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Review Article

The Prevalence of Burnout among Physicians in Saudi Arabia: A Review

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Abstract

The aim of this study is to review the current state of published literature (1993-2022) on the prevalence of burnout among pooled physicians regardless their specialties and professional rank in Saudi Arabia. Health care services organizations and researchers would be benefited from the outcome of this review. PubMed and Google Scholar were the source of data. Published original studies in English language, applied Maslach Burnout Inventory (MBI) as a tool to assess burnout prevalence. Twenty two Cross-sectional independent original studies published between 2005 and 2022 and consisted of 3329 participants were included in this study. The estimated arithmetic mean of seven studies for EE score is 20.3329 ± 5.3460, 95% CI 16.3728 - 24.2930, DP score 9.0214 ± 1.9322, 95% CI 7.5883 - 10.4525, and PA score 25.5614 ± 10.39, 95% CI 17.8647 - 33.2581. The cut-off score values were variable between studies, for high emotional exhaustion (HEE) score were ≥ 26, ≥ 27, ≥ 28, and ≥ 30, high depersonalization (HDP) ≥ 9, ≥ 10, ≥ 11, ≥ 12, and ≥ 13, and low personal accomplishment (LPA) ≤ 29, ≤ 30, ≤ 31, and ≤ 33. Estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate based on HEE, HDP, and LPA percentage (19 studies) were HEE 42.7032%, (33.5707% - 51.8317%); HDP 39.8753%, (35.9915 - 47.4875); and LPA 39.0874%, (29.0954 - 49.0794). Estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate based on tri-dimensional burnout criteria HEE, HDP, and LPA is 15.6043, (8.6030 - 22.6056|). There was variation between studies in methodology, cut-off score, burnout definition and expression, and data presentation.

Keywords: *Burnout; Physician Burnout; Burnout Prevalence; Saudi Physician; Maslach Burnout Inventory*

Introduction

The aim of this study is to review the current state of published literature on the prevalence of burnout among pooled physicians regardless their specialties and professional rank in Saudi Arabia hospitals and primary health care centers. The main outcome would provide useful information for the benefit of health care services organizations and researchers. Cross-sectional studies used Maslach Burnout Inventory (MBI) to assess burnout prevalence among physicians in Saudi Arabia were exclusively included in this study.

Burnout is described as exploratory and qualitatively as a state of emotional exhaustion due to excessive demands on energy, strength or sources in workplace. It is characterized by physical symptoms such as exhaustion, fatigue, frequent headache, and gastrointestinal

disorders, sleeplessness and behavioral signs include frustration, anger, a suspicious attitude omnipotence or overconfidence, cynicism and signs of depression [1]. Maslach definition "burnout as a psychological syndrome emerging as a prolonged response to chronic interpersonal stressors on the job" [2]. Burnout syndrome is characterized by three dimensions emotional exhaustion (EE): (energy depletion, emotional and physical fatigue or depletion), depersonalization (DP): (cynicism, loss of empathy, detachment from the job or subject or responsibility), and personal accomplishment (PA): inefficacy, ineffectiveness and sense lack of accomplishment or competence. Maslach Burnout Inventory (MBI), is the most widely used self-reported questionnaire to measure the three dimensions of burnout quantitatively [2,3]. The three dimensions of burnout are emotional exhaustion (EE), depersonalization (DP) (cynicism), and personal accomplishment (PA) (low sense of personal accomplishment). The world health organization (WHO) defined burnout as an occupational syndrome that result from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: feelings of energy depletion or exhaustion, increased mental distance from one's job, or feelings of negativism or cynicism related to one's job; and reduced professional efficacy. Burnout recognized in the edition of International Classification of Disease (ICD-11- the Official Compendium of Diseases 11th edition), WHO. Burnout was not classified as a medical condition, also recognized workplace burnout as the diagnosable condition (Diagnostic Code QD85) resulting from chronic workplace stress and encompassing a constellation of exhaustion, cynicism, and reduced efficacy [4].

Burnout appears as global phenomenon affects physician all over the world, burnout affects physician, patient, and health care organization. Burnout affects physical health, mental health, and psychological health and personal life of the physicians, leading to occupational consequences [5-9]. Burnout consequence negatively affect the quality of patient healthcare, patient's safety and satisfaction, including medical errors, malpractice, sub-optimal health care services [10,11]. Burnout consequences overburden the health care organizations with a high economic cost due high rate of physician turnover, early retirement, low productivity, paying compensation of malpractice and medical errors, patient poor satisfaction with the quality of health service [12-15].

Occupational burnout is widely reported all over the world among physicians, and Saudi Arabia is no exception. The prevalence rate of burnout among physicians in Saudi Arabia have been reported since 2005 in several cross-sectional studies using Maslach Burnout Inventory. The published studies since 2005 indicated variable rate of burnout prevalence among physicians in Saudi Arabia. To the best of our knowledge there is no review study considered the current state of burnout prevalence among physicians in Saudi Arabia. We aim to perform a survey of literature of the prevalence of burnout among physicians from different specialties in Saudi Arabia, based on frequency percentage of HEE, HDP, and LPA and burnout prevalence rate based on one, two, or three dimensions criteria. The outcome would provide informative data on the prevalence of burnout among pooled physicians from different specialties in Saudi Arabia.

Methods

Source of data were two electronic database PubMed and Google Scholar. The search for literature published in English language from January 1993 to September, 2022 using the term "the prevalence of burnout among physicians in Saudi Arabia". We extracted the appropriate data and included them in this review. Published original studies in English language, applied Maslach Burnout Inventory (MBI- 22 items or abbreviated MBI (aMBI) as a tool to assess burnout prevalence among pooled physicians in Saudi Arabia.

