



ORIGINAL RESEARCH

Burnout and its Associated Factors among Medical Laboratory Professionals in Public Hospitals of Jimma Zone, Southwest Ethiopia

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Abstract

Burnout is a work-related mental and physical syndrome resulting from long-term exposure to emotional and interpersonal stressors. Despite widespread burnout and a paucity of studies examining the precise patterns of burnout in this field, Medical Laboratory Professionals may be impacted by extended exposure to extreme stress.

The study aimed to assess the magnitude of burnout and associated factors among Medical Laboratory Professionals in public hospitals of Jimma zone, southwest Ethiopia, from May 1 - June 1, 2022.

Methods and material: An institutional-based cross-sectional study was conducted, on 153 study participants. Data was collected using a pretested self-administered questionnaire and then verified, encoded, entered with EPI INFO Version 7, and analyzed using SPSS Version 21.0.

Results: A total of 153 people participated in this study. The average age was under 29 years, at 89 (58%), with a standard deviation of (29.95 ± 4.2). 36 respondents, or 30.1%, said they were highly burned out. The multivariate logistic regression analysis revealed a statistically significant association between burnout and daily cigarette use [(AOR = 1.74, 95% CI (0.94 to 3.91)], drug abuse [(AOR = 0.083, 95% CI (0.034-0.247)], insufficient sleep [(AOR = 0.237, 95% CI (0.098-0.643)], and lack of a family relationship [(AOR = 4.73, 95% CI (1.82-7.324)].

Conclusion and recommendations: Drinking alcohol, abuse of drugs, smoking cigarettes for several days, lack of adequate sleep, and not having a family relationship were significant predictor variables for burnout in Medical Laboratory Professionals.

The results support the development of interventions to enhance mental health and additional research.

Keywords

Levels of burnout, Medical laboratory, Public hospitals, Jimma zone, Ethiopia

Abbreviations

DP: Depersonalization; FE: Emotional Exhaustion; MBI: Maslach Burnout Inventory; MLP: Medical Laboratory Professional; PA: Personal Accomplishment; COR: Crude Odd Ratio; CI: Confidence Interval; AOR: Adjusted Odd Ratio; N: Number of Healthcare Providers

Introduction

Burnout is defined as “complete emotional, physical, and mental exhaustion” [1]. It is a work-related mental and physical syndrome resulting from long-term exposure to emotional and interpersonal stressors at work. The health of medical laboratory professionals may be affected by prolonged exposure to massive stress. Burnout syndrome is the most common and threatening health problem with observable symptoms and is a diagnosable disorder [2].

In Ethiopia, the profession of medical laboratory science is one of the most under-recognized parts [3]. However, they conduct a variety of tests on blood, urine, body fluids, and tissues for complex scientific procedures in areas like hematology, chemistry, virology, and microbiology [4].

Burnout can manifest in medical laboratory professionals in a variety of ways. Depression, exhaustion, low morale, lost interest in work, lower productivity, tardiness, absences, anger, and frustration are a few of the symptoms. Other ones include headaches, backaches, muscular tension, and recurrent upper respiratory infections. Furthermore, role conflict, resistance to change, and a sense of isolation from other healthcare workers are symptoms of burnout [5]. In a nutshell, experiencing unprofessional behavior, suicidal thoughts, retiring from their jobs too soon, and making mistakes while providing patient care are all symptoms of burnout in the healthcare industry [6].

The laboratory personnel are precise and independent. They are adept problem solvers who not only deliver correct findings but also identify when those results need to be double-checked. Medical laboratory employees are just as dedicated to patients' health even if they spend less time with them than doctors and nurses do. They play a vital role in acquiring the data required to give an ill or wounded patient the best care possible as vital members of the medical team [7].

Laboratory investigations are considered the leading role in the field of patient care routinely, but they may put pressure on professionals, when a long time sitting in front of the computer, focusing on the microscope for a long time, and bending over is the nature of the work, manipulating various chemicals. When these activities are not ergonomic, they will cause workplace burnout and stress or further negatively impact health. Regulate these activities so that you can accomplish work without distraction [8].

