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Burnout and Coping Strategies among Nurses in Malaysia: A National-level Cross-sectional Study

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ABSTRACT

Objective: As nurses are often considered the backbone of healthcare service, this study set out to determine the prevalence and risk factors among nurses working under the Ministry of Health (MOH) Malaysia, as well as the coping strategies applied by them.

Design: This cross-sectional study was conducted in 2019 among the nurses in the MOH healthcare facilities using complex sampling design with two-staged stratified cluster sampling.

Setting and Participants: A total of 2428 nurses from 32 hospitals and 28 district health offices answered the questionnaires based on Maslach Burnout Inventory for Human Services (MBI-HSS) and Brief COPE. Logistic regression was performed to identify associated factors of burnout among nurses.

Primary and secondary outcome measures: The outcome variables were prevalence of burnout and coping strategies. Odds ratios (OR) using 95% confidence intervals (CI) were calculated for categorical variables. Significant factors at the univariate level were entered into the multivariate logistic regression to identify independent predictors of burnout.

Results: One in four (24.4%) of the nurses experienced burnout at work. It was higher among hospital nurses (25.8%) than primary care nurses (19.3%). Those who were younger, single, and childless had a higher prevalence of burnout. The numbers of night shifts and double shifts were significant predictors of burnout. The use of dysfunctional coping strategies was positively correlated with the domains of emotional exhaustion, depersonalisation, and negatively correlated with personal accomplishment.

Conclusion: Interventions that promote the application of positive coping strategies should be implemented. Organisational-drive efforts must target the improvement of work schedules for nurses, and the establishment of a structured debriefing service for post-trauma counselling. Addressing modifiable stressors identified in this study at individual, institutional, and systemic levels will be beneficial to reduce the prevalence of burnout among nurses.

Keywords: Burnout, nurse, primary care, hospital, Malaysia

Strength and Limitations of this Study

- This was the first nationwide study in Malaysia to determine the prevalence of burnout using a complex sampling analysis with a large sample size representative of the nursing population in the public healthcare sector
- The respondents included in this study consisted of two main groups of nurses from primary care and hospital settings
- The study adopts questionnaires based on the Maslach Burnout Inventory for Human Services (MBI-HSS) which are widely used internationally to measure burnout syndrome among nurses as well as Brief COPE to measure the strategies used for coping with stress
- As this was a cross sectional study, it was difficult to establish the link between the exposure and outcome as both are assessed at the same time
- Self-administered questionnaire was susceptible to recall bias and social desirability bias

Introduction

The concept of burnout was first described by Freudenberger as a syndrome of exhaustion of psychological and physical resources that commonly inflicted teachers, healthcare professionals, and social workers [1]. In 2019, under the 11th Revision of the International Classification of Diseases (ICD-11), burnout was categorised as an occupational phenomenon [2] and defined as a syndrome resulting from chronic workplace stress that has not been successfully managed. It follows the three dimensions established by Maslach and Jackson, namely emotional exhaustion (EE: feelings of energy depletion), depersonalisation (DP: increased mental distance from one's job), and personal accomplishment (PA: reduced professional efficacy [3].

Globally, the prevalence of burnout in the health sector has been extensively studied due to its close linkage with the wellbeing and productivity of healthcare workers (HCW) [4]. Recent reviews reported that burnout and poor mental wellbeing among HCW can lead to higher absenteeism and turnover rates. In addition to the significant financial costs from brain drain, burnout is also associated with increased adverse events and poorer patient satisfaction, subsequently leading to poorer quality and safety of patient care [5–8].

As early as 2013, a systematic review shows a prevalence rate of 22 to 40% of burnout among nurses in ten European countries [9]. In Malaysia, nurses represent the backbone of the healthcare workforce in the Ministry of Health (MOH) facilities. With an increasing workload on the healthcare system, the nursing work environment is becoming more demanding and challenging, thus predisposing nurses to burnout. The majority of burnout-related studies in Malaysia were single centred, hospital-based, or focused solely on medical doctors [10–12]. As the primary gatekeepers of MOH facilities, nurses are often the first line of contact with the general public. As a result, it is vital to ensure that nurses can function optimally in a healthy working environment to ensure patients' wellbeing.

This study aimed to determine the prevalence of burnout syndrome among nurses in MOH facilities in Malaysia and its association with the relevant sociodemographic and professional characteristics using the data from a national survey conducted in 2019, right before COVID-19 began. We also examined coping strategies used by the nurses in dealing with stressful conditions at work. The findings can provide vital baseline information on burnout among nurses during the pre-pandemic era in the attempt to guide the planning and implementation of preventive actions especially following the immeasurable workload and occupational burden brought on by the COVID-19 pandemic.

Material and Methods

A national level cross-sectional study was conducted in September to December 2019 among the nurses working in the hospital and primary settings under the Ministry of Health (MOH) Malaysia. Complex sampling was applied to obtain a nationally representative population of nurses. A total of 2516 nurses from both the hospital and primary care settings were selected using a multistage stratified random sampling. Those who were on leaves of absence and with underlying psychiatric illness were excluded.

The sample size was calculated based on a single proportion for prevalence estimation. Based on 27.3% estimated prevalence of burnout [13], a design effect of 2.5, and a non-response rate of 20%, the sample size required for single data analysis was 953. However, as this consisted of two main groups of nurses from primary care and hospital settings, the sample size was multiplied by two and became 1906. Based on the latest workforce distribution data by the MOH Nursing Board, the proportion of nurses working in hospital and primary care settings were 82% and 18% respectively. Thus, the sample size required from hospitals was 1563 (1906*82%). However, due to the low sample size of primary care side (1906*18%=343), it was adjusted as 953, the minimum sample size. Thus, the total sample size required for the study was 2516.

After that, a two-stage stratified cluster sampling was performed to select one state from each of the six zones in Malaysia, followed by the secondary stratum that was made up of 32 hospitals and 28 DHOs selected randomly from the six states in the primary stratum. Allocation of the sample to each state in Malaysia was done proportionately to the population size of nurses working in each state. The respondents were then randomly chosen from a list of nurses obtained from the liaison officers at each facility. A briefing was given to them to explain the objectives of study to the respondents and to highlight that their participation would be voluntary. Strict confidentiality was maintained and no identifier was used in the questionnaire. The participants were required to provide written informed consent before filling up the self-administered questionnaire. Completed questionnaires were returned to the investigators during the same session.

The questionnaire was prepared in dual languages of English and Malay (the national language of Malaysia). The first section of the questionnaire extracted information on the sociodemographic and professional characteristics of the nurses. In the next section, the Maslach Burnout Inventory for Human Services (MBI-HSS) was used to measure burnout

syndrome among nurses. It comprises 22 items under three domains: EE (nine items), DP (five items), and PA (eight items). All items are rated on a seven-point Likert scale from zero (never), one (few times a year), two (once a month), three (a few times a month), four (once a week), five (a few times a week), to six (every day). The total values from each domain were categorised accordingly as shown in Table 1. In this study, the operational definition of burnout followed the description whereby a nurse would be considered as burned out if he or she scored high on the dimensions of EE, DP, or both [14]. The translated version of MBI-HSS in the Malay language showed an overall Cronbach's alpha of 0.803, indicating a good internal consistency, thus making it culturally acceptable to be used in Malaysia [15].

The Malay version [16] of the Brief COPE [17] was used to measure strategies used for coping with stress. The questionnaire is made up of 28 items grouped into 14 subscales measuring three coping strategies: dysfunctional (venting, denial, substance use, behavioural disengagement, self-distraction, self-blame), problem-focused (active coping, planning, use of instrumental support), emotion-focused (use of emotional support, positive reframing, acceptance, religion, humour).

The data were analysed using Statistical Package for the Social Science (SPSS version 22) for complex sample analysis. The prevalence of burnout was calculated using sample weights and compared among all nurses under the MOH facilities in Malaysia. Sample weightage was carried out to allow references from person included in the sample to the populations from which they were drawn. It was to allow unbiased estimates, taking account into the fact that all persons in the population would not have the same probability of selection. Odds ratios (OR) using 95% confidence intervals (CI) were calculated for categorical variables. Significant factors with a p-value of <0.25 at the univariate level were entered into the multivariate logistic regression to identify independent predictors of burnout.

Patient and public involvement

No patient or public involved.

Results

A total of 2428 nurses participated in the survey, giving a response rate of 93.9%. After data cleaning, responses from 2418 nurses were included in the final analysis. Table 1 shows the baseline characteristics of respondents. The majority of them were married (83.7%), had one

to three children (59.2%), and aged between 31 to 40 years old (42.7%). More than half of the respondents (51.9%) had a diploma and had worked for more than 10 years (55.3%). Approximately two-thirds of the nurses (67.3%) spent more than half of their working hours performing direct clinical care on patients. As high as 63.1% of the respondents had to perform on-call or extended hour duties beyond normal working hours more than three times in a month. Based on the results in Table 2, approximately one in every four nurses (24.4%, 95% CI: 17.7, 32.6) suffered from burnout syndrome with high scores in EE, DP or both. The MBI score showed that 41.6% (95% CI 35.5, 48.0) of the nurses suffered from low PA, followed by 23.9% (95% CI 17.3, 32.1) with high EE and 4.5% (95% CI 2.2, 9.1) with high DP.

Table 1: Baseline Characteristics of the Respondents

	Variables	N	%
Age	Mean age (SD)	36.9 (8.1)	
Age Group (years)	21- 30	638	26.4
	31- 40	1033	42.7
	> 40	747	30.9
Marital Status	Single	395	16.3
	Married	2023	83.7
No. of children	No child	502	20.9
	1 - 3 child	1419	59.2
	> 3 child	475	19.9
Education level	Certificate	569	23.6
	Diploma	1720	71.2
	Degree and above	126	5.2
Household Income	B40	788	37.0
	M40	1173	55.0
	T20	171	8.0
Level of Healthcare	Hospital	1524	63.0
	Primary Care	894	37.0
Year of Service (years)	1 - 5	435	18.2
	6 -10	635	26.5
	> 10	1322	55.3
Time spent on clinical activities	> 50 %	1547	67.2
	< 50 %	756	32.8
Shift Work	Yes	1056	44.6
	No	1311	55.4
Total number of shifts per month	> 24X	544	49.8
	< 24 X	549	50.3
Total number of night shifts per month (evening + night)	> 6 x	409	40.7
	1 -6 X	596	59.3
Total number of double shifts per month	> 5x	103	25.9
	1 - 4x	294	74.1
Total number of on-call / extended hours per month	1 – 3 x	324	36.9
	4 – 6 x	217	24.7
	> 7 x	338	38.4
Sleeping Hours	<6 hours	673	28.8
	6-7 hours	1305	55.9
	>7 hours	358	15.3
Encountered traumatic events at work	Yes	667	27.7
	No	1737	72.3
Received debriefing/psychological support post-traumatic event	Yes	189	28.8
	No	468	71.2
Travelling Time to Workplace	>30 minutes	444	18.5
	16-30 minutes	817	34.1
	<15 minutes	1138	47.4

**B40, M40, and T20 are the income categories that represent the bottom 40%, middle 40%, and the top 20% of income earners based on the Malaysian Department of Statistics (DOSM) Household Income and Basic Amenities (HIS/BA) survey*

Table 2: Prevalence of Burnout by Domains among the Respondents

Variables	Prevalence (95% CI)
Burnout	
• 2 domains	24.4 (17.7, 32.6)
MBI Subscales	
Emotional Exhaustion (EE≥ 27)	23.9 (17.3, 32.1)
Depersonalization (DP≥ 13)	4.5 (2.2, 9.1)
Personal Accomplishment (PA≤ 31)	41.6 (35.5, 48.0)

Table 3 summarises the prevalence of burnout based on baseline characteristics. Younger age group (35.8, 95% CI: 28.3, 44.0), single (29.1, 95% CI: 13.2, 52.5) and childless (35.3, 95% CI: 30.1, 40.8) nurses recorded a higher prevalence of burnout than those who were older, married, and with child. The burnout level was the lowest among M40 household incomes (29.5, 95% CI: 20.7, 40.1) as compared to B40 and T20 groups. Hospital nurses reported a higher level of burnout than their counterparts in the primary care facilities. Furthermore, nurses who were less involved in clinical activities experienced a higher level of burnout (28.2, 95% CI: 22.1, 35.3). Shift work and after-office hour duties also led to a higher prevalence of burnout. Our study shows a 7% higher prevalence of burnout among nurses who performed shift work [Shift workers: 27.1% (95% CI: 18.2, 38.3), Non-shift workers: 20.7% (95% CI: 15.5, 27.1)]. While nurses who performed on-call or extended hours more than seven times, showed higher prevalence of burnout (24.4, 95% CI: 17.1, 33.7) as compared to those who performed between 1 to 3 times (18.0, 95% CI: 7.8, 36.0) and 4 to 6 times (20.3, 95% CI 14.1, 28.4). Among those who experienced a traumatic event at work, 39.9% (95% CI: 29.9, 50.8) suffered from burnout and the prevalence is higher among those who did not receive any debriefing post-traumatic event from their superiors 36.8% (95% CI: 24.1, 51.7).

Table 3: Prevalence of Burnout and the domains of Emotional Exhaustion, Depersonalization, and Low Personal Accomplishment among Nurses by Sociodemographic and Professional Characteristics

	Burnout *			High EE			High DP			Low PA		
	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)
Overall Nurses	686	15997	24.4 (17.7, 32.6)	672	15667	23.9 17.3, 32.1	142	2958	4.5 (2.2, 9.1)	1018	27120	41.6 (35.4, 48.1)
Age Group (years)												
21- 30	243	6401	35.8 (28.3, 44.0)	239	6315	35.3 (28.3, 42.9)	61	1480	8.3 (4.8, 13.9)	323	8586	48.0 (41.0, 55.0)
31- 40	277	6177	24.2 (17.5, 32.4)	270	5972	23.4 (17.1, 31.0)	56	1133	4.4 (2.1,9.2)	409	10363	40.5 (34.3, 47.1)
> 40	166	3420	15.5 (7.5, 29.3)	163	3379	15.3 (7.4,29.1)	25	345	1.6 (0.5. 4.8)	296	8313	37.6 (26.6, 50.1)
Marital Status												
Single	144	3245	29.1 (13.2, 52.5)	143	3221	28.9 (13.2, 52.0)	35	746	6.7 (2.5, 17.0)	200	6653	59.7 (36.7, 79.2)
Married	542	12752	23.4 (18.4, 29.4)	529	12446	22.9 (17.8, 28.8)	107	2211	4.1 (1.7, 9.3)	828	20610	37.9 (30.7, 45.6)
No. of children												
No child	188	4401	35.3 (30.1, 40.8)	187	4377	35.1 (30.1, 40.4)	44	877	7.0 (4.0, 12.1)	260	6141	49.2 (38.8, 59.8)
1 - 3 child	394	9417	24.7 (17.9, 33.2)	385	9175	24.1 (17.3, 32.5)	82	1841	4.8 (1.9, 12.0)	573	16990	44.6 (33.3, 56.6)
> 3 child	98	2050	14.0 (9.3, 20.5)	94	1987	13.5 (9.1, 19.7)	15	226	1.5 (0.8, 3.0)	185	3989	27.2 (14.8, 44.6)
Education level												
Certificate	120	1896	15.6 (9.9, 23.7)	116	1844	15.2 (9.6, 23.1)	22	249	2.1 (0.7, 5.9)	213	2449	48.9 (29.6, 68.6)
Diploma	525	13265	26.0 (19.3, 34.0)	515	12987	25.5 (18.7, 33.6)	112	2589	5.1 (2.5, 9.9)	757	20411	40.0 (32.6, 47.9)
Degree and above	41	836	35.9 (24.5, 49.0)	41	836	35.9 (24.6, 49.0)	8	119	5.1 (1.7, 14.7)	55	865	37.1 (23.8, 52.7)
Household Income												
B40	247	5657	29.5 (20.7, 40.1)	241	5559	29.0 (20.7, 39.0)	60	1242	6.5 (3.2, 12.8)	346	8519	44.5 (36.8, 52.4)
M40	314	7664	22.3 (16.2, 29.9)	307	7455	21.7 (15.5, 29.6)	61	1298	3.8 (1.6, 8.4)	478	12184	35.5 (27.0, 45.0)
T20	44	861	28.6 (15.3, 47.0)	44	861	28.6 (15.3, 47.0)	4	56	1.8 (0.6, 5.2)	60	981	32.6 (22.9, 44.1)
Level of Healthcare												
Hospital	484	13351	25.8 (16.6, 37.7)	474	13062	25.2 (16.2, 37.1)	107	2580	5.0 (2.1, 11.6)	707	23421	45.3 (41.3, 49.3)
Primary Care	202	2646	19.3 (14.4, 25.3)	198	2605	18.9 (13.8, 25.4)	35	378	2.7 (1.6, 4.7)	321	3842	27.9 (21.0, 35.9)
Year of Service												
1 - 5	155	3837	34.2 (22.9, 47.7)	150	3740	33.4 (22.9, 45.8)	42	973	8.7 (4.3, 16.7)	215	5415	48.3 (38.3, 58.4)
6 -10	206	5395	29.5 (22.5, 37.6)	203	5262	28.8 (22.1,36.5)	41	1035	5.7 (2.4, 12.8)	273	7574	41.4 (34.1, 49.1)
> 10	312	6528	19.8 (15.1, 25.4)	306	6429	19.5 (14.9, 25.0)	55	892	2.7 (1.4, 5.2)	524	13933	42.2 (29.7, 55.9)
Time Spent on Clinical Activities												
> 50 %	429	9461	22.5 (15.2, 32.1)	420	9205	21.9 (14.6, 31.6)	90	1878	4.5 (2.4, 8.3)	641	17299	41.2 (34.3, 48.7)
< 50 %	756	5698	28.2 (22.1, 35.3)	226	5623	27.9 (22.1, 34.5)	49	933	4.6 (1.5, 13.1)	335	8426	41.7 (33.5, 50.5)
Shift Work												

