

Prevalence and Risk Factors of Burnout among Healthcare Professionals during COVID-19 Pandemic - Saudi Arabia

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Abstract Objective: study the impact of COVID-19 pandemic on the prevalence of burnout and the associated factors among health care workers in Saudi Arabia. **Methodology:** This study targeted all categories of health care workers (HCWs) in Saudi Arabia. The data were collected through an online questionnaire that included: sociodemographic data, medical history, smoking history, work characteristics, direct care of infected patients, questions of Maslach Burnout inventory (MBI) to assess burnout among health care workers that assess the Emotional Exhaustion (EE), Depersonalization (DP), and Personal Achievement (PA). The collected data was analyzed through SPSS program version 25. **Results:** The total number of the participants in this study was 3,557. The results showed that 38.5% of the participants scored high for EE, 31.2% for DP, and 33.6% for PA. On analysis, being younger than the age of 40 years, female, or Saudi nationality tended to be associated with increased all burnout parameters. Shift work, on call duties, changing working hours, direct involvement in management of COVID-19 patients were associated with high burnout scores. **Conclusion:** High burnout is common among healthcare workers in Saudi Arabia during COVID-19 pandemic due to direct contact with infected cases and changes in the working patterns during the pandemic, etc. These factors should be discussed to find solutions to relieve the health care workers from excess stress and burnout.

Keywords: burnout, COVID-19, health care workers (HCWs), Maslach Burnout inventory (MBI), Saudi Arabia

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1. Introduction

Burnout syndrome is the experience of exhaustion over prolonged periods of time with lower levels of motivation and interest in the job. [1] Burnout results in three distinct symptoms: emotional exhaustion (EE), depersonalization (DP), and reduced professional achievement (PA). EE is characterized by energy deficiency and a lack of motivation. DP is a psychological state of emotional detachment can give rise to impersonal treatment of people in the workplace. Reduced PA is defined by the tendency of a worker to a negative self-assessment, feeling less competent and successful and dissatisfied with their PA. [2]

Healthcare Workers (HCWs) are very often susceptible to job burnout, with the highest levels are reported among HCWs in the emergency and Intensive Care Unit (ICU)

departments where they are subjected to excess work-related stress. [3] Burnout is associated with negative outcomes such as lack of concentration, low productivity, irritability, aggressiveness, and increased tendency to make mistakes. [4]

The coronavirus disease 2019 (COVID-19) pandemic emerged in December 2019 as a health care crisis first reported in Wuhan, in China, as a case of pneumonia triggered by an unknown pathogen. The coronavirus that causes COVID-19 is known as severe acute respiratory syndrome coronavirus 2 (SARSCoV-2). [5] Saudi Arabia was among the first countries to implement early and unprecedented precautionary measures to prevent SARS-CoV-2 introduction into the country. The first case reported in the country on March 2nd, 2020. [6]

Extensive efforts by the Ministry of health in Saudi Arabia were done to combat the spread of diseases in healthcare facilities [7]. These efforts help to control the

transmission of the disease, reduce complications and mortality among infected cases. But placed extra- stress and burden on health care workers and subject them to various forms of physical and mental fatigue and exhaustion. Numerous studies, both international and local attempt to study the impact of COVID-19 pandemic on health care workers, but there was not any nationwide study conducted in Saudi Arabia. This work was conducted to study the impact of COVID-19 pandemic on the prevalence of burnout and the associated factors among health care workers in Saudi Arabia.

2. Material and Methods

2.1. Type of Study

Cross sectional study involved all categories of health care workers (HCWs) working in different health care institutions in Saudi Arabia.

2.2. Sample size calculation

The sample size was calculated based on total number of health care workers (314, 000), 95 % confidence interval, and 5% percentage of error. [8]

2.3. Data Collection

Data were collected through an online survey targeting different categories of health care workers from all regions/ governorates of the kingdom to get at least 60 participants from each region to reach the required minimum sample size of 1200. Period of data collection from 5 to 12 October 2020.

The questionnaire includes the following data: -

1. Personal information such as age, sex, marital status, nationality.
2. Smoking history
3. Medical history and antipsychotics medications.
4. Place of work
5. Working characteristics such as name of health care facility, no. of daily working hours per shift work/ department, etc.
6. History of working with COVID-19 suspected and confirmed cases.
7. Burnout questionnaire: Burnout was measured by the Maslach Burnout inventory (MBI) which is the most commonly used tool for assessing burnout. It consists of 22 items which are divided into three subscales: Emotional exhaustion (9 items), Depersonalization (5 items), and Personal accomplishment (8 items). The items are answered in terms of the frequency with which the respondent experiences these feelings, on a 7-point scale ranging from 0 (never) to 6 (every day). The three scores are calculated for each respondent. A higher score indicates greater burnout except for the personal accomplishment scale which is rated inversely as low score on this dimension is associated with high level of burnout.

