The Indonesian Journal of Occupational Safety and Health
2024, 13 (3): 351-359
p ISSN: 2301 8046, e ISSN: 2540 7872
http://doi.org10.20473/ijosh.v13i3.2024.351-359

ORIGINAL ARTICLE

Work-Related Musculoskeletal Disorders: The Role of Workplace Ergonomics and Its Effect on Non-Teaching Staff Healthy Living in Nigerian Public Universities

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ABSTRACT

Introduction: Health status of an individual in paid employment is a function of many factors such as workplace settings, furniture, work design and tools used at work, among others. Based on this position, this study examined how work-related musculoskeletal disorders through workplace ergonomics determine non-teaching staff healthy living, and how each of the selected work-related musculoskeletal disorders caused by defective workplace ergonomics contributes to healthy living. **Methods:** This study was conducted among the non-teaching staff of selected public universities in south west Nigeria through quantitative approach that made use of descriptive research design with the use of structured questionnaire administered to collect data and both descriptive and inferential statistics were used to analyze data collected. **Results:** The study revealed that specific work-related musculoskeletal disorders caused by defective workplace ergonomics were of negative effect on non-teaching staff healthy living while others were not. Also, specific work-related musculoskeletal disorders (back pains and eyes dysfunctionality) examined against non-teaching staff healthy living were found to be detrimental to their health status while muscular pains, fracture, neck injuries, hand-arm vibration and bruises were of insignificant effect on the non-teaching staff healthy living. **Conclusion:** The study concludes that work-related musculoskeletal disorders through workplace ergonomics is an issue that management of universities should be mindful of to ensure staff healthy living as this is critical to job performance.

Keywords: ergonomics, healthy life, work design, work methods, workplace setting

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INTRODUCTION

Less attention has been given to how the type of employment, work patterns and system affects healthy life of workers (Farrants *et al*., 2023). Aside from aging in paid employment in the long run, employees' health status can be compromised quickly by many reasons in relation to their aspiration for why they work which is to have resources to take care of their needs, survive and maintain their health. This is not an ideal scenario but does happen when work settings, working tools and infrastructures provided by the organization as well as preferred work methods either by individuals or organization are not in line with global best practices (Yudisianto, Tualeka and Widajati, 2021). For employees that are often confined to office administrative activities like non-teaching staff of the university (Pratiwi, Haqi and Dwicahyo, 2022), work-related musculoskeletal disorders (WMSDs) are often experienced due to faulty and poorly arranged work settings and infrastructure (Abdulmujeeb *et al*., 2023). Through this, some employees have suffered all forms of health issues like back injuries, eyes dysfunction, neck injuries, fracture and hand-arm vibration (Abdulmujeeb *et al*., 2023; Arif Maspul, 2023). This suggests that not providing employees with good working tools or modern infrastructure can deteriorate their health as against healthy life they desire.

Cite this as: *James, A. et al. (2024) 'Work-Related Musculoskeletal Disorders: The Role of Workplace Ergonomics and Its Effect on Non-Teaching Staff Healthy Living in Nigerian Public Universities', The Indonesian Journal of Occupational Safety and Health, 13(3), pp. 351-359*

 doi:10.20473/ijosh.v13i3.2024.351-359. Received May 28, 2024; 1st revision September 4, 2024; 2nd revision October 3, 2024; Accepted December 31, 2024; Published: December 2024. Published by Universitas Airlangga.

