



RESEARCH ARTICLE

COVID-19 pandemic: determinants of workplace preventive practice among primary healthcare workers in Sabah, Malaysia

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Keywords

COVID-19 pandemic • Burnout • Preventive practice • Primary healthcare workers • Sabah • Malaysia

Summary

Introduction. COVID-19 pandemic has placed the entire world, including Malaysia in a state of fear. The rising burden on healthcare facilities has put healthcare workers consistently at risk of healthcare-associated infection. We sought to identify determinants of preventive practice against COVID-19 at work among primary healthcare professionals in Sabah, Malaysia.

Method. This was a cross-sectional study involving healthcare workers of the Penampang and Putatan districts of Sabah, Malaysia. A total of 167 health professionals from primary healthcare settings took part in this study via a self-administered questionnaire from November 2020 until January 2021. Independent t-test and Analysis of Variance were used to determine differences in preventive practice for categorical independent variables. Pearson product-moment correlation was applied to assess the relationship between Job Satisfaction, burnout, and preventive practice. Subsequently, predictors of preventive practice at work

among healthcare workers in Sabah were identified through Binomial Logistic Regression.

Results. The prevalence of good preventive practice among health professionals at work was 71.3%. There was no difference in preventive practice between professions. Almost all participants reported having good personal protective equipment compliance and hand hygiene practice at work. Marital status (AOR = 4.170, 95% CI = 1.787, 9.733; $p = 0.001$), average sleep hours (AOR = 1.775, 95% CI = 1.144, 2.754; $p = 0.01$), and pandemic-related burnout (AOR = 0.905, 95% CI = 0.847, 0.967; $p = 0.003$) were identified as significant predictors of preventive practice at primary healthcare facilities.

Conclusions. The outcome of this study is beneficial to the healthcare organization. It can serve as a useful guide to tackle issues related to poor preventive practice against COVID-19 at work for health professionals.

Introduction

The COVID-19 pandemic has caused great pressure on healthcare systems globally. Malaysia was experiencing a surge of cases with the state of Sabah reported a total of 51,115 cases (until 12th February 2021) since the first reported case in Malaysia on 4th February 2020 [1]. From 1st September 2020 until 31st January 2021, the districts of Penampang and Putatan reported a total of 2848 and 1528 COVID-19 cases respectively. Healthcare workers or more familiarly known as the *frontliners* are expected to adhere to strict safety and health guidelines in their daily tasks. Healthcare workers involved in the preventive, control, and treatment of COVID-19 are at risk of infecting themselves and others by inhaling droplets from sick patients and contact with contaminated surfaces [2]. When it comes to activities related to the management of COVID-19, the health and safety of the health workforce should take precedence. The Ministry of Health has provided guidelines on infection prevention and control (IPC) to lessen the risk of disease transmission. IPC guidelines include the proper usage of personal protective equipment (PPE) like face masks, face shields, gowns, gloves, and more stringent sanitization routines [3].

Failure to comply with the standard practice of occupational safety and health will put healthcare workers at great risk of getting Healthcare-Associated Infection (HAI) such as COVID-19, Middle East Respiratory Syndrome-Coronavirus, and tuberculosis [4]. On 18th December 2020, the Ministry of Health reported a total of 1771 healthcare workers were infected with COVID-19 [5]. Even though not all were attributed to nosocomial infection, the health setting is undeniably the most hazardous environment for every healthcare worker. Studies elsewhere have shown there are intrinsic and extrinsic factors that could jeopardize the practice of occupational safety and health in healthcare settings [6, 7]. Among the most significant factors is occupational burnout. Burnout is defined as a state of physical, emotional, and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding [8]. In the past two decades, the world has witnessed several deadly viral outbreaks (SARS, MERS-CoV, Ebola) and their impact on the health workforce of the affected countries [9]. A study conducted in South Korea during the MERS-CoV outbreak in 2015 reported the presence of burnout among Emergency Department Nurses which were influenced by both exogenous and endogenous factors [10]. Regardless of the reason, if left unaddressed, it will affect the wellbeing of both the health workforce and the

organization. To date, there is no research to study the determinants of good compliance on preventive practice among the health workforce in the state of Sabah, in both primary healthcare and hospital settings.

International borders were closed with movement restrictions on state and district borders has affected healthcare workers and their families as well, causing excessive negative psychological effects [11]. Case overload could threaten the well-being of our health workforce. In this scenario, understanding factors that could influence healthcare workers' compliance towards the preventive practice of COVID-19 at work is vital to provide the necessary interventions. Therefore, the main objective of this study is to identify the determinants of preventive practice at work among primary healthcare workers in Sabah during the COVID-19 pandemic.