Data extraction is performed including sample size, rate of response, participant's gender, Identification of place and date of study conduction, main outcome, method of burnout assessment, and score cut-off points criteria for burnout dimensions (EE, DP, and PA) stratification into high, moderate, and low. Quantitative measure data (mean ± SD score of MBI dimensions (EE, DP, and PA), or frequency or percentage of the individual dimension (HEE, HDP, and LPA), frequency or percentage of overall burnout based on predefined criteria uni-dimension (HEE and/or HDP), or bi-dimension (HEE and HDP), or tri-dimension (HEE, HDP, and LPA) or any other combination of the three dimensions EE, DP, and PA. Statistical analysis: Arithmetic mean ± standard deviation (SD) were estimated using CASIO Scientific Calculator *f*x-95MS. 95% Confidence intervals (95% CI) was estimated using the following equation:

CI= $\bar{x} \pm Z^* SD/\sqrt{N}$

CI: Confidence intervals

$\bar{x}$: Arithmetic mean

SD: Standard deviation

$\sqrt{N}$: Square root of the number of observations

Z: Confidence level value at 95%, Z = 1.96

The difference between two means was assessed by t-test, two-tailed at $p \leq 0.05$.

Results

We identified 22 [16-37] cross-sectional independent original studies published between 2005 and 2022 and consisted of 3329 participants were included in this study to assess burnout prevalence among physicians practicing in hospitals and primary health care centers, Saudi Arabia. Total participants (pooled physicians of different professional rank consultant, registrar, and resident) were 3329, male 1725 (51.82%), female 1084 (32.56%), and mix genders (not identified) 520 (15.62%). They were practicing different specialties in hospitals and primary health care centers, Saudi Arabia. Place of conduction, three studies were national surveys [30,31,34], one from assembly gathering [21], two [16,25] in Eastern, and another two [17,22] in Southern province, two [19,33] in multicity (Makkah, Riyadh, and Jeddah [19] and (Abha and Khamis Mushait [33], and 12 single city (AL Riyadh 4 [20,23,26,36], Jeddah 4 [18,24,28,29], and one in each city Khmis Mushait [27], Tabuk [32], Jazan [35], and Al Jubail Industrial City [37]. Studies according to specialty, primary health care 6 [22-25,36,37], pooled physicians from different specialties 5 [26-29,32], Emergency Medicine 4 [19-21,33], Orthopedics 2 [16,17], Psychiatrics 2 [31,34], Pediatrics 1 [18], Palliative Medicine 1 [30], and Intensive Care 1 [35]. Three studies conducted during COVID-19 pandemic (after 2019) [34,35,37] and 19 studies [16-33,36] before COVID-19 pandemic (before 2020) (Table 1).

Reference	Specialty	Date of conduction	Place of conduction	Sample size	Male	%	Female	%	Rate of response %
Sadat-Ali M., *et al*. 2005 [16]	Orthopedic surgeons	Sep. 2003 - Oct. 2004	Eastern province	69	na		na		67.6
Al-Otaibi MLS., *et al*. 2020 [17]	Orthopedic surgeons	Dec. 2018 - April 2019	Asir region 4 cities/ 12 hospital	107	6	5.6	101	94.9	na
Al-Youbi RA and Jan AA 2013 [18]	Pediatrics	2010	Jeddah	130	58	44.6	72	55	65
Alaslani MH., *et al*. 2016 [19]	Emergency medicine	July-August 2016	Three general hospitals in Makkah, Riyadh, Jeddah	160 + 39 as control	107	53.8	92	46.2	93.8
Alsaawi A., *et al*. 2014 [20]	Emergency medicine	na	KAMC Riyadh	72	45	85	8	15	74
Alsaawi A., *et al*. 2019 [21]	Emergency medicine	2015	E. M, assembly 2015 in Riyadh	265	223	84.2	42	15.8	87.5
Al-Sareai NS., *et al*. 2013 [22]	Primary health care	Oct. 2010 - June 2011	Asir province	370	303	81.9	67	18.1	94.9
Selaihem AA 2013 [23]	Primary health care	April. 2010	Military hospital Riyadh	144	88	61.1	56	38.9	72

Bawakid K., *et al*. 2017 [24]	Primary health care	Oct. 2016 - Jan. 2017	Primary health care centers Jeddah	246	105	42.6	141	57.3	92
Al-Hadad A., *et al*. 2020 [25]	Primary health care	March 2018 - Aug. 2019	Primary health care centers Alahsa region	226	154	68.1	72	31.9	80.7
Aldrees TM *et al*, 2013 [26]	Ten specialties	Oct.-Nov. 2010	KFNGH, Riyadh	348	252	72	96	27.6	74
Agha A., *et al*. 2015 [27]	Six specialties	Aug. - Oct. 2012	AFH, Khamis Mushyt	96	64	66.7	32	33.3	na
Marzouki H., *et al*. 2019 [28]	Physician	Dec. 2016 - June 2017	KAUH, Jeddah	77	na		na		77
Almostadi L., *et al*. 2019 [29]	Physicians	Oct. 2019	PHCC Jeddah Jeddah	183	57	31.1	126	68.9	79.9
Ghazwani EY 2022 [30]	Palliative care	2018	Palliative care centers National	44/51	26	59.1	18	40.9	86.3
AlHadi AN., *et al*. 2022 [31]	Mental health professionals (Psychiatrist)	Feb. - March 2018	National	198	na		na		na
Mohamed N., *et al*. 2021 [32]	Physicians	April - May 2015	KSAFH, Tabuk	147	110	74.8	37	25.2	
Alqahtani A M 2019 [33]	Emergency Physicians	na	Abha and Khamis Mushait	95	na		na		na
Alwashmi AH and Alkhamees AA 2021 [34]	Psychiatrist Physicians	May-August 2020	National	101	56	55.4	45	44.6	63.1
Shbeer A and Ageel M 2022 [35]	Intensive care unit	Agu. - Nov. 2021	Jazan	30	na		na		na
Alshreem R M., *et al*. 2022 [36]	Primary health care, Family medicine	May - Oct. 2016	KAMC Riyadh	150	71	47.3	79	52.7	66.37
Babiker M B., *et al*. 2021 [37]	Primary health care	April. 2021	Family medicine centers, Jubail Industrial City	51	na		na		89