High emotional exhaustion was considered at a score of 27 or more, high depersonalization was considered at a score of 10 or more, and low personal accomplishment

was considered at a score of 31 or less. [9]

2.4. Data Analysis

The collected data were analyzed through SPSS program version 25. Percentages, mean and standard deviation (SD) were used as descriptive statistics.

The independent t test was used to study the relationship between mean burnout subscale scores for emotional exhaustion, depersonalization and personal accomplishment with regard to independent variables of 2 groups and ANOVA test was used for comparing of the mean scores for more than 2 groups of the independent variables. The independent variables were: the demographic characteristics (age, sex, marital status, nationality, qualifications), smoking history, medical history, work characteristics, and COVID-19 exposure and experience. Then, ordinal logistic regression models were designed for each burnout parameter to detect the most significant independent variables that determine the occurrence of burnout among health care workers in Saudi Arabia.

3. Results:

The results showed that 38.5% of the participants scored high for EE burnout, 31.2% for DP, and 33.6% for PA (Figure 1).

Burnout scores are higher in health care workers \leq 40, Female, Saudi. Emotional exhaustion is significantly high in single HCWs. On the other hand, a high score on depersonalization and low personal achievement are significantly in widow/ divorced. Current smokers' participants have significantly high depersonalization and low personal achievement. (Table 1)

Low personal achievement scores are significantly common among participants with neurological diseases, psychiatric disease, and taking antipsychotic drugs. Taking antipsychotic drugs are associated with significant high burnout scores. (Table 2)

High burnout scores are recorded in Eastern region. Nurses are the most affected job categories to high burnout scores and the least are the technicians. Participants from ICUs reported higher emotional exhaustion and depersonalization scores compared to participants from other departments.

Participants with less than 10 years of work experience and those working 8 hours or more are more likely to have high emotional exhaustion and depersonalization scores. Working less than 8 h daily is associated with low personal achievement scores. Shift work affecting burnout in all parameters. On call duties is associated with high burnout scores in relation to emotional exhaustion and depersonalization. (Table 3)

Specific COVID-19 training is associated with significant lower scores on emotional exhaustion and depersonalization and high scores on personal achievement. On the other hand, changing job duties is associated with significant high burnout scores.

Changed working hours per shift, direct involvement in management of COVID-19 patients, infection of household member/s or colleague with COVID-19 are associated with significant high emotional exhaustion and depersonalization scores. No significant difference in the

mean burnout scores for HCWs with or without history of getting infection with COVID-19. (Table 4)

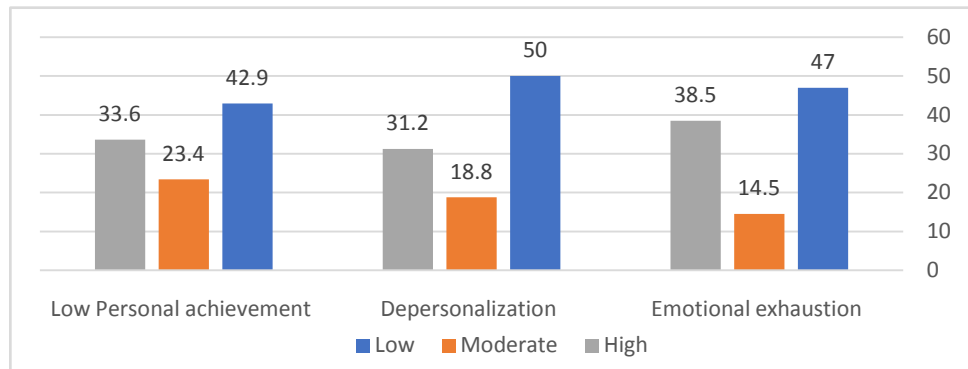


Figure 1. Distribution of burnout among the study participants

Table 1. Relation Between Mean Burnout Scores and Sociodemographic Characteristics and Smoking History

Personal information	N	Emotional exhaustion Mean (\pm SD)	Depersonalization Mean (\pm SD)	Personal achievement Mean (\pm SD)
Age categories:				
≤ 40	2529	24.08 (16.07)	8.26 (7.60)	33.67(10.59)
> 40	1027	18.59 (15.39)	5.73 (6.42)	36.22(10.65)
		T= 9.349, P ≤ 0.001*	T= 9.378, P ≤ 0.001*	T= -6.489, P ≤ 0.001*
Sex:				
Male	2063	20.10 (15.72)	6.88 (7.14)	34.75(11.18)
Female	1494	25.80 (15.96)	8.42 (7.59)	33.94 (9.91)
		T= 10.616, P ≤ 0.001*	T= -6.161, P ≤ 0.001*	T=2.254, P = 0.024
Marital status:				
Married	2782	21.86 (16.15)	7.21(7.28)	34.45 (10.81)
Single	633	24.87 (15.47)	8.66 (7.60)	34.39 (10.12)
Widow/ divorced	142	24.42 (15.96)	8.68 (7.45)	33.77 (10.47)
		F = 10.096, P ≤ 0.001*	F= 11.894, P ≤ 0.001*	F= 0.269, P =0.764
Nationality:				
Saudi	2566	22.85 (6.51)	7.68 (7.54)	33.51(10.98)
Non- Saudi	991	21.58 (14.82)	7.11 (6.89)	36.73 (9.43)
		T= 2.123, P = 0.034*	T= 2.073, P = 0.038*	T= -8.140, P ≤ 0.001*
Current Smoking:				
Yes	840	21.93(15.95)	7.98 (7.69)	33.53 (11.47)
No	2714	22.68 (16.10)	7.39 (7.26)	34.68 (10.40)
		T= 1.176, P = 0.237	T= 2.021, P = 0.050	T= -2.72, P = 0.006*

* Significant.