	Burnout *			High EE			High DP			Low PA		
	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)	n	Estimated population	Prevalence (95% CI)
No	319	5549	20.7 (15.5, 27.1)	310	5319	19.9 (14.3, 26.9)	61	997	3.7 (1.9, 7.3)	522	10768	40.2 (22.7, 60.6)
Yes	352	10175	27.1 (18.2, 8.3)	347	10075	26.8 (18.1, 37.8)	77	1916	5.1 (2.3, 11.0)	482	15843	42.2 (31.9, 53.3)
Total number of shifts per month												
> 24X	189	5211	27.2 (15.4, 43.5)	186	5146	26.9 (15.3, 42.8)	33	611	3.2 (0.8, 11.7)	243	6563	34.3 (18.9, 53.8)
< 24 X	178	5246	27.5 (19.5, 37.1)	176	5200	27.3 (19.3, 37.0)	48	1360	7.1 (3.7, 13.5)	261	9702	50.9 (43.3, 58.4)
Total number of night shifts per month												
> 6x	160	4424	33.9 (23.6, 46.1)	159	4408	33.8 (23.5, 46.0)	40	1076	8.2 (4.4, 14.9)	193	5816	44.6 (38.3, 51.1)
1 - 6x	175	5197	22.9 (14.8, 33.6)	171	5113	22.5 (14.7, 32.9)	34	663	2.9 (0.7, 11.6)	268	9138	40.2 (27.9, 54.0)
Total number of double shifts per month												
> 5x	38	1325	35.5 (24.0, 48.8)	38	1325	35.5 (24.0, 48.8)	13	352	9.4 (3.3, 24.4)	46	1538	41.2 (18.0, 69.0)
1 - 4x	119	3253	32.3 (22.3, 44.2)	116	3198	31.7 (22.1, 43.2)	30	727	7.2 (3.7, 13.7)	136	4372	43.4 (33.3, 54.1)
Total number of on-call / extended hours per month												
1 – 3 x	78	1721	18.0 (7.8, 36.0)	16	1591	16.6 (6.0, 38.4)	11	253	2.6 (0.8, 8.4)	125	4760	49.7 (19.6, 79.9)
4 – 6 x	57	834	20.3 (14.1, 28.4)	57	834	20.3 (14.1, 28.4)	14	238	5.8 (2.5, 12.7)	78	1160	28.2 (13.9, 49.0)
> 7 x	87	1315	24.4 (17.1, 33.7)	83	1266	23.5 (16.3, 32.6)	17	165	3.1 (1.2, 7.5)	115	1682	31.2 (20.5, 44.5)
Sleeping Hours												
<6 hours	262	6667	35.7 (29.7, 42.2)	260	6619	35.5 (29.6, 41.8)	58	1406	7.5 (4.8, 11.6)	323	8344	44.7 (36.3, 53.4)
6-7 hours	344	7564	20.7 (13.2, 31.0)	334	7319	20.0 (12.6, 30.3)	69	1299	3.6 (1.3, 9.1)	529	15363	42.0 (35.9, 48.4)
>7 hours	66	1433	17.0 (12.8, 22.1)	64	1395	16.5 (12.2, 22.0)	14	246	2.9 (0.9, 9.5)	141	2996	35.4 (21.6, 52.2)
Encountered traumatic events at work												
Yes	321	7253	39.9 (29.9, 50.8)	314	7058	38.9 (28.4, 50.5)	76	1759	9.7 (7.7, 12.2)	340	7973	43.9 (31.7, 56.9)
No	362	8686	18.5 (12.8, 26.0)	355	8550	18.2 (12.7, 25.5)	65	1192	2.5 (0.6, 9.4)	680	19317	40.8 (32.1, 50.1)
Received debriefing/psychological support post- traumatic event												
Yes	73	1423	19.5 (7.3, 42.8)	65	1291	19.8 (6.8, 45.7)	15	235	3.6 (1.1, 11.3)	199	2175	33.4 (11.2, 55.5)
No	349	7669	36.8 (24.1, 51.7)	246	5709	49.6 (40.0, 59.2)	61	1531	13.3 (8.2, 20.8)	238	5752	50.0 (39.1, 60.9)243
Travelling Time to Workplace												
>30 minutes	158	3514	30.6 (17.5, 47.8)	153	3435	29.9 (17.1, 46.8)	32	637	5.5 (2.1, 13.6)	220	6885	59.9 (40.9, 76.4)
16-30 minutes	260	5611	25.0 (16.1, 36.9)	255	5526	24.7 (16.1, 35.9)	65	1207	5.4 (2.2, 12.7)	358	9449	42.2 (30.2, 55.2)
<15 minutes	264	6824	21.7 (16.8, 27.5)	260	6659	21.1 (15.9, 27.6)	44	1109	3.5 (1.7, 7.0)	438	10805	34.3 (27.9, 41.5)

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Problem focused coping strategies are positively related to PA domain in MBI. An increase of one point score in active coping and planning led to 2.4 and 2.6 points increase in the score of PA. In contrast, dysfunctional coping strategies are negatively related to PA. The results showed that one point increase in the score of substance use, self-blame and behavioural disengagement resulted in 1.1, 1.6, and 2.0 points reduction in the PA score. As for the domain of EE, the significant predictor that led to higher score of EE included the use of behavioural disengagement (4.4), venting (3.8), substance use (2.7), humour (2.5), self-distraction (2.4), and use of emotional support (1.8). There are several coping strategies that are significant predictors of high DP (as shown in Table 4).

Table 4: Influence of different coping strategies on emotional exhaustion, depersonalization, and personal accomplishment

Coping (brief COPE)	Emotional exhaustion *B* (r^2)	Depersonalization *B* (r^2)	Personal accomplishment *B* (r^2)
Problem-focused coping strategies			
Active coping	1.041(0.02)	-0.032(0.00)	2.418(0.17)**
Planning	0.562(0.00)	-0.083(0.00)	2.557(0.18)**
Use of instrumental support	1.408(0.04)	0.269(0.01)	0.614(0.01)
Emotion-focused coping strategies			
Use of emotional support	1.803(0.07)*	0.331(0.02)**	0.737(0.02)
Positive reframing	0.385(0.00)	-0.218(0.01)	2.224(0.13)**
Acceptance	1.500(0.04)	0.237(0.01)	1.570(0.09)
Religion	-0.470(0.00)	-0.290(0.01)*	1.381(0.04)**
Humour	2.455(0.07)**	0.843(0.07)***	-0.436(0.00)
Dysfunctional coping strategies			
Venting	3.771(0.18)**	0.944(0.09)**	-0.812(0.02)
Denial	1.807(0.04)	0.938(0.09)***	-1.124(0.00)
Substance use	2.652(0.01)**	0.973(0.01)*	-1.127(0.00)*
Behavioral disengagement	4.350(0.18)***	1.293(0.13)***	-2.000(0.07)***
Self-distraction	2.428(0.13)**	0.396(0.03)**	0.885(0.03)
Self-blame	1.702(0.04)	0.698(0.06)*	-1.602(0.07)**

*$p < 0.05$; ** $p < 0.01$; *** $p < 0.000$

Table 5 shows the association between baseline variables and the risk of burnout using univariate logistic regression. Age group, number of children, and education level were closely associated with the development of burnout and its subdomains of high EE and high DP. Younger nurses between 21 and 30 years were more likely to experience burnout compared those who were older ($p = 0.010$). Similarly, for the subdomains of burnout, younger

nurses were more likely to experience high EE and high DP compared to those who above 40 years of age. Nurse with no children or less than three children were 3.4 and 2.2 times more likely to have burnout as compared to those with more than three children. A lower number of children also appeared to be a predisposing factor of the subdomains of burnout in which childless nurses were significantly associated with high EE (p = 0.000), high DP (p = 0.005) and low PA (p = 0.026).

Table 5: Association between demographic and professional characteristics with burnout using univariate logistic regression

	Burnout*		High EE		High DP		Low PA	
	Crude OR (95% CI)	*p*-value	Crude OR (95% CI)	*p*-value	Crude OR (95% CI)	*p* value	Crude OR (95% CI)	*p* value
Age Group (years)								
21- 30	3.04 (1.45 - 6.38)	**0.010**	3.02 (1.44 - 6.35)	**0.011**	5.67 (2.74 – 11.71)	**0.001**	1.53 (0.88 – 2.64)	0.108
31- 40	1.74 (0.66 - 4.60)	0.211	1.69 (0.67 - 4.27)	0.217	2.91 (1.15 – 7.39)	**0.031**	1.13 (0.62 – 2.04)	0.634
> 40	1		1		1		1	
Marital Status								
Single	1.34 (0.60 - 2.98)	0.402	1.37 (0.64 - 2.96)	0.355	1.69 (0.46 – 6.21)	0.359	2.43 (0.79 – 7.50)	0.102
Married	1		1		1		1	
No. of children								
No child	3.36 (2.36 - 4.79)	**0.000**	3.46 (2.47 - 4.83)	**0.000**	4.83 (1.96 – 11.92)	**0.005**	2.60 (1.17 – 5.76)	**0.026**
1 - 3 child	2.02 (1.26 - 3.22)	**0.011**	2.03 (1.32 - 3.11)	**0.007**	3.25 (0.75 – 14.15)	0.098	2.16 (0.71 – 6.58)	0.141
> 3 child	1		1		1		1	
Education level								
Degree and above	3.02 (1.61 - 5.67)	**0.005**	3.12 (1.65 - 5.90)	**0.005**	2.57 (1.23 – 5.36)	**0.020**	0.62 (o.29 – 1.28)	0.154
Diploma	1.89 (1.22 - 2.96)	**0.012**	1.91 (1.19 - 3.06)	**0.015**	2.55 (1.21 – 5.39)	**0.022**	0.69 (0.28 – 1.76)	0.376
Certificate	1		1		1		1	
Household Income								
B 40	1.05 (0.38 - 2.89)	0.917	1.02 (0.37 – 2.81)	0.962	3.68 (1.89 – 7.15)	**0.003**	1.66 (0.90 – 3.05)	0.089
M 40	0.72 (0.30 - 1.70)	0.383	0.69 (0.29 – 1.65)	0.339	2.09 (1.17 – 3.71)	**0.020**	1.14 (0.55 – 2.36)	0.682
T 20	1		1		1		1	
Level of Healthcare								
Hospital	1.46 (0.63-3.38)	0.308	1.45 (0.62 – 3.37)	0.324	1.86 (0.48 – 7.26)	0.307	2.14 (1.33 – 3.44)	**0.008**
Primary Care	1		1		1		1	
Year of Service (years)								
1 - 5	2.11 (1.49 - 2.99)	**0.002**	2.07 (1.51 – 2.84)	**0.001**	3.42 (2.09 – 5.57)	**0.001**	1.28 (0.66 – 2.49)	0.402
6 -10	1.69 (1.04 - 2.78)	**0.039**	1.67 (1.07 – 2.60)	**0.030**	2.16 (1.29 – 3.62)	**0.011**	0.97 (0.56 – 1.67)	0.885
> 10	1		1		1		1	
Time spend on clinical activities								
> 50 %	0.74 (0.54 – 1.02)	0.062	0.73 (0.53 – 1.01)	0.053	0.97 (0.49 – 1.93)	0.908	0.98 (0.69 – 1.39)	0.887
< 50 %	1		1		1		1	
Shift Work								
Yes	1.42 (0.95-2.13)	0.076	1.48 (0.99-2.24)	0.060	1.39 (0.83-2.34)	0.170	1.09 (0.33-3.54)	0.870
No	1		1		1		1	
Total number of shifts per month								
> 24X	1.11 (0.86-1.43)	0.417	0.98 (0.94-1.03)	0.394	0.43 0.39- 0.47)	**0.000**	0.50 (0.48-0.52)	**0.000**
< 24 X	1		1		1		1	
Total number of night shift per month								
> 6x	1.55	**0.001**	1.76	**0.000**	2.99	**0.000**	1.19	**0.000**

	Burnout*		High EE		High DP		Low PA	
	Crude OR (95% CI)	***p*-value**	**Crude OR (95% CI)**	***p*-value**	**Crude OR (95% CI)**	***p* value**	**Crude OR (95% CI)**	***p* value**
	(1.18-2.02)		(1.68-1.84)		(2.71-3.30)		(1.15-1.25)	
1 - 6x	1		1		1		1	
Total number of double shifts per month								
> 5x	1.15 (1.07-1.25)	**0.000**	1.18 (1.09-1.28)	**0.000**	1.34 (1.17-1.53)	**0.000**	0.91 (0.85-0.99)	**0.019**
1 - 4x	1		1		1		1	
Total number of on call / extended hours per month								
> 7 x	1.48 (0.41 - 5.26)	0.483	1.54 (0.35 – 6.73)	0.498	1.17 (0.19 – 7.26)	0.839	0.46 (0.12 – 1.76)	0.206
4 – 6 x	1.16 (0.36 - 3.74)	0.760	1.28 (0.33 – 4.96)	0.670	2.27 (0.49 – 10.46)	0.236	0.39 (0.14 – 1.15)	0.078
1 – 3 x	1		1		1		1	
Sleeping Hours								
<6 hours	2.72 (1.78 – 4.16)	**0.001**	2.78 (1.78-4.35)	**0.001**	2.72 (1.06-7.00)	0.041	1.47 (0.77-2.81)	0.191
6-7 hours	1.28 (0.78 – 2.09)	0.270	1.27 (0.76-2.13)	0.307	1.23 (0.73-2.08)	0.367	1.32 (0.79-2.24)	0.245
>7 hours	1		1		1		1	
Encountered traumatic event at work								
Yes	2.92 (2.24 – 3.81)	**0.000**	2.85 (2.17-3.76)	**0.000**	4.11 (1.24-13.7)	0.028	1.14 (0.55-2.35)	0.685
No	1		1		1		1	
Received debriefing/psychological support post traumatic event								
Yes	0.42 (0.11 – 1.62)	0.165	0.25 (0.06-1.05)	0.056	0.36 (0.08-1.58)	0.143	0.60 (0.15-2.41)	0.404
No	1		1		1		1	
Travelling Time to Workplace								
>30 minutes	1.59 (0.89 – 2.86)	0.100	1.59 (0.91-2.79)	0.091	1.61 (0.54-4.77)	0.329	2.86 (1.04-7.84)	0.044
16-30 minutes	1.21 (0.79 – 1.85)	0.326	1.22 (0.80-1.86)	0.292	1.56 (1.01-2.41)	**0.047**	1.39 (0.85-2.30)	0.155
<15 minutes	1		1		1		1	

As the education level increased, the prevalence of burnout increased by 1.9 times among diploma holders (COR: 1.89; 95% CI, 1.22–2.96; p=0.012) and 3.0 times among nurses with degree or higher level of qualifications (COR: 3.02; 95% CI, 1.61–5.67; p=0.005). Similar association was observed for the subdomains of high EE and high DP. While household income did not show any significant association with the overall burnout syndrome, nurses from the B40 and M40 household income group were 3.7 and 2.1 times more likely to experience high DP as compared to their counterparts in the highest T20 income group. It is important to note that burnout was not associated with the level of healthcare whether they worked in hospital or primary care setting.

