

## Burnout, Safety, and Job Satisfaction among Surgeons in Conflict-Affected Taiz, Yemen

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### ABSTRACT

**Background:** Surgeons work under substantial occupational stress. In conflict settings, this burden is amplified by resource shortages, long working hours, financial strain, and threats to personal safety. Data on burnout in such environments, particularly in Yemen, are scarce.

**Objective:** To assess the prevalence of burnout and its association with workplace safety and job satisfaction among surgeons in Taiz, Yemen, during ongoing conflict.

**Methods:** A descriptive cross-sectional study was conducted from 1 to 28 May 2025 among surgeons in public, private, and NGO hospitals in Taiz. A 35-item questionnaire included demographics, the MBI-HSS, and measures of job satisfaction and perceived safety. Burnout was evaluated using standard subscale scores. Statistical analyses were performed using SPSS.

**Results:** Eighty surgeons participated, 55% male and 53.8% aged 31 to 40 years. Most were government hospital trainees, and 43.8% had less than five years of experience. High emotional exhaustion (EE) was present in 67.5%, high depersonalization (DP) in 15%, and low personal accomplishment (PA) in 36.3%. Overall, 70% met burnout criteria in at least one domain. PA correlated positively with job satisfaction and perceived safety, and safety correlated with job satisfaction, all  $p < 0.001$ . EE was higher among females,  $p = 0.032$ . PA increased with age,  $p = 0.034$ . No significant differences were observed by specialty, hospital type, marital status, or rank.

**Conclusion:** Burnout is highly prevalent among surgeons in Taiz and is closely linked to safety concerns and job satisfaction. Interventions addressing workplace safety and professional fulfillment are urgently needed in conflict-affected surgical settings.

**Keywords:** Burnout, workplace safety, job satisfaction, surgeons, conflict zone, Yemen/Taiz, healthcare workers.

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## INTRODUCTION

Worldwide, healthcare workers face a challenging problem of burnout. Emotional exhaustion (EE), depersonalization (DP), and a diminished feeling of personal accomplishment (PA) are major signs of this condition, which is linked to long-term work-related stress (1). Reports show that up to 60% of surgeons experience burnout at some point in their careers (2–4). This high rate was attributed to limited resources, making difficult decisions under time pressure, and long working hours (5).

The consequences of burnout not only increase surgical errors that jeopardize patient safety but also elevate the risk of suicidal thoughts among surgeons (6–8). Female surgeons face additional challenges. Besides the need for professional recognition, female surgeons work in highly competitive environments that make them more susceptible to burnout. Social pressure to balance family responsibilities with the rigorous demands of surgical practice adds to the stress.

The scenario is gloomier in conflict zones with weak health systems. Health professionals in these areas face trauma, physical danger, and moral strain (9,10). Yemen is a clear example. Since 2015, more than 50% of the country's health facilities have closed or functioned poorly due to war and economic collapse. Health workers face daily threats while working with meager resources (11).

Personal safety is a major concern for health workers in Yemen, especially during the armed conflict. More than 60% of surveyed workers attributed their stress to violence linked to their job and lack of protective equipment and considered that as a leading cause of stress (11). These findings highlight the critical need to safeguard healthcare workers in general, and surgeons in particular, in disaster zones in order to keep health services running (10).

Taiz city, the capital of Yemen's most populated governorate, has been on the frontlines of the war for a decade and has consequently been impacted the most. Most of its main hospitals were closed, heavily damaged, or were operating without essential supplies. Under such conditions, healthcare workers must treat patients while coping with the emotional toll of constant violence. This made them more vulnerable to emotional and mental exhaustion (11).

Job satisfaction, an important shield against burnout, has dropped sharply among health workers during the years of conflict. In addition, staff in Taiz hospitals reported heavy workloads, unfair promotion systems, low wages, and weak institutional support (12). Furthermore, many also reported poor relations with supervisors and minimal chances for professional development (12). These pressures, combined with the city being under siege, forced many health workers to leave for safer and more stable jobs inside or outside Yemen. This is not unique to Taiz but has also been reported in other war-torn regions, where a high percentage of healthcare workers leave their profession for better opportunities (10).