Burnout may affect work performance negatively and cause reduced efficacy and lower productivity [9]. Principal signs of burnout are absenteeism and employee turnover. Additionally, it is well established that burnout has a negative impact on lowers job satisfaction, and reduces organizational citizenship practices [1]. Due to increased efficiency requirements, lower operating budgets, and faster response times, medical laboratory professionals faced job burnout risks and consequences related to laboratory errors [10]. The annual economic cost of medical errors is estimated to be close to US \$282 billion, of which laboratory errors are a cause [11].

Due to several hazards associated with their work-related activities, sub-Saharan Africa has not paid much attention to issues of burnout among health workers. Instead, attention is mostly focused on occupational health and safety. However, a burnout employee is far more vulnerable to workplace risks [1].

Doctors, nurses, occupational and physical therapists, psychiatrists, and social workers are just a few of the health care professionals that have examined burnout in great detail. However, research shows that higher

levels of perceived work-related family interference, a heavier workload, a lack of organizational support, a higher risk of job loss, and disruptive behaviors at work are all linked to higher levels of work exhaustion, particularly in medical laboratory professionals [12].

In Ethiopia, studies on the burden of burnout among health professionals, primarily nurses and physicians, are being conducted, and there is enormous published data. Despite medical laboratories contributing about 70% of patients' diagnosis of diseases [7], few or no published studies of burnout are conducted among medical laboratory professionals in the study area or even in the whole country of Ethiopia.

Thus, this study adds to the critical need for understanding the scope and contributing elements of burnout in the research area and lays the way for additional longitudinal studies to be carried out in order to identify the potential reasons of burnout among medical laboratory experts.

Material and Methods

Study area and period

This institutional-based cross-sectional study was conducted in public hospitals in the Jimma Zone from May 1-June 1, 2022. Jimma is the town of Jimma Zone, which is one of the 18 zones of the Oromia Regional State and is located in the Southwestern part of Ethiopia, 352 km from Addis Ababa, the capital city of Ethiopia. This zone has a total population of 2,486,155, of which 1,250,527 are men and 1,235,628 are women, and an area of 15,568.58 km [13].

There are 770 Health facilities in the Jimma zone. Of these, nine are public hospitals. All the public hospitals participated in this study, which included 1 medical center, 3 general hospitals, and 5 primary hospitals. These hospitals include Jimma University Medical Center, Shenen-Gibe General Hospital, Limu-Genet General Hospital, Agaro General Hospital, Seka Primary Hospital, Dedo Primary Hospital, Nada Primary Hospital, Seltema Primary Hospital, and Dimtu Primary Hospital. Among the 2,373 healthcare workers, 162 are medical laboratory professionals. Among the nine public hospitals studied, Jimma Medical Center is the only teaching and referral hospital in the Southwestern part of the country that gives specialized medical care to approximately 15 million people, generalized service to in-patients and outpatients and serves as a referral center for the rest of the surrounding peripheral hospitals.

Study variables

Burnout was defined as a dependent variable, whereas age, sex, marital status, educational level, service years, monthly income, average working hours per week, drinking alcohol, abuse of drugs, cigarette

smoking, and lack of adequate sleep were defined as independent variables.

Study design

A quantitative institutional-based cross-sectional study was conducted from May 1-June 1, 2022, using a self-administered questionnaire to assess the levels of burnout and its associated factors.

Source population

All healthcare professionals working in the public hospitals of the zone.

Study population

All medical laboratory professionals working in public hospitals of the Jimma zone fulfilled the inclusion criteria during the study period.

Inclusion criteria

All medical laboratory professionals working in public hospitals in the Jimma zone were present during the data-collection period.

All medical laboratory professionals had at least one year of work experience in the same or a similar healthcare facility.

Exclusion criteria

All medical laboratory professionals were unwilling to participate in this study and were absent during the data collection period for different reasons, including sickness and training. Additionally, all non-medical laboratory professionals who were delivering other than diagnostic services in the laboratory were excluded.

Sample size

The sample size of the study was all medical laboratory professionals working in the public hospitals of the Jimma zone. The total population of medical laboratory professionals in Jimma Zone was 162.

