

Study on causal effects of occupational stress on healthcare workers at a selected healthcare facility in Oman

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ABSTRACT

Introduction: Occupational stress (OS) can be described as any physical or psychological change in an individual due to immediate or long-term reactions to workplace conditions that pose perceived threats or challenges to that employee. Typically, since work environments differ worldwide, scientists posit that the nature, sources, and causes of OS and the solutions proffered to address its impacts among healthcare workers (HCWs), differ markedly. The study aims to identify and examine the causal effects of OS on HCWs at the selected health facility in Oman.

Methods: The study adopted a quantitative design that utilized questionnaires to examine the causes and effects of OS on selected health workers. Data was collected from December 2021 to January 2022 from 150 health facility employees to obtain their opinions on the causes and effects of OS on their health, work life, and productivity.

Results: Findings revealed that 47% of the respondents were male and 53% were female. Further, the results also revealed that HCWs at the selected health facility have experienced a high prevalence of OS due to various factors ranging from staff shortages, as revealed by 56.2% of the participants, to work duration and loads, as revealed by 69.0% of the participants, and staff working conditions.

Conclusion: As a panacea, recommend management of healthcare facilities engage more highly qualified staff and create highly conducive work environments and training. Likewise, the management can provide modern-day facilities and amenities. It is envisaged that such measures will also reduce workloads, which will help the HCWs to rest, resuscitate, re-energize, and nurture effective stress. Furthermore, the measures will help create a stress-free, healthy, and conducive environment for the HCWs and greatly improve quality healthcare delivery services.

Keywords: Healthcare workers, Occupational Health, Occupational stress, Workplace safety

Introduction

Good health and well-being (Goal 3) is regarded as an integral component of the United Nations (UN) Sustainable Development Goals (SDGs) adopted in 2015.¹ Goal 3 is a universal call for action to promote healthy lives and the well-being of people worldwide.² Furthermore, it seeks to ensure that people of all ages, races,

religions, and regions of the world have access to accessible, abundant, and affordable healthcare services. These include newborn, infant, maternal, adolescent, and reproductive health as well as the prevention of infectious and non-infectious diseases.³ In addition, goal 3 aims to ensure universal health access to effective, safe, quality,

and inexpensive medicines and vaccines.⁴ Based on the aforementioned, the timely delivery of healthcare services is considered one of the most important social amenities provided to individuals in any society. It is critical to the socio-cultural growth and economic development of any society.

Healthcare service delivery is typically provided by highly trained professionals or personnel otherwise termed healthcare workers (HCWs). The composition of HCWs in any typical healthcare facility includes physicians, nurses, nursing assistants, physiotherapists, and radiology as well as technicians in the pharmacy, health information sections, and maintenance and engineering departments. The ultimate goal of these HCWs is to safeguard the health and well-being of people and patients in the larger society. By so doing, they help to mitigate or eliminate the spread of diseases, epidemics, and pandemics worldwide. However, the job of HCWs is prone to numerous health and safety risks ranging from communicable diseases to occupational stress (OS). Other challenges include high patient loads, poor enumeration, and harsh working conditions among others that prevent their ability to timely and effectively deliver healthcare services in the wider society. Given the outlined challenges, HCWs are largely prone to OS and professional pressures, which impact their physiological, psychological, and ability to function effectively in their places of work.⁵

OS is defined as the change in an individual's physical or mental state as an immediate or long-term reaction to workplace conditions that pose perceived threats or challenges to that employee. OS is ascribed to various factors such as the work environment, organizational atmosphere, and conflict arising from the employee's job expectations.⁶ Six Other factors include toxic work environments, unfavorable workloads, isolation, long working hours, role conflicts/ambiguities, lack of independence, and problematic peer relationships.⁷⁻⁹ In addition, managerial bullying, harassment, and

organizational climate are stressors that could result in OS.⁷⁻¹⁰ Given the nature of their jobs, HCWs are exposed to these harsh conditions which result in OS. Typically, HCWs experience OS and professional pressures owing to job-related demands such as on-demand shifts, unsuitable work environments, and excessive administrative duties.¹¹