Although burnout in conflict areas is increasingly recognized, we still have significant knowledge gaps. There is a scarcity of studies focusing on burnout among surgeons in Yemen. The available reports have looked at healthcare employees (12), general practitioners (13), and dentists (14). Additionally, assessment of burnout in the conflicting zones in the Middle East remained underexplored. In this regard, the results of a systematic review highlighted the lack of a real estimation of burnout among surgeons. Most of the reported studies assessed burnout in healthcare workers in a broad sense or mixed categories (15). In addition, Yemen health authorities, especially during the recent unstable time, seldom implement support programs such as peer groups or cognitive-behavioral training due to limited resources and ongoing conflict (9, 13).

## METHODS

### Study Design

This was a descriptive cross-sectional study conducted to assess burnout, safety, and job satisfaction among surgeons in conflict-affected Taiz, Yemen. Data collection took place between 1 May and 28 May 2025.

### Study Population

The study population consisted of surgeons practicing in Taiz city, Yemen, across public, private, and non-governmental healthcare institutions, using an availability-based (convenience) sampling approach, recruiting surgeons who were present in Taiz and actively practicing during the study period. Due to the ongoing conflict and recurrent displacement of health



workers, a complete sampling frame of surgeons in Taiz was not feasible. A total of 88 surgeons were initially approached and provided with the study questionnaire. A total of 80 surgeons completed the questionnaire, yielding a response rate of 90.9%. Eight questionnaires were excluded from the analysis due to incomplete responses.

### **Inclusion Criteria**

Eligible participants were surgeons practicing in public, private, or non-governmental healthcare institutions within Taiz City at the time of data collection and had a minimum of one year of surgical experience. The included specialties covered general surgery, orthopedics, pediatrics, obstetrics and gynecology, urology, vascular surgery, otorhinolaryngology (ENT), ophthalmology, maxillofacial surgery, cardiothoracic surgery, neurosurgery, and plastic surgery.

### **Exclusion Criteria**

Surgeons were excluded from the study if they had less than one year of surgical experience, were not actively practicing at the time of the study, or were working outside healthcare institutions in Taiz city. Non-surgical medical personnel and other healthcare workers were also excluded to maintain a surgically focused and context-relevant sample.

### **Data Collection**

A structured questionnaire using a 5-point Likert scale was developed following a review of relevant approved literature. The survey consisted of 35 items and included (i) socio-demographic and professional characteristics; (ii) burnout symptoms assessed using the Maslach Burnout Inventory–Human Services Survey (MBI-HSS) (16, 17); and (iii) items on job satisfaction and safety that were derived from the Job Satisfaction Survey (18) and the Safety Attitudes Questionnaire (19). Workplace safety items reflected established safety climate/culture constructs and international guidance on preventing and responding to threats and violence against health workers in insecure settings (20).

The questionnaire was developed in English and translated into Arabic. It was designed using Google Forms, and the link was distributed through WhatsApp. Reliability testing was performed on 30% of the sample;

Cronbach's alpha was 0.75, indicating acceptable internal consistency.

Independent variables were demographic characteristics such as age, marital status, specialty, years of experience, type of hospital, and employment status, while the dependent variables were burnout (EE, DP, and PA), job satisfaction, and workplace safety.

### **Maslach Burnout Inventory (MBI) Scale**

The Maslach Burnout Inventory (MBI-HSS) assesses the burnout syndrome in three dimensions: EE (9 items), DP (5 items), and personal accomplishment (PA) (8 items) with a total of 22 questions. The modification of the original 7-point Likert scale to a 5-point Likert scale (0 "never" to 4 "always") as reported by (21) was adapted in our work. The Cronbach's alpha values of the MBI-HSS in this study were EE=0.90, DP=0.71, and PA=0.83.