Table 1: *Characteristics of the population.*

Score of MBI dimensions (EE, DP, and PA)

Score of EE, DP, and PA were presented in table 1. Out of 22 studies, only 7 (31.82%) studies [17,24,25,29,35-37] provided data on the mean score ± SD. Mean of Score ± SD (no. of observation) as reported in the included studies was ranged from 11.60 ± 4.70 (246) to 28.67 ± 14.91 (51) for EE, from 5.66 ± 5.20 (246) to 11.09 ± 3.68 (183) for DP, and from 13.15 ± 5.11 (183) to 39.71 ± 8.72 (51) for PA. The estimated arithmetic mean and 95% confidence of intervals (95% CI) of seven studies for EE score is 20.3329 ± 5.3460, (16.3728 - 24.2930), DP score 9.0214 ± 1.9322, (7.5883 - 10.4525), and PA score 25.5614 ± 10.39, (17.8647 - 33.2581) (Table 2 and 3).

Reference	Cut-off point	EE score Mean ± SD	DP score Mean ± SD	PA score Mean ± SD	HEE N (%)	HDP N (%)	LPA N (%)	HEE or HDP N (%)	HEE + HDP N (%)	HEE + HDP and LPA	Considered burn-out as defined by the study authors or outcome as reported
Sadat-Ali M., *et al*. 2005 [16]	na	na	na	na	35 (50.7)	41 (59.4)	12 (17.4)	na	na	na	na
Al-Otaibi MLS., *et al*. 2020 [17]	na	18.9 ± 9.1	9.2 ± 5.2	19.1 ± 6.5	12.5	51	31.5	na	na	na	All participants had moderate level of burnout
Al-Youbi RA and Jan AA 2013 [18]	na		na	na	na	na	na	na	na	na	BO mild 25 (19%), moderate 37 (29%), severe 45 (34%)
Alaslani MH., *et al*. 2016 [19]	HEE ≥ 27 HDP > 10 LPA< 33	na	na	na	66.7 (C14.4)	56.7 (C15)	95.6 (C94.9)	na	na	na	Overall BO 41.6% E.M. 48.7% vs 10% control
Alsaawi A., *et al*. 2014 [20]	na	2.72 ± 1.28	1.86 ± 1.31	4.5 ± 0.9	21 (40)	21 (40)	17 (32)	na	na	na	Moderate to high risk of BO
Alsaawi A., *et al*. 2019 [21]	na	2.51 ± 1.31	2.09 ± 1.28	4.27 ± 1.18	95 (35.8)	135 (50.9)	107 (40.4)	72.1	na	13.4	High risk: in one dim. 191 (72%), either HEE or HDP 156 (56.3%), three dim. 37 (13.4%)
Al-Sareai NS., *et al*. 2013 [22]	HEE ≥ 26 HDP ≥ 9 LPA≤ 33	na	na	na	29.5	15.7	19.7	na	na	24 (6.3)	34.8% had no BO
Selaihem AA 2013 [23]	HEE ≥ 27 HDP ≥ 10 LPA ≤ 33	na	na	na	77 (53.5)	56 (38.9)	64 (44.4)	48 (33.3)	57 (39.6)	4 (2.73)	24.25% had no BO
Bawakid K., *et al*. 2017 [24]	na	11.60 ± 4.70	5.66 ± 5.20	14.44 ± 3.66	na	na	na	na	na	na	Overall moderate to high BO 25.2% moderate to severe: EE 69.5%, DP 26%. Low PA 87.8%
Al-Hadad A., *et al*. 2020 [25]	na	24.99 ± 11.54	9.19 ± 6.13	29.41 ± 9.9	107 (47.3)	116 (51.3)	135 (59.7)	na	na	55 (24.3)	BO: HEE, HDP, and LPA 24.3%
Aldrees TM *et al*, 2013 [26]	HEE ≥ 27 HDP ≥ 13 LPA≤ 31	na	na	na	188 (54)	121 (35)	119 (33)	na	na	na	BO prevalence: high in one or more of the 3 dimensions HEE or HDP or LPA participants 248 (70%)