Table 2. Relation Between Mean Burnout Scores and Medical History

Medical history	N	Emotional exhaustion Mean (\pm SD)	Depersonalization Mean (\pm SD)	Personal achievement Mean (\pm SD)
Hypertension				
Yes	425	22.82 (16.31)	7.08 (7.21)	35.31 (10.92)
No	2966	22.14 (15.96)	7.42 (7.30)	34.50 (10.61)
Unknown	162	28.20 (16.28)	10.53 (8.40)	30.44 (10.49)
		F= 11.11, P ≤ 0.001*	F= 14.65, P ≤ 0.001*	F= 12.88, P ≤ 0.001*
Neurological diseases				
Yes	141	28.30 (17.81)	9.12 (8.23)	30.45(12.16)
No	3274	21.88 (15.87)	7.30 (7.26)	34.72 (10.56)
Unknown	139	31.18 (15.21)	11.29 (7.74)	31.13 (10.50)
		F= 32.45, P ≤ 0.001*	F= 23.250, P ≤ 0.001*	F= 17.84, P ≤ 0.001*
Psychiatric disease				
Yes	109	30.35 (16.44)	10.42 (8.45)	28.93 (13.07)
No	3264	21.54 (15.81)	7.15 (7.17)	34.83 (10.53)
Unknown	181	35.20 (13.67)	12.65 (7.92)	30.07 (9.83)
		F= 78.75, P ≤ 0.001*	F= 58.25, P < 0.001*	F= 32.53, P < 0.001*
Taking antipsychotic drugs				
Yes	99	26.73 (18.16)	9.71 (9.04)	31.27 (14.36)
No	3455	22.38 (15.99)	7.46 (7.31)	34.50 (10.54)
		T= 2.66, P ≤ 0.001*	T= 2.99, P ≤ 0.001*	T= -2.97, P ≤ 0.001*

Table 3. Relation Between Mean Burnout Scores and Some Work Characteristics

Work characteristics	N	Emotional exhaustion Mean (\pm SD)	Depersonalization Mean (\pm SD)	Personal achievement (Mean \pm SD)
Region				
Riyadh	584	22.05 (15.99)	7.66 (7.39)	33.78 (10.54)
Aseer	111	20.16 (15.55)	6.79 (6.82)	35.86 (9.75)
Eastern region	86	28.86 (15.90)	8.69 (7.90)	33.22 (10.64)
Al Jouf	104	23.43 (15.79)	8.72 (7.61)	34.58 (10.01)
Jeddah	369	26.30 (16.71)	8.96 (7.94)	31.63 (10.84)
Tabouk	74	16.96 (13.03)	5.62 (5.92)	35.36 (9.04)
Al Qassim	168	19.13 (15.00)	6.24 (6.84)	36.74 (10.28)
Bisha	290	18.24 (15.15)	6.09 (6.74)	35.72 (11.83)
Hail	60	22.88 (15.80)	6.57 (6.83)	38.47 (7.68)
Al Hassa	127	26.84 (17.71)	8.69 (8.16)	32.65 (10.79)
Northern borden	173	23.84 (15.69)	6.87 (6.66)	34.38 (9.67)
Makkah	243	22.48 (16.57)	8.21 (8.31)	32.88 (10.80)
Al Baha	59	26.08 (14.54)	7.90 (6.54)	34.02 (8.64)
Al Qunfatha	72	20.58 (15.95)	6.58 (6.73)	36.18 (9.75)
Al Quarayat	264	24.88 (16.20)	8.62 (7.92)	34.51 (10.31)
Hafr al Batin	158	26.28 (16.44)	8.52 (7.74)	35.46 (9.53)
Al Medina	111	21.43 (15.49)	7.14 (6.75)	33.59 (12.36)
Jizan	75	21.92 (15.24)	6.11 (6.85)	36.65 (9.79)
Al Taaif	392	20.12 (14.91)	6.89 (6.76)	35.58 (11.09)
Najran	35	13.49 (15.68)	4.26 (4.40)	34.43 (13.44)
		F= 6.68, P \leq 0.001*	F= 3.85, P \leq 0.001*	F= 3.89, P \leq 0.001*
Professional categories				
Doctor	823	22.85 (15.99)	7.36 (7.28)	35.70 (10.17)
Nurse	1361	24.70 (16.18)	8.37 (7.67)	34.22 (10.17)
Technician	467	18.17 (15.72)	5.91 (6.82)	34.49 (11.49)
Others	906	21.10 (15.58)	7.24 (7.09)	33.47 (11.29)
		F= 22.62, P \leq 0.0001*	F= 14.27, P \leq 0.0001*	F= 6.54, P \leq 0.001*
Department				
Emergency	606	23.54 (16.09)	7.96 (7.69)	33.94 (10.98)
ICUs	184	27.96 (16.04)	9.30 (7.32)	33.10 (9.54)
Inpatient departments	454	23.60 (15.77)	7.68 (7.01)	35.38 (10.30)
Radiology and laboratory	383	22.38 (15.95)	7.72 (7.68)	34.61 (10.87)
Administration	1301	20.09 (15.84)	6.70 (7.01)	34.61(10.98)
Operating theatre	14	18.25 (11.18)	6.00 (3.37)	41.75 (3.95)
Public health and quality	278	22.49 (16.49)	7.47(7.57)	32.43 (10.84)
Infection control	340	25.49 (15.61)	8.56 (7.74)	35.28 (9.37)
		F= 9.77, P \leq 0.001*	F= 5.26, P \leq 0.001*	F= 3.15, P \leq 0.001*
Years of working:				
less than 10 years	1569	23.70 (15.91)	8.13 (7.57)	34.24 (10.34)
More than 10 years	1987	21.55 (16.13)	7.05 (7.17)	34.55 (10.92)
		T= 3.976, P < 0.001*	T= 4.370, P < 0.001*	T= -0.86, P > 0.05
Daily working hours				
Less than 8 hours	366	18.76 (14.69)	6.60 (7.59)	31.78 (11.91)
8 hours or more	3190	22.92 (16.17)	7.63 (7.34)	34.71 (10.48)
		T= 4.710, P < 0.001*	T= 2.463, P < 0.05*	T= -4.513, P < 0.001*
Shift work				
Yes	1687	25.48 (15.94)	8.61 (7.60)	33.95 (10.41)
No	1868	19.81(15.70)	6.55 (6.90)	34.82 (10.89)
		T= 10.653, P < 0.001*	T= 8.384, P < 0.001*	T= -2.42, P < 0.05*
On call duties on the previous month				
Yes	1683	25.29 (15.89)	8.65 (7.58)	34.66 (10.10)
No	1871	20.00 (15.82)	6.52 (7.03)	34.18 (11.16)
		T= 9.93, P \leq 0.001*	T= 8.69, P \leq 0.001*	T= 1.351, P = 0.177