All variables with p<0.25 at univariate level were included in the multivariate logistic regression to determine the predictors for burnout among the nurses (Table 6). Having to work more night shifts, less sleeping hours and experienced traumatic events at work were

significant predictors for burnout, while receiving debriefing post traumatic events as one of the protective factors for nurses. As for the subdomains of burnout, variable predicting high EE included number of night shift, sleeping hours, traumatic event. While, number of night shift as the predictor of high DP and for low PA, younger age group, higher number of shifts working, double shift, longer time travelling to workplace were the predictor based on the multivariate logistic regression results.

Table 6: Association between sociodemographic and professional factors with burnout among nurses using multivariate logistic regression

	Burnout*		High EE		High DP		Low PA	
	Adjusted OR (95% CI)	***p* value**	**Adjusted OR (95% CI)**	***p* value**	**Adjusted OR (95% CI)**	***p* value**	**Adjusted OR (95% CI)**	***p* value**
Age Group (years)								
21- 30	0.94 (0.18 – 4.95)	0.930	1.04 (0.26 – 4.22)	0.942	0.07 (0.00 – 11.03)	0.240	2.10 (0.69 – 6.39)	0.154
31- 40	0.78 (0.18 – 3.39)	0.699	0.73 (0.21 – 2.59)	0.570	4.13 (0.40 – 42.19)	0.178	2.23 (1.46 – 3.39)	0.003
> 40	1		1		1		1	
Marital Status								
Single							0.56 (0.24 – 1.32)	0.148
Married							1	
No of Children								
No child	2.13 (0.98 – 4.65)	0.055	2.19 (0.88 – 5.45)	0.081	0.45 (0.01 – 14.69)	0.585	1.55 (0.39 – 6.19)	0.470
1 - 3 child	1.57 (0.56 – 4.42)	0.328	1.42 (0.56 – 3.65)	0.395	7.53 (0.55 – 104.08)	0.105	0.91 (0.58 – 1.44)	0.645
> 3 child	1		1		1		1	
Education level								
Degree and above	0.36 (0.04 – 2.97)	0.281	0.37 (0.04 – 3.69)	0.328	0.29 (0.05 – 1714.76)	0.727	0.35 (0.02 – 5.24)	0.378
Diploma	0.46 (0.09 – 2.54)	0.311	0.43 (0.07 – 2.48)	0.280	0.82 (0.00 – 280.84)	0.933	0.24 (0.03 – 2.02)	0.152
Certificate	1		1		1			
Household Income								
B 40					5.39 (0.04 – 840.39)	0.431	2.76 (0.87 – 8.76)	0.075
M 40					3.22 (0.00 – 3041.25)	0.679	2.68 (1.19 – 6.08)	0.025
T 20					1		1	
Level of Healthcare								
Hospital								
Primary Care								
Year of Service (years)								
1 - 5	0.69 (0.18 – 2.61)	0.514	0.49 (0.10 – 2.45)	0.324	80.67 (0.70 – 9256.64)	0.063		
6 -10	0.92 (0.26 – 3.22)	0.881	0.76 (0.21 – 2.76)	0.617	4.52 (0.491 – 41.68)	0.141		
> 10	1		1		1			
Time spent on clinical activities								
> 50 %	0.91 (0.63 – 1.32)	0.568	0.85 (0.62 – 1.17)	0.265				
< 50 %	1		1					
Shift Work								
Yes	0.64 (0.45 – 0.92)	0.023	0.86 (0.59 – 1.25)	0.360	1.85 (0.00 – 3817.23)	0.843		
No	1		1		1			
Total number of shifts per month								
> 24X					2.61 (2.27 – 3.01)	0.000	2.28 (2.12 – 2.45)	0.000
< 24 X					1		1	
Total number of night shift per month								
> 6x	1.54	0.045	1.55	0.000	2.52	0.000	1.04	0.240

	Burnout*		High EE		High DP		Low PA	
	Adjusted OR (95% CI)	***p* value**	**Adjusted OR (95% CI)**	***p* value**	**Adjusted OR (95% CI)**	***p* value**	**Adjusted OR (95% CI)**	***p* value**
	(1.01 - 2.36)		(1.44 – 1.67)		(2.18 – 2.90)		(0.97 – 1.12)	
1 - 6x	1							
Total number of double shifts per month								
> 5x	0.86 (0.54 – 1.37)	0.522	0.94 (0.87 – 1.02)	0.154	1.04 (0.89 – 1.21)	0.660	0.86 (0.79 – 0.93)	0.000
1 - 4x	1		1		1		1	
Total number of on call / extended hours per month								
> 7 x					2.47 (0.08 – 73.03)	0.522	0.65 (0.41 – 1.03)	0.062
4 – 6 x					4.69 (0.14 – 163.22)	0.314	0.64 (0.23 – 1.81)	0.334
1 – 3 x					1		1	
Sleeping Hours								
<6 hours	2.89 (1.40 – 5.97)	0.011	2.94 (1.36 – 6.38)	0.014	1.81 (0.77 – 4.24)	0.140	1.59 (0.69 - 2.62)	0.064
6-7 hours	1.62 (0.75 – 3.48)	0.176	1.43 (0.72 – 2.87)	0.252	1.24 0.55 – 2.75)	0.543	1.28 (0.93 - 1.76)	0.110
>7 hours	1		1		1		1	
Encountered traumatic event at work								
Yes	4.19 (2.31 – 7.63)	0.001	4.42 (2.28 – 8.57)	0.002	2.99 (0.98 – 9.07)	0.053		
No	1		1		1			
Received debriefing/psychological support post traumatic event								
Yes	0.47 (0.28 – 0.79)	0.013	0.49 (0.28 – 0.88)	0.025	0.21 (0.01 – 3817.23)	0.201		
No	1		1		1			
Travelling Time to Workplace								
>30 minutes	3.55 (0.69 – 18.09)	0.106	3.95 (0.88 – 17.78)	0.067	0.13 (0.01 – 2.06)	0.115	2.24 (1.18 – 4.23)	0.021
16-30 minutes	1.38 (0.45 – 4.23)	0.509	1.44 (0.58 – 3.62)	0.368	0.94 (0.14 – 6.24)	0.938	1.05 (0.29 – 3.76)	0.928
<15 minutes	1		1		1			

Discussion

Burnout among healthcare workers is a global phenomenon that can cast a profound negative impact on the personal wellbeing and organisational performance. This study was planned and executed back in 2019 in view of the lack of national-level data on the prevalence and common predictors of burnout among nurses in Malaysia. The results have now become important baseline data to compare the pre- and post-pandemic level of burnout among the nurses in Malaysia. In this study, one in every four nurses experienced burnout. The prevalence of burnout (24.4%) was comparable to single-centred studies among nurses from teaching hospitals in Malaysia (27.3%) [13] and Thailand (22.0%) [18] but lower than the prevalence among nurses in Indonesia at 48.8% [19]. In contrast, the pool prevalence of burnout globally was lower at 11.2% [20], and in Brazil 18.3% [21]. While the actual prevalence of burnout if likely to be different across countries and settings, the differences can also be attributed to the tools and classifications of burnout used in each study.

With regard to the three domains of burnout, the nurses in this study experienced low PA (41.6%), high EE (23.9%), and high DP (4.5%). Similar results were reported among primary care providers in China except for slightly higher prevalence under each domain in the Chinese study (low PA: 41.4%, high EE: 33.1%, high DP: 8.8%) [22]. Compared to other studies with higher prevalence of high EE, high DP, and low PA, more nurses in this study had high PA and low DP. Malaysia recorded a slightly higher nurse to patient ratio at 1:297 [23] than the 1:250 recommended by the World Health Organisation (WHO) (WHO, 2019). A high nurse-to patient ratio that indicated poor staffing and shortage of basic medical equipment at work station were significantly associated with the risk of developing EE [24-25]. Yeun and Kim described that supervisory support is vital in minimising the impact of EE impact by nurturing and instilling a sense of PA among the staff. In fact, this support is so essential that it is linked with retention of nurses in the service [26]. The high level of burnout in PA may also stemmed from the lower education level among our nurses as only 5.2% of them were degree holders compared to the their counterparts in the United States and Thailand who were mostly degree or master holders [27]. Hence, one of the long-term strategies to reduce nurses' burnout by enhancing their PA is by improving their access to further education to elevate their professional status [28].

In terms of age group, younger age group of nurses were more susceptible to burnout. This is in line with previous studies from various countries [29–35]. In addition, similar to other studies [13, 30, 36], years of working experience was also associated with burnout whereby junior nurses experienced more burnout than senior nurses. This could be attributed to the fact that junior nurses have yet to master the nursing skills, thus requiring longer period to complete their tasks. They might also lack the resilience in managing the occupational stress that often developed with longer years of experience at work [31, 36–38].

With regard to the association between burnout with marital status and number of children of the nurses, there have been contradictory findings in the research. In this study, burnout was higher among nurses who were single. Some studies reported that single nurses tend to have less social and family support, thus predisposing them to burnout [37, 39–41]. Furthermore, in this study, lower number of children was a significant predictor of burnout. However, most of the published studies reported the opposite whereby nurses with children were associated with higher EE and decreased PA, likely due to the additional obligations and potential family-work conflicts [31, 42, 43].

Working schedule also plays a vital role in the development of burnout, especially among hospital nurses who need to perform shift duties. In this study, while the total number of shifts per month was not a significant factor in the development of burnout, univariate logistic regression showed that the number of night shifts and double shifts significantly increased the prevalence of overall burnout and its three domains. Similar findings were noted among nurses in China and Thailand [18, 35, 44-45]. Shift work rotation may cause a disruption in the circadian rhythm and sleeping patterns of the involved staff. Previous research found that nurses on more rotational shifts or night shifts were more likely to suffer from negative physical and psychological health impacts [46]. Additionally, night shift workers commonly experience excessive daytime fatigue and somnolence that predispose them to higher risk EE and DP [47]. Shift work is an integral part of the nursing profession. While the nature of shift work will be hard to modify, it is vital to integrate important components such as sleep hygiene and psychosocial support in nursing education curriculum to better equip our nurses in facing the impending challenges.

Healthcare workers, especially doctors and nurses, are often exposed to highly stressful traumatic events such as witnessing deaths or desirous injuries, dealing with patients with critical illness, and managing the demands of patients' relative. Often, nurses are expected to remain stoic and continue caring for the patients after these stressful situations, subsequently leading to the development of burnout. Debriefing or psychology support was proposed as one of the ways to reduce incidence of burnout post traumatic events [48]. Debriefing, taking regular breaks, and utilising stress reduction measures throughout shifts have been demonstrated to reduce the risk of burnout among nurses [49]. However, only one-quarter of nurses who encountered traumatic events at work received debriefing. A structured debriefing system should be put in place in the health facilities to provide psychological support for nurses after a traumatic event to ensure their mental wellbeing.

In this study, we also evaluated the coping mechanisms applied by the nurses using the COPE Inventory. Different coping strategies can have varying effects on their personal emotion and work approaches. Problems-focused coping responses to distress reflects the cognitive and behavioural efforts in resolving life stressors. Both problems-focused and emotion-focused coping can be beneficial in dealing with stressors [50]. In a recent study, the use of emotion-focused and dysfunctional coping styles was linked to higher levels of EE, whereas problem-focused coping styles was linked to lower scores of DP higher scores of PA [51]. In this study, the use of religion as an emotion-focused coping strategy showed a positive correlation with high PA and low DP. Similarly, in Pakistan [52] and Palestine [53], praying and other religious activities were the highest-ranked coping techniques practised by the

healthcare workers. Religious belief was shown to be helpful to assist nurses in dealing with challenges at work and maintaining the quality of healthcare [54-55]. In contrast, the use of dysfunctional coping mechanism has been linked with mood disturbances and poor mental health [40, 55]. A high number of nurses relied on dysfunctional coping strategies such as behavioural disengagement and venting that led to significant increase in burnout and the three domains. This echoed the findings of two other studies whereby dysfunctional coping was strongly linked to EE and DP [56-57].

An effective coping mechanism may reduce burnout among nurses and may boost productivity as well as the quality of life [58]. Therefore, educational and training programmes to improve nurses' coping skills should be implemented from an early stage to better prepare them psychosocial distress at work. Other organisational measures including multidisciplinary psychosocial support such as debriefing post traumatic event and involvement of healthcare professionals in the creation, testing, and assessment of preventive measures against burnout can also be considered to reduce burnout [48, 59-60].

This was the first nationwide study in Malaysia to determine the prevalence of burnout using a complex sampling analysis with a large sample size representative of the nursing population in the public healthcare sector. The identified risk factors for burnout enable the policymakers and hospital managers to implement effective preventive initiatives that target the susceptible population. However, there are some limitations to this study. As this was a cross sectional study, it was difficult to establish the link between the exposure and outcome as both are assessed at the same time. In addition, self-administered questionnaire was susceptible to recall bias and social desirability bias. Future research should consider longitudinal studies to establish the causal relation between predisposing factors and burnout.

Conclusion

In this study, as high as one in four public nurses suffer from burnout in Malaysia. Nurses who were younger, single, childless, and working in hospitals recorded a higher level of burnout. Night shifts and double shifts were predictors of the development of burnout. Nurses represent the main workforce of front liners in the Malaysian health workforce. Following the two years battle with the COVID-19 pandemic, known and new stressors are likely intensified, predisposing nurses to higher level of strain and potential burnout. Therefore, it is essential to implement the necessary preventive and promotive efforts among the high-risk vulnerable nurses identified in this study. Modifiable stressors must be addressed via inculcation of

positive coping strategies to mitigate the potential mental health impact. Organisational reform in the form of legislation that promotes optimal staffing ratio is a critical component of a multitiered approach. Solutions must come from system-level efforts to reinvent and innovate workflow, human resources, and workplace wellness to decrease or eliminate burnout among nurses.