Methods

STUDY SETTING, DESIGN AND SAMPLING

Sabah is the second largest state in Malaysia and it is located in Borneo Island alongside Sarawak and neighboring countries namely Brunei and Indonesia [12]. Penampang is located on the west coast of Sabah, Malaysia with a size of 424.73 square kilometers. It is located approximately 9 km from the capital city of Sabah, Kota Kinabalu and about two-thirds of its area is highland and natural forest. Public primary healthcare facilities in Penampang are District Health Office, Penampang Health Clinics, Terian Health Clinic, two community clinics (Cyber Square and Bundusan), and four Rural Clinics (Nosob, Limbanak, Moyog, and Babagon). The district of Putatan is also located at the west coast region of Sabah. Primary healthcare facilities in Putatan are the District Health Office, Putatan Health Clinic, Putatan Jaya Community Clinic, and Petagas Rural Clinic. Primary healthcare services comprise detection, prevention, and control activities of COVID-19.

This was a health facility-based cross-sectional study involving governmental primary healthcare workers of Penampang and Putatan Sabah. It was carried out from December 2020 until February 2021. Doctors, Nurses, Assistant Medical Officers, Assistant Environmental Health Officers, Pharmacists, Science Officers, Occupational/Physiotherapists were recruited via convenience sampling. All primary healthcare workers of Penampang and Putatan districts were eligible to participate ($n = 409$). After participants were briefed on the research objective, self-administered questionnaires were given via online google form. Their daily tasks were not interrupted by this project. Out of 409 healthcare workers, a total of 167 took part in this study (response rate = 40.8%). Those who consented were briefed on this study. Then self-administered questionnaires (google form) were given to them.

INSTRUMENT

A structured questionnaire was generated from literature review and validated questionnaires. It consist of 6

constructs: sociodemographic characteristics, working environment, Risk assessment and information on Personal Protective Equipment, Copenhagen Burnout Inventory, Job Satisfaction, and preventive practice against COVID-19. Copenhagen Burnout Inventory contains 3 domains with a total question of 22: personal burnout (5 questions), work-related burnout (7 questions), and pandemic-related burnout (10 questions). The first and second domains were adopted from the Malay Version of the Copenhagen Burnout Inventory by Andrew Chin and Colleagues [13]. Simultaneously, Pandemic related burnout component was adopted from a study by Khasne R. and Colleagues on healthcare workers in India [14]. Job Satisfaction was a 5-point Likert scale measurement (strongly disagree, disagree, unsure, agree and strongly agree) questionnaire with a total of 7 questions and was adopted from Leggat, S., and Colleagues [15]. Questions on Preventive practice at work were adopted from the study by Asemahagn, M.'s study in Ethiopia which consists of 9 questions [6]. For every question, the respondents were required to choose one answer out of 3 options (never, occasionally, and always). The overall preventive practice score was computed from 9 questions with a possible maximum score of 27 and a minimum score of 0. Participants who scored less than the mean value were classified as having poor preventive practice. The higher the score, the better the preventive practice.

STATISTICAL ANALYSIS

First, data were coded and analyzed using Statistical Package for Social Science (SPSS) version 23. All the data were carefully checked and cleaned in Microsoft Excel before analysis in SPSS. Descriptive analysis was performed to determine frequency, percentage, mean, median, and standard deviation. It was used to describe the basic features of the data in this study. Descriptive statistics provided a simple summary of the sample and its measures. Before logistic regression, bivariate analysis was performed and all the independent variables with a p-value of less than 0.2 were selected to be analyzed in multivariate analysis. For categorical data, the Chi-square test was used to assess the relationship between the independent variables and preventive practice. Pearson correlation coefficient was applied to measure the linear association between two continuous variables. Subsequently, Binomial logistics regression was used to determine the predictors of preventive practice at the workplace. The dependent variable consists of two categories: good and poor preventive practice. Outliers, assumptions, multicollinearity, and interactions were checked. An odd ratio of more than one indicates an increased odd that affects preventive practice at work among health professionals an odds ratio of less than one indicates the opposite result. A p-value of less than 0.05 was considered statistically significant.

ETHICAL CONSIDERATION

Medical Research and Ethics Committee of the Ministry of Health Malaysia granted approval to conduct this research [NMRR-20-2554-57340 (IIR)]. Participation

in this research was voluntary and confidentiality of information was assured.