### **Ethical Considerations**

This study has been approved by Ethics Committee for scientific Research, Faculty of Medicine and Health Sciences, Taiz University (ECTU142025). Written informed consent was obtained from all participants. The study followed the principles of the Declaration of Helsinki.

### **Operational Definition of Burnout and Data Analysis**

Survey data were exported and analyzed using IBM SPSS Statistics v26. Following recent literature, burnout was analyzed using both continuous subscale scores and a cutoff (low/moderate/high) approach, with severity classified by the number of subscales in the burnout range. In the cutoffs approach, the burnout scores were expressed as low, moderate, and high (EE: low, 0–11; moderate, 12–17; and high,  $\geq 18$ ; DP: low, 0–5; moderate, 6–9; and high,  $\geq 10$ ; and PA: low, 0–21; moderate, 22–25; and high,  $\geq 26$ ) (22). Burnout severity was categorized into severe, two, and one subscales according to the number of MBI-HSS subscales falling within the burnout range, with "severe burnout" defined as high EE and DP with low PA (23). Given that reduced personal accomplishment (PA) reflects, but does not predict, professional burnout, burnout was operationalized as elevated scores on the emotional exhaustion (EE) and/or depersonalization (DP) subscales (24). Continuous variables were summarized using



mean ± SD and median (IQR), and categorical variables using frequencies and percentages. A combined continuous-and-cutoff approach was applied to enhance interpretability and comparability across heterogeneous burnout definitions (23).

Normality was assessed with the Kolmogorov–Smirnov test. Mann–Whitney U and Kruskal–Wallis tests were used for non-normally distributed variables, and one-way ANOVA for normally distributed variables. Pearson correlation coefficients were computed for continuous variables. Reliability for MBI-HSS was assessed using Cronbach’s alpha. Statistical significance was set at  $p < 0.05$ .

## RESULTS

The study involved eighty surgeons. Most of the participants (55%) were men, 80% were married, and 53.8% were between the ages of 31 and 40. Almost two-thirds of the participants are residency trainees working in government hospitals with experience not exceeding five years. Obstetrics and gynecology (33.8%) and general surgery (28.7%) were the most dominant specialties in the study sample, while other surgical fields were present but in lower percentages. This socio-demographic profile reflects a young, mostly junior workforce working for the government. Because of this, they are especially vulnerable during times of war, when limited resources and high workload are dominant (Table 1).

**Table 1:** Socio-Demographic Characteristics of Study Participants

Characteristics	Frequency	Percentage
<b>Gender</b>		
Male	44	55.0 %
Female	36	45.0 %
<b>Age</b>		
20 to 30	18	22.5 %
31 to 40	43	53.8 %
41 to 50	9	11.3 %
51 to 60	8	10.0 %
Over 60	2	2.5 %
<b>Marital Status</b>		
Married	64	80.0 %
Single	14	17.5 %
Divorced	2	2.5 %
<b>Employment status</b>		
Resident/Trainee	50	62.5 %
Specialist	17	21.3 %
Consultant	13	16.3 %
<b>Specialization</b>		
General Surgery	23	28.7 %
Orthopedics	15	18.8 %
Pediatric Surgery	1	1.3 %
Obstetrics and Gynecology	27	33.8 %
Urology		
Vascular Surgery	1	1.3 %
Maxillofacial Surgery	5	6.3 %
Cardiothoracic Surgery	2	2.5 %
	6	7.5 %
<b>Experience</b>		
Less than 5 years	35	43.8 %
5 to 10 years	27	33.8 %
11 to 15 years	8	10.0 %
Over 15 years	10	12.5 %
<b>Employer</b>		
Government Hospital	61	76.3 %
Non-Government Clinic	6	7.5 %
Private Hospital		16.3 %
	13	



Burnout symptom burden was summarized by subscale using continuous scores together with the distribution across low/moderate/high bands (Table 2).