Agha A., *et al*. 2015 [27]	na	na	na	na	68.8	63.6	38.5	na	na	na	BO at least in one dimension 85 (88.5%)
Marzouki H., *et al*. 2019 [28]	HEE ≥30 HDP ≥ 12 LPA≤ 33	na	na	na	9	23	34	na	na	na	Overall BO (medium+high): EE 35.1%, DP 50.7%, PA 66.2%
Almostadi L., *et al*. 2019 [29]	na	19.21 ± 6.59	11.09 ± 3.68	13.15 ± 5.11	na	na	na	na	na	na	BO moderate to high: EE 123 (67.2%), DP 163 (89.1%), PA 77 (42.1%), and overall BO 68 (37.2%)
Ghazwani EY 2022 [30]	HEE ≥ 26 HDP ≥ 9 LPA≤ 33	na	na	na	8 (18.2)	11 (25)	11 (25)	na	na	na	na
AlHadi AN., *et al*. 2022 [31]	HEE ≥ 27 HDP ≥ 13 LPA≤ 31	na	na	na	72 (36.36)	26 (13.13)	52 (26.26)	na	na	na	Overall BO 535/1253 (42.7%), for all workers
Mohamed N., *et al*. 2021 [32]	HEE ≥ 27 HDP ≥ 13 LPA≤ 31	na	na	na	96 (65)	72 (49)	48 (32.7)	na	na	14.2	BO: HEE, HDP, and LPA
Alqahtani A M 2019 [33]	HEE ≥ 26 HDP ≥ 9 LPA≤ 33	na	na	na	77 (81.1)	23 (24.2)	26 (27.4)			18 (18.9)	BO: HEE, HDP, and LPA 18 (18.9%)
Alwashmi AH and Alkhamees AA 2021 [34]	HEE ≥ 27 HDP ≥ 13 LPA ≤ 31	na	na	na	52 (51.5)	72 (71.3)	92 (91.1)	81 (80.2)	na	na	Experienced BO: HEE and/or HDP 81 (80.2%)
Shbeer A and Ageel M 2022 [35]	HEE ≥ 28 HDP ≥ 11 LPA ≤ 29	20.03 ± 12.02	7.33 ± 5.81	27.02 ± 12.15	7 (24)	7 (24)	16 (53)	na	na	na	na
Alshreem R M., *et al*. 2022 [36]	na	19 ± 12.02	10.8 ± 8.40	36.1 ± 10.27	32 (21.3)	57 (38)	41 (27.3)	na	na	na	na
Babiker M B., *et al*. 2021 [37]	na	28.67 ± 14.91	9.88 ± 6.84	39.71 ± 8.72	24 (47.1)	14 (27.5)	7 (13.7)	na	na	15 (29.4)	BO: HEE, HDP, and LPA 29.4%

Table 2: *Prevalence of burnout among 22 included studies.*
na: Data not available; N: Number of observations.

Dimension	Range of seven studies [Ref. 17,24,25,29,35-37] Dimension score	Estimated mean ± SD of seven studies, 95% CI
EE	11.60 - 28.67	20.3329 ± 5.3460 16.3728 - 24.2930
DP	5.66 - 11.09	9.0214 ± 1.9322 7.5883 - 10.4525
PA	13.15 - 39.71	25.5614 ± 10.39 17.8647 - 33.2581

Table 3: *Mean score of EE, DP, and PA and 95% confidence of intervals.*

MBI dimensions categorization

Predetermined cut-off score scale was used to categorize Maslach burnout inventory each dimension (EE, DP, and PA) to low, moderate, and high level. Eleven 11/22 (50%) studies provided criteria of cut-off point values [19,22,23,26,28,30-35] (Table 3). The cut-off points for HEE score were ≥ 26, ≥ 27, ≥ 28, and ≥ 30, HDP ≥ 9, ≥ 10, ≥ 11, ≥ 12, and ≥ 13, and LPA ≤ 29, ≤ 30, ≤ 31, and ≤ 33. There was a wide variation in cut-off score point. Eleven 11/22 (50%)) did not provide any values for cut-off points [16-18,20,21,24,25,27,29,36,37] eight studies quoted a reference, and three did not quote [29,36,37]. Table 2 and 4 shows the variation in cut-off score values between studies, and variable combination of HEE, HDP, and LPA.

Criteria of categorization combined	References
HEE ≥ 26, HDP ≥ 9, LPA ≤ 33	Al-Sareai 2016 [22], Ghazwani 2022 [30], Alqahtani 2019 [33]
HEE ≥ 27, HDP > 10, LPA < 33	Alaslani 2016 [19]
HEE ≥ 27, HDP ≥ 10, LPA ≤ 33	Selaihem 2013 [23]
HEE ≥ 27, HDP ≥ 13, LPA ≤ 31	Aldrees 2013 [26], AlHadi 2022 [31], Mohamed 2021 [32], Alwashmi 2021 [34]
HEE ≥ 28, HDP ≥ 11, LPA ≤ 29	Shbeer 2022 [35]
HEE ≥ 30, HDP ≥ 12, LPA ≤ 33	Marzouki [28]
Dimension	Reported cut-off values
HEE	≥ 26, ≥ 27, ≥ 28, and ≥ 30
HDP	≥ 9, ≥ 10, ≥ 11, ≥ 12, and ≥ 13
LPA	≤ 29, ≤ 30, ≤ 31, and ≤ 33

Table 4: *MBI dimensions categorization.*

Burnout prevalence rate based on individual dimension HEE, HDP, and LPA percentage

The frequency/percentage of HEE, HDP, and LPA among physicians were presented in table 1. Out-off 22 studies 19 (86.36%) [16,17,19-23,25-28,30-37] provided data on prevalence rate of HEE, HDP, and LPA (frequency/percentage of HEE, HDP, and LPA). The prevalence of burnout among physicians of in Saudi Arabia, based on prevalence rate of HEE, HDP, and LPA (frequency/percentage of HEE, HDP, and LPA) as reported in the included studies were ranged HEE (9% to 81.1%), HDP (13.13% to 71.3%), and LPA (13.70% to 95.60%. The estimated arithmetic mean of 19 studies for EE, HDP, and LPA percentage and 95% confidence of intervals (95% CI) shown in table 2 and 5.