Results

A total of 167 respondents took part in this study and all of them were Malaysians. Sociodemographic characteristics were presented in Table I alongside the difference in preventive practice. All our respondents were healthcare workers, aged between 21 to 56 years old with an interval of 35 years. The mean age of respondents was 35.2 (7.36) years. Approximately half of the respondents (43.1%)

were from the age group of 31 to 40 years old. A majority of respondents were married (70.1%) and more than half of them (65.3%) obtained cert/diploma/secondary education. Based on the profession, the majority of them were nurses (35.9%), followed by doctors (20.4%) and Assistant Medical Officers (17.4%). Other support staff such as Assistant Environmental Health Officer, Public Health Assistant comprised 26.3%.

Most of them (43.5%) have working experience of more than 10 years, average weekly working hours of 41-60 hours (53.3%), and average sleep of 6 hours or less daily (67.1%). A total of 40.7% of the respondents lived more than 10 km from their workplace. A vast majority of

Tab. I. Socio demographic characteristics of respondents.

Variables	Frequency (%)	Mean (SD)/median	Preventive practice at work		P-value
			Poor	Good	
Age					
Below 30	54 (32.3)	35.2(7.36) Median 34.0	17 (31.5)	37 (68.5)	0.747
31 to 40	72 (43.1)		21 (29.2)	51 (70.8)	
Above 40	41 (24.6)		10 (24.4)	31 (75.6)	
Mean (SD)					
Gender					
Male	54 (32.3)		21 (38.9)	33 (61.1)	0.045*
Female	113 (67.7)		27 (23.9)	86 (76.1)	
Marital status					
Married	117 (70.1)		25 (21.4)	92 (78.6)	0.001*
Unmarried	50 (29.9)		23 (46.0)	27 (54.0)	
Education					
Cert/diploma and below	109 (65.3)		31 (28.4)	78 (71.6)	0.906
Tertiary education	58 (34.7)		17 (29.3)	41 (70.7)	
Designation					
Doctor	34 (20.4)		11 (32.4)	23 (67.6)	0.070
Nurse	60 (35.9)		10 (16.7)	50 (83.3)	
Medical Assistant	29 (17.4)		10 (34.5)	19 (65.5)	
Others	44 (26.3)		17 (38.6)	27 (61.4)	
Working experience					
Less than 5 years	30 (17.9)	10.8(7.03) Median 9.0	9 (30.0)	21 (70.0)	0.632
5 to 10 years	65 (38.7)		21 (32.3)	44 (67.7)	
More than 10 years	72 (43.5)		18 (25.0)	54 (75.0)	
Comorbids					
Yes	33 (19.8)		8 (24.2)	25 (75.8)	0.524
No	134 (80.2)		40 (29.9)	94 (70.1)	
Average sleep hour					
6 hours and less	112 (67.1)	6.1 (1.07) Median 6.0	37 (33.0)	75 (67.0)	0.080
More than 6 hours	55 (32.9)		11 (20.0)	44 (80.0)	
Working duration (weekly)					
40 hours and below	38 (22.8)	54.1 (14.46) Median 50.0	7 (18.4)	31 (81.6)	0.230
41-60 hours	89 (53.3)		23 (25.8)	66 (74.2)	
More than 60 hours	40 (24.0)		18 (45.0)	22 (55.0)	
Elderly family members at home					
Yes	46 (27.5)		9 (19.6)	37 (80.4)	0.106
No	121 (72.5)		39 (32.2)	82 (67.8)	
PPE discomfort					
Yes	88 (52.7)		32 (36.4)	56 (63.6)	0.022*
No	79 (47.3)		16 (20.3)	63 (79.7)	
House distance					
Less than 5 km	45 (26.9)		10 (22.2)	35 (77.8)	0.162
5-10 km	54 (32.3)		13 (24.1)	41 (75.9)	
More than 10 km	68 (40.7)		25 (36.5)	43 (63.2)	
Treated as PUI*					
Yes	90 (53.9)		28 (31.1)	62 (68.9)	0.465
No	77 (46.1)		20 (26.0)	57 (74.0)	

PUI: Person Under Investigation, * P < 0.05 is considered significant.

respondents have no comorbid (80.2%) and not staying with an elderly family member (72.5%). Half of the respondents claimed to have discomfort when wearing Personal Protective equipment at work (52.7%). Since the beginning of this pandemic (up to the end of the data collection phase), a total of 90 respondents (53.9%) had a history of quarantine due to contact with positive cases or interstate traveling.