Emotional exhaustion (EE) was high in most surgeons, consistent with EE being a principal burnout dimension, and had a mean and (SD) of 21.0 (7.4) and a median (IQR) of 21.0 (16–26), with 54 surgeons (67.5%) experiencing high emotional exhaustion, 17 surgeons (21.3%) experiencing moderate levels, and only 9 surgeons (11.3%) reporting low levels.

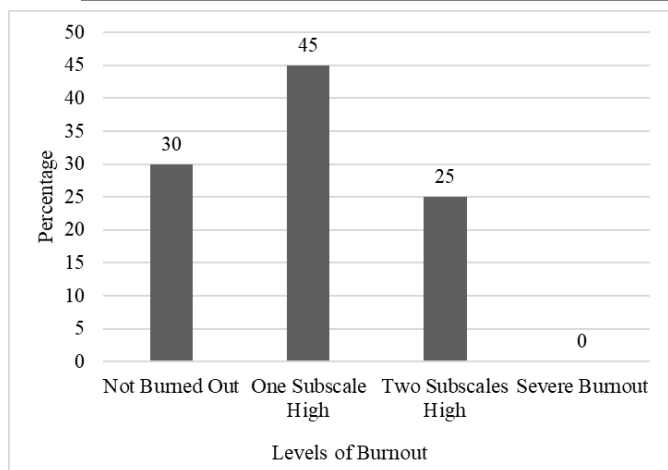
Depersonalization (DP) and Personal Accomplishment (PA) showed a mixed distribution with predominance of low- to-moderate levels. Depersonalization (DP) showed a mean and (SD) of 6.5 (3.3) and a median (IQR) of 6.0 (4–8), with 35 surgeons (43.8%) falling into the low range, 33 surgeons (41.3%) into the moderate

range, and 12 surgeons (15.0%) into the high range. Personal accomplishment had a mean and (SD) of 22.7 (4.3) and a median (IQR) of 23.0 (21–25), with 36.3% of surgeons reporting low levels, 41.3% reporting moderate levels, and 22.5% reporting high levels.

Our results show that two-thirds (67.5%) of the sample met the high emotional exhaustion threshold, and 15.0% met the high depersonalization threshold on MBI-HSS subscales. As illustrated in Figure 1, no participant met criteria for “severe/high” burnout. Nevertheless, a sizable proportion exhibited partial burnout patterns (45%) and had high levels in one subscale, while 25% had high levels in two subscales. Interestingly, 30% of participants were not burned out at all.

**Table 2:** Prevalence of Burnout among Surgeons

Variable	Low	Moderate	High	(Mean ± SD) Median (IQR)
<b>Burnout Symptoms</b>				
<b>Emotional Exhaustion</b>	9 (11.3%)	17 (21.3%)	54 (67.5%)	(21.0 ± 7.4), 21.0 (16-26)
<b>Depersonalization (DP)</b>	35 (43.8%)	33 (41.3%)	12 (15.0%)	(6.5 ± 3.3), 6.0 (4-8)
<b>Accomplishment (PA)</b>	29 (36.3%)	33 (41.3%)	18 (22.5%)	(22.7 ± 4.3), 23.0 (21-25)



**Figure 1:** Levels of burnout among participants

Burnout subscale scores were evaluated across different surgical specialties (Table 3). Descriptive analysis revealed some variability among specialties in which general, obstetrics & gynecology, and orthopedic surgeons demonstrated higher median EE (21-23) with DP scores of 6, 7, and 8, respectively, which likely reflected the high-volume, emergency-driven nature of these fields in a war zone. However, burnout did not differ significantly across surgical specialties in our sample with EE ( $p = 0.223$ ), DP ( $p = 0.339$ ), or PA ( $p=0.779$ ).

