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Healthcare Worker Absenteeism: The Impact of Job Grade and Other Determinants on Sickness Leave

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Abstract

Sick leave among healthcare workers (HCWs) can disrupt hospital operations and negatively affect patient care quality. This study aimed to explore the factors associated with absenteeism due to sickness among HCWs in a tertiary hospital in Lebanon. A retrospective review of sick leave records and corresponding health data was conducted for 2,850 HCWs from 2015 to 2018. Sick leave events were classified by diagnostic categories. Associations between demographic, occupational, and health-related factors and sick leave frequency were evaluated using bivariate analysis and negative binomial regression models. Over the study period, employees experienced an average of 10.6 sick leave episodes. The most pronounced predictor of increased absenteeism was employment in lower-grade positions (IR = 1.52; 95% CI = 1.39–1.67). Additional significant predictors included being female (IR = 1.24; 95% CI = 1.14–1.36), older age (IR = 1.19; 95% CI = 1.08–1.30), marital status as married (IR = 1.21; 95% CI = 1.11–1.33), current smoking (IR = 1.21; 95% CI = 1.11–1.32), and presence of selected medical conditions. Sick leave occurrence among HCWs is shaped by a combination of personal, job-related, and health factors. Future investigations should assess how socio-economic disparities influence health outcomes and guide tailored interventions to support the well-being of essential healthcare personnel.

Keywords: Sickness absenteeism, Sick leave predictors, Healthcare workers, Job grade, Health inequity, Tailored interventions

Introduction

Absenteeism due to sickness poses a significant challenge to public health and workplace efficiency and can serve as a proxy for individual health status [1, 2]. For healthcare systems, the absence of staff can compromise service delivery, reduce efficiency, and negatively affect patient outcomes [3]. Identifying the factors that drive sick leave is essential for implementing strategies to reduce excessive absenteeism. Previous research, predominantly focusing on nurses, has identified age, education level, type of job, shift schedules, tenure, and workplace conditions as important predictors of sick leave [4]. More recently, infectious disease outbreaks, such as the COVID-19 pandemic, have led to notable increases in absenteeism among healthcare staff [5, 6], with studies in Lebanon highlighting age and job role as predictors of prolonged COVID-19-related absences [7].

Most literature on HCW absenteeism originates from high-income countries and is largely limited to nursing staff [8]. Data from middle- and low-income countries remain scarce, often incomplete, and not fully reliable [8]. Healthcare delivery depends on a diverse workforce that extends beyond nurses to include laboratory and radiology technicians, pharmacists, nursing assistants, clerical staff, dietary staff, transport personnel, and housekeeping staff.

The present study aimed to investigate predictors of sick leave over four years among a heterogeneous group of HCWs. We hypothesized that absenteeism would be

influenced by a combination of demographic, socio-economic, occupational, and health-related factors.

Materials and Methods

Study design, setting, and data sources

This retrospective cross-sectional study analyzed sick leave and health data of employees at the American University of Beirut Medical Center from 2015 to 2018. Health information included sick leave diagnoses, duration, medical history, blood pressure, smoking, alcohol use, and exercise, collected from the University Health System electronic records. Demographic details, including date of birth, sex, marital status, job grade, and department, were obtained from Human Resources. Data were anonymized prior to analysis. The study protocol was approved by the Institutional Review Board at the American University of Beirut (protocol SBS 2018-0236), and informed consent was waived due to minimal risk. All procedures conformed to the Helsinki Declaration.

Population and inclusion criteria

All HCWs with at least one sick leave episode between January 2015 and December 2018 were included. The sample encompassed medical staff, nurses, administrative personnel, housekeeping, food services, laboratory, medical and plant engineering, respiratory therapy, physical therapy, endoscopy, outpatient labs, and security staff. Sick leave was defined as any absence from work lasting at least one day. Physicians were excluded due to consistently low sick leave usage documented in prior research [9, 10]. The final cohort included 2,850 employees, representing approximately two-thirds of the workforce.

Variables

Demographic variables included sex (male/female), age (<35/≥35 years), marital status (married/not married), and grade (lower: G1–G8, higher: G9–G13). Job roles were grouped into 12 categories. Medical history and lifestyle factors (alcohol use, exercise) were coded as yes/no, and smoking was categorized as current, former, or never. Sick leave diagnoses were grouped into 13 diagnostic categories.