Dimension	Percentage of prevalence range 19 studies: [16,17,19-23,25-28,30-37]	Estimated percentage of prevalence Mean ± SD of 19 studies, 95% CI
HEE	9% to 81.1%	42.7032 ± 20.3015 33.5707% - 51.8317%
HDP	13.13% to 71.3%	39.8753 ± 16.9291 32.30 - 47.4875
LPA	13.70% to 95.60%	39.0874 ± 22.2218 29.0954 - 49.0794

Table 5: *Burnout prevalence rate based on individual dimension HEE, HDP, and LPA percentage and 95% confidence of intervals.*

Burnout prevalence rate based on one, two, or three dimensions criteria

The frequency/percentage of prevalence of burnout based on defined burnout one dimension (Uni-dimensional: HEE and/or HDP), two dimensions (Bi-dimensional: HEE and HDP), and three dimensions (Tri-dimensional: HEE, HDP, and LPA) among physicians were presented in table 2. Out of 22 studies, only 8 (36.36%) studies reported burnout prevalence according to above criteria (Table 2 and 6). One dimension (HEE and/or HDP): 33.30%, 72.10%, and 80.20% (3 studies) [23,21,34]. Two dimensions (HEE and HDP): 39.6% (1 study) [23]. Three dimensions (HEE, HDP, and LPA): 2.73%, 6.3%, 13.40%, 14.2%, 18.90%, 24.30%, and 29.40% (7 studies) [21-23,32,33,37] (Table 6).

Criteria of burnout	Percentage of burnout prevalence
One dimension HEE and/or HDP	33.30%, 72.10%, and 80.20% (3 studies: 23, 21, and 34 respectively) Range 33.30% - 80.20%. Estimated mean ± SD, (95% CI) 61.8667 ± 23.0688 (43.3 - 80.50)
Two dimensions (HEE and HDP)	39.6% (1 study: 23)
Three dimensions (HEE, HDP, and LPA)	2.73%, 6.3%, 13.40%, 14.2%, 18.90%, 24.30%, and 29.40% (7 studies: 23, 22, 21, 32, 33, 23, and 37 respectively). Range 2.73% - 29.40%. Estimated mean ± SD, (95% CI) 15.6043 ± 9.4512 (8.6030 - 22.6056)

Table 6: *Burnout prevalence rate based on one, two, or three dimensions (uni-, bi-, and tridimensional criteria), (8 studies).*

Discussion

Mean of dimensions score

Out of 22 published independent studies, 7 (31.82%) provided primary data mean ± SD of burnout dimensions score. This primary data shows the average of score in sample size, the scores categorize to different level (high, moderate, and low) according to predeter-

mined criteria. Reporting score is useful to assess heterogeneity, publication bias of the primary data, and provide score baseline data for the population. It is useful to stratify the score of each dimension to low, moderate and high level according to well defined cut-off score criteria.

Variation in cut-off points

The cut-off points for HEE score were ≥ 26, ≥ 27, ≥ 28, and ≥ 30, HDP ≥ 9, ≥ 10, ≥ 11, ≥ 12, and ≥ 13, and LPA ≤ 29, ≤ 30, ≤ 31, and ≤ 33. There was a varied criteria of cut-off points across the included studies of this review. Some of them quoted a reference for the used criteria of cut-off points, but it was not possible to trace any quantitative data, other did not quote any reference [29,36,37]. Fifty percent (11/22) of the studies did not report the values of cut-off points. Moreover, there was six different sets of criteria for dimensions combination set table 3 were used to define burnout among 11 studies. The variation in criteria of categorization and not specifying values of cut-off preclude meaningful comparison between studies. Sanfilippo., *et al*. 2020 [38] reported in a systematic review of burnout prevalence among intensive care physicians, that the cut-off value was not specified in 7/17 (41%) studies. The predetermination of cut-off values is the corner stone of the rate of burnout prevalence, whatever the criteria of burnout state definition. The unification of cut-off criteria is must for the meaningful comparison, results generalization, and conclusion. It is important to establish global or regional or national cut-off values.

Burnout prevalence rate based on individual dimension percentage

HEE, HDP, and LPA

Burnout prevalence rate based on individual dimension HEE, or HDP, or LPA. Nineteen 19/22 (86.36%) reported frequency/percentage of high emotional exhaustion (HEE), high depersonalization (HDP), and low personnel achievement (LPA), and only 11/19 (57.89%) studies provided the criteria of cut-off points values to categorize MBI dimensions to low, moderate and high levels, using six different categorizing criteria. There was a wide variation in the range of burnout prevalence among physicians from different specialties in Saudi Arabia, based on frequency/percentage of HEE, HDP, and LPA were ranged HEE (9% to 81.1%), HDP (13.13% to 71.3%), and LPA (13.70% to 95.60%) [16-37]. Estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate based on HEE, HDP, and LPA percentage (19 studies) were HEE 42.7032%, (33.5707% - 51.8317%); HDP 39.8753%, (35.9915 - 47.4875); and LPA 39.0874%, (29.0954 - 49.0794). Differences between means of burnout prevalence of HEE, HDP, and LPA percentage were assessed by t-test at $p \leq 0.05$, there was no statically significance between pooled physicians (19 studies) and other groups pooled physicians, primary health care physicians, or emergency medicine physicians. There was no significant difference in the rate of burnout prevalence between primary health care, emergency medicine, and pooled physicians (Table 7).