**Table 3:** Prevalence of occupational burnout according to surgeons’ specialties

Variable	(EE)	(DP)	(PA)	P value
	Median (IQR)	Median (IQR)	Median (IQR)	
<b>Specialization</b>				
General Surgery	23 (17-25)	6 (4-7)	22 (21-25)	(EE, 0.223)
Orthopedic Surgery	21 (15-25)	8 (5-10)	21 (20-22)	
Obstetrics and Gynecology	22 (18-28)	7 (5-8)	24 (21-26)	(DP, 0.339)
Vascular Surgery	16 (10-24)	4 (3.5-7)	24 (20.5-28.5)	
Maxillofacial Surgery	23.5 (21-23.5)	9 (9-9)	22.5 (21-22.5)	(PA, 0.779)
Cardiothoracic Surgery	18 (11-25.5)	3.5 (2-7.5)	23.5 (19-26.5)	

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

Considering age and experience, our initial assumption was that burnout among surgeons would decrease as

they get older and gain more experience. The results in Table 4 and Table 5 invalidated these assumptions,



where neither age nor experience had expressively affected their level of emotional exhaustion (EE) and depersonalization (DP), unlike the sense of accomplishment (PA), which increased with age ( $p = 0.034$ ) and experience ( $p = 0.192$ ).

This suggested that junior surgeons with less experience lacked the sense of achievement compared to older surgeons, whereas the age and experience of other

groups showed similar levels of exhaustion ( $p = 0.408$ ,  $p = 0.510$ ) and detachment ( $p = 0.302$ ,  $p = 0.845$ ). A literature survey of surgeons' burnout did not reveal a specific trend. For instance, the result of a national survey in the U.S. involving general surgery residents showed that older residents had a higher level of burnout, yet final-year residents (PGY 5) had lower burnout rates than those in their first year.

**Table 4:** Prevalence of Occupational Burnout According to Age

Variable	(EE)	(DP)	(PA)	P value
	Median (IQR)	Median (IQR)	Median (IQR)	
<b>Age</b>				(EE, 0.408)
20 to 30	16 (11.75-25)	4.5 (2-8)	21.5 (16.75-24)	
31 to 40	22 (17-26)	6 (5-9)	23 (21-26)	(DP, 0.302)
41 to 50	21 (16.5-21)	8 (4-9.5)	23 (21-24)	
51 to 60	22 (17.25-25)	6 (4.25-7)	23.5 (23-26.25)	(PA, 0.034)
Over 60	27 (19-27)	10.5 (8-11)	23 (17-23)	

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

**Table 5:** Prevalence of occupational burnout according to Experience

Variable	(EE)	(DP)	(PA)	P value
	Median (IQR)	Median (IQR)	Median (IQR)	
<b>Experience</b>				(EE, 0.510)
Less than 5 years	21 (12-26)	5(4-8)	22 (19-24)	(DP, 0.845)
5 to 10 years	21 (16-25)	6 (5-8)	22 (21-26)	(PA, 0.192)
11 to 15 years	22.5 (18.25-25.5)	8 (5-9.75)	24.5 (22-24.75)	
Over 15 years	28 (17.75-29.75)	6.5 (3.75-8.5)	23 (23-25.5)	

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

Distinct gender disparities were also observed in our study. There was no difference between the sexes in terms of depersonalization and accomplishment, but female surgeons were substantially more tired (22 (17.25-27.75) compared to male surgeons (21 (13-25),  $p = 0.032$ ).

Factors such as insufficient institutional support, worries about safety, and juggling professional and family duties probably contributed to women's greater levels of weariness (Table 6).

**Table 6:** Prevalence of occupational burnout according to Gender

Variable	(EE)	(DP)	(PA)	P value
	Median (IQR)	Median (IQR)	Median (IQR)	
<b>Gender</b>				(EE, 0.032)
Male	21 (13-25)	6.5 (4-9)	22 (20-24)	(DP, 0.840)
Female	22 (17.25-27.75)	6 (5-8)	23.5 (21-26)	(PA, 0.140)

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment.

Institutional and other demographic factors exerted a diminished influence. Despite the lack of correlation between marital status and performance, the fact that single surgeons reported more weariness and less success than their married counterparts suggested that

having a family to lean on could alleviate some of the strain. Our data in Table 7 did not reveal statistically significant differences in burnout scores attributed to marital status. (EE,  $P = 0.143$ ; DP,  $P = 0.156$ ; PA,  $P = 0.795$ ).