Numerous studies have revealed that working in healthcare is challenging due to several reasons. For example, HCWs characteristically experience high workloads, long working hours, unpleasant working circumstances, dealing with difficult patients, uncertainty over patient treatment, and other occupational health and safety issues, which could result in OS. Trifunovic et. al reported that HCWs experience wide-ranging OS, which poses significant risks to their health and well-being.¹¹ For example, it can lead to physical, and mental, health, as well as behavioral disorders and social problems, including depression, anxiety, and suicidal ideation.¹²⁻¹³ Other studies have also revealed that long-term stress causes high blood pressure, heart failure, or immune system compromise.¹⁴

Numerous studies have demonstrated that OS is widespread among HCWs. The reason is that HCWs have high expectations combined with a lack of time, skills, and social support, which could cause extreme anxiety, burnout, or physical sickness, as well as reduced quality of life and service delivery.¹⁵⁻¹⁷ Stress and burnout are known to cause absenteeism and attrition. Similarly, anxiety and depression disorders caused by both work-related and non-work-related stress can severely affect HCWs.¹⁸⁻¹⁹ Overall, OS can bring about changes in the physical or mental state of an individual due to working in a challenging environment such as the healthcare sector, whereas HCWs are most prone. In general, the review of the literature points to the fact that OS is harmful to both individuals and organizations.

Due to the differences in demographics, cultures, socio-economic, and work environments of people world, the sources, causes, and impacts of

OS in one country may differ markedly. Likewise, the solutions meted out to address such challenges in one country will not differ but may be ineffective in addressing OS-related problems among HCWs. Hence, further studies are required to address the problems of OS across the world. Therefore, the objective of the study is to examine the causal effects of OS on healthcare workers at a selected health facility in the Sultanate of Oman. The study also seeks to investigate the sources, causes, and impacts of OS among HCWs in Oman as well as proffer solutions and suggestions that reduce OS and professional pressures among the nation's HCWs based on the findings deduced from the selected health facility in the country.

Methods

This study adopted a descriptive and quantitative research technique by utilizing questionnaires to examine the causes and effects of OS on selected health workers at the health facility. Furthermore, the website of the health facility was used to determine the number of healthcare workers, their schedules, and the various departments to ensure equitable distribution of the questionnaires. The designed questionnaire comprised five (5) questions including gender, work description, work duration, as well as respondents' opinions on the causal effects, and potential solutions for reducing occupational pressure. The questionnaire was subjected to face validity and content validity by administering it to experts in the field.

To achieve a sample size the study utilized the Kriecjie and Morgan formula for determining sample size. Based on a population of 250 workers who work the health care units the sample size is calculated below:

$$n = \frac{X^2 NP(1-P)}{e^2(N-1)+X^2 P(1-P)} \dots \dots \dots \text{Equation (1)}$$

Where: $N = \text{Population Size} = 245$
 $X^2 = \text{Chi Square Value} = 3.841$

$$P = \text{Population Proportion} = 0.5$$

$$E = \text{Margin of Error} = 0.05$$

$$n = \frac{3.841^2 \times 245 \times 0.5 (1 - 0.5)}{0.05^2(245 - 1) + 3.841^2 \times 245 (1 - 0.5)}$$

$$n = 150$$

Based on the sample size calculation 150 Health care workers are the respondents for the study. On completion, the questionnaire was distributed to 150 employees of the health facility who were selected randomly to obtain their opinions on the causes and effects of OS on their health, work life, and productivity. Data collection lasted from 28th Dec 2021 to 7th Jan 2022. It is important to state that before the commencement of the data collection process, the express permission of the chief medical director, healthcare personnel department, and management of the facility was processed and procured. Ethical approval was obtained from the research and ethics committee of ICEM. After data collection, the data from the questionnaires were coded and imported into Microsoft Excel for data analysis.

Results

This study aims to identify and examine the causal effects of OS on HCWs at the selected health facility in Oman in line with this the results of the study are presented below. The first section presents the demographic results of the study. The data includes the ages, gender, cadre, years of experience, and type of work performed by each health facility staff.

As can be seen (Table 1), the male gender accounts for 46.6% of the total population, whereas females account for 53.3% of the respondents in the study. The marital status analysis showed that 20% are unmarried, whereas 80% are married. The analysis of the workforce showed that there are 50 physicians, 46 nurses, 14 pharmacists, 12 laboratory scientists, and 20 administrative employees working in the various departments (such as indicated various things such as security, social workers, and cleaners) at the facility.