Author Contributions

NZ designed the project and data collection tools. All authors collected the data. NZ and NHZ cleaned, analysed and interpreted the data. NZ, NHZ and AR drafted the paper. KY reviewed and gave technical advisory towards the manuscript as well as contributed important revisions. All authors read and approved the manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interest

None declared.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Ethics approval

Ethics clearance and approval was obtained from the Medical Research and Ethics Committee (MREC) of the Ministry of Health Malaysia prior to the conduct of this study, Ref: KKM/NIHSEC/P19-683(13). Participants gave informed consent to participate in this research prior to taking part. Subject's names were kept on a password-protected database and were linked only with a study identification number. All the data involved in this study is only restricted to the use by the investigator.

Data availability statement

The data that support the study findings are available from the Ministry of Health Malaysia. Restrictions apply to the data availability, which was used under license for the current article, so it is not publicly available. Nevertheless, data are available from the authors upon reasonable request together with the permission of the Ministry of Health Malaysia.

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References

[1] H. J. Freudenberger, “The staff burn out syndrome in alternative institutions,” *Psychotherapy*, 1975.

[2] “WHO | Burn-out an ‘occupational phenomenon’: International Classification of Diseases,” *WHO*, 2019.

[3] C. Maslach and S. E. Jackson, “The measurement of experienced burnout,” *J. Organ. Behav.*, vol. 2, no. 2, pp. 99–113, 1981.

[4] J. P. Quenot *et al.*, “Suffering among carers working in critical care can be reduced by an intensive communication strategy on end-of-life practices,” *Intensive Care Med.*, 2012.

[5] L. H. Hall, J. Johnson, I. Watt, A. Tsipa, and D. B. O’Connor, “Healthcare staff wellbeing, burnout, and patient safety: A systematic review,” *PLoS ONE*, vol. 11, no. 7. Public Library of Science, Jul-2016.

[6] J. Johnson, L. H. Hall, K. Berzins, J. Baker, K. Melling, and C. Thompson, “Mental healthcare staff well-being and burnout: A narrative review of trends, causes, implications, and recommendations for future interventions,” *International Journal of Mental Health Nursing*, vol. 27, no. 1. Blackwell Publishing, pp. 20–32, Feb-2018.

[7] M. P. Salyers *et al.*, “The Relationship Between Professional Burnout and Quality and Safety in Healthcare: A Meta-Analysis,” *J. Gen. Intern. Med.*, 2017.

[8] A. Welp and T. Manser, “Integrating teamwork, clinician occupational well-being and patient safety - Development of a conceptual framework based on a systematic review,” *BMC Health Services Research*. 2016.

[9] M. M. Heinen *et al.*, “Nurses’ intention to leave their profession: A cross sectional observational study in 10 European countries,” *International Journal of Nursing Studies*, vol. 50, no. 2. pp. 174–184, 2013.

[10] R. V. Balang, “Concise literature review on burnout and work stress among mental health nurses in Malaysia,” *Malaysian Journal of Nursing*, vol. 2, no. 1. pp. 14–28, 2010.

[11] S. Y. Sharifah Zainiyah, I. M. Afiq, C. Y. Chow, and D. Siti Sara, “Stress and Its Associated Factors Amongst Ward Nurses in a Public Hospital Kuala Lumpur,”

Malaysian J. Public Heal. Med., vol. 11, no. 1, pp. 78–85, 2011.

[12] A. S. Zuraida and N. Z. Zainal, "Exploring burnout among Malaysian junior doctors using the abbreviated Maslach Burnout Inventory," *Malaysian J. Psychiatry*, vol. 24, no. 1, pp. 32–41, 2015.

[13] C. S. Siau *et al.*, "Predicting burnout and psychological distress risks of hospital healthcare workers," *Malaysian J. Public Heal. Med.*, vol. 2018, no. Specialissue1, pp. 125–136, 2018.

[14] M. P. Christina Maslach, Susan E Jackson, *Maslach burnout inventory*, Third. Palo Alto, California Consulting Psychologist Press, 1996.

[15] W. S. Chen *et al.*, "Translation, Cross-cultural Adaptation and Validation of the Malay Version of the Maslach Burnout Inventory (MBI) in Malaysia," *Int. J. Soc. Sci. Stud.*, vol. 2, no. 2, pp. 66–74, 2014.

[16] B. Y. Muhamad Saiful, "The Validity of the Malay Brief Cope in Identifying," *Int. Med. J.*, vol. 18, no. March 2011, pp. 29–33, 2011.

[17] Charles S. Carver, "You want to measure coping but your protocol's too long: Consider the brief COPE," *Int. J. Behav. Med.*, vol. 4, no. 1, pp. 92–100, 1997.

[18] A. Wisetborisut, C. Angkurawaranon, W. Jiraporncharoen, R. Uaphanthasath, and P. Wiwatanadate, "Shift work and burnout among health care workers," *Occup. Med. (Chic. Ill).*, vol. 64, no. 4, pp. 279–286, 2014.

[19] K. Rusca Putra and Setyowati, "Prevalence of burnout syndrome among nurses in general hospitals in provincial East Java: Cross-sectional study," *Enferm. Clin.*, vol. 29, no. Insc 2018, pp. 362–366, 2019.

[20] T. Woo, R. Ho, A. Tang, and W. Tam, "Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis," *J. Psychiatr. Res.*, vol. 123, pp. 9–20, Apr. 2020.

[21] M. C. Das Merces *et al.*, "Prevalence and factors associated with burnout syndrome among primary health care nursing professionals: A cross-sectional study," *Int. J. Environ. Res. Public Health*, vol. 17, no. 2, 2020.

[22] H. Li, B. Yuan, Q. Meng, and I. Kawachi, "Contextual factors associated with burnout among Chinese primary care providers: A multilevel analysis," *Int. J. Environ. Res.*

Public Health, vol. 16, no. 19, 2019.

[23] Ministry Of Health Malaysia, “Health Facts 2021,” vol. 21, no. November, 2021.

[24] A. Bruyneel, P. Smith, J. Tack, and M. Pirson, “Prevalence of burnout risk and factors associated with burnout risk among ICU nurses during the COVID-19 outbreak in French speaking Belgium,” *Intensive Crit. Care Nurs.*, vol. 65, no. xxxx, p. 103059, 2021.

[25] L. H. Aiken *et al.*, “Patient safety, satisfaction, and quality of hospital care: Cross sectional surveys of nurses and patients in 12 countries in Europe and the United States,” *BMJ*, vol. 344, no. 7851, pp. 1–14, 2012.

[26] E. Yeun and H. Kim, “The Effects of Supervisor Support, Emotional Exhaustion, and Sense of Personal Accomplishment on Hospital Nurse Turnover Intentions,” *Indian J. Sci. Technol.*, vol. 8, no. S5, pp. 63–68, Mar. 2015.

[27] L. H. Aiken *et al.*, “Importance of work environments on hospital outcomes in nine countries,” *Int. J. Qual. Heal. Care*, vol. 23, no. 4, pp. 357–364, 2011.

[28] L. feng Zhang *et al.*, “The association of Chinese hospital work environment with nurse burnout, job satisfaction, and intention to leave,” *Nurs. Outlook*, vol. 62, no. 2, pp. 128–137, 2014.

[29] T. Ahmed, H. Shah, A. Rasheed, and A. Ali, “Burnout among nurses working at Dow and Civil Hospitals in Karachi: A cross-sectional study,” *J. Pak. Med. Assoc.*, vol. 70, no. 6, pp. 1018–1022, 2020.

[30] A. Khodadadizadeh, A. Ravari, A. Sayadi, H. Khodadadi, and H. Jafarinaveh, “Occupational burnout assessment among nurses working in Iranian hospital of Ali-ebn Abitaleb, Rafsanjan- Iran,” *J. Occup. Heal. Epidemiol.*, vol. 1, no. 2, pp. 103–110, 2012.

[31] E. Ayala and A. M. Carnero, “Determinants of Burnout in Acute and Critical Care Military Nursing Personnel: A Cross-Sectional Study from Peru,” *PLoS One*, vol. 8, no. 1, 2013.

[32] A. Bartosiewicz and P. Januszewicz, “Readiness of Polish nurses for prescribing and the level of professional burnout,” *Int. J. Environ. Res. Public Health*, vol. 16, no. 1, 2019.

[33] S. C. P. S. Silva, M. A. P. Nunes, V. R. Santana, F. P. Reis, J. Machado Neto, and S. O. Lima, “A síndrome de burnout em profissionais da rede de atenção primária à Saúde de Aracaju, Brasil,” *Cienc. e Saude Coletiva*, vol. 20, no. 10, pp. 3011–3020, 2015.

[34] E. Amoafo, N. Hanbali, A. Patel, and P. Singh, “What are the significant factors associated with burnout in doctors?,” *Occup. Med. (Lond).*, vol. 65, no. 2, pp. 117–121, 2015.

[35] L. P. Chou, C. Y. Li, and S. C. Hu, “Job stress and burnout in hospital employees: Comparisons of different medical professions in a regional hospital in Taiwan,” *BMJ Open*, vol. 4, no. 2, pp. 1–7, 2014.

[36] E. Zarei, F. Ahmadi, M. S. Sial, J. Hwang, and P. A. Thu, “Prevalence of Burnout among Primary Health Care Sta ff and Its Predictors : A Study in Iran,” *Int. J. Environ. Res. Public Health*, 2019.

[37] Y.-H. Lee and M.-H. Lin, “Exploring the Relationship Between Burnout and Job Satisfaction Among Clinical Nurses,” *Eur. Sci. J. ESJ*, vol. 15, no. 3, pp. 449–460, 2019.

[38] F. E. Okwaraji and E. N. Aguwa, “Burnout and psychological distress among nurses in a Nigerian tertiary health institution,” *Afr. Health Sci.*, vol. 14, no. 1, pp. 237–245, 2014.

[39] J. Wang *et al.*, “Prevalence of burnout among intensivists in mainland China: a nationwide cross-sectional survey,” *Crit. Care*, vol. 25, no. 1, pp. 1–10, 2021.

[40] M. Sofology, M. Efstratopoulou, and T. Dunn, “Predicting Burnout Syndrome in Greek Mental Health Professionals,” *J. Soc. Serv. Res.*, vol. 45, no. 1, pp. 142–149, 2019.

[41] E. M. de Vasconcelos and M. M. F. De Martino, “Predictors of burnout syndrome in intensive care nurses,” *Rev. Gauch. Enferm.*, vol. 38, no. 4, p. e65354, 2018.

[42] Z. Ashrafi, H. Ebrahimi, A. Khosravi, A. Navidian, and A. Ghajar, “The Relationship Between Quality of Work Life and Burnout: A Linear Regression Structural-Equation Modeling,” *Heal. Scope*, vol. 7, no. 1, pp. 1–7, 2018.

[43] G. A. Cañadas-De La Fuente, E. Ortega, L. Ramirez-Baena, E. I. De La Fuente-Solana, C. Vargas, and J. Luis Gómez-Urquiza, “Gender, marital status, and children

as risk factors for burnout in nurses: A meta-analytic study," *mdpi.com*.

[44] Z. Xie, A. Wang, and B. Chen, "Nurse burnout and its association with occupational stress in a cross-sectional study in Shanghai," *J. Adv. Nurs.*, vol. 67, no. 7, pp. 1537–1546, 2011.

[45] Y. Yestiana, T. Kurniati, and A. A. A. Hidayat, "Predictors of burnout in nurses working in inpatient rooms at a public hospital in Indonesia," *Pan Afr. Med. J.*, vol. 33, pp. 1–8, 2019.

[46] P. C. Lin *et al.*, "The association between rotating shift work and increased occupational stress in nurses," *J. Occup. Health*, vol. 57, no. 4, pp. 307–315, 2015.

[47] K. V. Amaral, M. J. Q. Galdino, and J. T. Martins, "Burnout, daytime sleepiness and sleep quality among technical-level Nursing students," *Rev. Lat. Am. Enfermagem*, vol. 29, 2021.

[48] M. Govindan, P. Keefer, J. Sturza, M. R. Stephens, and N. Malas, "Empowering Residents to Process Distressing Events: A Debriefing Workshop," *MedEdPORTAL J. Teach. Learn. Resour.*, vol. 15, p. 10809, 2019.

[49] J. Maben and J. Bridges, "Covid-19: Supporting nurses' psychological and mental health," *J. Clin. Nurs.*, vol. 29, no. 15–16, pp. 2742–2750, 2020.

[50] A. Fathi and R. H. Simamora, "Investigating nurses' coping strategies in their workplace as an indicator of quality of nurses' life in Indonesia: A preliminary study," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 248, no. 1, 2019.

[51] C. Di Monte, S. Monaco, R. Mariani, and M. Di Trani, "From Resilience to Burnout: Psychological Features of Italian General Practitioners During COVID-19 Emergency," *Front. Psychol.*, vol. 11, no. October, 2020.

[52] M. Salman *et al.*, "The psychological effects of COVID-19 on frontline healthcare workers and how they are coping: a web-based, cross-sectional study from Pakistan," *medRxiv*, p. 2020.06.03.20119867, 2020.

[53] B. Maraqa, Z. Nazzal, and T. Zink, "Palestinian Health Care Workers' Stress and Stressors During COVID-19 Pandemic: A Cross-Sectional Study," *J. Prim. Care Community Heal.*, vol. 11, 2020.

[54] A. Mattei, F. Fiasca, M. Mazzei, V. Abbossida, and V. Bianchini, "Burnout among

healthcare workers at L'Aquila: its prevalence and associated factors," *Psychol. Heal. Med.*, vol. 22, no. 10, pp. 1262–1270, 2017.

[55] A. Shechter *et al.*, "Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic," *Gen. Hosp. Psychiatry*, vol. 66, no. May, pp. 1–8, 2020.

[56] K. Mctiernan and N. Mcdonald, "Occupational stressors, burnout and coping strategies between hospital and community psychiatric nurses in a Dublin region," *J. Psychiatr. Ment. Health Nurs.*, vol. 22, no. 3, pp. 208–218, Apr. 2015.

[57] H. Zhou *et al.*, "Mediating effect of coping styles on the association between psychological capital and psychological distress among Chinese nurses: a cross-sectional study," *J. Psychiatr. Ment. Health Nurs.*, vol. 24, no. 2–3, pp. 114–122, Mar. 2017.

[58] H. F. Lee, C. C. Kuo, T. W. Chien, and Y. R. Wang, "A Meta-Analysis of the Effects of Coping Strategies on Reducing Nurse Burnout," *Appl. Nurs. Res.*, 2016.

[59] C. G. Leo *et al.*, "Burnout Among Healthcare Workers in the COVID 19 Era: A Review of the Existing Literature," *Front. Public Heal.*, vol. 9, no. October, pp. 1–6, 2021.

[60] E. D. Browning and J. S. Cruz, "Reflective Debriefing: A Social Work Intervention Addressing Moral Distress among ICU Nurses," *J. Soc. Work End-of-Life Palliat. Care*, vol. 14, no. 1, pp. 44–72, 2018.

Reporting checklist for cross sectional study.

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	2
Abstract	#1b	Provide in the abstract an informative and balanced summary	2

		of what was done and what was found	
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	5
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for exposed and unexposed groups if applicable.	6
Bias	#9	Describe any efforts to address potential sources of bias	6
Study size	#10	Explain how the study size was arrived at	5

Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	6
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	6
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	6
Statistical methods	#12c	Explain how missing data were addressed	6
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	6
Statistical methods	#12e	Describe any sensitivity analyses	n/a
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7
Participants	#13b	Give reasons for non-participation at each stage	7
Participants	#13c	Consider use of a flow diagram	n/a
Descriptive data	#14a	Give characteristics of study participants (eg demographic,	7-9

		clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	8-9
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	8-9
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
Main results	#16b	Report category boundaries when continuous variables were categorized	8-16
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	8-16
Discussion			
Key results	#18	Summarise key results with reference to study objectives	18-21
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	21

Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	18-12
Generalisability	#21	Discuss the generalisability (external validity) of the study results	21

Other Information

Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	23

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Burnout and Coping Strategies among Nurses in Malaysia: A National-level Cross-sectional Study

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Burnout and Coping Strategies among Nurses in Malaysia: A National-level Cross-Sectional Study

ABSTRACT

Objective: This national-level study aimed to determine the prevalence and risk factors of burnout, as well as the coping strategies among nurses in the Ministry of Health (MOH) Malaysia.