**Table 7:** Prevalence of occupational burnout according to Marital Status

Variable	(EE) Median (IQR)	(DP) Median (IQR)	(PA) Median (IQR)	P value
<b>Marital Status</b>				(EE, 0.143)
Married	22 (17- 26)	6 (5 - 8.75)	23 (21- 25)	(DP, 0.156)
Single	17.5 (15 - 22.5)	5 (2-7)	24.5 (20-29)	(PA, 0.795)
Divorced	28 (21- 28)	8.5 (8 - 8.5)	22 (20- 22)	

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

No significant relationship was found between burnout and employment rank (resident, specialist, and consultant) or hospital type (public, private, or non-governmental organization). According to these data,

which were not statistically significant, burnout in Taiz was widespread and affected professionals at all levels and regardless of their employer, as shown in Tables 8 and 9.

**Table 8:** Prevalence of occupational burnout according to Employment status

Variable	(EE) Median (IQR)	(DP) Median (IQR)	(PA) Median (IQR)	P value
<b>Employment status</b>				(EE, 0.575)
Resident/Trainee	25.5 (13-26)	6 (4-8)	22.5 (20-25.25)	(DP, 0.701)
Specialist	22 (17.5-25)	6 (5-9.5)	23 (21-25)	(PA, 0.571)
Consultant	21 (18-25)	6 (4.5-8.5)	23 (21-25.5)	

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

**Table 9:** Prevalence of occupational burnout according to workplace

Variable	(EE) Median (IQR)	(DP) Median (IQR)	(PA) Median (IQR)	P value
<b>Foundation</b>				(EE, 0.463)
Government Hospital	22 (16.6-26)	7 (5-9)	23 (20.5-25)	(DP, 0.412)
Non-Government	22.5 (18.75-24.75)	6.5 (4.5-8.5)	23.5 (21.5-27.5)	(PA, 0.584)
Clinic	17 (10.5-26)	5 (3-7.5)	24 (21-25.5)	
Private Hospital				

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

Table 8 revealed similar scores of burnout among the three groups of surgeons, indicating that the three dimensions of burnout were widespread among surgeons in Taiz City. In current study, the perception of safety by surgeons revealed no statistically significant association with both burnout dimensions: emotional exhaustion ( $r = -0.132$ ,  $p = 0.245$ ) and depersonalization ( $r = -0.103$ ,  $p = 0.362$ ). However, a moderate positive correlation between safety and personal

accomplishment (PA) ( $r = 0.42$ ,  $p = 0.001$ ) was seen (Table 10). This correlation may indicate that a safe working environment was positively reflected on surgeons' sense of efficacy (PA) and thus enhanced their accomplishment, which validated partially our hypothesis. To the contrary, the negative facets of burnout (EE/DP) seemed to be relatively insensitive unless heavier system pressures change.



**Table 10:** The Correlation between Safety and Dimensions of Burnout

Variable 1	Variable 2	Correlation (R)	P Value	Correlation Type
Safety	(EE)	-0.132	0.245	Weak negative and insignificant
Safety	(DP)	-0.103	0.362	Weak negative and insignificant
Safety	(PA)	0.42	0.001	Strong positive

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

As postulated in Table 11, job satisfaction was weakly correlated with emotional exhaustion ( $r = -0.195$ ;  $p = 0.083$ ) and depersonalization ( $r = -0.188$ ;  $p = 0.095$ ). However, job satisfaction was positively correlated with personal accomplishment ( $r = 0.37$ ;  $p = 0.001$ ). On one hand, this result reinforced the idea that feeling

satisfied with one’s job and high personal achievement (PA) go hand in hand. On the other hand, the negative dimensions (EE/DP) may be less sensitive to job satisfaction, potentially reflecting stronger ties to workload, call burden, and organizational stressors.