Bivariate analysis reported several factors associated with good COVID-19 preventive practice at the workplace. Female respondents have better preventive practice compared to male respondents. Married participants were reported to have better preventive practice than the unmarried participants. Respondents with discomfort when wearing PPE reported to have poorer preventive practice than those without discomfort when wearing PPE. Pearson product-moment correlation was run to determine the relationship between preventive practice against COVID-19 and Job Satisfaction, personal burnout, work burnout and pandemic burnout. There was a correlation between Job Satisfaction and preventive practice against COVID-19 which was statistically significant ($r = 0.235$, $n = 167$, $p = 0.002$). Burnout was also found to have effect on preventive practice against

COVID-19. Personal burnout ($r = -.0242$, $n = 167$, $p = 0.002$), work burnout ($r = -.306$, $n = 167$, $p < 0.001$) and pandemic burnout ($r = -0.305$, $n = 167$, $p < 0.001$) has negative correlation towards preventive practice against COVID-19 and were statistically significant.

A vast majority of healthcare workers, 163 (97%) regularly throw used tissue into the dustbin when they were at work (Tab. II). Almost all respondents (98.2%) frequently wash their hands, regularly wear face masks/ face shields (98.8%) at work, and no longer practice handshaking (91.7%). More than half of the respondents (60.7%) still occasionally practice table sharing during lunch break with their colleagues. A total of 71 (42.3%) participants claimed that their workplace/room/cubicle was occasionally crowded. Half of the respondents [89 (53.0%)] occasionally touch their eyes, nose, or mouth when they are at work and a total of 126 (75.0%) respondents always practice social distancing as recommended by World Health Organization. A total of 117 (69.9%) respondents always disinfect their belongings, table, and working room.

Binomial logistic regression was used to determine the predictors of good preventive practice among healthcare workers in Sabah (Tab. III). The logistic regression model

Tab. II. Preventive practice among healthcare workers.

Variables	Never n (%)	Occasionally n (%)	Always n (%)
Do you throw used tissue safely in a dustbin?	3 (1.8)	2 (1.2)	163 (97.0)
Do you use frequent handwashing with water and soap /or alcohol-based hand rub sterilizer as per recommended?	0 (0.0)	3 (1.8)	165 (98.2)
Do you routinely wear a facemask / face shields at work?	0 (0.0)	2 (1.2)	166 (98.8)
Do you and your colleague eat together at workplace (same table)?	33 (19.6)	102 (60.7)	33 (19.6)
Is your workplace/room/cubicle crowded?	57 (33.9)	71 (42.3)	40 (23.8)
Do you practice handshaking?	154 (91.7)	11 (6.5)	3 (1.8)
Do you touch your eyes, nose or mouth when you are at work?	71 (42.3)	89 (53.0)	8 (4.8)
Do you practice social distancing recommended by the WHO?	7 (4.2)	35 (20.8)	126 (75.0)
Do routinely disinfect your own belongings, surfaces table and working room?	10 (6.0)	41 (24.4)	117 (69.9)

Tab. III. Predictors of prevention practice against COVID-19 among healthcare workers at work.

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)	P value
Gender	1.253 (0.410-3.836)		0.692
Marital status	5.788 (1.871-17.906)	4.170 (1.787-9.733)	0.001
Designation			
Doctor			0.058
AMO*	0.900		0.886
Nurse	1.504		0.616
Others	0.232		0.063
Average sleep hours	1.671 (1.011-2.763)	1.775 (1.144-2.754)	0.010
Working duration	0.986 (0.956-1.017)		0.365
Elderly at home	3.108 (1.032-9.355)		0.059
PPE discomfort	0.787 (0.314-1.974)		0.610
House distance	1.600 (0.661-3.871)		0.297
Treated as PUI	1.385 (0.535-3.587)		0.503
Job satisfaction	1.207 (1.076-1.355)	1.145 (1.050-1.248)	0.002
Personal burnout	1.018 (0.834-1.242)		0.864
Work related burnout	1.019 (0.865-1.199)		0.825
Pandemic related burnout	0.882 (0.781-0.996)	0.905 (0.847-0.967)	0.003

AMO: Assistant Medical Officer; Model of chi square (df): 47.99 (4) p-value < 0.001; n = 167; Hosmer and Lemeshow Test p-value = 2.368 > 0.05; CI: Confidence Interval; OR: Odd Ratio; * Logistic Regression (no multicollinearity, assumptions were all met); Dependent variables: preventive practice against COVID-19 at work (poor vs good).