Health is metabolic efficiency of living organism including human being. Employee as a living organism is said to be healthy when his mind and body is free from illness, injury or pain (Farrants *et al*., 2023). According to Kumar (2017), healthy living is about physical and mental state of individuals health and wellness. In different climes, there are variations in employees' health reports especially developing countries where work organizations' arrangement of work designs and structures are compromised (Saptiansyah, Haqi and Juwono, 2023) with some of these work designs and structures not at the convenience of employees. This suggests workplace ergonomics issues around work systems, tools, and structure are what make up workplace ergonomics (Ahmad *et al*., 2022). According to Reiman *et al*. (2021), it is systems centric macro ergonomics which is about formal work design comprising of both technological and personnel usage (Saptiansyah, Haqi and Juwono, 2023). There are different aspects of workplace ergonomics like physical ergonomics, cognitive ergonomics, workplace ergonomics, macro ergonomics, user-centered design, usability engineering and anthropometry (Ahmad *et al*., 2022; Marras and Karwowski, 2023) but this study concentrates on workplace ergonomics which is about the broader socio-technical systems in which work is conducted. It considers factors such as work settings, structure, and office setting. Workplace ergonomics aims to improve the overall effectiveness, efficiency, and well-being of individuals at work (Pratiwi, Haqi and Dwicahyo, 2022). However, this is not always the case as a description of what employee healthy living encapsulates a focus on ensuring that employees are happy and healthy, which can include (but is not limited to): reducing their risk for injuries and illnesses, addressing quality of work life issues (Hoffmeister *et al*., 2015). Healthy living, in the context of this study, relates to workplace ergonomics and staff overall well-being.

This study found the organization support theory of Rhoades and Eisenberger (2002) suitable in advancing the nexus between the variables. When organization provides modern infrastructural facilities and work methods with tools that are supportive and friendly, employees will have no health challenge as a result of defective ergonomics as tasks and activities are carried out with ease. It was affirmed that with such provisions, employees are often psychologically balanced and mentally stable, thereby enhancing their healthy living and wellbeing. Within the context of this study, workplace ergonomics is a function of how management provides support in the areas of working tools, office settings, and other infrastructures that will make working life pleasant for employees (Aulianingrum and Hendra, 2022). This position underpinned the relevance of organization support theory in explaining how workplace ergonomics provide the required work delivery support system via infrastructural facilities and work processes that are not detrimental to the staff healthy living. Therefore, this forms the theoretical framework of the study as it connects workplace ergonomics to staff healthy living.

There are existing studies (Faez *et al*., 2021; Farrants *et al*., 2023; Marková and Škurková, 2023; Brandi *et al*., 2024) that are related to this assumption. For instance, Farrants *et al*. (2023) examined health status of employees below the age 64 years and found that those who were in paid employment below 64 years had better health than those who were not as over 62% subscribed to this. However, the study of Brandi *et al*. (2024), which compared work-related musculoskeletal disorders in work setting, found that the nature of task determines health status of employees as squat lifting task recorded higher work-related musculoskeletal disorders than others. In a related study, Faez *et al*. (2021) assessed ergonomics climate and self-reported pain cum well-being in Iranian plants and found that unconducive ergonomics climate result into musculoskeletal pain. It is against this backdrop that this study examined the effects of workplace ergonomics on the healthy living of non-teaching staff in Nigerian public universities being a work setting with consistent complaints of neglect by the government, which owns the institution. This neglect over the years has put working tools, infrastructures and structures into deplorable states.

The purpose of this study is to examine the impact of workplace ergonomics on the prevalence of work-related musculoskeletal disorders (WMSDs) among non-teaching staff in Nigerian public universities. It aims to evaluate how ergonomic interventions can enhance the health and well-being of these employees, thereby improving their overall work-life quality. In this context, the reasons for targeting non-teaching staff instead of teaching staff emanate from a set of preliminary observations indicating that the status of workplace ergonomics and associated outcomes substantially

differs. Whereas their tasks are more physically demanding, non-teaching staff often carry out administrative duties, maintenance, clerical work, and manual handling, which also increase their risks of developing WMSDs. Additionally, many of these jobs involve prolonged sitting, repeated motion, heavy lifting, or unnatural postures-each highly related to the development of WMSDs. Additionally, the non-teaching staff may not have equal ergonomic interventions or resources that may help minimize these risks, unlike teaching staff who often work in environments tailored for intellectual activities, such as classrooms and offices. This disparity makes it even more necessary to explore how lack of or availability of ergonomics affects the health and well-being of staff that are non-teaching.

METHODS

This study was conducted in public universities in Southwest, Nigeria. This geographical location of Nigeria is where there are the foremost federal universities in Nigeria such as University of Ibadan, University of Lagos, and Obafemi Awolowo University. These three universities are a reflection of what is obtainable in average federal universities in Nigeria. With the nature of the study, quantitative research approach was adopted with descriptive research design found suitable for the study to describe workplace ergonomics and staff healthy living. The study's population targeted the non-teaching staff because of their administrative activities which has to do with sitting in an office, using infrastructures, and following through work methods.