Table 4. Relation between Mean Burnout Scores and COVID-19 Training and Experience

COVID-19 training and experience	N	Emotional exhaustion Mean (\pm SD)	Depersonalization Mean (\pm SD)	Personal achievement Mean (\pm SD)
COVID-19 specific training				
Yes	2103	21.26 (15.60)	7.14 (7.16)	35.59 (10.08)
No	1452	24.31 (16.56)	8.08 (7.63)	32.70 (11.27)
		T=5.587, P \leq 0.001*	T= -3.74, P \leq 0.001*	T= 8.020, P \leq 0.001*
Changed job duties				
Yes	2243	25.39 (16.19)	8.65 (7.72)	33.98 (10.47)
No	1312	17.55 (14.59)	5.61 (6.28)	35.15 (10.98)
		T= 14.449, P \leq 0.001*	T= 12.11, P \leq 0.001*	T= 3.16, P \leq 0.001*
Changed working hours per shift				
Yes	2466	23.81(16.08)	8.00 (7.50)	34.64 (10.40)
No	1090	19.51 (15.65)	6.46 (6.95)	33.90 (11.25)
		T= 7.421, P \leq 0.001*	T= 5.95, P \leq 0.001*	T= 1.89, P = 0.058
Direct involvement in care of COVID-19 patients				
Yes	2466	23.81 (16.08)	8.00 (7.50)	34.64 (10.40)
No	1090	19.51 (15.65)	6.46 (6.94)	33.90 (11.25)
		T= 7.48, P \leq 0.001*	T= 2.97, P = 0.003*	T= 2.02, P = 0.044*
Infection of household member/s				
Yes	1349	24.42 (16.70)	8.33 (7.75)	33.55 (10.79)
No	2206	21.33 (15.56)	7.04 (7.09)	34.93 (10.57)
		T= 5.592, P \leq 0.001*	T= 5.08, P \leq 0.001*	T= -3.75, P \leq 0.001*
Infection of Colleague member/s				
Yes	3282	23.09 (16.04)	7.72 (7.42)	34.41 (10.60)
No	274	15.33 (14.67)	5.23 (6.31)	34.41 (11.48)
		T= 7.74, P \leq 0.001*	T= 5.39, P \leq 0.001*	T= .008, P=0.993
Infection with COVID-19				
Yes	607	23.32 (15.88)	7.76 (7.36)	34.17 (10.80)
No	2949	22.33 (16.10)	7.48 (7.37)	34.46 (10.65)
		T= 1.41, P= 0.161	T= 0.85, P= 0.394	T= 0.59, P=0.554