**Table 11:** The Correlation between Job Satisfaction and Dimensions of Burnout

Variable 1	Variable 2	Correlation (R)	P Value	Correlation Type
Job Satisfaction	(EE)	-0.195	0.083	Weak negative and insignificant
Job Satisfaction	(DP)	-0.188	0.095	Weak negative and insignificant
Job Satisfaction	(PA)	0.37	0.001	Moderately strong positive correlation

DP = Depersonalization, EE = Emotional exhaustion, and PA = Personal Accomplishment

Our results pointed out that Taiz surgeons who felt safer at work had higher scores of job satisfaction (Pearson  $r = 0.508$ ,  $p = 0.001$ ), as shown in Table 12, which supported our hypothesis. The association between

both factors was moderately strong, emphasizing the importance of a supportive work environment as a meaningful lever for morale.

**Table 12:** The Correlation between Safety and Job Satisfaction

Variable 1	Variable 2	Correlation (R)	P Value	Correlation Type
Job Satisfaction	Safety	0.508	0.001	Moderately strong

## DISCUSSION

The current results of prevalence among surgeons were relatively higher compared with results reported for surgeons in more stable areas, such as the US (32% high EE and 13% high DP) (25), EE 31.7% (6), and Australia (47.6%) (26), supporting our hypothesis that surgeons in Taiz are considerably more stressed than their colleagues in stable healthcare systems. In addition, our results were relatively comparable to those published by Suleyman et al. on surgeons in Turkey, where no burnout was reported in 24.5%, while severe, two subscales, and one subscale were found in 22%, 29.4%, and 24.1%, respectively (23).

For the prevalence of occupational burnout according to surgeons' specialties, the current finding was consistent with prior evidence showing no significant variation in burnout by surgical specialty in UK surgeons (27) and Iran (28), making our hypothesis that burnout would be affected by the type of specialty invalid. This absence of detected specialty gradients may reflect a setting where system-level pressures (workload intensity, constrained resources, and work environment factors) act broadly across surgical fields. This interpretation aligns with

evidence from conflict-affected settings; for example, a large Syrian crisis study reported no significant association between burnout and specialty, suggesting that shared war-related stressors can dominate specialty-specific effects (29). One factor that may affect the EE score has to do with the low number of participants in some specialties, such as pediatric surgeons ( $n = 1$ ), urologists ( $n = 1$ ), and maxillofacial surgeons ( $n = 2$ ). This is supported by a multispecialty resident burnout study, where authors explicitly note that small numbers in subgroups made comparisons underpowered to detect differences (30).

Regarding the prevalence of occupational burnout according to age, the current results suggested that longer experience may counterbalance age-related risk (31). To the contrary, the findings of an international survey revealed that senior surgeons with longer practice had less burnout (32). Similarly, a systematic review reported that younger surgeons who were frequently on night call reported higher burnout risk (6). For the prevalence of occupational burnout according to gender, the current results were in line with prior research done in resource-limited environments and substantiate (6,33). Regarding the prevalence of



occupational burnout according to marital status, the current finding was in agreement with the reported literature, in which a large study of attending general surgeons revealed non-significant differences in burnout associated with marital status (23). The work of Damilola Jesuyajolu et al. in their systematic review indicated that marital status was an inconsistent predictor of burnout across studies (34).

A recent cohort study showed higher burnout among orthopedic surgical trainees compared to attendings (35). A meta-analysis of medical and surgical residents confirmed that residents in various specialties showed higher burnout rates exceeding 50% (36), while Jesuyajolu et al. attributed the high rate of burnout to workload and system-level stressors rather than to career status (34). This was also supported by qualitative evidence, which emphasized that organizational culture and moral distress were dominant factors that strongly shape burnout risk (37). Our findings therefore generally agreed with previous reports confirming that burnout among surgeons was a common professional stress caused by many factors such as workload, night duties, and institutional climate. With respect to the perception of safety and its correlation to burnout dimensions, our observations were supported by recent literature. The support of team members and a safe working climate were two crucial factors that reduced both EE and DP among physicians (38). A recent work by McNeill et al. with surgeons also underscored the organizational drivers (workload, moral distress, culture) as the main factors influencing surgeons' burnout, rather than seniority per se (37).