was statistically significant, $\chi^2(4) = 47.99$, $p < 0.001$. The model explained 35.7% (Nagelkerke R^2) of the variance in preventive practice and correctly classified 71.3% of cases. The outcome variable was dichotomous and selected independent variables from socio-demographic characteristics, working environment, risk assessment, and information of Personal Protective Equipment including continuous variables: Copenhagen Burnout Inventory and Job Satisfaction. Married respondents were 4.170 times more likely to have better preventive practice than unmarried respondents (95% CI: 1.787, 9.733; $p = 0.001$). Every unit of adequate sleep will increase preventive practice by 1.775 times (95% CI: 1.144, 2.754; $p = 0.01$). Every unit increase in burnout (pandemic related) score, there was a 10% decrease in odds of having good preventive practice (95% CI: 0.847, 0.967; $p = 0.003$). With every unit of increment in Job Satisfaction, preventive practice improves by 1.15 times with AOR: 1.145 (95% CI: 1.050-1.248). However, the 95% CI of the OR was reported to be 1.050 times and 1.24 times. Therefore, Job Satisfaction was not a significant predictor for the preventive practice among primary healthcare workers in Sabah because the lowest point of 95% CI was near 1.0.

Discussion

To the best of our knowledge, this study was one of the first to assess the level of preventive practice at the workplace among primary healthcare workers in Malaysia. Compliance with good occupational safety and health protocols among healthcare workers is vital to reduce the risk of contracting COVID-19. Healthcare workers are the most important resources in the war against this devastating pandemic. Good workplace health and safety practice against infection is important to prevent health professionals from contracting Healthcare-Associated Infection (HAI) such as COVID-19. Our analysis discovered substantial determinants of preventive practice against COVID-19 among healthcare workers at the workplace.

In this study, the prevalence of good overall preventive practice against COVID-19 in healthcare settings was 71.3%. However, it is vital to acknowledge that almost all health professionals who took part in this study constantly wear personal protective equipment such as face mask/face shield at work and regularly practice good hand hygiene. Similar findings were reported in other developing countries namely Ethiopia, Nepal, and China [16-18]. Good hand hygiene practice and adherence to personal protective equipment were two of the most important preventive measure to repel nosocomial infection. Even though gloves were worn during certain clinical procedures and disease control activities in the field, it is not a substitute for handwashing. The World Health Organisation (2009) reported that a simple procedure such as hand hygiene can reduce the global burden of Healthcare-Associated Infection [19]. Furthermore, supplies of alcohol-

based sanitizers and personal protective equipment in healthcare settings have been consistently sufficient throughout this pandemic.

Chi-square analysis reported that there was a significant difference in preventive practice at work between males and females. Female respondents have better preventive practices than male respondents. Similar findings were reported among healthcare workers in Saudi Arabia whereby female nurses practice better infection control practice compared to male nurses [20]. Nevertheless, logistic regression indicated that gender was not a predictor of preventive practice among healthcare workers in Sabah. A similar finding was reported among healthcare workers in Lebanon and Pakistan [21, 22].

It is not surprising that the education level of healthcare workers did not influence COVID-19 preventive practice as studies in other developing countries reported similar findings [16, 20]. The preventive practice among healthcare was also not influenced by their profession. Furthermore, it is worth noting that respondents with higher educational backgrounds such as tertiary education are in the management and professional group. Thus, an intervention can be focused on healthcare workers in general regardless of their rank and position. Marital status significantly affects preventive behaviours in our study. Married healthcare workers have better preventive practices than unmarried healthcare workers. A study in Saudi Arabia reported a similar finding [20]. Al-Dossary and colleagues conducted studies among nurses in Saudi Arabia and postulated that married healthcare workers have better preventive practice than unmarried healthcare workers. This might be attributed to one's responsibility to prevent infecting family members.

Job Satisfaction improves preventive practice at work for healthcare providers. Our study reported that healthcare workers with good Job Satisfaction practice better COVID-19 preventive behaviour. It was not surprising to discover that burnout affects the preventive practice of health professionals other than their work performance. This was supported by the findings of Appleton K and Colleagues in their study on the general practitioners in Leeds, England [23]. Job Satisfaction can be influenced by the level of motivation. One study in Indonesia demonstrated that Infection Prevention Control Practice among healthcare workers improves with better motivation levels [24]. Good sleeping habit promotes better preventive behaviours, job performance and quality of service [25, 26]. Sleeping disorders can also cause metabolic disturbances. Our study reported that lack of sleep leads to the poor preventive practice of health professionals at the workplace. Sleep deprivation leads to error which lead to poor infection control practice among healthcare workers. It is interesting to note that certain demographic variables like age and working experience do not significantly affect one's preventive behaviour.

