreased sleep among healthcare workers was found to be associated with burnout by OR of 2.0 (95% CI: 1.1, 3.6) (Matsuo *et al.*, 2020). Among doctors or nurses in emergency department in Saudi Arabia who suffered from sleep disorder and require to take sleeping pills were associated with higher risk of burnout (Alqahtani *et al.*, 2019). Another study conducted in Saudi Arabia during COVID-19 pandemic also showed a significant association between average hours of sleep and risk of burnout (Alsulimani *et al.*, 2021). Prior to COVID-19 pandemic, a study comparing the risk of burnout between doctors and nurses revealed that longer sleeping hours was a protective factor against burnout among doctors (adjusted OR 0.71, 95% CI: 0.51, 0.89) but no association noted for nurses (Faruq *et al.*, 2020).

Previous studies also investigated for a potential association between risk of burnout with exercise and smoking habit although the literatures were still limited. In a study that looked specifically on burnout among ICU doctors and nurses in China, exercise was found to have a protective effect against burnout if it was practiced at least once a week (OR 0.66, 95% CI 0.45, 0.95) (Hu *et al.*, 2021). Physical activity was found to be associated with burnout in a study among primary healthcare nurses in Brazil (Das Mercedes *et al.*, 2020). In contrast, no association was established between exercise and smoking in relation to burnout in study conducted in Kazakhstan among cardiologists and surgical residents in Kuwait (Vinnikov *et al.*, 2019; Burhamah *et al.*, 2021). Similar finding that showed no significant association between burnout and



smoking could be observed in a study carried out in Bangladesh (Faruq *et al.*, 2020). However, a study conducted among Turkish urologist had found that smoking was significantly associated with higher score of emotional exhaustion and depersonalization of MBI ( $p < 0.03$ ) (Bolat *et al.*, 2019). This is consistent with the finding on a study conducted in Brazil among nurses in primary health care services which showed smoking was associated with burnout (PR = 1.82, 95% CI 1.35, 2.45) (Das Mercedes *et al.*, 2020)

#### **2.2.4 Other psychological conditions**

Several studies worldwide had explored the association between other psychological disorder such as depression, anxiety as well as job satisfaction with burnout among healthcare worker prior and during pandemic. For example, a study conducted among healthcare workers in four public health hospital in Singapore during COVID-19 pandemic had found that those with HADs anxiety or depression score equal or more than eight were significantly associated with higher score of burnout, evaluated using OLBI (Tan *et al.*, 2020). This findings was similar to a study conducted in China among frontline medical staffs that showed a positive correlation coefficient between each subscale of MBI and score of depressive symptoms using Patient Health Questionnaire (PHQ-9) (Huo *et al.*, 2021). In another study conducted among physician and nurses in anaesthesiology and resuscitation department in Russia revealed that depression, personal and situational anxiety had a positive correlation with burnout (Sinbukhova, Lubnin & Popugayev, 2019). In term of job satisfaction, a negative correlation between work satisfaction and burnout had been established in a study conducted in Turkey among family physician (Yilmaz, 2018).

#### **2.3 Conceptual framework**

Component of the framework was constructed from evidence and findings in existing literatures. The dependent variable is burnout. The independent variables that will be studied are sociodemographic, employment characteristics and lifestyle factors. Sociodemographic characteristics include: age, gender, ethnicity, marital status and number of children. Employment characteristic are as follow: job category, working experience, working hours, days-off per week and experience in receiving any PFA.

Lifestyle factors that will be studied are average hours of sleep per day, regular exercise and smoking. Apart from that, no previous literatures investigated the association between number of job task related to COVID-19 management and burnout but it will be included in this study.

Due to limited time and resources, several components will not be studied which include association between burnout with other psychological conditions such as stress, depression, and anxiety disorder as well as the level of job satisfaction.