Among them, 83 were from Jimma Medical Center, 14 from Shenen-Gibe General Hospital, 13 from Agaro General Hospital, 12 from Limu-Genet General Hospital, 9 from both Seka and Dedo primary hospitals, 8 from Nada primary hospital, and then 7 from both Seltema and Dimtu primary hospitals.

Sampling technique

For this particular study, the census method was used to collect data from each medical laboratory professional. However, nine study participants-five due to sickness and four on continuous professional development training in another country-were excluded from the study.

Data collection procedures

The study used raw data obtained from medical laboratory professionals (MLPs) employed by public

hospitals in the Jimma zone. Data were collected using a pretested, self-administered questionnaire after explaining the study's goal and obtaining written informed consent from the study participants. The investigator chose public hospitals because they provide wide health services to a large number of populations with advanced laboratory tests. The standard tool, the Maslach Burnout Inventory (MBI), was used to measure levels of burnout, which comprises 22 items regrouped into three subscales: emotional exhaustion (EE), depersonalization (DP), and a reduced feeling of personal accomplishment (PA), which were graded on a Likert scale ranging from (0: never, 1: "a few times a year or less, 2: "once a month or less, 3: "a few times a month, 4: "once a week, 5: "a few times a week, and 6: "every day") [14]. The self-administered questionnaire was developed in English to indicate their feelings for independent variables, including socio-demographic factors, individual factors, working environment factors, and organizational factors used to collect data in this study.

A score more than or equal to 27 indicates high EE, a score greater than or equal to 13 indicates high DP, and a score less than or equal to 31 indicates low PA. If a participant had high EE and DP scores but low PA scores, they were considered to have burnout.

Measurement

The Maslach Burnout Inventory Human Services Survey (MBI-HSS) is a trustworthy and valid tool for assessing burnout despite the dearth of burnout validation research in this particular study area. An earlier study found that the instrument yielded high sensitivity and specificity (92.2 and 92.1%, respectively) even when it was utilized in a different language (Spanish) [15,16].

Maslach Burnout Inventory Human Services Survey (MBI-HSS): The scores for each stage were the summative total of the scores for each area of the questions. A high score on the EE and DP stages, according to the MBI, is indicative of burnout. On the other hand, a low PA score is indicative of a high level of burnout [14].

Data analysis procedures

Data were verified for completeness, encoded, entered into EPI INFO Version 7, and exported to SPSS Version 21.0 for analysis. The descriptive statistical analysis, including frequency and percentages of the results, was analyzed and presented in tables.

Bivariate and multivariable analyses were used to assess the association between the explanatory variables and the outcome variable to control the effect of confounding and see the independent effect of each variable on burnout. Associations between independent variables (age, sex, marital status, educational level, service years, monthly income, average working hours

per week, drinking alcohol, abuse of drugs, cigarette smoking, and lack of adequate sleep) and burnout were analyzed first using bivariate analysis (in the binary logistic regression) to identify factors eligible for the multivariable binary logistic regression analysis. Those variables with a p-value < 0.25 in the bivariate analysis were included in the multivariable analysis. The Hosmer and Lemeshow goodness tests were used to assess the fitness of the model. The magnitude of the association was measured using the adjusted odd ratio (AOR) and 95% CI. A p-value of < 0.05 was considered statistically significant.

Data quality management

All data collection tools were pre-tested on 5% of the samples at Jimma Health Center to assess instrument simplicity, flow, and consistency. The data was collected by three trained BSc medical laboratory professionals who were trained by the investigator. There were regular meetings between the data collectors and the principal investigator during data collection. The supervisor checked each collected questionnaire for errors, consistency, and completeness at all of the public hospitals.

Operational definitions

Not having a family relationship: It is to define an individual as not only living alone due to being single or widowed but also having lost all family members.

Medical laboratory professionals: Health care workers who took training at degree or master level to carry out clinical laboratory examinations

including clinical chemistry, microbiology, hematology, coagulation, general immunology, serology, parasitology, urine and body fluid analysis, mycology, hormonal tests, tumor markers, and so on.