Table 1: Demographic data of the study respondents

Characteristics		Frequency
Gender	Male	70 (46.60%)
	Female	80 (53.30%)
Age	Age group (20-45) years	100 (66.60%)
	Age group (45-60) years	50 (33.30%)
Marital status	Single	30 (20%)
	Married	120 (80%)
Cadres	Doctors	50 (33.30%)
	Nurses	46 (30.60%)
	Pharmacist	14 (9.30%)
	Laboratory Scientists	12 (8%)
	Administrative Staff	20 (13.30%)
	Others (security, cleaners, social workers etc.)	8 (5.30%)
Years of experience	0-6 years	70 (46.60%)
	7-above	80 (53.30%)
Employment type	Temporary	73 (48.60%)
	Permanent	77 (51.30%)

Sources of OS

One of the objectives of the study was to identify and examine the perceived sources and causes of OS among staff at the health facility.

Table 2 shows the various sources or causes of OS among workers at the facility. As can be

observed the causes of OS among the staff are numerous and varied, as outlined. However, these factors can be broadly grouped into personnel-related problems, work duration/loads, and staff conditions, independently or jointly contributing to OS among healthcare workers at the selected health facility.

Table 2: Sources/causes of OS among health workers

Occupational Stress	D	N	P	LS	AS	O
Inadequate staffing levels	32(21%)	20(13.3%)	8(5.3%)	5(3.3%)	8(5.3%)	2(1.3%)
Working hours are excessively lengthy	40(26.6%)	30(20%)	10(6.6%)	8(5.3%)	8(5.3%)	7(4.6%)
Taking care of a huge number of patients	35(23.3%)	42(28%)	10(6.6%)	7(4.6%)	7(4.6%)	8(5.3%)
Working with inadequate support personnel	5(3.3%)	7(4.6%)	2(1.3%)	1(0.6%)	1(0.6%)	0%
Call rooms and workstations in an unfavorable working environment	35(23.3%)	42(28%)	10(6.6%)	7(4.6%)	7(4.6%)	8(5.3%)
Time pressure	45(30%)	35(23.3%)	10(6.6%)	8(5.3%)	8(5.3%)	7(4.6%)

D- Doctors; N-Nurses; P-Pharmacists; LS-Laboratory Scientists; AS-Administrative Staff; O- Others

According to the results of this study, insufficient staffing levels were adjudged by 49.5 % of

respondents as one of the major causes of OS among healthcare workers. Likewise, excessively

long working hours were also considered to be an essential cause of OS based on the opinions of 68.6% of the respondents. Long working hours are also regarded as one of the primary stressors experienced by physicians, nurses, laboratory scientists, cleaners, and others. Results from Table 2 further show that 72.4% of the respondents reported that taking care of a huge number of patients was the leading cause of stress. Even though the findings revealed that working with inadequate support was not a main contributor to stress as shown in Table 2 which revealed that only 10% agreed, the results further

showed that 72.4% of the respondents agree that unfavorable working conditions were precursors for occupational stress. Further results from the analysis indicated that 75.1% of respondents agreed that time pressure was a leading cause of OS.

Table 3 outlines some selected OS coping mechanisms used by HCWs at the selected healthcare facility examined in this study. As can be observed, the HCWs have devised and used several methods such as prioritizing tasks, taking breaks, work-life balance, and relaxation to lower work stress.

Table 3: OS coping mechanisms of HCWs (weighted mean)

Occupational stress	D	N	P	LS	AS	O
Prioritizing and concentrating on only the most critical work-related tasks	45(30%)	40(26.6%)	10(6.6%)	8(5.3%)	18(12%)	8(5.3%)
Taking breaks from work to think, pray and listen to music	47(31.3%)	40(26.6%)	12(8%)	10(6.6%)	20(13.3%)	8(5.3%)
Making social arrangements that aren't work-related	20(13.3%)	12(8%)	2(1.3%)	2(1.3%)	5(3.3%)	1(0.6%)
Have some time for fun and joke about it at work to relieve tension.	20(13.3%)	12(8%)	2(1.3%)	2(1.3%)	5(3.3%)	1(0.6%)

D – Doctors; N – Nurses; P – Pharmacists; LS – Laboratory Scientists; Administrative Staff – AS; O – Others

Based on findings from Table 3 above, it can be seen that 128 (85.3%) HCWs agree that prioritizing tasks was a very crucial mechanism used in coping with OS. The table also shows that another coping mechanism used by HCWs was taking breaks from work which was agreed by 137 (91.3%) HCWs across all departments studied. Further findings from Table 3 also show that both making social arrangements and having time for fun were agreed by only 42 (28%) respondents across all departments respectively.