Our study suggested that pandemic-related burnout negatively influenced preventive practice among healthcare workers. Burnout can seriously affect the physical and mental health of health professionals which can lead to low productivity, absenteeism, and accident

at the workplace [27]. Experience from the SARS pandemic revealed that burnout during a pandemic can be devastating and long-lasting which leads to serious effects on the well-being of healthcare providers [28]. Failure to address issues related to burnout can lead to low productivity, reduced Job Satisfaction, and intention to leave a job. Burnout can be addressed according to its severity [29]. The work-life balance needs to be optimized. Several issues such as flexible schedule, childcare, and work hours need to be taken into consideration to address the well-being of employees. Early prevention of burnout is important to avoid the need of pharmacological intervention. Health services managers should be attentive and those who are having burnout must get adequate rest. Counselling service should be provided as well. At the same time, we must monitor for alcohol and substance abuse. Some health facilities have taken the initiative to provide portable beds for their healthcare workers to rest on their break. A power nap as short as 10-20 minutes can help healthcare workers with extended working hours to rejuvenate [30]. Discomfort when wearing PPE significantly affects preventive behaviour among healthcare workers. This was supported by findings from studies in Nigeria and Saudi Arabia [31, 32]. However, PPE discomfort was not a significant predictor in logistic regression. It has been almost a year since the first reported COVID-19 case in Malaysia. Thus, we can expect that awareness of the importance of PPE compliance at work has been relatively increased. Adherence to face masks and face shields also reduce face touching behaviours, supported by Chen, Y., and colleagues who reported similar findings among healthcare workers in China [33]. PPE such as face masks could be contaminated especially during the process of doffing. Thus, constant awareness is important to educate on the importance of hand hygiene before touching their face, nose, eyes, or mouth after removing PPE. Correspondingly, proper disposal of clinical waste needs to be regularly monitored by the designated Infection Control team in health facilities. Having comorbidities did not significantly influence preventive practice among healthcare workers. This contradicted the finding of Asemahagn who conducted a study on health professionals in Ethiopia. Coincidentally there were no disparities in preventive practice between people who were treated as Person Under Investigation for COVID-19 (PUI) and those who never undergo quarantine. The magnitude of fear among those with chronic illness in contracting COVID-19 was higher compared to those without any comorbid. Furthermore, people with chronic illnesses were considered as a high-risk group and at risk of serious outcomes from the infection [34]. This finding reflects the lack of concern among those with comorbidities. There is a need to educate them on the importance of being extra cautious and that COVID-19 can be fatal in high-risk groups. Handshaking is considered a cultural value in many nations, including Malaysia. Understandably, such a tradition will be difficult to avert. It is good to note that the huge majority of healthcare workers avoid handshaking.

The main strength of the study was it serves as baseline data of preventive behaviours among healthcare workers to formulate intervention strategies. Further study is needed to include health professionals from the hospital setting. Additionally, mental health and the risk of metabolic diseases among healthcare workers also require appropriate attention. A qualitative study on job satisfaction among healthcare workers could serve as a good method to explore its determinants. Good job satisfaction will optimize the health system service delivery. It will be interesting to assess preventive behaviours at the workplace which include other communicable diseases such as tuberculosis. Sedentary lifestyle habits among healthcare workers which resulted from overwork should be assessed as well to address non-communicable diseases.

Several limitations of this study should be acknowledged. First, a cross-sectional study only allows us to obtain independent and dependant variables concurrently. Hence only association can be identified but causality could not be inferred. Secondly, since the study was carried out in District Health Office and Health Clinics, the generalizability of research findings is limited to governmental primary healthcare facilities. Another limitation that warrants an explanation was in a self-reported questionnaire, respondents might be biased in expressing their opinion.

Conclusions

The current study revealed that the prevention practice among health professionals still requires optimization to prevent Healthcare-Associated infection. Marital status, average hours of sleep daily, job satisfaction, and burnout were significant predictors of preventive practice against COVID-19 among healthcare workers. The outcome of this study is beneficial to the policymakers of healthcare. It can serve as a guide to tackle issues related to poor preventive practice against COVID-19 at work. Focused intervention can be delivered according to the significant findings by aiming at specific target groups. This will be more cost-effective and at the same time able to provide an efficient service.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

SFJ designed and directed the project. AJ helped to supervise the study. AFM and MEE were involved in data collection. SFJ performed the analysis, results interpretation and wrote the manuscript with the support of AJ, AFM, and MEE. All authors reviewed and approved the final version of the manuscript.