Statistical analysis

Data were analyzed using SPSS version 22. Descriptive statistics included frequencies and percentages for categorical variables and means with standard deviations for continuous variables. Predictors of sick leave frequency were assessed using negative binomial regression, including variables with $p<0.2$ in bivariate analyses. Spearman's correlation identified potential multicollinearity; variables with correlation >0.4 were selectively included [11]. Job grade and position correlations were specifically evaluated. Statistical significance was set at $p<0.05$.

Results and Discussion

Table 1 summarizes the characteristics of the 2,850 HCWs with at least one sick leave episode. Over the four years, the mean number of sick leave episodes per employee was 10.6. Females accounted for 52.6% of the sample, and approximately half were aged 35 or older. Registered nurses comprised 30.6% of the cohort, clerks and clinical assistants 26.5%, and orderlies, practical nurses, and nursing assistants 15.9%. Respiratory and gastrointestinal conditions were the most commonly reported medical issues, affecting 62.3% and 42.8% of employees, respectively. Nearly half of the cohort (49.1%) were current smokers.

Table 1. Characteristics of healthcare workers with sick leave episodes (n = 2850)

Variable	Mean ± SD / Frequency (%)
Sick Leave	
Number of episodes	10.6 ± 10.6 episodes
Duration	2.60 ± 4.5 days
Sex	
Female	1499 (52.6%)
Male	1351 (47.4%)
Age	
<35 years	1476 (51.8%)
≥35 years	1374 (48.2%)
Marital Status	

Married	1686 (59.2%)
Unmarried	1164 (40.8%)
Job Grade	
G9–G13+	1541 (54.1%)
G1–G8	1309 (45.9%)
Position	
Registered Nurse (RN)	871 (30.6%)
Clerk / Clinical Assistant (CA)	755 (26.5%)
Orderly / Practical Nurse (PN-NA)	454 (15.9%)
Physical plant, laundry, central sterilization, motor pool	205 (7.2%)
Laboratory Technician	164 (5.8%)
Housekeeping	124 (4.4%)
Dietary Staff	75 (2.6%)
Other (e.g., physical therapist, radiology, respiratory therapist, pharmacist)	202 (7.1%)
Medical History	
Respiratory conditions	1787 (62.7%)
Gastrointestinal issues	1198 (42.0%)
Back pain	816 (28.6%)
Headache	293 (10.3%)
Dizziness	230 (8.1%)
Anemia	220 (7.7%)
Mental health (depression/anxiety)	153 (5.4%)
Hypertension / kidney disease	130 (4.6%)
Chest pain	74 (2.6%)
Diabetes	34 (1.2%)
Smoking Status	
Current smoker	1378 (49.1%)
Ex-smoker	67 (2.4%)
Never smoked	1363 (48.5%)
Exercise	Yes: 1351 (55.2%)
Alcohol Use	Yes: 492 (17.3%)

Abbreviations: G = grade; CA = clinical assistant; PN = practical nurse; RN = registered nurse.

When examining the distribution of sick leave by diagnosis, infectious diseases and musculoskeletal disorders accounted for the largest share of episodes, totaling 6598 (21.7 percent) and 6097 (20.0 percent), respectively **(Table 2).** The average length of sick leave varied slightly by diagnosis, ranging from 2.4 days for genitourinary, gynecological, and obstetric conditions to 2.9 days for respiratory illnesses, with all diagnostic categories showing relatively brief absences on average.

Table 2. Distribution of sick leave episodes and average duration by diagnosis

Sick Leave Diagnosis	Average Duration (days) Mean ± SD	Episodes, n (%)*
Infectious diseases (e.g., upper respiratory infections, acute gastroenteritis, cellulitis)	2.6 ± 5.0	6598 (21.7%)
Musculoskeletal disorders	2.6 ± 5.1	6097 (20.0%)
Surgeries / injuries	2.5 ± 4.5	4792 (15.7%)
Non-infectious gastrointestinal conditions	2.6 ± 4.5	3714 (12.2%)
Other diagnoses&	2.5 ± 4.4	3175 (10.4%)
Genitourinary, gynecological, obstetric conditions	2.4 ± 3.9	1612 (5.3%)
Neurological, psychological, and behavioral disorders	2.6 ± 6.2	1270 (4.2%)
Dental issues	2.7 ± 5.1	931 (3.0%)
Non-infectious respiratory diseases	2.9 ± 6.6	629 (2.0%)