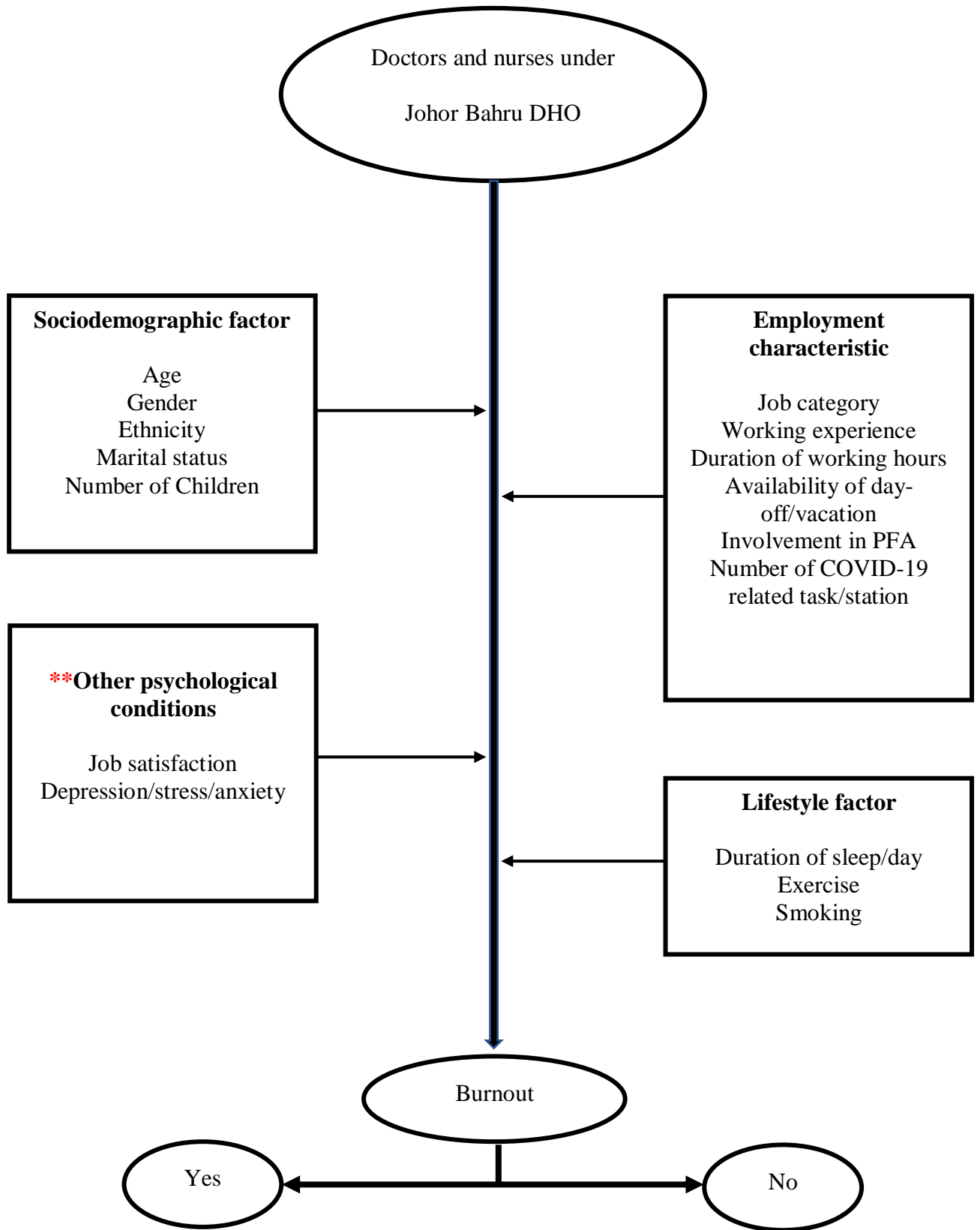


Figure 2. 1 : Conceptual framework of the study.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Research design**