Burnout prevalence rate among practicing physicians in a systematic review of 182 articles published between 1991 and 2018, consist of 109628 participants from 45 countries, used Maslach Burnout Inventory (MBI) to assess burnout in 85.7% (156/182) of the studies, in these articles the prevalence of burnout among the studies were expressed as overall burnout ranged from 0.0 to 80.5%, and EE from 0.0% to 86.2%, DP from 0.0% to 89.9%, and PA from 0.0% to 87.1 [39]. The prevalence of burnout among GPs in 29 countries HEE 32% (95% CI 26% - 39%), HDP 31% (95% CI 19% - 43%), and LPA 27% (95% CI 22% - 32%), was reported in a systematic review and meta-analysis consisted 22177 GPs across 29 countries [40]. In a systematic review and meta-analysis of 37 studies, included 15183 participants, the burnout prevalence among French physicians for HEE, 21% (95% CI 19% - 24%), HDP 21% (95% CI 19% - 24%), and LPA 29% (95% CI 24% - 34%). REM Pooled burnout prevalence estimate was 49% (95% CI 45% - 53%), (Burnout criteria: HEE, or HDP, or LPA), and severe burnout 5% (95% CI 4% - 7%), (Severe burnout: high scores of EE and DP, and low score of PA) [41]. The global prevalence of burnout among general practitioners of 16 cross-sectional studies with 7,595 participants were included. The pooled burnout rate showed 37%, 28%, and 26% of general GPs suffer from high emotional exhaustion (EE), high depersonalization (DP), and low personal exhaustion (PA), respectively [42]. The Saudi and other national and international studies table 6, showed a wide variation existed in the

Specialty	Sample size	HEE%	HDP%	LPA%
Pooled physicians (4 studies, ref. 11, 12, 13, and 17)	774	Range, *Mean ± SD, *(95%CI) 9% - 68.80% 49.20 ± 27.525 (22.2252 - 76.1745)	Range, *Mean ± SD, *(95%CI) 23% - 63.60% 42.65 ± 17.5487 (25.40 - 59.8)	Range, *Mean ± SD, *(95%CI) 23% - 63.60% 34.55 ± 2.6913 (31.9127 -37.1873)
Primary health care (5 studies, ref. 7, 8, 10, 21, and 22)	791	21.30% - 53.50% 39.74 ± 13.6524 (27.7735 - 51.7065)	15.70% - 51.30% 34.28 ± 13.3795 (22.5526 - 46.0074)	13.70% - 59.70% 32.96 ± 18.8727 (16.4176 - 49.5024)
Emergency medicine (4 studies, ref. 4, 5, 6, and 18)	612	35.8% - 81.1% 55.90 ± 21.6679 (34.6656 - 77.1344)	24.20% - 59.90% 45.20 ±16.4963 (29.0338 - 61.3662)	27.40% - 95.60% 48.85 ±31.6280 (17.8546 - 79.8454)
Pooled (19 studies, (ref. 1,2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, and 22)	2810	9% - 81.1% 42.7032 ± 20.3015 (33.5707 - 51.8317)	13.13% - 71.3% 39.8753 ± 16.9291 (32.305 - 47.4875)	13.70% - 95.60% 39.0874 ± 22.2218 (29.0954 - 49.0794)

Table 7: *Comparison of burnout prevalence rate based on individual dimension HEE, HDP, and LPA percentage and 95% confidence of intervals across Saudi studies included in this review.*

Percentage of prevalence range. Estimated percentage of prevalence, mean ± SD and 95% CI.

rate of burnout prevalence. The rates of burnout prevalence, based on individual dimension HEE, HDP, and LPA percentage among Saudi physicians were higher than other national and international studies, the significance of this difference need to be evaluated by performing meta-analysis on Saudi studies, since we performed preliminary statistical analysis of our review (Table 8).

Burnout prevalence rate based on one, two, or three dimensions criteria

Seven 7/22 (31.82%) studies reported burnout prevalence rate based on tri-dimensional criteria HEE, HDP, and LPA of MBI. It ranged from 2.73% to 29.40%. Selaihem 2013 [23], reported burnout prevalence of 2.73% among public health care physicians applying tridimensional criteria (HEE ≥ 27, HDP ≥ 10, and LPA ≤ 33), Al-Sareai., *et al*. 2013 [22], reported burnout prevalence of 6.3% among public health care physicians applying tridimensional criteria, (HEE ≥ 26, HDP ≥ 9, and LPA ≤ 33). Al-Hadad., *et al*. 2020 [25], reported burnout prevalence of 24.30% among public health care physicians applying tridimensional criteria, but did not report value of cut-off. Babiker., *et al*. 2021 [37], reported burnout prevalence of 29.40% among family medicine physicians applying tridimensional criteria, but did not report value of cut-off. Mohamed., *et al*. 2021 [32], reported burnout prevalence of 14.20% among pooled physicians applying tridimensional criteria (HEE ≥ 27, HDP ≥ 13, and LPA ≤ 31). Alqahtani., *et al*. 2019 [33] reported burnout prevalence of 18.90% among Emergency medicine physicians applying tridimensional criteria (HEE ≥ 26, HDP ≥ 9, and LPA ≤ 33). Alsaawi., *et al*. 2019 [21], burnout prevalence of