Duty working hour: It is the duration of working hours that medical laboratory professionals elapse starting from the beginning of the day at 6 p.m. to the next day at 12:00 p.m., for a total of 18 hours per day.

Results

A total of 153 study participants were included in the study, with a response rate of 94.4%. From this, the majority of 89 (58.2%) were aged less than 29 years, with a mean and SD of 29.95 ± 4.20 .

Besides, about 88 (57.5%) of the participants were male. Regarding their marital status, nearly half of the respondents, 85 (55.6%), were single. Moreover, most participants (121, or 79%) had a bachelor's degree, and almost half (78, or 51%) had less than five years of work experience. Of the study participants, 77 (50.3%) worked more than 60 hours per week (Table 1).

In this study, the overall prevalence of burnout among medical laboratory professionals (MLP) was 46 (30.1%). Regarding components of burnout, 97 (63.4%), 112 (73.2%), and 98 (64.1%) were high emotional exhaustion (EE), high depersonalization (DP), and low personal accomplishment (PA), respectively.

A chi-square test of independence was performed to examine the relation between the duration of working hours per week and the tendency to burnout. The relation between these variables was significant ($X^2 9.45$,

Table 1: Socio-demographic characteristics among medical laboratory professionals in public hospitals of Jimma zone, Southwest Ethiopia, from May 1-June 1, 2022 ($n = 153$).

Variables	Categories	Frequency, N = 153	Percentage (%)
Sex	Male	88	57.5
	Female	65	42.5
Marital Status	Single	85	55.6
	Married	64	41.8
	Divorced	2	1.3
	Widowed	2	1.3
Educational status	Diploma	11	7.2
	Bachelor's degree	121	79.1
	Master's degree	21	13.7
Service Years	0-5 years	78	51.0
	6-10 years	67	43.8
	11-15 years	2	1.3
	> 15 years	6	3.9
Average working hours per week (including duty-time)	35-40	19	12.4
	41-45	14	9.2
	46-50	5	3.3
	50-60	38	24.8
	> 60	77	50.3

Table 2: Socio-demographic and lifestyle characteristics among medical laboratory professionals in public hospitals of Jimma zone, Southwest Ethiopia, from May 1-June 1, 2022 (*n* = 153).

Variables	Burnout		Chi-square	P-value
	No	Yes		
Sex				
Male	59 (55.1%)	29 (63.0%)	0.8223	0.364496
Female	48 (44.9%)	17 (37.0%)		
Educational Status				
Diploma	9 (8.4%)	2 (4.3%)	0.8644	0.649093
Bachelor	83 (77.6%)	38 (82.6%)		
Master's degree	15 (14%)	6 (13.1%)		
Working hours per week (including duty-time)				
35-40	18 (16.8%)	1 (2.2%)	9.4573	0.02379
41-45	12 (11.2%)	2 (4.3%)		
46-60	29 (27.1%)	14 (30.4%)		
> 60	48 (44.9%)	29 (63.1%)		
Chew Khat				
Several days	47 (43.9%)	21 (45.7%)	0.7244	0.69614
Sometimes	35 (32.7%)	17 (37%)		
Never at all	25 (23.4%)	8 (17.4%)		

Table 3: Multivariable (AOR) estimates and approximate 95% confidence intervals of individual factors associated with burnout among MLPs in public hospitals of Jimma zone, Southwest Ethiopia, from May 1-June 1, 2022.

Variables	Burnout		COR (95%CI)	P-value	AOR (CI 95%)	P-value
	No	Yes				
Drink alcohol						
Yes	15 (17.6%)	27 (9.8%)	0.115 (0.052-0.256)	0.000	4.72 (2.34-9.73)	0.0001
No	92 (20.3%)	19 (52.3%)	1		1	
Abuse drugs						
Yes	8 (7.5%)	21 (45.7%)	0.092 (0.038-0.243)	0.000	0.083 (0.034-0.247)	0.000
No	99 (92.5%)	25 (54.3%)	1		1	
Smoke a cigarette						
Several days	37 (34.6%)	26 (46.5%)	0.95 (0.33-1.23)	0.037	1.74 (0.94-3.91)	0.000
Sometimes	23 (21.5%)	18 (39.1%)	1.08 (0.66-2.34)	0.007		
Never at all	47 (43.9%)	2 (4.4%)	1			
Lack of adequate sleeping						
Yes						
No	11 (10.3%)	16 (34.8%)	0.215 (0.09-0.513)	0.001	0.237 (0.098-0.643)	0.0003
	96 (89.7%)	30 (65.2%)	1		1	
Not having family relationship						
Yes	93 (87%)	26 (56.5%)	5.1 (2.27-11.48)	0.000	4.73 (1.82-7.324)	0.0001
No	14 (13%)	20 (43.5%)	1		1	