Table 5. Logistic Regression Analysis of the Variables Included in Study of Burnout Among Health Care Workers

Variables	Emotional Exhaustion		Depersonalization		Personal achievement	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Age categories < 40 years	1.68(0.34- 0.71)	0.000*	1.87 (0.44- 0.81)	0.000*	1.45 (0.20-0.54)	0.886
Age categories \geq 40 years						
Male/ female	1.56 (0.62- 0.27)	0.000*	1.19 (0.35-0-.01)	0.045*	1.25 (0.39- 0.06)	0.035
Married	1.15 (0.22- 0.49)	0.455	1.19 (0.52- 0.17)	0.315	1.18 (0.17- 0.51)	0.690
Single	1.19 (0.21- 0.56)	0.363	0.90 (0.47- 0.27)	0.594	1.03 (0.33- 0.39)	0.848
Widow/ divorced						
Saudi / non-Saudi	1.40 (0.11- 0.56)	0.003*	1.01 (0.23- 0.21)	0.908	1.37 (0.10- 0.53)	0.030*
Smoking status/ non smokers	1.05 (0.23- 0.13)	0.563	1.19 (0.01- 0.34)	0.053	1.01 (0.18- 0.16)	0.850
Hypertensive status	1.31 (0.67-0.12)	0.177	1.60 (0.85- 0.09)	0.015*	1.64 (0.86- 0.13)	0.020*
Not hypertensive	1.63 (0.84- 0.14)	0.006*	1.59 (0.79- 0.13)	0.006*	1.49 (0.72- 0.08)	0.008*
Unknown						
Neurological disease	1.11 (0.42-0.62)	0.695	1.41 (0.84- 0.14)	0.165	1.61 (0.00- 0.95)	0.062
No neurological disease	1.27 (0.64-0.17)	0.252	1.65 (0.89-0.12)	0.010*	1.01 (0.36- 0.38)	0.816
Unknown						
Psychiatric disease	1.74 (1.13-0.03)	0.062	2.18 (1.30- 0.26)	0.003*	1.10 (0.42- 0.61)	0.753
No Psychiatric disease	4.02 (1.76- -1.02)	0.000*	3.04 (1.45- 0.78)	0.000*	2.13 (1.07- 0.43)	0.000*
Unknown						
Taking antipsychotic drugs	1.26 (0.72-0.25)	0.342	1.02 (0.47- 0.43)	0.936	1.79 (1.04- 0.13)	0.011*