Cross-sectional study

#### **3.2 Study area**

This study was conducted at District of Johor Bahru, in the state of Johor. Johor Bahru DHO, one of the busiest DHO in Malaysia manages the health of 42.5% people of Johor which is approximately 1.6 million population (DOSM, 2021). Under its jurisdiction and administration, there are 16 health clinics and nine international point of entry (POE) which consist of three ports, three ground crossings and three ferry terminals. Only one ferry terminal and one ground crossing (train station) were not operated since Movement Control Order (MCO), while other POE maintained its service as usual until now but some with shorter operating hours. The first five cases of COVID-19 in Malaysia were detected in Johor Bahru. Four of them arrived in Malaysia via Custom, Immigration and Quarantine (CIQ) checkpoint of Bangunan Sultan Iskandar (BSI) and one through Kompleks Sultan Abu Bakar (KSAB) which connect Johor Bahru to Singapore. Until 9<sup>th</sup> June 2021, a total of 62, 822 positive cases were registered in Johor where 29, 009 ( 46.2 %) of the cases were detected in Johor Bahru (MOH, 2021). There were 35 quarantines station (QS) opened in Johor Bahru between April until June 2020 and currently there are 10 QS remain operated for Person under Surveillance (PUS) (NADMA, 2021). Travellers under Periodic Commuting Arrangement (PCA) scheme can only enter Malaysia through Johor Bahru's ground crossings (Ministry of Foreign Affair, 2020).

There were 215 doctors and 511 nurses registered under Johor Bahru DHO when this study was conducted. Throughout the pandemic, other than their usual work station (health clinic or DHO) both doctors and nurses were also deployed and rotated among themselves to either POEs, transit station, quarantine station, vaccination centre, one stop covid assessment centre (OSCAC), COVID 19 operational room, or become part of sampling team, infection control team, or home surveillance team. Most of these new tasks operated even after usual working hours. As a result, increased in job demands has led to increase in number of hours of work. There was no doctors or nurses who work according to shift hours, however, for the extra hours they work after their usual working hours were considered as over time (OT).

### **3.3 Reference population**

All doctors and nurses under Johor Bahru DHO

### **3.4 Source population / sampling pool**

Doctors and nurses who are still working under Johor Bahru DHO

### **3.5 Study duration**

January 2021- May 2021

### **3.6 Sampling frame**

The list of doctors and nurses of Johor Bahru DHO who fulfilled the inclusion criteria.

### **3.7 Subject criteria**

#### **3.7.1 Inclusion criteria**

Doctors or nurses who are still working under Johor Bahru DHO and at least for the last 6 months (from the day of data collection).

### **3.7.2 Exclusion criteria**

Doctors or nurses with underlying psychiatric illness (will be determined from self-administered questionnaire)

### 3.8 Sample size estimation

**Objective 1:** To determine the prevalence of burnout among doctors and nurses under Johor Bahru DHO during COVID-19 pandemic.

Sample size was calculated using a single proportion formula;

$$n = ( z / \Delta )^2 p ( 1 - p )$$

Table 3.1 : Value of the prevalence of burnout among healthcare worker.

<b>z</b>	<b>Δ</b>	<b>p</b>	<b>n</b>	<b>n +10 %</b>	<b>Literature review</b>
1.96	0.05	31.4 %	330	<b>363</b>	Matsuo T <i>et al.</i> , 2020
1.96	0.05	29.5 %	319	351	Dobson H <i>et al.</i> , 2020.



**Objective 2:** To determine the associated factors of burnout among doctors and nurses under Johor Bahru DHO during COVID-19 pandemic.

Sample size was calculated using comparison of two independent proportions formula in PS Software Version 3.1.2

Table 3.2 : Value of prevalence of burnout according to factors

Variable	P <sub>0</sub>	P <sub>1</sub>	m	n	n x 2 + 10 %	Literature review
<b>Work experience ( ≤ 10 years)</b>	0.32	0.5	1	116	255	Zarei E <i>et al.</i> , 2019
<b>Gender (female)</b>	0.67	0.5	1	131	288	Matsuo T <i>et al.</i> , 2020
<b>Marital status (single)</b>	0.25	0.4	2	152	336	Siti Hajar R & Huda BZ, 2018
<b>Profession (nurse)</b>	0.44	0.6	1	152	334	Siau <i>et al.</i> , 2018

Power = 0.8     $\alpha = 0.05$     m = ratio between groups    n = number of subjects

P<sub>0</sub> = Proportion of risk factor among those without burnout from Literature review

P<sub>1</sub> = Estimated of proportion of risk factor among those with burnout

Therefore, by taking into account calculated sample size from objective 1 and 2, the sample size required for this study is **363**