p value 0.0237). However, the rest of the variables, such as gender, educational status, and chewing Khat, have no relation to the tendency to burnout among medical laboratory professionals (Table 2).

Factors associated with burnout

Among the factors associated with burnout, statistical significance was observed in study participants who drink alcoholic beverages [(AOR = 4.72, 95% CI (2.34-9.73)], frequently abuse drugs [(AOR = 0.083, 95% CI (0.034-0.247)], smoke cigarettes [(AOR = 1.74, 95% CI (0.94-3.91)], lack adequate sleep [(AOR = 0.237, 95% CI (0.098-0.643)], do not have family relationships [(AOR = 4.73, 95% CI (1.82-7.324)]], frequently abuse drugs [(AOR = 0.083, 95% CI (0.034-0.247)], and smoke cigarette [(AOR = 1.74 (0.94-3.91)] (Table 3).

Discussion

To determine burnout, there is a need to study the magnitude of burnout and its associated factors among medical laboratory professionals (MLPs) in Ethiopia, particularly in the current study region. According to the findings of this study, about 30.1% of MLPs working in Jimma Zone public hospitals were reported to have burnout, which is quite lower than a study done in the Midwestern United States in Omaha but higher than a study conducted in Ghana, which was found to be 13%. This difference might be due to the sample size, study subjects duration of work, age, and sex [1,17]. About 63.4% and 73.2% of study participants scored the highest EE (emotional exhaustion) and DP (depersonalization) subscales, respectively. On the other hand, about 64.1% of them scored low on the PA (personal accomplishment) subscale.

This study showed a level of burnout among medical laboratory professionals (MLPs), whereas there is no study on burnout among MLPs in the Jimma zone or even Ethiopia. There have also been a few previous studies on the prevalence of burnout syndrome among other health professionals in southwestern Ethiopia. The results of this study were similarly low compared to the earlier findings done among all professionals from the Amhara district public hospital and Jimma university teaching hospital, which included 50.4% and 36.7%, respectively [18-20]. Furthermore, the level of burnout in this study was much higher than 13.7% in previous research from the Gondar University Hospital. Moreover, this study's findings are higher than those of the South African study in terms of the EE, DP, and PA sub-scales, which were 16%, 13%, and 10%, respectively [21]. Also, considering the subclasses from this study, EE (16%), DP (13%), and PA (10%) are higher than South Africa EE (26.6%), DP (22.5%), and PA (10.4%) in a previous study from Belgium [22]. This significant prevalence difference might be due to socio-demographic factors, different catchment regions, workload, or a difference in the hospitals' character.

This study's socio-demographic variables, including marital status, service year, income, and working hours, showed a statistically significant burnout score. These findings were consistent with the previous study in Dire Dawa, Ethiopia, among all health professionals [23]. Also, these findings are supported by the studies conducted in the eastern United States and Poland on marital status and working hours [24,25]. Nonetheless, compared to other findings from Turkey, there was no significant difference regarding gender, marital status, education level, or working unit factors [26].

Medical laboratory professionals who experienced insomnia or related sleeping disorders were significantly associated with burnout. Also, a similar finding was obtained from Spain [27]. The possible reason might be working night shifts that could disturb an individual's circadian cycle, rest, and sleep.

Regarding job satisfaction, in this study, about 37% of respondents were dissatisfied with their job, and similar results were obtained in the Midwestern United States, Omaha [17]. The possible reason might be that laboratory investigations may put pressure on professionals when sitting in front of a computer for a long time, focusing on the microscope, bending over the nature of the work, and manipulating various laboratory chemicals [8].