Variables	Emotional Exhaustion		Depersonalization		Personal achievement	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Regions:						
Riyadh	1.17 (0.63-0.94)	0.695	1.12 (0.86- 0.63)	0.762	1.06 (0.71-0.60)	0.971
Aseer	1.27(1.10-0.62)	0.590	1.51 (1.23- 0.41)	0.325	1.50(1.13- 0.33)	0.345
Eastern region	2.07 (0.16- 1.61)	0.106	1.20 (1.02- 0.65)	0.667	1.42 (1.10- 0.40)	0.544
Al Jouf	1.39 (0.53- 1.19)	0.454	1.13 (0.70- 0.94)	0.778	1.16 (0.88- 0.59)	0.679
Jeddah	2.07 (0.07- 1.52)	0.073	1.34 (0.46- 1.05)	0.443	1.33 (0.38- 0.95)	0.305
Tabouk	1.30 (1.18-0.66)	0.575	1.53 (1.29- 0.45)	0.340	1.63(1.26- 0.28)	0.308
Al Qassim	1.02 (0.84-0.81)	0.970	1.22 (0.98- 0.59)	0.619	1.85 (1.31- 0.08)	0.114
Bisha	1.12 (0.92-0.69)	0.776	0.70 (1.11- 0.41)	0.367	1.69 (1.19- 0.15)	0.223
Hail	1.43 (0.57- 1.29)	0.451	1.19 (1.06- 0.72)	0.710	1.93(1.49- 0.17)	0.157
Al Hassa	2.21 (0.06- 1.64)	0.067	1.16 (0.66- 0.95)	0.719	1.04 (0.76- 0.68)	0.855
Northern Borden	1.29 (0.57- 1.08)	0.547	1.19 (0.96- 0.61)	0.666	1.31 (0.97- 0.43)	0.523
Makkah	1.58 (0.35- 1.27)	0.269	1.11 (0.67- 0.87)	0.798	1.06 (0.62- 0.74)	0.779
Al Baha	2.58 (0.01- 1.88)	0.047*	1.11 (0.78- 0.99)	0.824	1.09 (0.88- 0.71)	0.990
Al Qunfatha	1.33 (0.63- 1.20)	0.541	1.25 (1.10- 0.65)	0.618	1.30(1.05- 0.53)	0.466
Al Quarayat	1.60 (0.34- 1.28)	0.257	1.02 (0.74- 0.79)	0.955	1.20 (0.86- 0.50)	0.632
Hafr al Batin	1.65 (0.33- 1.33)	0.236	1.11 (0.68- 0.89)	0.800	1.35 (1.00- 0.40)	0.436
Al Medina	1.59 (0.38- 1.32)	0.283	1.07 (0.88- 0.75)	0.878	1.42 (0.08- 0.38)	0.543
Jizan	1.47 (0.51- 1.28)	0.395	1.54 (1.29- 0.43)	0.323	1.88(1.41- 0.14)	0.192
Al Taaif	1.32 (0.52- 1.07)	0.494	1.07 (0.82- 0.68)	0.852	1.40 (0.99- 0.33)	0.378
Najran □						
Professional categories:						
Doctor	1.40 (0.09- 0.59)	0.009*	1.16 (0.10- 0.40)	0.229	1.04 (0.20- 0.28)	0.544
Nurse	1.18 (0.03- 0.37)	0.101	1.21 (0.01- 0.38)	0.059	1.21(0.38- 0.00)	0.020*
Technician	1.38 (0.56-0.09)	0.007*	1.39 (0.56- 0.10)	0.005*	1.18 (0.38- 0.00)	0.065
Others						
Working more than 10 years	1.08 (0.09- 0.23)	0.367	1.07 (0.09- 0.22)	0.376	1.01 (0.16- 0.14)	0.073
Departments:						
Emergency	1.11 (0.38-0.18)	0.477	1.11 (0.38- 0.16)	0.444	1.25 (0.04- 0.49)	0.142
ICUs	1.12 (0.27-0.49)	0.560	1.11 (0.26- 0.47)	0.566	1.90 (0.29- 1.00)	0.001*
Inpatient departments	1.02 (0.36-0.32)	0.907	1.06 (0.27- 0.39)	0.717	1.01 (0.32- 0.34)	0.835
Radiology and laboratory	1.07 (0.25-0.38)	0.685	1.01 (0.31- 0.29)	0.963	1.07 (0.37- 0.23)	0.467
Administration	1.40 (0.59- 0.08)	0.009*	1.36 (0.55- 0.06)	0.014*	1.07 (0.17- 0.31)	0.723
Operating theatre	1.01(0.36-0.37)	0.970	1.03 (0.33- 0.38)	0.879	1.31(0.08- 0.61)	0.149
Public health and quality	1.18 (0.49-0.17)	0.328	1.02 (0.34- 0.29)	0.884	1.65 (0.19-0.81)	0.001*
Infection control						
Daily working hours ≥8 hours	1.48 (0.15- 0.63)	0.001*	1.36 (0.08- 0.53)	0.009*	1.36 (0.52-0.09)	0.004*
On call duties/ No call duties	1.71 (0.39- 0.69)	0.000*	1.68 (0.37- 0.66)	0.000*	1.09 (0.05- 0.23)	0.285
Specific COVID-19 training	1.79 (0.72-0.44)	0.000*	1.46 (0.52- 0.24)	0.000*	1.45 (0.51- 0.24)	0.000*
Changed job duties	2.15 (0.61- 0.93)	0.000*	1.88 (0.47- 0.79)	0.000*	1.42 (0.20- 0.50)	0.000*
Direct involvement in management of COVID-19 patients	1.34 (0.13- 0.46)	0.000*	1.14 (0.29- 0.03)	0.119	1.04 (0.19-0.11)	0.827
Changed working hours per shift	1.03 (0.14-0.19)	0.729	1.00 (0.16-0.16)	0.991	1.26 (0.39- 0.07)	0.002*
Infection of household member/s	1.17 (0.01- 0.31)	0.049*	1.20 (0.03- 0.33)	0.019*	1.04 (0.11- 0.19)	0.653
Infection of Colleague member/s	1.86 (0.34- 0.90)	0.000*	1.47 (0.12- 0.65)	0.005*	1.20 (0.07- 0.43)	0.338
Get the infection with COVID-19	1.01 (0.18-0.20)	0.894	1.01 (0.17- 0.19)	0.888	1.02 (0.16- 0.20)	0.993

Ordinal logistic regression analysis of burnout parameters reveals the following: - For emotional exhaustion, the only significant independent variables are age, sex, nationality, hypertension and history of psychiatric disease, region, professional categories, departments, daily working hours, on call duties, specific training in the care of COVID-19

patients, job duties changed, direct involvement in management of COVID-19 patients, infection of household member/s or colleague with COVID-19. For depersonalization, the only significant independent variables are age, sex, hypertension, neurological disease, and history of psychiatric disease, professional categories, departments,

daily working hours, on call duties, specific training in the care of COVID-19 patients, changed job duties, infection of household member/s or colleague with COVID-19. For personal achievement, the only significant independent variables are age, sex, nationality, hypertension, history of psychiatric disease and taking antipsychotic drugs, departments, daily working hours, COVID-19 specific training, changed job duties and working hours. (Table 5)

4. Discussion

In the COVID-19 pandemic, the working conditions in the hospitals are becoming highly demanding and stressful, which has worsened the already-existing burnout among health care providers. [10]