Design: Using a complex sampling design, a two-stage stratified cluster sampling was performed to recruit MOH nurses between August and November 2019.

Setting and Participants: A total of 2428 nurses from 32 hospitals and 28 district health offices answered the questionnaires based on Maslach Burnout Inventory for Human Services (MBI-HSS) and Brief COPE. Complex sampling analysis was applied.

Outcome measures: The outcome of interest was the prevalence of burnout and its three domains of emotional exhaustion (EE), depersonalisation (DP), and low personal accomplishment (PA). Odds ratios (OR) using 95% confidence intervals (CI) were calculated. Significant factors at the univariate level were entered into the multivariate logistic regression to identify independent predictors of burnout.

Results: One in four (24.4%) nurses experienced burnout. Younger, single, and childless nurses had a higher prevalence of burnout. Shift working nurses were 1.6 times more likely to develop burnout. Those who performed >6 night shifts per month were 1.5 times more predisposed to burnout (95% CI: 1.01, 2.36; p< 0.05). While encountering traumatic events at work led to 4.2 times (95% CI: 2.31, 7.63; p< 0.05) higher risk of burnout, those who received post-traumatic psychological support were better protected. The use of dysfunctional coping strategies was detrimental as it was positively correlated with EE and DP.

Conclusion: Addressing modifiable stressors of burnout at individual and institutional levels identified in this study can be potentially beneficial in reducing burnout and its undesirable effects among nurses. Interventions that promote positive coping strategies should be implemented. Organisational-driven efforts must target the improvement of work schedules for nurses and the establishment of a structured debriefing service for post-trauma counselling.

Keywords: Burnout, nurse, primary care, hospital, Malaysia, COPE, MBI

Strength and Limitations of this Study

- National-level study with a prominent sample size representative of the nursing population from both primary care and hospital settings in the public healthcare sector of a developing nation.
- The use of Maslach Burnout Inventory for Human Services (MBI-HSS) and Brief COPE, two internationally-used tools facilitates the comparison of burnout and coping strategies with other studies in the literature.
- Complex sampling analysis improves the precision of sample estimates by ensuring nursing populations from multiple stages of sampling have an equal probability of being in the sample.
- Causal relationships cannot be derived from the cross-sectional analysis as the exposure and outcome were assessed at the same time.
- Potential recall bias and social desirability bias from self-administered questionnaires.

Introduction

The concept of burnout was first described by Freudenberger as a syndrome of exhaustion of psychological and physical resources that commonly inflicts teachers, healthcare professionals, and social workers [1]. In 2019, under the 11th Revision of the International Classification of Diseases (ICD-11), burnout was categorised as an occupational phenomenon [2] resulting from chronic workplace stress that has not been successfully managed. The burnout syndrome encompasses three dimensions, namely emotional exhaustion (EE: feelings of energy depletion), depersonalisation (DP: increased mental distance from one's job), and personal accomplishment (PA: reduced professional efficacy) [3]. Coping strategies, when applied appropriately in a timely manner, can reduce or even prevent the onset of burnout. The importance of instilling positive coping strategies has been emphasised in relevant burnout literature.

Globally, the prevalence of burnout in the health sector has been extensively studied due to its close linkage with the wellbeing and productivity of healthcare workers (HCW) [4]. As early as 2013, a systematic review reported a burnout prevalence of 22-40% among nurses in ten European countries [5]. Recent studies reported that burnout and poor mental wellbeing among HCWs can lead to higher absenteeism and turnover rates. In addition to the significant financial costs from brain drain, burnout is also associated with increased adverse events and poorer patient satisfaction, subsequently leading to poorer quality of patient care [6–9].

The healthcare sector in Malaysia is a public-private dichotomous system. The public healthcare system under the Ministry of Health (MOH) is the main healthcare service provider. Nurses represent the backbone of the healthcare workforce in the MOH facilities. With an increasing workload, the nursing work environment is becoming more demanding and challenging, thus predisposing nurses to burnout. To date, the majority of burnout-related studies in Malaysia were single-centred, hospital-based, or focused solely on medical doctors [10–12]. As the primary gatekeepers of MOH facilities, nurses are often the first line of contact with the general public. To ensure that nurses can function optimally in a healthy working environment to ensure patients' wellbeing, it is imperative to investigate the extent of the burnout phenomenon among them. By identifying the predisposing factors and the commonly practised coping strategies among the at-risk nurses, the necessary mitigation measures can be put in place.

In view of the scarcity of national-level data, this study aimed to determine the prevalence of burnout syndrome among nurses in MOH facilities in Malaysia as well as its association with the relevant sociodemographic and professional characteristics using the data from a national survey conducted in 2019, right before the COVID-19 pandemic. We also examined coping strategies used by nurses in dealing with stressful conditions at work. Our findings can provide vital baseline information on burnout among nurses during the pre-pandemic era in the attempt to guide the planning and implementation of preventive actions, especially following the immeasurable workload and occupational burden brought on by the COVID-19 pandemic.

Material and Methods

A national-level cross-sectional study was conducted from September to December 2019 among the nurses working in the hospital and primary settings under the Ministry of Health (MOH) Malaysia. Complex sampling was applied to obtain a nationally representative population of nurses. A total of 2516 nurses from both the hospital and primary care settings were selected using a multistage stratified random sampling. Those who were on leaves of absence and with underlying psychiatric illness were excluded.

The sample size was calculated based on a single proportion for prevalence estimation. Based on a 27.3% estimated prevalence of burnout [13], a design effect of 2.5, and a non-response rate of 20%, the sample size required for a single data analysis was 953. However, as this consisted of two main groups of nurses from primary care and hospital settings, the sample size was multiplied by two and became 1906. Based on the latest workforce distribution data by the MOH Nursing Board, the proportion of nurses working in hospital and primary care settings were 82% and 18% respectively. Thus, the sample size required from hospitals was 1563 (1906*82%). However, due to the low sample size on the primary care side (1906*18%=343), it was adjusted to 953, the minimum sample size. Thus, the total sample size required for the study was 2516.

After that, a two-stage stratified cluster sampling was performed to select one state from each of the six zones in Malaysia, followed by the secondary stratum that was made up of 32 hospitals and 28 DHOs selected randomly from the six states in the primary stratum. Allocation of the sample to each state in Malaysia was done proportionately to the population size of nurses working in each state. The respondents were then randomly chosen from a list of nurses obtained from the liaison officers at each facility. A briefing was given to them to

explain the study objectives to the respondents and to highlight that their participation would be voluntary. Strict confidentiality was maintained and no identifier was used in the questionnaire. The participants were required to provide written informed consent before filling up the self-administered questionnaire. Completed questionnaires were returned to the investigators during the same session.

The questionnaire was prepared in dual languages of English and Malay (the national language of Malaysia). The first section of the questionnaire extracted information on the sociodemographic and professional characteristics of the nurses such as independent variables, namely age, gender, marital status, number of children, and household income. Based on the Malaysian Department of Statistics (DOSM) Household Income and Basic Amenities Survey 2019, household income categories in Malaysia were categorised as B40, M40, and T20; representing the bottom 40% (less than MYR 4,360), middle 40% (MYR 4,361-MYR 9,619), and the top 20% of income earners (more than MYR 9,620) [14].

In the next section, the Maslach Burnout Inventory for Human Services (MBI-HSS) was used to measure burnout syndrome among nurses. It comprises 22 items under three domains: EE (nine items), DP (five items), and PA (eight items). All items are rated on a seven-point Likert scale from zero (never), one (few times a year), two (once a month), three (a few times a month), four (once a week), five (a few times a week), to six (every day). The total values from each domain were summed up. The cut-off scores for EE, DP, and PA are >27, >13, and <32 respectively. In this study, the operational definition of burnout followed the description whereby a nurse would be considered burned out if he or she scored high on the dimensions of EE, DP, or both [15]. The translated version of MBI-HSS in the Malay language showed an overall Cronbach's alpha of 0.803, indicating a good internal consistency, thus making it culturally acceptable to be used in Malaysia [16].

The Malay version [17] of the Brief COPE [18] was used to measure strategies used for coping with stress. The questionnaire is made up of 28 items grouped into 14 subscales measuring three coping strategies: dysfunctional (venting, denial, substance use, behavioural disengagement, self-distraction, self-blame), problem-focused (active coping, planning, use of instrumental support), emotion-focused (use of emotional support, positive reframing, acceptance, religion, humour).

The data were analysed using Statistical Package for the Social Science (SPSS version 22). The levels of overall burnout and its three domains (EE, DP, and PA) were the outcomes of interest in this study. Following complex sampling analysis procedures, the

prevalence of burnout was calculated using sample weights and compared among all nurses under the MOH facilities in Malaysia. Sample weightage was carried out to allow references from persons included in the sample to the populations from which they were drawn. It was to allow unbiased estimates, taking account into the fact that all persons in the population would not have the same probability of selection. Odds ratios (OR) using 95% confidence intervals (CI) were calculated for categorical variables. Significant factors with a p-value <0.25 at the univariate level were entered into the multivariate logistic regression to identify independent predictors of burnout. The correlation matrix showed no sign of pairwise collinearity as all correlation coefficients were below 0.7. On top of that, all the variables met the assumption of collinearity (Tolerance <1, *VIF* <5). Therefore, multicollinearity was not a concern.

Patient and Public Involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Results

A total of 2428 nurses participated in the survey, giving a response rate of 93.9%. After data cleaning, responses from 2418 nurses were included in the final analysis. Table 1 shows the baseline characteristics of respondents. The majority of them were married (83.7%), had one to three children (59.2%), and between 31 to 40 years old (42.7%). More than half of the respondents (51.9%) had a diploma and had worked for more than 10 years (55.3%). Approximately two-thirds of the nurses (67.3%) spent more than half of their working hours performing direct clinical care on patients. As high as 63.1% of the respondents had to perform on-call or extended hour duties beyond normal working hours more than three times a month.

Table 1: Baseline Characteristics of the Nurses

	Variables	N	%
Age	Mean age (SD)		36.9 (8.1)
Age group (years)	21- 30	638	26.4
	31- 40	1033	42.7
	> 40	747	30.9
Marital status	Single	395	16.3
	Married	2023	83.7
No. of children	No child	502	20.9
	1 - 3 child	1419	59.2
	> 3 child	475	19.9
Education level	Certificate	569	23.6

	Diploma	1720	71.2
	Degree and above	126	5.2
Household income	B40	788	37.0
	M40	1173	55.0
	T20	171	8.0
Level of healthcare	Hospital	1524	63.0
	Primary Care	894	37.0
Year of service (years)	1 - 5	435	18.2
	6 -10	635	26.5
	> 10	1322	55.3
Time spent on clinical activities	> 50 %	1547	67.2
	< 50 %	756	32.8
Shift work	Yes	1056	44.6
	No	1311	55.4
Total number of shifts per month	> 24X	544	49.8
	< 24 X	549	50.3
Number of night shifts per month (evening + night)	> 6 x	409	40.7
	1 -6 X	596	59.3
Number of double shifts per month	> 5x	103	25.9
	1 - 4x	294	74.1
Number of on calls/ extended hours per month	1 – 3 x	324	36.9
	4 – 6 x	217	24.7
	> 7 x	338	38.4
Sleeping hours	<6 hours	673	28.8
	6-7 hours	1305	55.9
	>7 hours	358	15.3
Encountered traumatic events at work	Yes	667	27.7
	No	1737	72.3
Received debriefing/ psychological support for post-traumatic events	Yes	189	28.8
	No	468	71.2
Travelling time to the workplace	>30 minutes	444	18.5
	16-30 minutes	817	34.1
	<15 minutes	1138	47.4

Table 2 summarises the prevalence of burnout based on baseline characteristics. Based on the results, approximately one in every four nurses (24.4%, 95% CI: 17.7, 32.6) suffered from burnout syndrome with high scores in EE, DP, or both. The MBI score showed that 41.6% (95% CI 35.5, 48.0) of the nurses suffered from low PA, followed by 23.9% (95% CI 17.3, 32.1) with high EE, and 4.5% (95% CI 2.2, 9.1) with high DP. Younger age group (35.8, 95% CI: 28.3, 44.0), single (29.1, 95% CI: 13.2, 52.5) and childless (35.3, 95% CI: 30.1, 40.8) nurses recorded a higher prevalence of burnout. Burnout level was the lowest among nurses from M40 households (29.5, 95% CI: 20.7, 40.1) as compared to B40 and T20 groups. Hospital nurses reported a higher level of burnout than their counterparts in primary care facilities. Furthermore, nurses who were less involved in clinical activities experienced a higher level of burnout (28.2, 95% CI: 22.1, 35.3). Shift work and after-office hour duties also led to

a higher prevalence of burnout. Our study showed a 7% higher prevalence of burnout among nurses who performed shift work [Shift workers: 27.1% (95% CI: 18.2, 38.3), Non-shift workers: 20.7% (95% CI: 15.5, 27.1)]. In addition, nurses who performed on calls or extended hours more than seven times a month reported a h prevalence of burnout (24.4, 95% CI: 17.1, 33.7). Among those who experienced a traumatic event at work, 39.9% (95% CI: 29.9, 50.8) suffered from burnout. A higher prevalence of burnout (36.8%) was observed among nurses who did not receive any debriefing post-traumatic events (95% CI: 24.1, 51.7).