	Mean ± SD	n (%)
Ophthalmologic conditions	2.8 ± 4.6	624 (2.0%)
Cardiovascular diseases	2.3 ± 3.2	395 (1.3%)
Ear, nose, and throat (ENT) disorders	2.6 ± 4.8	331 (1.0%)
Dermatologic conditions	2.3 ± 3.5	250 (0.8%)
Total	–	30,418

*The total number of sick leave episodes recorded over the 4-year period; & other diagnoses encompass metabolic, congenital, hematology/oncology conditions, preventive health care, general symptoms, and unspecified or miscellaneous diagnoses.

Univariate analyses were performed to assess associations between sick leave frequency and individual predictors. Those with a p-value below 0.2 were retained for the negative binomial regression model, encompassing age, job grade, marital status, selected past medical conditions (namely gastrointestinal disorders, back pain, chest pain, headaches, respiratory issues, diabetes, and mental health disorders), along with lifestyle variables including smoking status and physical activity levels **(Table 3).** Gender was additionally forced into the model given its established relevance.

Table 3. Bivariate analysis of sick leave frequency by potential predictors

Predictor	Category	Mean ± SD of Sick Leave Episodes	p-Value
Sex	Male	10.3 ± 10.6	0.268
	Female	10.8 ± 10.6	
Age Group	<35 years	9.1 ± 9.2	<0.001 *
	≥35 years	12.1 ± 11.8	
Marital Status	Married	11.6 ± 11.1	<0.001 *
	Not married	9.1 ± 9.7	
Job Grade	G1–G8	13.5 ± 12.3	<0.001 ***
	G9–G13	8.1 ± 8.2	
Position / Role	Clerk / Clinical Assistant	8.5 ± 9.0	<0.001 *
	Registered Nurse	10.3 ± 9.5	
	Orderly / Practical Nurse	13.8 ± 12.3	
	Housekeeping Staff	14.3 ± 14.5	
	Dietary Staff	14.4 ± 14.2	
	Laboratory Technician	8.2 ± 8.6	
	Physical plant, laundry, sterilization, motor pool	14.2 ± 12.9	
	Physical Therapist	6.9 ± 5.5	
	Radiology Technician	6.9 ± 7.4	
	Respiratory Therapist	9.3 ± 6.4	
	Pharmacist	6.1 ± 5.9	
	Other roles	5.3 ± 6.5	
Health Conditions	Respiratory problems	Yes: 11.45 ± 10.95	<0.001 ***
		No: 9.05 ± 9.88	
	Gastrointestinal issues	Yes: 11.88 ± 11.19	<0.001 ***
		No: 9.59 ± 10.09	
	Back pain	Yes: 13.28 ± 11.45	<0.001 ***
		No: 9.46 ± 10.07	
	Headache	Yes: 12.2 ± 10.8	0.006 ***
		No: 10.4 ± 10.6	
	Dizziness	Yes: 11.1 ± 9.7	0.409
		No: 10.5 ± 10.7	
	Anemia	Yes: 7.0 ± 5.3	0.224
		No: 10.6 ± 10.7	
	Mental health issues	Yes: 13.95 ± 13.78	<0.001 ***
		No: 10.36 ± 10.39	

	Hypertension / kidney disease	Yes: 10.62 ± 11.74	0.947
		No: 10.55 ± 10.57	
	Chest pain	Yes: 13.2 ± 13.5	0.087
		No: 10.5 ± 10.5	
	Diabetes	Yes: 8.2 ± 8.5	0.195
		No: 10.6 ± 10.6	
Lifestyle Factors	Alcohol consumption	Yes: 10.5 ± 10.6	0.403
		No: 10.9 ± 10.7	
	Regular exercise	Yes: 10.5 ± 10.5	0.119
		No: 11.2 ± 10.8	
	Smoking	Current smoker: 12.2 ± 11.5	<0.001 ***
		Ex-smoker: 11.99 ± 10.6	
		Never smoked: 8.9 ± 9.4	