Discussion

This study is aimed at investigating the effects of stress on healthcare workers at a selected facility in Oman. Findings from Table 2 revealed that a major source of stress was inadequate levels of

staffing. This result is shown by 49.5% of the respondents in this study who agree that low staffing is a crucial cause of stress. Labor shortages are known to put additional pressure on the few healthcare professionals available, as reported by various industries in the literature. These findings are in tandem with Ang²⁰ who reported that the high shortages of labor in the agricultural sector in New Zealand have resulted in high levels of stress among farmers in the country. One of the notable factors identified as the reason for the problem is labor shortages. The study observed that the inability of family-owned farms to employ workers to assist with farm work has an adverse effect on the stress levels of owners. In their study on the occupational wellness of women in Northern Eastern India,

Bhattacharyya and Chakrabarti²¹ observed a link between the OS and labor shortages during the peak agricultural season. Similarly, the group of Agarwal and Shilpkar²² observed that labor shortages are a critical determining factor of OS, as this results in increased workloads for existing workers. Kulkarni et al²³ reported a link between OS and labor shortages in the health sector in South Africa. The authors also reported that OS could result in the poor mental health of workers, particularly HCWs such as nurses, which was ascribed to increased workloads like during the peak of the COVID-19 pandemic. In Nigeria, the shortage of medical personnel remains a major challenge as noted by the nation's Medical Association. Hence, the country's doctor-to-patient ratio is 1:6000, which is well short of the World Health Organization's recommendation. This high physician-to-patient ratio was also detected in a Chinese study, which discovered that the greater physician-to-general-population ratio in China exacerbates Chinese physicians' professional stress. Further findings from table 2 revealed that long working hours are considered to be an essential cause of OS based on the opinions of 68.6 % of the respondents. Similar findings have been reported by Boran et. al.²⁴ Whose study on work-related stress among Jordanian HCWs observed that long workers (along with gender and job title) significantly accounted for OS among staff. In another study by Chou et al ²⁵ LWHs were responsible for only OS but also burnout among HCWs, particularly nurses (66%) in Taiwan. More recently, Jung and Baek²⁶ reported that LWH is a major cause of depression among HCWs. Virtanen et al.²⁷ reported that the LWHs and OS experienced by HCWs could greatly endanger patients as well as staff. The findings of the study showed that the risks of hospital-associated infections increased when HCWs were subjected to LWHs. Another critical cause of OS among HCWs is the need to cater to large numbers of patients in the selected health facility. This study observed that the healthcare needs of numerous patients cause great pressure and workloads for HCWs with this causative factor. The results show that it is

the second most noticeable source of tension in the selected health facility with 72% agreeing with this viewpoint as opposed to 27.6% of the respondents. The study by Zare et al²³ reported that 77.5% (or as high as 87% among nurses) of the HCWs in selected hospitals in Iran reported moderate to high levels of workplace stress due to workload among other factors. In another study, Wright²⁸ reported that high patient load is an important contextual factor of workplace stress as well as conflicts, burnout, and job satisfaction. Kaburi et al²⁹ reported that workload pressures arising from high patient loads could negatively affect even highly skilled HCWs like doctors and nurses. The study demonstrated that psychological working conditions are important indicators of workplace or work-related stress among HCWs. Nurses working with inadequate support staff were also identified as having a response rate of 4.6% as a factor of OS.