For the correlation between job satisfaction and dimensions of burnout, the profile of our data was in line with recent publications. For instance, personal accomplishment and job satisfaction were directly associated among general surgeons, while thoughts of leaving training were attributed to job dissatisfaction (39). Similar findings were also shown in broader work, where work environment and peer and organizational support affected both burnout and satisfaction, with satisfaction acting as a mediator in surgical trainees (40). As expected, burnout was widely spread among practicing surgeons, which was confirmed by a 2024 SAGES survey that reports substantial EE/DP, even though PA may be high. These findings help explain why

PA was not the only factor that reduced job burnout, but wider changes in job climate, including working hours, moral distress reduction, night calls, and organizational support, were necessary to reduce EE and DP (41, 42). The importance of improving the organizational setting to reduce burnout was further confirmed by a meta-analysis linking burnout to career disengagement and intent to leave (39, 43). The implication of the current work was that our data fit a coherent model: enhancing job satisfaction mainly elevated personal accomplishment, but significant reductions in EE and DP would require wider changes in the work environment. This framing aligned with current surgeon well-being research and offers a practical target for intervention design (43).

Regarding the correlation between safety and job satisfaction, the current finding aligned with scientific work that correlated safety climate, satisfaction, and burnout in surgical settings. Rotenstein, in a recent report, showed that better teamwork and safety climate tracked with lower burnout risk among U.S. physicians (38). To the contrary, scientific evidence suggested that elevated burnout among surgeons was associated with a reduction in patient safety and professionalism, pointing to the organizational setting (not merely the individual) as a core cause of the problem (44). This was further reinforced by a national survey of surgeons where perceptions of safety and burnout move together (41), and within surgical training, personal accomplishment is aligned with job satisfaction and lower intent to leave training (38,39).

Some limitations of this work could be highlighted. The cross-sectional design is one of the limitations since it does not allow for causal inference. Due to the study's urban focus, the findings may not apply to all Yemeni surgeons. When it comes to sensitive topics like safety, relying on self-reports might lead to reporting bias. A small sample size (N = 80) limits precision, particularly for sub-specialty comparisons, where some participating groups are small for detecting differences. Lastly, it's worth noting that the use of international instruments such as MBI-HSS may miss certain cultural and conflict-specific stresses.

Based on our findings, immediate system-level actions are required. The most important variables that safeguard Taiz surgeons from the high levels of weariness and poor levels of achievement are safety



and professional satisfaction. Prioritizing worker safety should be the first concern. Physical safety, dependable access to necessary resources, and faith in institutions are all part of this. Safety gear, open lines of communication, and stringent security measures should all be in place at hospitals. Secondly, young surgeons in particular should feel encouraged to achieve their professional goals. In order to boost morale and cut down on turnover, we need mentorship programs, equitable promotion routes, and training opportunities. On the third point, it is crucial to implement measures that are sensitive to gender. Female surgeons reported far greater levels of weariness, demonstrating the need for policies that promote gender equality, help women juggle many roles, and make the workplace safer for women. Lastly, systemic actions are required. The problem is systemic, as significant burnout rates are seen across all grades.

## CONCLUSION

The study demonstrates a high prevalence of burnout among surgeons in Taiz, driven by systemic factors inherent in conflict zones. Safety perception and job satisfaction significantly enhance professional accomplishment. Interventions should target institutional reform, gender equity, mentorship, and security measures to preserve surgical workforce resilience in humanitarian crises.

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## Conflict of Interest

The authors declare no conflict of interest.

## Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

## Author's Contributions

Maha A. Alkadasi conceptualized and designed the study, supervised data collection, and drafted the manuscript. Abdulqawi A. Numan assisted in manuscript revision and professional consultation. Asaad S. Abdulrazzaq supported the data management and statistical analysis using SPSS.

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