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

Job grade and position were strongly associated (Pearson's chi-square = 1349.76, $p < 0.001$), so each was tested separately in the multivariate regression models. Both models demonstrated a good fit, but the model including job grade had the lowest Akaike's Information Criterion (AIC) and was therefore selected as the final model. In this analysis, job grade emerged as the most influential factor for sick leave frequency, with healthcare workers in lower grades experiencing 1.59 times more sick leave episodes than those in higher grades (IR = 1.52; 95 percent CI: 1.39–1.67). Additional significant predictors of increased sick leave included female sex (IR = 1.24; 95 percent CI: 1.14–1.36), older age (IR = 1.19; 95 percent CI: 1.08–1.30), and being married (IR = 1.21; 95 percent CI: 1.11–1.33). Among medical conditions, back pain, headaches, respiratory issues and allergies, gastrointestinal disorders, and mental health conditions remained significant. Current smoking was also associated with a higher incidence of sick leave episodes (IR = 1.21; 95 percent CI: 1.11–1.32) **(Table 4).**

Table 4. Negative binomial regression of the predictors of number of sick leave episodes.

	95% CI	Incidence Rate (IR)	*p*-Value
Sex—ref. Male Female	1.14, 1.36	1.24	<0.001 ***
Age—ref. <35 years ≥35 years old	1.08, 1.30	1.19	<0.001 ***
Marital status—ref. Not married Married	1.11, 1.33	1.21	<0.001 ***
Grade—ref. G9 to G13+			
G1 to G8	1.39, 1.67	1.52	<0.001 ***
Medical History—ref. No			
Mental health	1.03, 1.48	1.24	0.021 *
Gastrointestinal problems	1.13, 1.34	1.23	<0.001 ***
Respiratory problems and allergies	1.17, 1.40	1.28	<0.001 ***
Back pain	1.24, 1.49	1.36	<0.001 ***
Chest pain	0.78, 1.33	1.02	0.892
Diabetes	0.59, 1.26	0.86	0.441
Headache	1.07, 1.41	1.23	0.003 **
Lifestyle factors			
Exercise—ref. No exercise			
Exercise (yes)	0.95, 1.13	1.03	0.448
Smoking—ref. No smoking			
Smoking—current smoker	1.11, 1.32	1.21	<0.001 ***
Smoking—ex-smoker	0.83, 1.50	1.12	0.467

* p < 0.05; ** p < 0.01; *** p < 0.001.

This study, which sought to identify factors influencing sick leave among healthcare workers (HCWs), revealed that various demographic, socioeconomic, and health-related variables significantly predicted sickness absenteeism, with job grade being the most powerful predictor. Being female, older in age, married, and a current smoker were all associated with a greater number of sick leave episodes. Additionally, holding lower-grade positions and having a prior history of certain conditions—specifically gastrointestinal disorders, mental health issues, back pain, headaches, and respiratory illnesses—were linked to increased episodes of sick leave.

These findings are consistent with prior research on determinants of sick leave in HCWs, which has similarly identified female gender, older age, being married, and lower occupational grades as predictors of higher absenteeism. Studies involving all hospital employees have shown that women take more sick leave than men [12]. Older workers also exhibit higher rates of absenteeism [13]. A similar pattern has been noted among married individuals [3]. Furthermore, occupational hierarchy has been identified as a key factor, with higher-ranking staff, such as physicians, reporting fewer absences than others [8]. In Finland, physicians had lower sick leave rates than nurses [14], while in other research, ancillary staff demonstrated the highest rates and durations of sick leave compared to medical and dental personnel [15]. These patterns have been replicated in studies from various countries [8].

Our results support the existing evidence that workers in the lowest pay brackets experience poorer health and higher rates of sick leave compared to those in higher-paying roles. A longitudinal study following hospital staff for one year found that sickness absences increased as socioeconomic status decreased [16]; however, the precise mechanisms remain unclear due to the potential role of multiple interacting factors and mediators. Investigating these could shed light on how lower socioeconomic status contributes to greater absenteeism. Possible explanatory factors include reduced control over job tasks and schedules [17], high levels of job strain [18], and physically intensive work [19]. One systematic review indicated that job dissatisfaction and psychosocial stressors may also elevate sick leave, particularly through mental health issues [20].