Furthermore, physicians, nurses, and care professionals generally reported that the inadequate/unavailability of workrooms is one of the key impediments to successful healthcare service delivery as well as stress. The results of the study are confirmed by the outcome of 109 out of 150 employees who responded positively. Lastly, time pressure was also adjudged to constitute one of the highest percentages of sources of tension among HCWs at the selected health care with 75.1% of the respondents confirming this view. Similar to the findings of this study, there have been reports of a high prevalence of OS among HCWs in similar healthcare facilities as well as in other nations such as India, Ghana, Iran, Taiwan, and Ethiopia among others. The study findings also suggest that OS is not country-specific or workplace, as evident in the varied reports from various geographical locations and workplaces. In addition, the safety culture of organizations plays a crucial role in the prevalence of occupational stress and professional pressures encountered by workers in general.³⁰⁻³¹

One of the most critical approaches for alleviating work-related stress was identified as

setting priorities. These OS coping mechanisms help HCWs to identify and prioritize the most important workplace-related tasks and focus only on these to prevent burnout and stress. The study findings showed that 85.3% of the HCWs agree with the view that drafting a scale of preference for workplace tasks will go a long way in addressing workplace stress along with the extant challenges that hamper effective healthcare delivery. Another critical mechanism is taking breaks from workplace tasks and duties. By doing so, HCWs can relax, think, pray, and listen to music, which helps to recover and re-energize for their tasks. The results showed that 91.3% agree with the view that respondents require breaks in between work for effective management of work-related stress. Lastly, the third method of reducing stress is to create and spend time for social interactions, which can help relieve tension.

Under extreme stress, the human body may be unable to critically fight disease, which leaves room for various illnesses. Therefore, health practitioners and others must reduce/eliminate the detrimental impacts of stress through the application and use of various coping methods. The measures provide an avenue for HCWs to effectively deliver their tasks during work hours for the effective delivery of healthcare services to their patients.

Conclusions

Healthcare institutions in many developed and developing countries have identified the various factors that affect effective healthcare delivery. One of the most notable challenges is OS experienced by healthcare employees who

typically comprise doctors, nurses, anesthetists, radiographers, and cleaners among others. In this study, various factors such as staffing levels, excessively long working hours, caring for numerous patients, support staff shortages, and time pressure account for the stress experienced by HCWs in the selected healthcare facility examined in this study. The findings also showed that the majority of sources of stress identified in the study can be broadly termed job-related variables, which shows that aspects related to job content and settings are the most common drivers of work-related stress. Again the findings of this study showed that OS is a major problem among the HCWs at the selected health facility. The high prevalence of OS reported by the study indicates more efforts are required to address the problem to prevent any disruptions to effective healthcare service delivery. Hence, the management of the health facility and others, in general, will need to hire more staff to reduce the workload of current HCWs, while also maintaining proper labor division. Furthermore, the authors opine that employing highly qualified HCWs, creating highly conducive work environments, and training could foster effective stress management and greatly improve quality healthcare delivery services. In addition, these measures could potentially ensure workers can rest, resuscitate, and re-energize, which ultimately creates a stress-free, healthy, and conducive environment for the HCWs. The management can provide modern facilities and amenities for the general improvement of the working environment for staff and patients, which could greatly improve the mental health and general well-being of HCWs and the healthcare service delivery by extension.

References

1. Asad M, Razali H, Mehmood Soomro Q, Sherwani F, Aamir M. Identification of Hazardous Nature of Well Drilling Operation With Associated Potential Hazards at Oil and Gas Extraction Industries: an Explanatory Approach. 4th Scientific Conference on Occupational Safety and Health: Sci-COSH, Pakistan; 2016. Available from: <https://www.researchgate.net/publication/325673975>
2. Mazzoni L, Ahmed R, Janajreh I. Plasma gasification of two waste streams: Municipal solid waste and hazardous waste from the oil and gas