Reference	HEE %	HDP %	LPA %
Rotenstien LS., *et al*. 2018 [39], S. R.	Range: 0.0% - 86.2%	Range: 0.0% - 89.9%	Range: 0.0% - 87.1
S and N. current study (19 studies)	Range: 9% - 81.1%	Range: 13.13% - 71.3%	Range: 13.70% - 95.60%
Karuna C., *et al*. 2022 [40] M-A, GPs Global	Mean %, (95% CI) 32%, 26 % - 39%	Mean %, (95% CI) 31%, 19 % - 43%	Mean %, (95% CI) 27%, 22 % - 32%
Kansoun Z., *et al*. 2019 [41] M-A, French physicians	Mean %, (95% CI) 21%, 19% - 24%	Mean %, (95% CI) 21%, 19% - 24%	Mean %, (95% CI) 29%, 24% - 34%
S and N. current study (19 studies)	Mean %, (95% CI) *42.7032 (33.57 - 51.83)	Mean %, (95% CI) *39.8753 (32.30 - 47.49)	Mean %, (95% CI) *39.0874 (29.10 - 49.08)
Shen X., *et al*. 2022 [42] M-A, Global	Mean % 37%	Mean % 28%	Mean % 26%

Table 8: *Comparison of burnout prevalence of individual dimension (HEE %, HDP %, and LPA %) with other national and global studies. S. R.: Systematic Review, M-A: Meta-Analysis*

**Estimated percentage of prevalence, mean of 19 studies, and 95% CI from table 5.*

13.40% among Emergency medicine physicians, but did not report value of cut-off. Out of 7 studies 4/7 (57.14%) provided the criteria of cut-off points values to categorize MBI dimensions to low, moderate and high levels. Four studies reported the prevalence of burnout on the primary health care physicians 2.73%, 6.30%, 24.30%, and 29.40% [22,23,25,33]. Two studies reported the prevalence of burnout on Emergency medicine physicians 18.90% and 13.40% [21,33], and one on pooled physicians 14.20% [32].

The estimated mean of burnout prevalence among physicians in Saudi Arabia based on three dimensions criteria (HEE, HDP, and LPA) is 15.60% and 95% confidence intervals (95% CI) is 8.6030 - 22.6056.

The prevalence of burnout, based on uni-, bi-, or tridimensional criteria for Saudi and other national and global studies percentage shown in table 9. The prevalence rate of burnout among US physicians in 2011, 2014 and 2017 were 45.8% (3310/7227), 54.4% (3680/6767), and 43.9% (2147/4893) based on high score on EE ≥ 27 and/or DP ≥ 10 respectively [43]. The prevalence rate of burnout among intensivist in China, nationwide cross-sectional survey, was 82.1%, and severe burnout 38.8%. Positive burnout defined by HEE ≥ 27 or HDP ≥ 10 or LPA ≤ 33, and severe burnout defined by HEE with HDP ≥ 10 or LPA ≤ 33 [44]. A systematic review included of 56 studies, from 41 European countries. Physicians' burnout prevalence rates ranged from 2.5% to 72.0%. The pooled prevalence rate of burnout was 7.7% (5.3 - 10.4%) based on tridimensional definition, 19.7% [13.5 - 26.3%] bi-dimensional definition and 43.2% (29.0 - 57.6%) unidimensional definition [45]. A study from 12 European countries (Bulgaria, Croatia, France, Greece, Hungary, Italy, Malta, Poland, Spain, Sweden, Turkey, and England), consist of 1393 participants (conducted almost in 2003), the prevalence rate of burnout among family doctors, 12% scored high burnout in all three dimensions, high burnout in two dimensions 21.4%, and one dimension 31.5%. High EE (43%), high DP (35%), and low PA (32%), and dimension score cut-off for high EE ≥ 27, high DP ≥ 10, and for low PA (high burnout) ≤ 33 [46]. In a systematic review included 7 studies the prevalence of burnout among emergency physicians is ranged from 25.4% to 71.4% [47]. In a meta-analysis and systematic review consisted of 1943 emergency medicine physicians the prevalence of burnout HEE 40% (95% CI 26% - 55%), HDP 41% (95% CI 30% - 52%), and LPA 35% (95% CI 19% - 52%) [48]. In a meta-analysis study of 9 articles

considered Psychiatrist, the pooled mean for emotional exhaustion was 22.03 (95% confidence interval (CI): 19.71 - 24.34, tau = 3.74). For depersonalization, the pooled mean was 7.41 (95% CI: (5.91 - 8.90). The pooled mean for personal accomplishment was 30.00 (95% CI: 24.75 - 35.27) [49]. The Prevalence of overall burnout among psychiatrists was reported in systematic review and meta-analysis of thirty-six studies from 19 countries, consisted of 5481 was 25.9% [11.1% - 40.7%] as assessed by a Maslach Burnout Inventory (MBI). The pooled prevalence was 43.5% [27.9% - 59%] for HEE, 28.2% [17.5% - 38.9%] for (HDP), and 32.4% [3.4% - 61.3%] LPA. The mean scores of 22-items MBI subscales were 21.51 [18.64% - 24.38%] for EE, 6.57 [5.53% - 7.62%] for DP, and 31.83 [25.73% - 37.94%] for PA. European psychiatrists revealed (p = 0.045) lower EE score (20.82; 95% CI 7.24 - 24.41) measured by 22-item MBI compared to their non-European colleagues (24.99; 95% CI 23.05 - 26.94) [50].