Additionally, lower-paid roles, which are often more physically demanding, may involve greater exposure to workplace hazards, increasing the risk of acute injuries and subsequent absences. Research has shown that lower socioeconomic status is linked to higher rates of work-related injury absences [21]. The disparities in injury-related absences were even more pronounced than those for general sickness absence [21].

As many of these factors are modifiable, workplace interventions could be designed to reduce their impact [22]. However, the literature also highlights non-modifiable factors that add complexity. A twin study demonstrated that while low education and income were associated with increased sick leave, this association weakened in dizygotic twins and became non-significant in monozygotic twins [23], suggesting possible confounding by genetic factors [23].

In addition to socioeconomic and occupational variables, this study evaluated HCWs' medical histories and lifestyle factors, including smoking and exercise. Those with past gastrointestinal issues, mental health conditions (especially anxiety and depression), back pain, headaches, or respiratory problems had more sick leave episodes than those without these conditions. These results align with previous studies on the relationship between chronic illnesses and absenteeism. Prior to the COVID-19 pandemic in Qatar, HCWs with respiratory, back/neck, or gastrointestinal conditions took more sick leave [2]. In other contexts, the leading causes of sick leave frequency and duration among HCWs were musculoskeletal disorders, influenza, infectious diseases, and mental/behavioral disorders [3, 24]. Research worldwide has shown that sick leave days increase with the number of chronic conditions [25]. Mental health disorders have been identified as particularly strong predictors of absence [26], with anxiety being the second most common mental disorder in some populations, at a prevalence of 15.9% [26].

Our findings also indicated higher sick leave among current smokers compared to non-smokers or ex-smokers, even after adjustment for age, occupational factors, and health conditions. This is in agreement with earlier literature. A systematic review on smoking and sickness absence concluded that smoking increases both the risk and the number of sick leave days [27]. However, that review included only four studies specific to healthcare and had limited data on absence duration [27].

Strengths and limitations

A key limitation of this research is its confinement to a single medical facility. While the participant pool may resemble those in large medical centers within developed nations, it might not reflect conditions in smaller or differently structured hospitals. In Lebanon, for instance, occupational health and safety protocols, along with accreditation levels, vary considerably across institutions based on size and ownership (private vs. public) [28]. Furthermore, several occupational and personal details—such as shift patterns, age upon hiring, tenure in the role, and parenthood status—were absent from the dataset. Information regarding whether sick leave episodes were work-related was also unavailable, preventing its inclusion in the analysis. That said, the diagnostic breakdown of absences suggests that the vast majority were unrelated to workplace incidents. Additionally, lifestyle variables like physical activity and alcohol consumption were recorded only in binary form, restricting deeper exploration of how intensity or quantity might influence sick leave rates. The study primarily examined individuals with at least one absence episode, meaning it identified factors linked to higher frequency of sick leave among those already taking it, rather than predictors of any sick leave occurrence overall. Lastly, both the frequency and length of absences were notably low for mental health issues, which may indicate under-reporting attributable to stigma concerns prevalent in Middle Eastern cultures [29].

Notwithstanding these constraints, the study possesses several notable strengths. Primarily, it drew from a substantial cohort of healthcare workers (HCWs) who incurred sick leave (n = 2850) across four years. Secondly, in contrast to prior research limited to particular professions like nursing or medicine, this investigation encompassed the full spectrum of hospital employees across varied socioeconomic backgrounds, including doctors, registered nurses, nursing aides, administrative personnel, housekeeping, dietary services, laboratory technicians, medical engineers, plant maintenance, respiratory therapists, physical therapists, endoscopy staff, outpatient lab workers, and security guards. Thirdly, the comprehensive database incorporated complete sick leave documentation (both occupational and non-occupational) alongside clinical histories, enabling the evaluation of prior medical conditions as predictors of absenteeism. This also facilitated the identification of modifiable risk factors, which is valuable for developing targeted strategies to lower sick leave in this population. Fourthly, unlike many studies that examined predictors in isolation, this one employed multivariable regression to concurrently assess a broad range of relevant variables—covering socioeconomic, demographic, occupational, lifestyle, and physical/mental health aspects—providing a more integrated understanding of sickness absenteeism. The results emphasize the necessity of incorporating socioeconomic disparities into the design of sick leave reduction programs.