- industry. *Energy Procedia*. 2017;105:4159-66. Available from: <https://doi.org/10.1016/j.egypro.2017.03.882>
3. Mearns K, Flin R. Risk perception and attitudes to safety by personnel in the offshore oil and gas industry: a review. *Journal of loss prevention in the process industries*. 1995;8(5):299-305. Available from: [https://doi.org/10.1016/0950-4230\(95\)00032-V](https://doi.org/10.1016/0950-4230(95)00032-V)
 4. Naji GM, Isha AS, Mohyaldinn ME, Leka S, Saleem MS, Rahman SM, Alzoraiki M. Impact of safety culture on safety performance; mediating role of psychosocial hazard: an integrated modelling approach. *International journal of environmental research and public health*. 2021 Aug 13;18(16):8568. Available from: <https://doi.org/10.3390/ijerph18168568>
 5. White J, Beswick J. Working long hours. Health and Safety Laboratory. Sheffield, UK. 2003. Available from: https://www.hse.gov.uk/research/hsl_pdf/2003/hsl_03-02.pdf
 6. Johnson JV, Lipscomb J. Long working hours, occupational health and the changing nature of work organisation. *American journal of industrial medicine*. 2006;49(11):921-9 Available from: <https://doi.org/10.1002/ajim.20383>
 7. Harun H, Salleh R, Memon MA, Baharom MNR, Abdullah A. Job satisfaction, organisational commitment and stress among offshore oil and gas platform employees. *Asian Social Science*. 2014;10(11):28. Available from: <https://doi.org/10.5539/ass.v10n11p28>
 8. Kivimäki M, Nyberg ST, Batty GD, Kawachi I, Jokela M, Alfredsson L, Bjorner JB, Borritz M, Burr H, Dragano N. Long working hours as a risk factor for atrial fibrillation: a multi-cohort study. *Eur Heart J*. 2017;38(34):2621-8. Available from <https://doi.org/10.1093/eurheartj/ehx324>
 9. Spurgeon A, Harrington JM, Cooper CL. Health and safety problems associated with long working hours: a review of the current position. *Occupational and environmental medicine*. 1997;54(6):367-75. Available from <http://dx.doi.org/10.1136/oem.54.6.367>
 10. Skogstad M, Mamen A, Lunde L-K, Ulvestad B, Matre D, Aass HCD, Øvstebø R, Nielsen P, Samuelsen KN, Skare Ø. Shift work including night work and long working hours in industrial plants increases the risk of atherosclerosis. *Int J Environ Res Public Health*. 2019;16(3):521. Available from <https://doi.org/10.3390/ijerph16030521>
 11. Trifunovic N, Jatic Z, Kulenovic AD. Identification of causes of the occupational stress for health providers at different levels of health care. *Medical Archives*. 2017 Jun;71(3):169-72. Available from: <https://doi.org/10.5455/medarh.2017.71.169-172>
 12. Al-Hilali M. Abraj Energy Services Sultanate of Oman: Abraj Energy Services Limited; 2020 Websource. Available from: <https://bit.ly/3CCAB7S>.
 13. Smith A. Shiftwork on oil installations. *Contemporary Ergonomics 2006*: Taylor & Francis; 2020. p. 565-9. Available from: <https://www.taylorfrancis.com/chapters/edit/10.1201/9781003072072-133/shiftwork-oil-installations-andy-smith>
 14. Hagan-Haynes K, Ramirez-Cardenas A, Wingate KC, Pratt S, Ridl S, Schmick E, et al. On the road again: A cross-sectional survey examining work schedules, commuting time, and driving-related outcomes among US oil and gas extraction workers. *American journal of industrial medicine*. 2022;65(9):749-61. Available from <https://doi.org/10.1002/ajim.23405>
 15. Kim W, Park E-C, Lee T-H, Kim TH. Effect of working hours and precarious employment on depressive symptoms in South Korean employees: a longitudinal study. *Occupational and environmental medicine*. 2016;73(12):816-22. Available from <http://dx.doi.org/10.1136/oemed-2016-103553>
 16. Virtanen M, Jokela M, Madsen IE, Hanson LLM, Lallukka T, Nyberg ST, et al. Long working hours and depressive symptoms: systematic review and meta-analysis of published studies and unpublished individual participant data. *Scandinavian journal of work, environment & health*. 2018;44(3):239-50. Available from: <https://doi.org/10.5277/sjweh.3712>
 17. Bonafede M, Marinaccio A, Asta F, Schifano P, Michelozzi P, Vecchi S. The association between extreme weather conditions and work-related injuries and diseases. A systematic review of epidemiological studies. *Annali dell'Istituto*