Table 2: Prevalence of Burnout and the domains of Emotional Exhaustion, Depersonalisation, and Low Personal Accomplishment among Nurses by Sociodemographic and Professional Characteristics

Prevalence Rate	Overall Burnout (95% CI)	High EE (95% CI)	High DP (95% CI)	Low PA (95% CI)
Overall nurses	24.4 (17.7, 32.6)	23.9 17.3, 32.1	4.5 (2.2, 9.1)	41.6 (35.4, 48.1)
Age Group (years)				
21- 30	35.8 (28.3, 44.0)	35.3 (28.3, 42.9)	8.3 (4.8, 13.9)	48.0 (41.0, 55.0)
31- 40	24.2 (17.5, 32.4)	23.4 (17.1, 31.0)	4.4 (2.1,9.2)	40.5 (34.3, 47.1)
> 40	15.5 (7.5, 29.3)	15.3 (7.4,29.1)	1.6 (0.5. 4.8)	37.6 (26.6, 50.1)
Marital status				
Single	29.1 (13.2, 52.5)	28.9 (13.2, 52.0)	6.7 (2.5, 17.0)	59.7 (36.7, 79.2)
Married	23.4 (18.4, 29.4)	22.9 (17.8, 28.8)	4.1 (1.7, 9.3)	37.9 (30.7, 45.6)
No. of children				
No child	35.3 (30.1, 40.8)	35.1 (30.1, 40.4)	7.0 (4.0, 12.1)	49.2 (38.8, 59.8)
1 - 3 child	24.7 (17.9, 33.2)	24.1 (17.3, 32.5)	4.8 (1.9, 12.0)	44.6 (33.3, 56.6)
> 3 child	14.0 (9.3, 20.5)	13.5 (9.1, 19.7)	1.5 (0.8, 3.0)	27.2 (14.8, 44.6)
Education level				
Certificate	15.6 (9.9, 23.7)	15.2 (9.6, 23.1)	2.1 (0.7, 5.9)	48.9 (29.6, 68.6)
Diploma	26.0 (19.3, 34.0)	25.5 (18.7, 33.6)	5.1 (2.5, 9.9)	40.0 (32.6, 47.9)
Degree and above	35.9 (24.5, 49.0)	35.9 (24.6, 49.0)	5.1 (1.7, 14.7)	37.1 (23.8, 52.7)
Household income				
B40	29.5 (20.7, 40.1)	29.0 (20.7, 39.0)	6.5 (3.2, 12.8)	44.5 (36.8, 52.4)
M40	22.3 (16.2, 29.9)	21.7 (15.5, 29.6)	3.8 (1.6, 8.4)	35.5 (27.0, 45.0)
T20	28.6 (15.3, 47.0)	28.6 (15.3, 47.0)	1.8 (0.6, 5.2)	32.6 (22.9, 44.1)
Level of healthcare				
Hospital	25.8 (16.6, 37.7)	25.2 (16.2, 37.1)	5.0 (2.1, 11.6)	45.3 (41.3, 49.3)
Primary Care	19.3 (14.4, 25.3)	18.9 (13.8, 25.4)	2.7 (1.6, 4.7)	27.9 (21.0, 35.9)
Year of service				
1 - 5	34.2 (22.9, 47.7)	33.4 (22.9, 45.8)	8.7 (4.3, 16.7)	48.3 (38.3, 58.4)
6 -10	29.5 (22.5, 37.6)	28.8 (22.1,36.5)	5.7 (2.4, 12.8)	41.4 (34.1, 49.1)
> 10	19.8 (15.1, 25.4)	19.5 (14.9, 25.0)	2.7 (1.4, 5.2)	42.2 (29.7, 55.9)
Time spent on clinical activities				
> 50 %	22.5 (15.2, 32.1)	21.9 (14.6, 31.6)	4.5 (2.4, 8.3)	41.2 (34.3, 48.7)
< 50 %	28.2 (22.1, 35.3)	27.9 (22.1, 34.5)	4.6 (1.5, 13.1)	41.7 (33.5, 50.5)
Shift work				
No	20.7 (15.5, 27.1)	19.9 (14.3, 26.9)	3.7 (1.9, 7.3)	40.2 (22.7, 60.6)
Yes	27.1 (18.2, 8.3)	26.8 (18.1, 37.8)	5.1 (2.3, 11.0)	42.2 (31.9, 53.3)
Total number of shifts per month				

Prevalence Rate	Overall Burnout (95% CI)	High EE (95% CI)	High DP (95% CI)	Low PA (95% CI)
> 24X	27.2 (15.4, 43.5)	26.9 (15.3, 42.8)	3.2 (0.8, 11.7)	34.3 (18.9, 53.8)
< 24 X	27.5 (19.5, 37.1)	27.3 (19.3, 37.0)	7.1 (3.7, 13.5)	50.9 (43.3, 58.4)
Total number of night shifts per month				
> 6x	33.9 (23.6, 46.1)	33.8 (23.5, 46.0)	8.2 (4.4, 14.9)	44.6 (38.3, 51.1)
1 - 6x	22.9 (14.8, 33.6)	22.5 (14.7, 32.9)	2.9 (0.7, 11.6)	40.2 (27.9, 54.0)
Total number of double shifts per month				
> 5x	35.5 (24.0, 48.8)	35.5 (24.0, 48.8)	9.4 (3.3, 24.4)	41.2 (18.0, 69.0)
1 - 4x	32.3 (22.3, 44.2)	31.7 (22.1, 43.2)	7.2 (3.7, 13.7)	43.4 (33.3, 54.1)
Total number of on-call / extended hours per month				
1 – 3 x	18.0 (7.8, 36.0)	16.6 (6.0, 38.4)	2.6 (0.8, 8.4)	49.7 (19.6, 79.9)
4 – 6 x	20.3 (14.1, 28.4)	20.3 (14.1, 28.4)	5.8 (2.5, 12.7)	28.2 (13.9, 49.0)
> 7 x	24.4 (17.1, 33.7)	23.5 (16.3, 32.6)	3.1 (1.2, 7.5)	31.2 (20.5, 44.5)
Sleeping hours				
<6 hours	35.7 (29.7, 42.2)	35.5 (29.6, 41.8)	7.5 (4.8, 11.6)	44.7 (36.3, 53.4)
6-7 hours	20.7 (13.2, 31.0)	20.0 (12.6, 30.3)	3.6 (1.3, 9.1)	42.0 (35.9, 48.4)
>7 hours	17.0 (12.8, 22.1)	16.5 (12.2, 22.0)	2.9 (0.9, 9.5)	35.4 (21.6, 52.2)
Encountered traumatic events at work				
Yes	39.9 (29.9, 50.8)	38.9 (28.4, 50.5)	9.7 (7.7, 12.2)	43.9 (31.7, 56.9)
No	18.5 (12.8, 26.0)	18.2 (12.7, 25.5)	2.5 (0.6, 9.4)	40.8 (32.1, 50.1)
Received debriefing/psychological support for post- traumatic event				
Yes	19.5 (7.3, 42.8)	19.8 (6.8, 45.7)	3.6 (1.1, 11.3)	33.4 (11.2, 55.5)
No	36.8 (24.1, 51.7)	49.6 (40.0, 59.2)	13.3 (8.2, 20.8)	50.0 (39.1, 60.9)
Travelling time to the workplace				
>30 minutes	30.6 (17.5, 47.8)	29.9 (17.1, 46.8)	5.5 (2.1, 13.6)	59.9 (40.9, 76.4)
16-30 minutes	25.0 (16.1, 36.9)	24.7 (16.1, 35.9)	5.4 (2.2, 12.7)	42.2 (30.2, 55.2)
<15 minutes	21.7 (16.8, 27.5)	21.1 (15.9, 27.6)	3.5 (1.7, 7.0)	34.3 (27.9, 41.5)

Based on the results, problem-focused coping strategies were positively related to the PA domain in MBI. An increase of one-point in the scores of active coping and planning led to a 2.4 and 2.6 points increase in the score of PA. In contrast, dysfunctional coping strategies were negatively related to PA. A one-point increase in the score of substance use, self-blame, and behavioural disengagement resulted in 1.1, 1.6, and 2.0 points reduction in the PA score. Most of the significant predictors that led to higher scores under the domains of EE and DP were dysfunctional coping strategies (Table 3).

Table 3: Influences of different coping strategies on domains of emotional exhaustion, depersonalisation, and personal accomplishment under burnout syndrome through analysis of the slope of the regression line

Coping strategies (Brief COPE)	Emotional exhaustion *B* (r^2)	Depersonalisation *B* (r^2)	Personal accomplishment *B* (r^2)
Problem-focused			
Active coping	1.041 (0.02)	-0.032 (0.00)	2.418 (0.17)**
Planning	0.562 (0.00)	-0.083 (0.00)	2.557 (0.18)**
Use of instrumental support	1.408 (0.04)	0.269 (0.01)	0.614 (0.01)
Emotion-focused			
Use of emotional support	1.803 (0.07)*	0.331 (0.02)**	0.737 (0.02)
Positive reframing	0.385 (0.00)	-0.218 (0.01)	2.224 (0.13)**
Acceptance	1.500 (0.04)	0.237 (0.01)	1.570 (0.09)
Religion	-0.470 (0.00)	-0.290 (0.01)*	1.381 (0.04)**
Humour	2.455 (0.07)**	0.843 (0.07)***	-0.436 (0.00)
Dysfunctional			
Venting	3.771 (0.18)**	0.944 (0.09)**	-0.812 (0.02)
Denial	1.807 (0.04)	0.938 (0.09)***	-1.124 (0.00)
Substance use	2.652 (0.01)**	0.973 (0.01)*	-1.127 (0.00)*
Behavioural disengagement	4.350 (0.18)***	1.293 (0.13)***	-2.000 (0.07)***
Self-distraction	2.428 (0.13)**	0.396 (0.03)**	0.885 (0.03)
Self-blame	1.702 (0.04)	0.698 (0.06)*	-1.602 (0.07)**

*$p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

B denotes β-coefficient, r^2 denotes the coefficient of determination

Table 4 shows the association between baseline variables and the risk of burnout using univariate logistic regression. Age group, number of children, education level, and years of service were closely associated with the development of burnout and its subdomains. A higher number of shifts, double shifts, and night shifts per month, as well as sleep deprivation (< 6 hours per night), were significantly associated with burnout ($p < 0.05$).

Table 4: Association between demographic and professional characteristics with burnout using univariate logistic regression

	Burnout		High EE		High DP		Low PA	
	Crude OR (95% CI)	*p-value*	Crude OR (95% CI)	*p-value*	Crude OR (95% CI)	*p*-value	Crude OR (95% CI)	*p*-value
Age Group (years)								
21- 30	3.04 (1.45 - 6.38)	**0.010**	3.02 (1.44 - 6.35)	**0.011**	5.67 (2.74 – 11.71)	**0.001**	1.53 (0.88 – 2.64)	0.108
31- 40	1.74 (0.66 - 4.60)	0.211	1.69 (0.67 - 4.27)	0.217	2.91 (1.15 – 7.39)	**0.031**	1.13 (0.62 – 2.04)	0.634
> 40	1		1		1		1	
Marital Status								
Single	1.34 (0.60 - 2.98)	0.402	1.37 (0.64 - 2.96)	0.355	1.69 (0.46 – 6.21)	0.359	2.43 (0.79 – 7.50)	0.102
Married	1		1		1		1	
No. of children								
No child	3.36 (2.36 - 4.79)	**<0.001**	3.46 (2.47 - 4.83)	**<0.001**	4.83 (1.96 – 11.92)	**0.005**	2.60 (1.17 – 5.76)	**0.026**
1 - 3 child	2.02 (1.26 - 3.22)	**0.011**	2.03 (1.32 - 3.11)	**0.007**	3.25 (0.75 – 14.15)	0.098	2.16 (0.71 – 6.58)	0.141
> 3 child	1		1		1		1	
Education level								
Degree and above	3.02 (1.61 - 5.67)	**0.005**	3.12 (1.65 - 5.90)	**0.005**	2.57 (1.23 – 5.36)	**0.020**	0.62 (o.29 – 1.28)	0.154
Diploma	1.89 (1.22 - 2.96)	**0.012**	1.91 (1.19 - 3.06)	**0.015**	2.55 (1.21 – 5.39)	**0.022**	0.69 (0.28 – 1.76)	0.376
Certificate	1		1		1		1	
Household Income								
B 40	1.05 (0.38 - 2.89)	0.917	1.02 (0.37 – 2.81)	0.962	3.68 (1.89 – 7.15)	**0.003**	1.66 (0.90 – 3.05)	0.089
M 40	0.72 (0.30 - 1.70)	0.383	0.69 (0.29 – 1.65)	0.339	2.09 (1.17 – 3.71)	**0.020**	1.14 (0.55 – 2.36)	0.682
T 20	1		1		1		1	
Level of Healthcare								
Hospital	1.46 (0.63-3.38)	0.308	1.45 (0.62 – 3.37)	0.324	1.86 (0.48 – 7.26)	0.307	2.14 (1.33 – 3.44)	**0.008**
Primary Care	1		1		1		1	
Year of Service (years)								
1 - 5	2.11 (1.49 - 2.99)	**0.002**	2.07 (1.51 – 2.84)	**0.001**	3.42 (2.09 – 5.57)	**0.001**	1.28 (0.66 – 2.49)	0.402
6 -10	1.69 (1.04 - 2.78)	**0.039**	1.67 (1.07 – 2.60)	**0.030**	2.16 (1.29 – 3.62)	**0.011**	0.97 (0.56 – 1.67)	0.885
> 10	1		1		1		1	
Time spend on clinical activities								
> 50 %	0.74 (0.54 – 1.02)	0.062	0.73 (0.53 – 1.01)	0.053	0.97 (0.49 – 1.93)	0.908	0.98 (0.69 – 1.39)	0.887
< 50 %	1		1		1		1	
Shift Work								
Yes	1.42 (0.95-2.13)	0.076	1.48 (0.99-2.24)	0.060	1.39 (0.83-2.34)	0.170	1.09 (0.33-3.54)	0.870
No	1		1		1		1	
Total number of shifts per month								
> 24	1.11 (0.86-1.43)	0.417	0.98 (0.94-1.03)	0.394	0.43 0.39- 0.47)	**<0.001**	0.50 (0.48-0.52)	**<0.001**
< 24	1		1		1		1	
Total number of night shifts per month								
> 6	1.55 (1.18-2.02)	**0.001**	1.76 (1.68-1.84)	**<0.001**	2.99 (2.71-3.30)	**<0.001**	1.19 (1.15-1.25)	**<0.001**
1 - 6	1		1		1		1	

	Burnout		High EE		High DP		Low PA	
	Crude OR (95% CI)	*p-value*	Crude OR (95% CI)	*p-value*	Crude OR (95% CI)	*p*-value	Crude OR (95% CI)	*p*-value
Total number of double shifts per month								
> 5	1.15 (1.07-1.25)	**<0.001**	1.18 (1.09-1.28)	**<0.001**	1.34 (1.17-1.53)	**<0.001**	0.91 (0.85-0.99)	**0.019**
1 - 5	1		1		1		1	
Total number of on-call / extended hours per month								
> 6	1.48 (0.41 - 5.26)	0.483	1.54 (0.35 – 6.73)	0.498	1.17 (0.19 – 7.26)	0.839	0.46 (0.12 – 1.76)	0.206
4 – 6	1.16 (0.36 - 3.74)	0.760	1.28 (0.33 – 4.96)	0.670	2.27 (0.49 – 10.46)	0.236	0.39 (0.14 – 1.15)	0.078
1 – 3	1		1		1		1	
Sleeping Hours								
<6	2.72 (1.78 – 4.16)	**0.001**	2.78 (1.78-4.35)	**0.001**	2.72 (1.06-7.00)	0.041	1.47 (0.77-2.81)	0.191
6-7	1.28 (0.78 – 2.09)	0.270	1.27 (0.76-2.13)	0.307	1.23 (0.73-2.08)	0.367	1.32 (0.79-2.24)	0.245
>7	1		1		1		1	
Encountered traumatic event at work								
Yes	2.92 (2.24 – 3.81)	**<0.001**	2.85 (2.17-3.76)	**<0.001**	4.11 (1.24-13.7)	0.028	1.14 (0.55-2.35)	0.685
No	1		1		1		1	
Received debriefing/psychological support for post-traumatic event								
Yes	0.42 (0.11 – 1.62)	0.165	0.25 (0.06-1.05)	0.056	0.36 (0.08-1.58)	0.143	0.60 (0.15-2.41)	0.404
No	1		1		1		1	
Travelling Time to the Workplace								
>30 minutes	1.59 (0.89 – 2.86)	0.100	1.59 (0.91-2.79)	0.091	1.61 (0.54-4.77)	0.329	2.86 (1.04-7.84)	0.044
16-30 minutes	1.21 (0.79 – 1.85)	0.326	1.22 (0.80-1.86)	0.292	1.56 (1.01-2.41)	**0.047**	1.39 (0.85-2.30)	0.155
<15 minutes	1		1		1		1	

All variables with $p < 0.25$ at the univariate level were included in the multivariate logistic regression to determine the predictors for burnout among the nurses (Table 5). Based on the results, shift working nurses were 1.6 times more likely to develop burnout than their non-shift working counterparts. Those who performed more than six night shifts per month were more predisposed to experience overall burnout, high EE, and high DP at 1.54 (95% CI: 1.01, 2.36; $p < 0.05$), 1.55 (95% CI: 1.44, 1.67; $p<0.001$), and 2.52 (95% CI: 2.18, 2.90; $p < 0.001$) times, respectively. In addition, sleep deprivation led to significantly higher levels of overall burnout and EE. Having less than six hours of sleep per day increased the prevalence of burnout and EE by 2.89 (95% CI: 1.40, 5.97; $p < 0.05$) and 2.94 times (95% CI: 1.36, 6.38; $p < 0.05$). While encountering traumatic events at work led to 4.19 times (95% CI: 2.31, 7.63; $p < 0.05$) higher risk of overall burnout and 4.42 times higher risk of EE (95% CI: 2.28, 8.57; $p < 0.05$), those who received psychological support or debriefing post-traumatic events were protected against burnout.