Recommendations

The outcomes of this research offer guidance for upcoming initiatives and policies. Interventions should prioritize modifiable elements, particularly occupational factors (such as job dissatisfaction, work strain, and limited control over tasks or schedules) alongside lifestyle habits (notably smoking), to mitigate the impact of lower job grades on absenteeism due to illness. To tackle health disparities, further investigations are warranted to explore how socioeconomic variables contribute to adverse health results. Additional studies should employ mediation analyses to elucidate the interactions among these factors, with particular attention to environments with limited resources.

Conclusion

This investigation revealed strong links between multiple risk factors—encompassing socioeconomic, demographic, and health-related domains—and elevated counts of sick leave episodes, with the most prominent being lower occupational grade. Gaining insight into these determinants is essential for addressing the root causes of illness-related absences among HCWs. Targeted measures are required to shape policies and practices that foster healthier, more efficient work environments. Given the worldwide shortfall in healthcare personnel [30], proactive steps to manage sickness absenteeism are imperative. The findings highlight the importance of customizing interventions for sick leave to suit various worker subgroups, especially those in the lowest socioeconomic tiers, to prevent exacerbating health inequalities.

References

1. Vahtera J, Kivimäki M. Reducing sickness absence in occupational settings. BMJ Publishing Group Ltd. 2008;219-220. doi:10.1136/bmj.39670.456760.68.

2. Al-Nuaimi AA, Abdeen S, Abed Alah M, AlHajri S, Semaan S, Al-Kuwari MG. Sickness absenteeism among primary health care workers in Qatar before and during the COVID-19 pandemic. J Occup Med Toxicol. 2023;18(1):3. doi:10.1186/s12995-023-00388-3.

3. Mollazadeh M, Saraei M, Mehrdad R, Izadi N. Sickness absenteeism of healthcare workers in a teaching hospital. Hosp Pract Res. 2018;3(1):6-10. doi:10.15171/hpr.2018.02.

4. Bargas EB, Monteiro MI. Fatores relacionados ao absenteísmo por doença entre trabalhadores de Enfermagem. Acta Paul Enferm. 2014;27(5):533-538. doi:10.1590/1982-0194201400084.

5. Calvo-Bonacho E, Catalina-Romero C, Fernández-Labandera C, et al. COVID-19 and sick leave: An analysis of the Ibermutua cohort of over 1,651,305 Spanish workers in the first trimester of 2020. Front Public Health. 2020;8:580546. doi:10.3389/fpubh.2020.580546.

6. Alquézar-Arbé A, Piñera P, Jacob J, et al. Impact of the COVID-19 pandemic on hospital emergency departments: Results of a survey of departments in 2020-the Spanish ENCOVUR study. Emergencias. 2020;32(5):320-331. doi:10.1016/j.emerg.2020.06.001.

7. Sakr CJ, Fakih L, Melhem NM, et al. COVID-19 infections and predictors of sickness related absences among healthcare workers: The experience of a tertiary care center with the COVID-19 pandemic. J Occup Environ Med. 2023;65(7):590-594. doi:10.1097/JOM.0000000000002872.

8. Belita A, Mbindyo P, English M. Absenteeism amongst health workers–developing a typology to support empiric work in low-income countries and characterizing reported associations. Hum Resour Health. 2013;11:34. doi:10.1186/1478-4491-11-34.

9. Oxtoby K. Why doctors don't take sick leave. BMJ. 2015;351:h6719. doi:10.1136/bmj.h6719.

10. Szymczak JE, Smathers S, Hoegg C, Klieger S, Coffin SE, Sammons JS. Reasons why physicians and advanced practice clinicians work while sick: A mixed-methods analysis. JAMA Pediatr. 2015;169(9):815-821. doi:10.1001/jamapediatrics.2015.1367.

11. Akoglu H. User's guide to correlation coefficients. Turk J Emerg Med. 2018;18(3):91-93. doi:10.1016/j.tjem.2018.07.002.

12. Isah E, Omorogbe V, Orji O, Oyovwe L. Self-reported absenteeism among hospital workers in Benin city, Nigeria. Ghana Med J. 2008;42(1):2. doi:10.4314/gmj.v42i1.47492.

13. Brady HD, McGrath D, Dunne CP. Sick leave determinants in the healthcare sector (part III): A review of individual-level factors. Brown Hosp Med. 2023;2(1):1-21. doi:10.1002/bhm3.10008.