Burnout among the MLPs is associated with individuals having addictive behaviors, including alcohol drinking, drug abuse, cigarette smoking, and not having family relationships. Nevertheless, a similar finding was obtained from the southwest part of Ethiopia [20].

Concerning the association between socio-demographic and lifestyle characteristics and burnout among medical laboratory professionals, the duration of working hours has a significant association with burnout, which is in line with a study conducted in China [28], whereas educational status and chewing Khat have no association with burnout.

Coming to the association of burnout with marital status, this study revealed that individuals who have a family are 4.73 times more likely to have burnout as compared to individuals who don't have a family. This finding contradicts the study conducted in Ontario, Canada, which reported that there was no association between burnout and having a family relationship [12].

Limitation of the Study

First, the results from the cross-sectional study only refer to one point in time. Being a cross-sectional study poses an inability to make cause-and-effect analyses. In addition to that, due to the self-administered nature of data collection tools, the study cannot rule out possible respondent bias. Moreover, the questionnaire was not a validated data collection tool in the study area or even in Ethiopia for medical laboratory professionals or other health care providers.

Conclusion

According to the findings of this study, drinking alcohol, abuse of drugs, smoking cigarettes for several days, lack of adequate sleep, and not having family relationships were significant predictor variables for burnout in medical laboratory professionals (MLPs).

These findings contribute to further research with larger sample sizes and the establishment of interventions to improve the mental health and well-being of MLPs.

Declarations

Ethical approval and consent to participate

An ethical approval letter was obtained from the Jimma University Institutional Review Board (IRB), with the letter reference number IHRPGN/352//22 dated February 28, 2022. Besides that, a letter of cooperation was received from the Jimma Zone Health Bureau. Finally, the Chief Executive Officers of the Hospitals were informed through support letters from the higher officials. Just before the actual data collection process, written informed consent was obtained from each participant. The Helsinki Declaration was followed when conducting this study.

Consent for publication

Not applicable.

Availability of data and materials

Data will be available upon convincing request from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

DA has contributed to the conceptualization and wrote the first draft of the manuscript. SA has contributed to the development of study design and data analysis; YA has substantially contributed to the interpretation of the result and revision; and SB has critically participated in the supervision from the inception to the end of the study. Besides that, all authors reviewed the manuscript.

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References

- Odonkor ST, Frimpong K (2020) Burnout among healthcare professionals in Ghana: A critical assessment. *Biomed Res Int* 2020: 1614968.
- Selic P, Ignjatovic TS, Ketis ZK (2012) Burnout among Slovenian family medicine trainees: A cross-sectional study. *Slov Med J* 81.
- Derbie A, Mekonnen D (2017) Health professional's stance towards medical laboratory technology: A cross-sectional study. *Journal of Medical Laboratory and Diagnosis* 8: 12-17.
- Gebregzabher EH, Tesfaye F, Cheneke W, Negesso AE, Kedida G (2023) Continuing professional development (CPD) training needs assessment for medical laboratory professionals in Ethiopia. *Hum Resour Health* 21: 47.
- Powell K (2017) Work-life balance: Break or burn out. *Nature* 545: 375-377.
- Gelaw YM, Hanoch K, Adini B (2023) Burnout and resilience at work among health professionals serving in tertiary hospitals, in Ethiopia. *Front Public Heal* 11: 1118450.
- Kumareswaran S, Muhadi SU, Sathasivam J, Thurairasu V (2023) Prevalence of occupational stress and workload among laboratory staff. *Prevalence of occupational stress and workload among laboratory staff. Int J Public Health Sci* 12: 1014-1020.
- Joseph B, Arasu S (2020) Occupational risks and health promotion for healthcare workers. *Handbook of Global Health* 1-29.
- Pinto ICJF (2017) Stress, burnout and coping in health professionals: A literature review. *Journal of Psychology and Brain Studies* 1: 1-8.
- Muirhead D, Aoun P, Powell M, Juncker F, Mollerup J (2010) Pathology economic model tool: A novel approach to workflow and budget cost analysis in an anatomic pathology laboratory. *Arch Pathol Lab Med* 134: 1164-1169.
- Hammerling JA (2012) A review of medical errors in laboratory diagnostics and where we are today. *Laboratory Medicine* 43: 41-44.
- Nowrouzi-Kia B, Dong J, Gohar B, Hoad M (2022) Factors associated with burnout among medical laboratory professionals in Ontario, Canada: An exploratory study during the second wave of the COVID-19 pandemic. *Int J Health Plann Manage* 37: 2183-2197.
- Wikipedia (2022) Bibliographic details for "Jimma Zone".
- Brady KJS, Ni P, Sheldrick RC, Trockel MT, Shanafelt TD, et al. (2020) Describing the emotional exhaustion, depersonalization, and low personal accomplishment symptoms associated with Maslach burnout inventory subscale scores in US physicians: An item response theory analysis. *J Patient Rep Outcomes* 4: 42.
- Maslach C, Jackson SE (1981) The measurement of experienced burnout. *Journal of Occupational Behaviour* 2: 99-113.
- Montiel-Company JM, Subirats-Roig C, Flores-Martí P, Bellot-Arcís C, Almerich-Silla JM (2016) Validation of the Maslach burnout Inventory-Human services survey for estimating burnout in dental students. *J Dent Educ* 80: 1368-1375.
- Garcia E, Kundu I, Kelly M, Soles R, Mulder L, et al. (2020) The American society for clinical pathology's job satisfaction, well-being, and burnout survey of laboratory professionals. *Am J Clin Pathol* 153: 470-486.