Table 5: Association between sociodemographic and professional factors with burnout among nurses using multivariate logistic regression

	Burnout		High EE		High DP		Low PA	
	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
Age Group (years)								
21- 30	0.94 (0.18 – 4.95)	0.930	1.04 (0.26 – 4.22)	0.942	0.07 (0.00 – 11.03)	0.240	2.10 (0.69 – 6.39)	0.154
31- 40	0.78 (0.18 – 3.39)	0.699	0.73 (0.21 – 2.59)	0.570	4.13 (0.40 – 42.19)	0.178	2.23 (1.46 – 3.39)	**0.003**
> 40	1		1		1		1	
Marital Status								
Single							0.56 (0.24 – 1.32)	0.148
Married							1	
No of Children								
No child	2.13 (0.98 – 4.65)	0.055	2.19 (0.88 – 5.45)	0.081	0.45 (0.01 – 14.69)	0.585	1.55 (0.39 – 6.19)	0.470
1 - 3 child	1.57 (0.56 – 4.42)	0.328	1.42 (0.56 – 3.65)	0.395	7.53 (0.55 – 104.08)	0.105	0.91 (0.58 – 1.44)	0.645
> 3 child	1		1		1		1	
Education level								
Degree and above	0.36 (0.04 – 2.97)	0.281	0.37 (0.04 – 3.69)	0.328	0.29 (0.05 – 1714.76)	0.727	0.35 (0.02 – 5.24)	0.378
Diploma	0.46 (0.09 – 2.54)	0.311	0.43 (0.07 – 2.48)	0.280	0.82 (0.00 – 280.84)	0.933	0.24 (0.03 – 2.02)	0.152
Certificate	1		1		1			
Household Income								
B 40					5.39 (0.04 – 840.39)	0.431	2.76 (0.87 – 8.76)	0.075
M 40					3.22 (0.00 – 3041.25)	0.679	2.68 (1.19 – 6.08)	**0.025**
T 20					1		1	
Level of Healthcare								
Hospital								
Primary Care								
Year of Service (years)								
1 - 5	0.69 (0.18 – 2.61)	0.514	0.49 (0.10 – 2.45)	0.324	80.67 (0.70 – 9256.64)	0.063		
6 -10	0.92 (0.26 – 3.22)	0.881	0.76 (0.21 – 2.76)	0.617	4.52 (0.491 – 41.68)	0.141		
> 10	1		1		1			
Time spent on clinical activities								
> 50 %	0.91 (0.63 – 1.32)	0.568	0.85 (0.62 – 1.17)	0.265				
< 50 %	1		1					
Shift Work								
Yes	1.56 (0.45 – 1.92)	**0.023**	1.16 (0.59 – 1.25)	0.360	1.85 (0.00 – 3817.23)	0.843		
No	1		1		1			
Total number of shifts per month								
> 24					2.61 (2.27 – 3.01)	**<0.001**	2.28 (2.12 – 2.45)	**<0.001**
< 24					1		1	
Total number of night shifts per month								
> 6	1.54 (1.01 - 2.36)	**0.045**	1.55 (1.44 – 1.67)	**<0.001**	2.52 (2.18 – 2.90)	**<0.001**	1.04 (0.97 – 1.12)	0.240
1 - 6	1							
Total number of double shifts per month								

	Burnout		High EE		High DP		Low PA	
	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
> 5	0.86 (0.54 – 1.37)	0.522	0.94 (0.87 – 1.02)	0.154	1.04 (0.89 – 1.21)	0.660	1.86 (0.79 – 1.93)	**<0.001**
1 - 5	1		1		1		1	
Total number of on-call / extended hours per month								
> 7					2.47 (0.08 – 73.03)	0.522	0.65 (0.41 – 1.03)	0.062
4 – 6					4.69 (0.14 – 163.22)	0.314	0.64 (0.23 – 1.81)	0.334
1 – 3					1		1	
Sleeping Hours								
<6	2.89 (1.40 – 5.97)	**0.011**	2.94 (1.36 – 6.38)	**0.014**	1.81 (0.77 – 4.24)	0.140	1.59 (0.69 - 2.62)	0.064
6-7	1.62 (0.75 – 3.48)	0.176	1.43 (0.72 – 2.87)	0.252	1.24 0.55 – 2.75)	0.543	1.28 (0.93 - 1.76)	0.110
>7	1		1		1		1	
Encountered traumatic event at work								
Yes	4.19 (2.31 – 7.63)	**0.001**	4.42 (2.28 – 8.57)	**0.002**	2.99 (0.98 – 9.07)	0.053		
No	1		1		1			
Received debriefing/psychological support for post-traumatic event								
Yes	0.47 (0.28 – 0.79)	**0.013**	0.49 (0.28 – 0.88)	**0.025**	0.21 (0.01 – 3817.23)	0.201		
No	1		1		1			
Travelling Time to the Workplace								
>30 minutes	3.55 (0.69 – 18.09)	0.106	3.95 (0.88 – 17.78)	0.067	0.13 (0.01 – 2.06)	0.115	2.24 (1.18 – 4.23)	**0.021**
16-30 minutes	1.38 (0.45 – 4.23)	0.509	1.44 (0.58 – 3.62)	0.368	0.94 (0.14 – 6.24)	0.938	1.05 (0.29 – 3.76)	0.928
<15 minutes	1		1		1			

Discussion

Burnout among HCW is a global phenomenon that can cast a profound negative impact on the personal wellbeing and organisational performance. This study was planned and executed back in 2019 in view of the lack of national-level data on the prevalence and common predictors of burnout among nurses in Malaysia. The results have now become important baseline data to compare the pre- and post-pandemic levels of burnout among the nurses in Malaysia.

In this study, one in every four nurses experienced burnout. The prevalence of burnout (24.4%) was comparable to single-centred studies among nurses from teaching hospitals in Malaysia (27.3%) [13] and Thailand (22.0%) [19]. However, it was half of the prevalence among nurses in Indonesia (48.8%) [20]. In contrast, the pool prevalence of burnout globally was lower at 11.2% according to a systematic review [21] and in Brazil (18.3%) [22]. While the actual prevalence of burnout is likely to be different across countries and settings, the differences can also be attributed to the tools and classifications of burnout used in each published study.

With regard to the three domains of burnout, a high proportion of nurses in this study experienced low PA (41.6%) and high EE (23.9%), with a smaller percentage of them having high DP (4.5%). Similar results were reported among primary care providers in China, except for higher prevalence rates for each domain (low PA: 41.4%, high EE: 33.1%, high DP: 8.8%) [23]. Malaysia recorded a slightly higher nurse-to-population ratio at 1:297 [24] compared to the ratio of 1:250 recommended by the World Health Organisation (WHO) [25]. A high nurse-to- patient ratio that indicated poor staffing and shortages of basic medical equipment at work were significantly associated with the risk of developing EE [26-27]. In addition, Yeun and Kim described that supervisory support is vital in minimising EE by nurturing a sense of PA among the staff. In fact, this support is so essential that it has been linked with the retention of nurses [28]. Apart from that, the sense of PA often heightens with higher levels of education. Studies from other countries that reported a lower prevalence of low PA consisted mostly of nurses who were degree or master holders [29]. In comparison, only 5.2% of our nurses were degree holders, thus likely attributed to the higher prevalence of low PA. Hence, one of the long-term strategies to enhance nurses' PA and reduce their burnout is by improving their access to further education to elevate their professional status [30].

In terms of age group, younger nurses reported a higher prevalence of burnout in this study. This is in line with previous studies from various countries [31–37]. In addition, similar to other studies [13, 32, 38], years of working experience were also associated with burnout whereby junior nurses were more susceptible to burnout than their senior counterparts. This could be attributed to the fact that junior nurses have yet to master the nursing skills, thus requiring a longer period to complete their tasks. They might also lack resilience in managing occupational stress, a skill that is often acquired with longer years of work experience [33, 38–40]. With regard to the association between burnout with marital status and the number of children, there have been contradictory findings in the research. In this study, burnout was higher among nurses who were single. Some studies reported that single nurses tend to have less social and family support, thus predisposing them to burnout [39, 41–43]. Furthermore, in this study, a lower number of children was also a significant predictor of burnout. However, most of the published studies reported the opposite whereby nurses with children were associated with higher EE and decreased PA, likely due to the additional obligations and potential family-work conflicts [33, 44, 45]. Recent studies have reported an association between smoking and alcohol use with burnout among healthcare professionals in other countries. However, disparities in the sociocultural norms, as well as tobacco and alcohol legislation, could explain the prevalence dissimilarity across countries. In this study, the prevalence of smoking and alcohol use was very low (<0.1%). According to the Malaysian

National Health Morbidity Survey (NHMS), the ratio of Malaysian male to female smokers was 31:1. Furthermore, other ethnicities apart from Malays were more likely to be associated with alcohol consumption [46]. Given that nurses in Malaysia are predominantly female Malay Muslims, it is unsurprising to find a low prevalence of smokers and alcohol drinkers among our study population. Thus, both of these variables were excluded from further analysis.

Working schedule also plays a vital role in the development of burnout, especially among hospital nurses who need to perform shift duties. In this study, while the total number of shifts per month was not significantly linked to the development of burnout, the number of night shifts was a significant predictor of overall burnout, high EE, and high DP. Similarly, a higher number of double shifts led to low PA. Similar findings were noted among nurses in China and Thailand [19, 37, 47-48]. Shift work rotation may disrupt the circadian rhythm and sleeping patterns of the involved staff. Previous research found that nurses on more rotational shifts or night shifts were more likely to suffer from negative physical and psychological health impacts [49]. Additionally, night shift workers commonly experience excessive daytime fatigue and somnolence that predispose them to higher risks EE and DP [50]. Despite these health hazards, the nature of shift work will be hard to modify as it is an integral part of the nursing profession to provide round-the-clock patient care. Therefore, it is vital to integrate important components such as sleep hygiene and psychosocial support into the nursing education curriculum to better equip young nurses in facing the impending challenges in their future careers.

Healthcare workers, especially doctors and nurses, are often exposed to highly stressful traumatic events such as witnessing deaths or injuries, dealing with patients with critical illnesses, and managing the demands of patients' relatives. Often, nurses are expected to remain stoic and continue caring for the patients after these stressful situations, subsequently leading to the development of burnout. Debriefing or psychological support was proposed as one of the ways to reduce the incidence of burnout from post-traumatic events [51]. This is evidenced by our study findings in which nurses who experienced traumatic events were less likely to develop burnout following debriefing or psychological support sessions. Debriefing, taking regular breaks, and utilising stress reduction measures throughout shifts have been demonstrated to reduce the risk of burnout among nurses [52]. However, only one-quarter of nurses who encountered traumatic events at work received debriefing in this study. In view of this, a structured debriefing system should be put in place in various health facilities to provide the necessary psychological support services to ensure the mental wellbeing of nurses and other HCWs alike.

In this study, we also evaluated the coping mechanisms applied by the nurses. Different coping strategies, be it problem-focused, emotion-focused, or dysfunctional mechanisms can have varying effects on personal emotions and work approaches. Problem-focused coping responses to distress reflect positive cognitive and behavioural efforts in resolving life stressors. Thus, it can be beneficial in dealing with stressors [53]. In a recent study, the use of emotion-focused and dysfunctional coping styles was linked to higher levels of EE, whereas problem-focused coping styles were linked to lower scores of DP and higher scores of PA [54]. In this study, the use of religion as an emotion-focused coping strategy showed a positive correlation with high PA and low DP. Similarly, in Pakistan [55] and Palestine [56], praying and other religious activities were the highest-ranked coping techniques practised by the HCW. Religious belief was shown to be helpful for nurses to deal with challenges at work and maintaining the quality of healthcare [57-58]. In contrast, the use of dysfunctional coping mechanism has been linked with mood disturbances and poor mental health [42, 48]. A high number of nurses relied on dysfunctional coping strategies such as behavioural disengagement and venting that led to a significant increase in the three domains of burnout. This echoed the findings of two other studies whereby dysfunctional coping was strongly linked to EE and DP [59-60].

Accordingly, one of the major practical implications of our research findings is that it provides much-needed empirical data on the actual prevalence of burnout on a national-level. With one in four nurses experiencing burnout, more attention and resources are warranted to prevent a worsening of the problem. A second important contribution of our study revolves around the need to instil positive coping strategies, especially among at-risk nurses. An effective coping mechanism may reduce burnout among nurses as well as boost their productivity and quality of life [61]. Therefore, organisation-driven interventions such as educational and training programmes aimed at improving nurses' coping skills should be implemented from an early stage to better prepare them in managing psychosocial stressors at work. Other organisational measures including multidisciplinary psychosocial support such as debriefing post-traumatic events and involvement of healthcare professionals in the creation, testing, and assessment of prevention measures against burnout can also be considered to reduce burnout [51, 62-63].

This was the first nationwide study in Malaysia to determine the prevalence of burnout using a complex sampling analysis with a large sample size representative of the nursing population in the public healthcare sector. The identified risk factors for burnout enable the policymakers and hospital managers to implement effective preventive initiatives that target the susceptible population. However, there are some limitations to this study. As this was a

cross-sectional study, it was difficult to establish the link between the exposure and outcome as both are assessed at the same time. In addition, self-administered questionnaire was susceptible to recall bias and social desirability bias. In this study, we only focused on predictors of burnout from the individual perspective of nurses. With increasing evidence showing the roles of interpersonal and organisational stressors in the development of burnout, future research should consider longitudinal studies that encompass a wider range of variables to establish the predisposing factors of burnout at various levels.

Conclusion

In this study, one in four public nurses suffered from burnout in Malaysia. Younger, single, and childless nurses recorded a higher level of burnout. Shift works, especially night shifts significantly predisposed to burnout. As compared to problem-focused coping strategies that reduced burnout, dysfunctional coping strategies should be discouraged as they led to higher levels of EE, DP, and low PA. Following the two years battle with the COVID-19 pandemic, known and new stressors are likely intensified, predisposing nurses who are the main workforce of front liners in the Malaysian health workforce to even higher levels of strain and burnout. Therefore, it is essential to implement the necessary preventive and promotive efforts among the high-risk vulnerable nurses identified in this study. Modifiable stressors must be addressed via inculcation of positive coping strategies to mitigate potential mental health impacts. Organisational reform in the form of system-level efforts to reinvent and innovate workflow, human resources, and workplace wellness is critical to decreasing burnout among nurses.

Author contributions

All authors designed the project and data collection tools. All authors collected the data. NZ, NHZ, and LKY cleaned, analysed, and interpreted the data. NZ, NHZ, and AR drafted the paper. LKY reviewed and gave technical advisory towards the manuscript as well as contributed important revisions. All authors read and approved the manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interest

None declared.

Ethics approval

Ethics approval was obtained from the Medical Research and Ethics Committee (MREC) of the Ministry of Health Malaysia prior to the conduct of this study, Ref: KKM/NIHSEC/P19-683 (13). Participants gave informed consent to participate in this research prior to taking part. All names were kept on a password-protected database and were linked only with a study identification number. All the data involved in this study is only restricted to the use by the investigator.

Data availability statement

The data that support the study findings are available from the Ministry of Health Malaysia. Restrictions apply to the data availability, which was used under license for the current article, so it is not publicly available. Nevertheless, data are available from the authors upon reasonable request together with the permission of the Ministry of Health Malaysia.