To our knowledge, this research is the most widespread study conducted in the Kingdom of Saudi Arabia to study the prevalence of burnout and associated factors during COVID-19 pandemic as this study involves (3,557) participants of different categories of health care workers in Saudi Arabia. The results showed that 38.5% of the participants scored high for EE, 31.2% for high DP, and 33.6% for low PA (Figure 1). Many local studies were done in Saudi Arabia since start of COVID-19 pandemic to study the psychological impact of the pandemic on the health care workers. However, it is difficult to compare some of the results of these studies to our findings due to assessment of different aspects of psychological stresses as anxiety, fear, mental stress, and depression, or the use of different assessment tools that makes comparison of the prevalence with these studies are invalid. [11,12,13]

However, all of these studies agreed that there is a negative psychological effect of COVID-19 pandemic on the mental health of health care workers. Study of Sulais et al., 2020 [14] detects that 67.5% of physicians has worry, 56.9% feel isolated and 49.7% experience sense of fear. Also, a study to assess burnout and depression among HCWs in emergency and intensive care units detected that 30% of respondents were classified as having moderate burnout and 11% had high burnout levels. This study involved only selected category of health care workers. So, the results are not comparable to our findings. [15]

The prevalence of emotional exhaustion and depersonalization of the current study is relatively high when compared to Italian study. On the other hand, prevalence of low personal achievement in our study is lower than the Italian study. [16] Study of burnout and somatic symptoms among frontline healthcare professionals at the peak of the Italian COVID-19 pandemic reported that more than 1 out of 3 of the participants had high emotional exhaustion scores and 1 out of 4 reported high depersonalization levels, while only about 15 percent reported low personal achievement levels. [17]

Significant high burnout scores for younger age (Table 1), and this is supported by [18]. This could be explained by the effect of years of experience as older health care workers (HCWs) may have a better knowledge in comparison to the younger participants. In addition, the use of social media tends to be more prevalent among younger health care workers and can be a source for disturbing and confusing information that can contribute to stress and burnout symptoms. [14] This finding is also

supported by [19]. On the other hand, the level of psychological distress is higher in older medical personnel in a study conducted in China and explained by the fear of more exposure risk to infection and occurrence of complications especially if there are underlying diseases with old age. [20]

Significant high burnout scores in all parameters in the female in comparison to the male health care workers and this is supported by many other studies both local and international. [14,19,21,22] Against to this finding are the results of one pre- COVID-19 study. Being single in this study is associated with a significantly high level of emotional exhaustion. While, widow or divorced participants are experiencing a significant high level of depersonalization and low scores on personal achievement (Table 2). This finding is supported by [23].

Saudi nationality in the current study is associated with high burnout level for all subscales (Table 1). National studies conducted in Saudi Arabia before COVID-19 pandemic detect high levels of burnout among Saudi participants as high EE and DP scores was seen in Saudi physicians working in primary health care centers. [24] Another study involved nurses working in critical care areas revealed that the prevalence of burnout among Saudi and the non-Saudi nurses was (55.6% & 44% respectively) with statistically significant between burnout and nationality. [25] The reason for high burnout among Saudi participants relative to non-Saudi in this study could be explained by differences in the age distribution between the 2 groups as most of the Saudi participants in our study are in the age categories ≤ 40 years with a few years of experience.

On the other hand, study of burnout syndrome among emergency physicians and nurses in Asser region, detected that Saudi health care professionals had significant low EE prevalence and low PA compared to non-Saudi. [15]

This study shows no significant association between current smoking and emotional exhaustion among the study participants, but there is a significant relationship between current smoking and high depersonalization score and low personal achievement scores. Smokers were at higher significant risk of burnout compared to nonsmokers (OR=15.37, $p < 0.001$). [26] Smoking can be a contributing factor to burnout or may be used as a mean used by healthcare workers for relieving from feelings of exhaustion related to work problems. [27,28] On the contrary, another study in Kazakhstan found that smoking did not predict high burnout level. [29]

In this study, there is a significant high burnout score for participants with unknown medical history of hypertension and neuro-psychiatric diseases compared to the other 2 groups (Table 2), this may be due to small number of the participants in the unknown category or that if the person has undiagnosed diseases with no medical treatment there may be a high level of burnout. A study of the relationship between job burnout and somatic diseases found that there is a significant association between hypertension and burnout and explained this relation to increase the sympathetic activity and the inflammation process. [30]

A significant association of neuropsychiatric diseases and taking antipsychotic drugs with low scores on personal achievement. For taking antipsychotic drugs,

there are also high scores on EE and DP (Table 2). Association between burnout and psychological symptoms as insomnia, depressive symptoms, use of psychotropic and antidepressant medications, etc. detected in study of [31,32].