- superiore di sanita. 2016;52(3):357-67. Available from: https://doi.org/10.4415/ANN_16_03_07
18. Barss P, Barss SBM, Smith GS, Mohan D, Baker SP, Baker S. Injury prevention: an international perspective epidemiology, surveillance, and policy: Oxford University Press, USA; 1998. Available from: <https://global.oup.com/academic/product/injury-prevention-an-international-perspective-9780195119824?cc=np&lang=en&>
 19. Cheng Y, Du C-L, Hwang J-J, Chen I-S, Chen M-F, Su T-C. Working hours, sleep duration and the risk of acute coronary heart disease: a case-control study of middle-aged men in Taiwan. *International journal of cardiology*. 2014;171(3):419-22. Available from: <https://doi.org/10.1016/j.ijcard.2013.12.035>
 20. Ang HB. Occupational stress among the New Zealand farmers-a review. *Labour, Employment and Work in New Zealand*. 2010. Available from: <https://doi.org/10.26686/lew.v0i0.1708>
 21. Bhattacharyya N, Chakrabarti D. Ergonomics-a way to occupational wellness of workers engaged in industrial activities: Specific reference to Assam. *Journal of ergonomics*. 2016;6(3):164. Available from: <https://doi.org/10.4172/2165-7556.1000164>
 22. Agarwal A, Shilpkar H. Understanding Labour Issues In The Indian Economy: Women, Policy Reforms, And Industry 4.0. *Think India Journal*. 2019 Nov 6;22(15):458-71
 23. Kulkarni S, Dagli N, Duraiswamy P, Desai H, Vyas H, Baroudi K. Stress and professional burnout among newly graduated dentists. *Journal of international society of preventive & community dentistry*. 2016 Nov;6(6):535. Available from: <https://doi.org/10.4103/2231-0762.195509>
 24. Boran A, Shawaheen M, Khader Y, Amarin Z, Hill Rice V. Work-related stress among health professionals in northern Jordan. *Occupational Medicine*. 2012 Mar 1;62(2):145-7. Available from: <https://doi.org/10.1093/occmed/kqr180>
 25. Chou PH, Lin WH, Hung CA, Chang CC, Li WR, Lan TH, Huang MW. Perceived occupational stress is associated with decreased cortical activity of the prefrontal cortex: a multichannel near-infrared spectroscopy study. *Scientific reports*. 2016 Dec 13;6(1):39089. Available from: <https://doi.org/10.1038/srep39089>
 26. Jung HS, Baek E. A structural equation model analysis of the effects of emotional labor and job stress on depression among nurses with long working hours: Focusing on the mediating effects of resilience and social support. *Work*. 2020 Jan 1;66(3):561-8. Available from: <https://doi.org/10.3233/wor-203198>
 27. Virtanen M, Vahtera J, Pentti J, Honkonen T, Elovainio M, Kivimäki M. Job strain and psychologic distress: influence on sickness absence among Finnish employees. *American journal of preventive medicine*. 2007 Sep 1;33(3):182-7. Available from: <https://doi.org/10.1016/j.amepre.2007.05.003>
 28. Zare S, Esmaeili R, Kazemi R, Naseri S, Panahi D. Occupational stress assessment of health care workers (HCWs) facing COVID-19 patients in Kerman province hospitals in Iran. *Heliyon*. 2021 May 1;7(5). Available from: <https://doi.org/10.1016/j.heliyon.2021.e07035>
 29. Wright SA, Walker LF, Hall EE. Effects of workplace stress, perceived stress, and burnout on collegiate coach mental health outcomes. *Frontiers in Sports and Active Living*. 2023 Apr 25;5:974267. Available from: <https://doi.org/10.3389/fspor.2023.974267>
 30. Kaburi BB, Bio FY, Kubio C, Ameme DK, Sackey SO, Kenu E, Afari EA. Psychological working conditions and predictors of occupational stress among nurses, Salaga Government Hospital, Ghana, 2016. *Pan African Medical Journal*. 2019 Aug 23;33(1). Available from: <https://doi.org/10.11604/pamj.2019.33.320.16147>
 31. Otitolaiye VO, Abd Aziz FS, Munauwar M, Omer F. The Relationship Between Organisational Safety Culture and Organization Safety Performance. The Mediating Role of Safety Management System. *International Journal of Occupational Safety and Health*. 2021 Sep 30;11(3):148-57. Available from: <https://doi.org/10.3126/ijosh.v11i3.39766>
 32. Otitolaiye VO, Abd Aziz FS. Bibliometric analysis of safety management system research (2001–2021). *Journal of Safety Research*. 2023 Nov 10. Available from: <https://doi.org/10.1016/j.jsr.2023.10.014>