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References

[1] H. J. Freudenberger, “The staff burn out syndrome in alternative institutions,” *Psychotherapy*, 1975.

[2] “WHO | Burn-out an ‘occupational phenomenon’: International Classification of Diseases,” *WHO*, 2019.

[3] C. Maslach and S. E. Jackson, “The measurement of experienced burnout,” *J. Organ. Behav.*, vol. 2, no. 2, pp. 99–113, 1981.

[4] J. P. Quenot *et al.*, “Suffering among carers working in critical care can be reduced by an intensive communication strategy on end-of-life practices,” *Intensive Care Med.*, 2012.

[5] M. M. Heinen *et al.*, “Nurses’ intention to leave their profession: A cross sectional observational study in 10 European countries,” *International Journal of Nursing Studies*, vol. 50, no. 2. pp. 174–184, 2013.

[6] L. H. Hall, J. Johnson, I. Watt, A. Tsipa, and D. B. O’Connor, “Healthcare staff wellbeing, burnout, and patient safety: A systematic review,” *PLoS ONE*, vol. 11, no. 7. Public Library of Science, Jul-2016.

[7] J. Johnson, L. H. Hall, K. Berzins, J. Baker, K. Melling, and C. Thompson, “Mental healthcare staff well-being and burnout: A narrative review of trends, causes, implications, and recommendations for future interventions,” *International Journal of Mental Health Nursing*, vol. 27, no. 1. Blackwell Publishing, pp. 20–32, Feb-2018.

[8] M. P. Salyers *et al.*, “The Relationship Between Professional Burnout and Quality and Safety in Healthcare: A Meta-Analysis,” *J. Gen. Intern. Med.*, 2017.

[9] A. Welp and T. Manser, “Integrating teamwork, clinician occupational well-being and patient safety - Development of a conceptual framework based on a systematic review,” *BMC Health Services Research*. 2016.

[10] R. V. Balang, “Concise literature review on burnout and work stress among mental health nurses in Malaysia,” *Malaysian Journal of Nursing*, vol. 2, no. 1. pp. 14–28, 2010.

[11] S. Y. Sharifah Zainiyah, I. M. Afiq, C. Y. Chow, and D. Siti Sara, “Stress and Its Associated Factors Amongst Ward Nurses in a Public Hospital Kuala Lumpur,”

Malaysian J. Public Heal. Med., vol. 11, no. 1, pp. 78–85, 2011.

[12] A. S. Zuraida and N. Z. Zainal, "Exploring burnout among Malaysian junior doctors using the abbreviated Maslach Burnout Inventory," *Malaysian J. Psychiatry*, vol. 24, no. 1, pp. 32–41, 2015.

[13] C. S. Siau *et al.*, "Predicting burnout and psychological distress risks of hospital healthcare workers," *Malaysian J. Public Heal. Med.*, vol. 2018, no. Specialissue1, pp. 125–136, 2018.

[14] Department of Statistics, Malaysia. HOUSEHOLD INCOME AND BASIC AMENITIES SURVEY 2019. Putrajaya: Department of Statistics, Malaysia. 2020

[15] M. P. Christina Maslach, Susan E Jackson, *Maslach burnout inventory*, Third. Palo Alto, California Consulting Psychologist Press, 1996.

[16] W. S. Chen *et al.*, "Translation, Cross-cultural Adaptation and Validation of the Malay Version of the Maslach Burnout Inventory (MBI) in Malaysia," *Int. J. Soc. Sci. Stud.*, vol. 2, no. 2, pp. 66–74, 2014.

[17] B. Y. Muhamad Saiful, "The Validity of the Malay Brief Cope in Identifying," *Int. Med. J.*, vol. 18, no. March 2011, pp. 29–33, 2011.

[18] Charles S. Carver, "You want to measure coping but your protocol's too long: Consider the brief COPE," *Int. J. Behav. Med.*, vol. 4, no. 1, pp. 92–100, 1997.

[19] A. Wisetborisut, C. Angkurawaranon, W. Jiraporncharoen, R. Uaphanthasath, and P. Wiwatanadate, "Shift work and burnout among health care workers," *Occup. Med. (Chic. Ill).*, vol. 64, no. 4, pp. 279–286, 2014.

[20] K. Rusca Putra and Setyowati, "Prevalence of burnout syndrome among nurses in general hospitals in provincial East Java: Cross-sectional study," *Enferm. Clin.*, vol. 29, no. Insc 2018, pp. 362–366, 2019.

[21] T. Woo, R. Ho, A. Tang, and W. Tam, "Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis," *J. Psychiatr. Res.*, vol. 123, pp. 9–20, Apr. 2020.

[22] M. C. Das Merces *et al.*, "Prevalence and factors associated with burnout syndrome

among primary health care nursing professionals: A cross-sectional study," *Int. J. Environ. Res. Public Health*, vol. 17, no. 2, 2020.

[23] H. Li, B. Yuan, Q. Meng, and I. Kawachi, "Contextual factors associated with burnout among Chinese primary care providers: A multilevel analysis," *Int. J. Environ. Res. Public Health*, vol. 16, no. 19, 2019.

[24] Ministry Of Health Malaysia, "Health Facts 2021," vol. 21, no. November, 2021.

[25] "Indicators index." [Online]. Available: https://www.who.int/data/gho/data/indicators/indicators-index. [Accessed: 15-Aug-2022].

[26] A. Bruyneel, P. Smith, J. Tack, and M. Pirson, "Prevalence of burnout risk and factors associated with burnout risk among ICU nurses during the COVID-19 outbreak in French speaking Belgium," *Intensive Crit. Care Nurs.*, vol. 65, no. xxxx, p. 103059, 2021.

[27] L. H. Aiken *et al.*, "Patient safety, satisfaction, and quality of hospital care: Cross sectional surveys of nurses and patients in 12 countries in Europe and the United States," *BMJ*, vol. 344, no. 7851, pp. 1–14, 2012.

[28] E. Yeun and H. Kim, "The Effects of Supervisor Support, Emotional Exhaustion, and Sense of Personal Accomplishment on Hospital Nurse Turnover Intentions," *Indian J. Sci. Technol.*, vol. 8, no. S5, pp. 63–68, Mar. 2015.

[29] L. H. Aiken *et al.*, "Importance of work environments on hospital outcomes in nine countries," *Int. J. Qual. Heal. Care*, vol. 23, no. 4, pp. 357–364, 2011.

[30] L. feng Zhang *et al.*, "The association of Chinese hospital work environment with nurse burnout, job satisfaction, and intention to leave," *Nurs. Outlook*, vol. 62, no. 2, pp. 128–137, 2014.

[31] T. Ahmed, H. Shah, A. Rasheed, and A. Ali, "Burnout among nurses working at Dow and Civil Hospitals in Karachi: A cross-sectional study," *J. Pak. Med. Assoc.*, vol. 70, no. 6, pp. 1018–1022, 2020.

[32] A. Khodadadizadeh, A. Ravari, A. Sayadi, H. Khodadadi, and H. Jafarinaveh, "Occupational burnout assessment among nurses working in Iranian hospital of Ali-ebn Abitaleb, Rafsanjan- Iran," *J. Occup. Heal. Epidemiol.*, vol. 1, no. 2, pp. 103–110,

2012.

[33] E. Ayala and A. M. Carnero, “Determinants of Burnout in Acute and Critical Care Military Nursing Personnel: A Cross-Sectional Study from Peru,” *PLoS One*, vol. 8, no. 1, 2013.

[34] A. Bartosiewicz and P. Januszewicz, “Readiness of Polish nurses for prescribing and the level of professional burnout,” *Int. J. Environ. Res. Public Health*, vol. 16, no. 1, 2019.

[35] S. C. P. S. Silva, M. A. P. Nunes, V. R. Santana, F. P. Reis, J. Machado Neto, and S. O. Lima, “A síndrome de burnout em profissionais da rede de atenção primária à Saúde de Aracaju, Brasil,” *Cienc. e Saude Coletiva*, vol. 20, no. 10, pp. 3011–3020, 2015.

[36] E. Amoafo, N. Hanbali, A. Patel, and P. Singh, “What are the significant factors associated with burnout in doctors?,” *Occup. Med. (Lond).*, vol. 65, no. 2, pp. 117–121, 2015.

[37] L. P. Chou, C. Y. Li, and S. C. Hu, “Job stress and burnout in hospital employees: Comparisons of different medical professions in a regional hospital in Taiwan,” *BMJ Open*, vol. 4, no. 2, pp. 1–7, 2014.

[38] E. Zarei, F. Ahmadi, M. S. Sial, J. Hwang, and P. A. Thu, “Prevalence of Burnout among Primary Health Care Sta ff and Its Predictors : A Study in Iran,” *Int. J. Environ. Res. Public Health*, 2019.

[39] Y.-H. Lee and M.-H. Lin, “Exploring the Relationship Between Burnout and Job Satisfaction Among Clinical Nurses,” *Eur. Sci. J. ESJ*, vol. 15, no. 3, pp. 449–460, 2019.

[40] F. E. Okwaraji and E. N. Aguwa, “Burnout and psychological distress among nurses in a Nigerian tertiary health institution,” *Afr. Health Sci.*, vol. 14, no. 1, pp. 237–245, 2014.

[41] J. Wang *et al.*, “Prevalence of burnout among intensivists in mainland China: a nationwide cross-sectional survey,” *Crit. Care*, vol. 25, no. 1, pp. 1–10, 2021.

[42] M. Sofology, M. Efstratopoulou, and T. Dunn, “Predicting Burnout Syndrome in Greek Mental Health Professionals,” *J. Soc. Serv. Res.*, vol. 45, no. 1, pp. 142–149, 2019.

[43] E. M. de Vasconcelos and M. M. F. De Martino, “Predictors of burnout syndrome in intensive care nurses,” *Rev. Gauch. Enferm.*, vol. 38, no. 4, p. e65354, 2018.

[44] Z. Ashrafi, H. Ebrahimi, A. Khosravi, A. Navidian, and A. Ghajar, “The Relationship Between Quality of Work Life and Burnout: A Linear Regression Structural-Equation Modeling,” *Heal. Scope*, vol. 7, no. 1, pp. 1–7, 2018.

[45] G. A. Cañadas-De La Fuente, E. Ortega, L. Ramirez-Baena, E. I. De La Fuente-Solana, C. Vargas, and J. Luis Gómez-Urquiza, “Gender, marital status, and children as risk factors for burnout in nurses: A meta-analytic study,” *mdpi.com*.

[46] Institute for Public Health (IPH) 2015. National Health and Morbidity Survey 2015 (NHMS 2015). Vol. II: Non-Communicable Diseases, Risk Factors & Other Health Problems; 2015.

[47] Z. Xie, A. Wang, and B. Chen, “Nurse burnout and its association with occupational stress in a cross-sectional study in Shanghai,” *J. Adv. Nurs.*, vol. 67, no. 7, pp. 1537–1546, 2011.

[48] Y. Yestiana, T. Kurniati, and A. A. A. Hidayat, “Predictors of burnout in nurses working in inpatient rooms at a public hospital in Indonesia,” *Pan Afr. Med. J.*, vol. 33, pp. 1–8, 2019.

[49] P. C. Lin *et al.*, “The association between rotating shift work and increased occupational stress in nurses,” *J. Occup. Health*, vol. 57, no. 4, pp. 307–315, 2015.

[50] K. V. Amaral, M. J. Q. Galdino, and J. T. Martins, “Burnout, daytime sleepiness and sleep quality among technical-level Nursing students,” *Rev. Lat. Am. Enfermagem*, vol. 29, 2021.

[51] M. Govindan, P. Keefer, J. Sturza, M. R. Stephens, and N. Malas, “Empowering Residents to Process Distressing Events: A Debriefing Workshop,” *MedEdPORTAL J. Teach. Learn. Resour.*, vol. 15, p. 10809, 2019.

[52] J. Maben and J. Bridges, “Covid-19: Supporting nurses’ psychological and mental health,” *J. Clin. Nurs.*, vol. 29, no. 15–16, pp. 2742–2750, 2020.

[53] A. Fathi and R. H. Simamora, “Investigating nurses’ coping strategies in their workplace as an indicator of quality of nurses’ life in Indonesia: A preliminary study,” *IOP Conf. Ser. Earth Environ. Sci.*, vol. 248, no. 1, 2019.

[54] C. Di Monte, S. Monaco, R. Mariani, and M. Di Trani, “From Resilience to Burnout: Psychological Features of Italian General Practitioners During COVID-19 Emergency,” *Front. Psychol.*, vol. 11, no. October, 2020.

[55] M. Salman *et al.*, “The psychological effects of COVID-19 on frontline healthcare workers and how they are coping: a web-based, cross-sectional study from Pakistan,” *medRxiv*, p. 2020.06.03.20119867, 2020.

[56] B. Maraqa, Z. Nazzal, and T. Zink, “Palestinian Health Care Workers’ Stress and Stressors During COVID-19 Pandemic: A Cross-Sectional Study,” *J. Prim. Care Community Heal.*, vol. 11, 2020.

[57] A. Mattei, F. Fiasca, M. Mazzei, V. Abbossida, and V. Bianchini, “Burnout among healthcare workers at L’Aquila: its prevalence and associated factors,” *Psychol. Heal. Med.*, vol. 22, no. 10, pp. 1262–1270, 2017.

[58] A. Shechter *et al.*, “Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic,” *Gen. Hosp. Psychiatry*, vol. 66, no. May, pp. 1–8, 2020.

[59] K. Mctiernan and N. Mcdonald, “Occupational stressors, burnout and coping strategies between hospital and community psychiatric nurses in a Dublin region,” *J. Psychiatr. Ment. Health Nurs.*, vol. 22, no. 3, pp. 208–218, Apr. 2015.

[60] H. Zhou *et al.*, “Mediating effect of coping styles on the association between psychological capital and psychological distress among Chinese nurses: a cross-sectional study,” *J. Psychiatr. Ment. Health Nurs.*, vol. 24, no. 2–3, pp. 114–122, Mar. 2017.

[61] H. F. Lee, C. C. Kuo, T. W. Chien, and Y. R. Wang, “A Meta-Analysis of the Effects of Coping Strategies on Reducing Nurse Burnout,” *Appl. Nurs. Res.*, 2016.

[62] C. G. Leo *et al.*, “Burnout Among Healthcare Workers in the COVID 19 Era: A Review of the Existing Literature,” *Front. Public Heal.*, vol. 9, no. October, pp. 1–6, 2021.

[63] E. D. Browning and J. S. Cruz, “Reflective Debriefing: A Social Work Intervention Addressing Moral Distress among ICU Nurses,” *J. Soc. Work End-of-Life Palliat. Care*, vol. 14, no. 1, pp. 44–72, 2018.

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	2
Abstract	#1b	Provide in the abstract an informative and balanced summary	2

		of what was done and what was found	
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	5
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for exposed and unexposed groups if applicable.	6
Bias	#9	Describe any efforts to address potential sources of bias	6
Study size	#10	Explain how the study size was arrived at	5

Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	6
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	6
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	6
Statistical methods	#12c	Explain how missing data were addressed	6
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	6
Statistical methods	#12e	Describe any sensitivity analyses	n/a
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7
Participants	#13b	Give reasons for non-participation at each stage	7
Participants	#13c	Consider use of a flow diagram	n/a
Descriptive data	#14a	Give characteristics of study participants (eg demographic,	7-9

		clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	8-9
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	8-9
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
Main results	#16b	Report category boundaries when continuous variables were categorized	8-16
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	8-16
Discussion			
Key results	#18	Summarise key results with reference to study objectives	18-21
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	21

Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	18-12
Generalisability	#21	Discuss the generalisability (external validity) of the study results	21

Other Information

Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	23