14. Kivimäki M, Sutinen R, Elovainio M, et al. Sickness absence in hospital physicians: 2 year follow up study on determinants. Occup Environ Med. 2001;58(6):361-366. doi:10.1136/oem.58.6.361.

15. Ritchie K, Macdonald E, Gilmour W, Murray K. Analysis of sickness absence among employees of four NHS trusts. Occup Environ Med. 1999;56(10):702-708. doi:10.1136/oem.56.10.702.

16. Kristensen TR, Jensen SM, Kreiner S, Mikkelsen S. Socioeconomic status and duration and pattern of sickness absence: A 1-year follow-up study of 2331 hospital employees. BMC Public Health. 2010;10:643. doi:10.1186/1471-2458-10-643.

17. Ala-Mursula L, Vahtera J, Linna A, Pentti J, Kivimäki M. Employee worktime control moderates the effects of job strain and effort-reward imbalance on sickness absence: The 10-town study. J Epidemiol Community Health. 2005;59(10):851-857. doi:10.1136/jech.2004.030091.

18. Kondo K, Kobayashi Y, Hirokawa K, et al. Job strain and sick leave among Japanese employees: A longitudinal study. Int Arch Occup Environ Health. 2006;79(3):213-219. doi:10.1007/s00420-005-0042-1.

19. Petersen J, Kirkeskov L, Hansen BB, et al. Physical demand at work and sick leave due to low back pain: A cross-sectional study. BMJ Open. 2019;9(2):e026917. doi:10.1136/bmjopen-2018-026917.

20. Duchaine CS, Aubé K, Gilbert-Ouimet M, et al. Psychosocial stressors at work and the risk of sickness absence due to a diagnosed mental disorder:

A systematic review and meta-analysis. JAMA Psychiatry. 2020;77(8):842-851. doi:10.1001/jamapsychiatry.2020.0586.

21. Piha K, Laaksonen M, Martikainen P, Rahkonen O, Lahelma E. Socio-economic and occupational determinants of work injury absence. Eur J Public Health. 2013;23(5):693-698. doi:10.1093/eurpub/ckt024.

22. Odeen M, Magnussen LH, Mæland S, et al. Systematic review of active workplace interventions to reduce sickness absence. Occup Med. 2013;63(1):7-16. doi:10.1093/occmed/kqs162.

23. Torvik FA, Ystrom E, Czajkowski N, et al. Socioeconomic status and sick leave granted for mental and somatic disorders: A prospective study of young adult twins. BMC Public Health. 2015;15:134. doi:10.1186/s12889-015-1511-1.

24. Rocha FP, Saito CA, Pinto TCNO. Sickness absenteeism among health care workers in a public hospital in São Paulo, Brazil. Rev Bras Med Trab. 2020;17(4):355-360. doi:10.5327/Z1678-4464202000040007.

25. Vuorio T, Suominen S, Kautiainen H, Korhonen P. Determinants of sickness absence rate among Finnish municipal employees. Scand J Prim Health Care. 2019;37(1):3-9. doi:10.1080/02813432.2018.1555678.

26. Demou E, Smith S, Bhaskar A, et al. Evaluating sickness absence duration by musculoskeletal and mental health issues: A retrospective cohort study of Scottish healthcare workers. BMJ Open. 2018;8(5):e018085. doi:10.1136/bmjopen-2017-018085.

27. Troelstra SA, Coenen P, Boot CR, et al. Smoking and sickness absence. Scand J Work Environ Health. 2020;46(1):5-18. doi:10.5271/sjweh.3879.

28. Habib RR, Blanche G, Souha F, El-Jardali F, Nuwayhid I. Occupational health and safety in hospitals accreditation system: The case of Lebanon. Int J Occup Environ Health. 2016;22(3):201-208. doi:10.1080/10773525.2016.1194109.

29. Merhej R. Stigma on mental illness in the Arab world: Beyond the socio-cultural barriers. Int J Hum Rights Healthc. 2019;12(3):285-298. doi:10.1108/IJHRH-02-2019-0031.

30. Darzi A, Evans T. The global shortage of health workers—An opportunity to transform care. Lancet. 2016;388(10058):2576-2577. doi:10.1016/S