Significant differences in the mean burnout scores between regions of Saudi Arabia detected in this study with the Eastern region reports the highest mean score for emotional exhaustion and depersonalization, followed by al Hassa and Jeddah regions. While, Najran region reports the lowest mean score on emotional exhaustion and depersonalization compared to all other regions of Saudi Arabia. (Table 3). No available published study that measured the burnout of COVID-19 on health care workers in all KSA regions. But this difference in burnout between different regions could be explained by date of entering the COVID-19 the outbreak in that region and the magnitude of the outbreak, health care facilities preparedness to face the consequence of the COVID-19 outbreak. Eastern region is the first Saudi area that reported first case of COVID-19 case which may place excess workload on staff in the region with prolonged exposure to work stress from the date of first reported case. The incidence of COVID-19 was not similar across different cities. This is reflected on the amount of the workload on health care professionals in different areas with the risk of burnout to be higher in area than others. [33]

Nurses are the most job categories subjected to high burnout as presented by high emotional exhaustion and depersonalization scores compared to other job categories. And this occurs in accordance with many other studies as that conducted in Japan. The Japanese study showed that the burnout criteria were met by more than 40 percent of nurses and more than 30 percent of radiological technologists and pharmacists. [21].

High level of burnout was detected for staff working in intensive care units (ICUs) (Table 3) and this is supported by a study of [3,34]. Factors that may lead to high level of burnout among health care workers, especially in critical care areas are intense work load, having long shift hours, facing critical cases due to COVID 19, etc. [34,35]

On the other hand, working in surgery departments in this study was associated with significant low burnout levels and this contributed to policy taken by the Saudi ministry of health to postpone all elective surgery during peak of COVID-19 pandemic, which markedly reduce the operative lists and relieve staff working in this department from tension and stress. The COVID-19 pandemic has contributed to substantial global disruption of routine health care services. Elective surgery has been limited to prevent the in-hospital viral transmission. [36] On the other hand, staff working in infection control (IC) field demonstrates significant high scores for EE and DP, but not for PA and this attributed to extra-workload of IC staff ranging from implementing and updating policies and procedures, regular review of the current situation and the control measures, ensure all precautions are implemented, etc.

In this study, the shift work is associated with significant high burnout scores in all subscales (Table 3) and this explained by disturbance of circadian rhythm, and job strain. [37] This is supported by a study in Thailand. [38]

Working less than 10 years is associated with a significant high level of burnout and this is supported by the finding of Omari et al., 2020 who found that healthcare providers with fewer years of experience, have difficulty coping with stress and workload. [39] Direct involvement in care of COVID-19 is associated with high EE and DP but not on PA (Table 4). This is supported by [16,17,18,19,20,21,22], who found that being in contact with COVID-19 patients are strong, independent factors for EE and DP among HCWs.

In this study, infection of household members or colleagues is associated with a significant high level of emotional exhaustion and depersonalization (Table 4). This may be related to emotional pressure for fear of infection and the wellbeing of their families. [34] On the other hand, no significant differences in the mean burnout scores between health care workers with or without a history of catching COVID-19 infection (Table 4). Physicians with a previous exposure to similar traumatic events were less likely to experience psychological stress during the COVID-19 pandemic. [14]

Some of the variables are insignificant in the regression models for all burnout domains, including marital status, smoking history, working more than 10 years, and history of COVID-19 infection. Independent significant variables for burnout that remains in the models including age, sex, hypertension and a history of taking antipsychotic drugs, neurological disease, region (only for Al Baha region; significantly lower than Najran the reference category), professional category, departments, daily working hours, on call duties, training, changing duties and working hours, and infection of household members or colleagues. These results are supported by another study that found that predictors of all the three components of burnout were working hours, psychological diseases, fear of infection and perceived support by friends. Being female, nurse, and in contact with COVID-19 patients were predictors of both emotional exhaustion and depersonalization. Age is a significant predictor for personal accomplishment. [16] Study in Wuhan found that nurses, women, frontline workers, and those in Wuhan reported experiencing more severe symptoms of depression, anxiety, insomnia, and distress. [22] Gender, age, and previous exposure to similar traumatic events were predictive of psychological reactions. [14]

5. Limitations

This study has limitations that included collection of data through cross-sectional survey and so, the causal association between research variables and burnout is difficult. The use of self-reported data requires care in drawing conclusions about the impact of working conditions on burnout. Furthermore, because we did not assess the baseline level of burnout before the pandemic, we were unable to compare changes in prevalence.

6. Conclusion

This work highlights the impact of COVID-19 pandemic on burnout prevalence among health care

workers and detect significant related factors both personal and work related.

7. Recommendations

Factors associated with high burnout that should be discussed thoroughly to address these issues and implement interventions as means to relief health care workers especially those dealing with COVID-19 cases.

Ethical Approval

This work was approved by the ethical committee (Institutional Review Board)- King Fahad Medical City, Riyadh on 29 September 2020. IRB log number: 20- 636 E. All data were kept confidential.

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Conflict of Interest

The authors have no conflict of interest among authors.

Authors Contribution

KA shared in the design of the study, preparation of research materials, and data collection. GS shared in the design of study, analysis and interpretation of data. SA shared in conception of the study and drafting the article, and providing research materials. MA shared in design of study, writing, revising the article for final disposal. HH shared in the design of the study, acquisition of data, shared in analysis and interpretation of data, and drafting the article. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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