References

- [1] Sabah COVID-19 Daily Situation. Sabah State Health Department Infographic. 2021. Available from: <https://web.facebook.com/jknsabah> (accessed 13 February 2021).
- [2] Ashinyo ME, Dubik SD, Duti V, Amegah KE, Ashinyo A, Larsen-Reindorf R, Kaba Akoriyea S, Kuma-Aboagye P. Healthcare workers exposure risk assessment: a survey among frontline workers in designated COVID-19 treatment centers in Ghana. *J Prim Care Community Health* 2020;11:2150132720969483. <https://doi.org/10.1177/2150132720969483>
- [3] Infection prevention and control [Internet]. World Health Organization. 2020. Available from: <https://www.who.int/western-pacific/emergencies/COVID-19/technical-guidance/infection-prevention-control> (accessed 5 February 2021).
- [4] Haque M, Sartelli M, McKimm J, Abu Bakar M. Healthcare-associated infections & ndash; an overview. *Infect Drug Resist* 2018;11:2321-33. <https://doi.org/10.2147/idr.s177247>
- [5] 1,771 healthcare workers in Malaysia infected with COVID-19. CNA 2021. Available from: <https://www.channelnewsasia.com/news/asia/COVID-19-malaysia-healthcare-workers-nurses-infected-13801794> (accessed 13 February 2021).
- [6] Asemahagn M. Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia: a cross-sectional survey. *Tropical Medicine and Health* 2020;48(1). <https://doi.org/10.1186/s41182-020-00254-3>
- [7] Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *J Hosp Infect* 2020;105:183-7. <https://doi.org/10.1016/j.jhin.2020.04.012>
- [8] Ofei-Dodoo S, Kellerman R, Gilchrist K, Casey E. Burnout and Quality of life among active member physicians of the Medical Society of Sedgwick County. *Kansas Journal of Medicine*. 2019;12(2):33-39. <https://doi.org/10.17161/kjm.v12i2.11701>
- [9] Khasne R, Dhakulkar B, Mahajan H. Burnout among Healthcare Workers during COVID-19 Pandemic in India: Results of a Questionnaire-based Survey. *Indian J Crit. Care Med* 2020;24:664-71. <https://doi.org/10.5005/jp-journals-10071-23518>
- [10] Kim J, Choi J. Factors influencing emergency nurses' burnout during an outbreak of middle east respiratory syndrome coronavirus in Korea. *Asian Nurs. Res* 2016;10:295-9. <https://doi.org/10.1016/j.anr.2016.10.002>
- [11] Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* 2020;287:112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- [12] Official website of the Sabah State Government. Sabah.gov.my 2021. Available from: <https://www.sabah.gov.my/cms/?q=en/content/geography> (accessed 1 February 2021).
- [13] Andrew Chin R, Chua Y, Chu M, Mahadi N, Wong M, Yusoff M et al. Investigating validity evidence of the Malay translation of the Copenhagen Burnout Inventory. *J Taibah Univ Med Sci* 2018;13:1-9. <https://doi.org/10.1016/j.jtumed.2017.06.003>
- [14] Khasne R, Dhakulkar B, Mahajan H. Burnout among healthcare workers during COVID-19 pandemic in India: results of a Questionnaire-based Survey. *Indian J Crit Care Med* 2020;24:664-71. <https://doi.org/10.5005/jp-journals-10071-23518>
- [15] Leggat S, Karimi L, Bartram T. A path analysis study of factors influencing hospital staff perceptions of quality of care factors associated with patient satisfaction and patient experience. *BMC Health Serv Res* 2017;17:739. <https://doi.org/10.1186/s12913-017-2718-x>
- [16] Assefa J, Diress G, Adane S. Infection prevention knowledge, practice, and its associated factors among healthcare providers in primary healthcare unit of Wogdie District, Northeast Ethiopia, 2019: a cross-sectional study. *Antimicrob Resist Infect Control* 2020;9:136. <https://doi.org/10.1186/s13756-020-00802-w>
- [17] Limbu D, Piryani R, Sunny A. Healthcare workers' knowledge, attitude and practices during the COVID-19 pandemic response in a tertiary care hospital of Nepal. *PloS One* 2020;15:e0242126. <https://doi.org/10.1371/journal.pone.0242126>
- [18] Lai X, Wang X, Yang Q, Xu X, Tang Y, Liu C, Tan L, Lai R, Wang H, Zhang X, Zhou Q, Chen H. Will healthcare workers improve infection prevention and control behaviors as COVID-19 risk emerges and increases, in China? *Antimicrob Resist Infect Control* 2020;9:83. <https://doi.org/10.1186/s13756-020-00746-1>
- [19] World Health Organization. First global patient safety challenge clean care is safer care. WHO Guidelines on Hand Hygiene in Healthcare 2009.
- [20] Al-Dossary R, Alamri M, Albaqawi H, Al Hosis K, Aljeldah M, Aljohan M, Aljohani K, Almadani N, Alrasheadi B, Falatah R, Almazan J. Awareness, Attitudes, Prevention, and Perceptions of COVID-19 Outbreak among Nurses in Saudi Arabia. *Int J Environ Res Public Health* 2020;17:8269. <https://doi.org/10.3390/ijerph17218269>
- [21] Abou-Abbas L, Nasser Z, Fares Y, Chahrour M, El Haidari R, Atoui R. Knowledge and practice of physicians during COVID-19 pandemic: a cross-sectional study in Lebanon. *BMC Public Health* 2020;20:1474. <https://doi.org/10.1186/s12889-020-09585-6>
- [22] Hussain I, Majeed A, Imran I, Ullah M, Hashmi FK, Saeed H, Chaudhry MO, Rasool MF. Knowledge, Attitude, and Practices Toward COVID-19 in Primary Healthcare Providers: A Cross-Sectional Study from Three Tertiary Care Hospitals of Peshawar, Pakistan. *J Community Health* 2021;46:441-449. <https://doi.org/10.1007/s10900-020-00879-9>
- [23] Appleton K, House A, Dowell A. A survey of job satisfaction, sources of stress and psychological symptoms among general practitioners in Leeds. *Br J Gen Pract* 1998;48:1059-63.
- [24] Asmara A, Hariyati R, Handiyani H, Avia I. Analysis of infection prevention control nurse performance: a descriptive study. *enfermería clínica* 2019;29:36-40. <https://doi.org/10.1016/j.enfcli.2019.04.006>
- [25] Frost P, Kolstad H, Bonde J. Shift work and the risk of ischemic heart disease – a systematic review of the epidemiologic evidence. *Scand J Work Environ Health* 2009;35:163-79. <https://doi.org/10.5271/sjweh.1319>
- [26] Puttonen S, Härmä M, Hublin C. Shift work and cardiovascular disease - pathways from circadian stress to morbidity. *Scand J Work Environ Health* 2010;36:96-108. <https://doi.org/10.5271/sjweh.2894>
- [27] Ramírez M, Otero P, Blanco V, Ontaneda M, Díaz O, Vázquez F. Prevalence and correlates of burnout in health professionals in Ecuador. *Compr Psychiatry* 2018;82:73-83. <https://doi.org/10.1016/j.comppsy.2017.11.011>
- [28] Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, Fernandes CM, Goldbloom DS, Gupta M, Hunter JJ, McGillis Hall L, Nagle LM, Pain C, Peczenik SS, Raymond G, Read N, Rourke SB, Steinberg RJ, Stewart TE, VanDeVelde-Coke S, Veldhorst GG, Wasilenki DA. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg Infect Dis* 2006;12:1924-32. <https://doi.org/10.3201/eid1212.060584>
- [29] Familo K. Power napping for nurses. *Am J Nurs* 2014;114:11. <https://doi.org/10.1097/01.naj.0000446754.24180.03>