Reference	HEE and/or HDP Uni-dimensional	HEE and HDP Bi-dimensional	HEE, HDP and LPA Tri-dimensional
Shanafelt 2019 [43] USA	HEE ≥ 27 and/or HDP ≥ 10 Mean 45.8% (2011) 54.4% (2014) 43.9% (2017)	No data	No data
Hiver C., *et al*. 2022 [45] 41 European countries, 56 studies M-A	Mean, (95% CI) 43.2% (29.0 - 57.6%) Range: 2.5% to 72.0%	Mean, (95% CI) 19.7% (13.5 - 26.3%)	Mean, (95% CI) 7.7% (5.3 - 10.4%)
Soler J K., *et al*. 2008 [46] 12 European countries family physicians M-A	EE ≥ 27 and/or DP ≥ 10 Mean 31.5%	EE ≥ 27 and DP ≥ 10 Mean 21.4%	HEE ≥ 27, HDP ≥ 10 and LPA ≤ 33 Mean 12%
S and N. This study	Range 33.30% - 80.20%	Range: 13.13% - 71.3%	Range: 2.73% - 29.40%
S and N. This study	Estimated mean ± SD 61.8667 ± 23.0688 95% CI: (43.3 - 80.50) 3 studies	39.6% (one study)	Estimated mean ± SD 15.6043 ± 9.4512 95% CI: (8.6030 - 22.6056) 7 studies

Table 9: *Comparison of burnout prevalence based on uni-. bi-, and tridimensional criteria with other national and global studies. M-A: Meta-analysis study.*

Based on one dimension criteria (HEE and/or HDP) the estimated rate of burnout prevalence among physicians was 61.8 7%, 43.90%, and 31.50%, mean of three Saudi studies [22,23,34], forty one European countries [45], and 12 European countries family medicine physicians [46] respectively, and 45.80%, 54.40%, and 43.90% in American physicians for 2011, 2014, and 2017 respectively [43].

Based on two dimensions criteria (HEE and HDP) the reported rate of burnout prevalence among physicians was 39.9%, 21.40%, and 19.70%, one Saudi study, 12 European countries family medicine physicians [46], and forty one European countries [45] respectively.

Based on three dimensions criteria (HEE, HDP and LPA) the estimated rate of burnout prevalence among physicians was 15.60%, 12.00%, and 7.70%, mean of seven Saudi studies [21-23,25,32,33,37], twelve European countries family medicine physicians [46], forty one European countries [45] respectively.

The heterogeneity and publication bias across studies were not assessed in this review, so the estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate in this review did not account for the effect of heterogeneity and publication bias factors. These factors and other would affect our estimates, also the variation in the criteria of cut-off points, which have been used to categorize emotional exhaustion, depersonalization, and personnel achievement (MBI Dimensions) to low, moderate and high levels, consequently affect the criteria of experienced burnout definition.

Conclusion

About thirty two (31.82%) of the studies provided data for mean of score ± SD (no. of observation) of MBI dimensions. It was ranged from 11.60 ± 4.70 (246) to 28.67 ± 14.91 (51) for EE, from 5.66 ± 5.20 (246) to 11.09 ± 3.68 (183) for DP, and from 13.15 ± 5.11 (183) to 39.71 ± 8.72 (51) for PA. The estimated arithmetic mean of seven studies for EE score is 20.3329 ± 5.3460, and 95% CI 16.3728 - 24.2930, DP score 9.0214 ± 1.9322, and 95% CI 7.5883 - 10.4525, and PA score 25.5614 ± 10.39, 95% CI 17.8647 - 33.2581.

Eleven 11/22 (50%) studies provided criteria of cut-off point values. The cut-off points for HEE score were ≥ 26, ≥ 27, ≥ 28, and ≥ 30, HDP ≥ 9, ≥ 10, ≥ 11, ≥ 12, and ≥ 13, and LPA ≤ 29, ≤ 30, ≤ 31, and ≤ 33.

Out-off 22 studies 19 (86.36%) provided data on prevalence rate of HEE, HDP, and LPA (frequency/percentage of HEE, HDP, and LPA). The prevalence of burnout among physicians of in Saudi Arabia, based on prevalence rate of HEE, HDP, and LPA (frequency/percentage of HEE, HDP, and LPA). Based on the individual dimension, the burnout prevalence rate were for HEE (9% to 81.1%), HDP (13.13% to 71.3%), and LPA (13.70% to 95.60%. The estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate based on HEE, HDP, and LPA percentage (19 studies) were HEE 42.7032%, (33.5707% - 51.8317%); HDP % 39.8753%, (35.9915 - 47.4875); and LPA 39.0874%, (29.0954 - 49.0794).

Out of 22 studies, only 8 (36.36%) studies reported burnout prevalence as follow: One dimension (HEE and/or HDP): 33.30%, 72.10%, and 80.20% (3 studies). Calculated mean ± SD, (95% CI) 61.8667 ± 23.0688, (43.3 - 80.50). Two dimensions (HEE and HDP): 39.6% (1 study). Three dimensions (HEE, HDP, and LPA): 2.73%, 6.3%, 13.40%, 14.2%, 18.90%, 24.30%, and 29.40%. (7 studies). Estimated mean ± SD, (95% CI) 15.6043 ± 9.4512, (8.6030 - 22.6056).

A wide variation in the prevalence of burnout was found among physicians in Saudi Arabia. The diverse in the criteria of burnout assessment and reported results, preclude meaningful comparison and sensible conclusion. Unification of methodology, data presentation, criteria of burnout assessment (burnout definition), and setting baseline criteria for cut-off points. Criteria for cut-off points should originate from each country or region. Presenting data amenable for comparison and statistical analysis. Researcher should establish standardized methodology, data presentation and criteria of cut-off values and burnout definition for useful outcome, and meaningful analysis and comparison.

Limitation of the Study

The heterogeneity and publication bias across studies were not evaluated in this review. Estimated arithmetic mean and 95% confidence intervals of burnout prevalence rate in this review would be affected by heterogeneity, publication bias, and other factors such

as using results of un-unified: methodology, burnout definition, and cut-off points. The studies did not cover most of the specialties, and limited number of studies included pooled physicians.

Conflict of Interest

None declared.

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