18. Bhagavathula AS, Abegaz TM, Belachew SA, Gebreyohannes EA, Gebresilassie BM, et al. (2018) Prevalence of burnout syndrome among health-care professionals working at Gondar university hospital, Ethiopia. *J Educ Health Promot* 7: 145.
19. Adbaru DG, Assen ZM, Demelew TM, Teshome GS (2019) Magnitude of burnout and its associated factors among nurses working in public hospitals of Amhara regional state, Ethiopia. *MOJ Womens Health* 8: 133-141.
20. Biksegn A, Kenfe T, Matiwos S, Eshetu G (2016) Burnout status at work among health care professionals in a tertiary hospital. *Ethiop J Heal Sci* 26: 101-108.
21. Liebenberg AR, Coetzee JF, Conradie HH, Coetzee JF (2018) Burnout among rural hospital doctors in the Western Cape: Comparison with previous South African studies. *Afr J Prim Health Care Fam Med* 10: e1-e7.
22. Montgomery A, Spânu F, Băban A, Panagopoulou E (2015) Job demands, burnout, and engagement among nurses: A multi-level analysis of ORCAB data investigating the moderating effect of teamwork. *Burn Res* 2: 71-79.
23. Ahmed F, Hawulte B, Yuya M, Birhanu S, Oljira L (2022) Prevalence of burnout and associated factors among health professionals working in public health facilities of Dire Dawa city administration, Eastern Ethiopia. *Front Public Health* 10: 836654.
24. Antonsdottir I, Rushton CH, Nelson KE, Heinze KE, Swoboda SM, et al. (2022) Burnout and moral resilience in interdisciplinary healthcare professionals. *J Clin Nurs* 31: 196-208.
25. Robakowska M, Tyrańska-Fobke A, Walkiewicz M, Tartas M (2018) Adaptive and maladaptive perfectionism, and professional burnout among medical laboratory scientists. *Med Pr* 69: 253-260.
26. Devedakan N (2018) The relationship between burnout and perceived stress: A sample of healthcare workers. *Psychiatry and Behavioral Sciences* 8: 178-185.
27. Membrive-Jiménez MJ, Gómez-Urquiza JL, Suleiman-Martos N, Velando-Soriano A, Ariza T, et al. (2022) Relation between burnout and sleep problems in nurses: A systematic review with meta-analysis. *Healthcare* 10: 954.
28. Lu Y, Liu Q, Yan H, Gao S, Liu T (2021) Job burnout and its impact on work ability in biosafety laboratory staff during the COVID-19 epidemic in Xinjiang. *BMC Psychiatry* 21: 543.