- [30] De Hert S. Burnout in healthcare workers: prevalence, impact and preventative strategies. *Local Reg Anesth* 2020;13:171-83. <https://doi.org/10.2147/LRA.S240564>
- [31] Alao M, Durodola A, Ibrahim O, Asinobi O. Assessment of health workers' knowledge, beliefs, attitudes, and use of personal protective equipment for prevention of COVID-19 infection in low-resource settings. *Adv Public Health* 2020;2020:1-10. <https://doi.org/10.1155/2020/4619214>
- [32] Bazaid A, Aldarhami A, Binsaleh N, Sherwani S, Althomali O. Knowledge and practice of personal protective measures during the COVID-19 pandemic: a cross-sectional study in Saudi Arabia. *PloS One* 2020;15:e0243695. <https://doi.org/10.1371/journal.pone.0243695>
- [33] Chen YJ, Qin G, Chen J, Xu JL, Feng DY, Wu XY, Li X. Comparison of face-touching behaviors before and during the coronavirus disease 2019 pandemic. *JAMA Network Open* 2020;3:e2016924. <https://doi.org/10.1001/jamanetworkopen.2020.16924>
- [34] Li J, Gong X, Wang Z, Chen R, Li T, Zeng D, Li M. Clinical features of familial clustering in patients infected with 2019 novel coronavirus in Wuhan, China. *Virus Res* 2020;286:198043. <https://doi.org/10.1016/j.virusres.2020.198043>

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