Available statistics released from the establishment offices of the three federal universities about their non-teaching staff as at December 2023 are as follows: University of Ibadan = 1,010, University of Lagos = 722, and Obafemi Awolowo University = 911. The target population of the study stood at 2, 643. The study considered 10% (264) of the population as sample size due to fact that the situations in these universities are similar. A 10% sample size representative is appropriate for a large and homogeneous population (Hossan, Dato' Mansor and Jaharuddin, 2023). Provided the nature of the sample guarantees randomness or stratification, this will strike a good balance between statistical accuracy and practical feasibility of empirical and methodological evidence in the sampling theory (Lakens, 2022). Primary data were gathered using a structured questionnaire with few modifications from the works of Ayub and Shah (2018), Faez *et al*. (2021), and Sahito, Bazuhair and Mimesh (2022) on ergonomic awareness and work-related musculoskeletal disorders. The items were measured on a 5-point scale. Data were analyzed using both descriptive and inferential statistics. Descriptive statistics involved the mean and standard deviation. The mean decision rule was based on mean score between 4:21 – 5.00 either excellent or highly frequent; 3.41- 4.20 is good or frequent; 2.61 – 3.40 is average or indifferent; 1.81 – 2.60 is fair or infrequent while 1.00 – 1.80 is poor or highly infrequent. For inferential statistics, regression analysis was conducted. The protocol for this study was submitted for ethical clearance to the Bowen University Teaching Hospital Health Research Ethical Committee with registration number: NHREC/12/04/2012 and the approval number: BUTH/REC-1133.

RESULTS

Workplace Ergonomics

Measures of workplace ergonomics considered in this study were investigated to reveal their state. Table 1 shows the state of each.

Based on the results presented in Table 1, the office settings were rated fair with the mean score 2.398. This affirmed that work settings in Nigerian public universities need improvement. Likewise, furniture was rated average with mean score of 2.928. By this, the state of office furniture in public universities is not satisfactory. On working tools, the mean score is 2.508, that is also fair while work design was found to be average with the mean score 3.229. The range of the measures of workplace ergonomics is between average and fair in this study.

Table 1. Workplace Ergonomics

Items	Mean	Standard Deviation
Office settings	2.398	1.3970
Furniture	2.928	1.3391
Working tools	2.508	1.1403
Work design	3.299	1.4765

Source: Processed Data Output (2024)

Work Design as a Risk Factor in Ergonomics

Poor design of tasks, equipment, and workstations may result in work design emerging as a significant risk factor in ergonomics. What normally occurs in poorly designed workstations is forcing employees to assume unnatural postures, repeat certain motions continuously, or apply unwarranted forces; this subject muscles, tendons, and joints to unwarranted stress. Activities involving long periods of sitting or standing, reaching overhead, or bending in an awkward position can eventually precipitate fatigue and injury. Repetitive tasks with insufficient breaks or variation of movement will strain particular muscle groups and increase the risk of WMSDs. Workstations not adapted to the dimensions of the worker's body - desk height, chair support, placement of tools - can lead to chronic pain or injury in employees. In this respect, good work design proposes a series of ergonomic principles which minimize risks and make the place of work healthier, safer and more productive.

Work-related Musculoskeletal Disorders as Determinant of Staff Healthy Living

Feedback on work-related musculoskeletal disorder were as follows (Table 2): back pains was 3.515 which depicts frequent. This implies that respondents frequently experienced back pains.

On muscular pains, the mean score is 2.477; which represents infrequent. By implication, muscular pains were not really experienced by the respondents. Similarly, fracture with the mean outcome of 2.174 represents infrequent too. This is also not frequently experienced. Whereas, neck injuries with the mean of 2.705 implies indifferent. By implication, the respondents were not sure if neck injuries were from work-related activities or not. As there are other reasons like sleep positions that can lead to neck injuries. On eyes dysfunctionality, the mean score was 3.413 which represents frequent. This suggests that the majority of the respondents' activities has to do with the use of computer system which might be telling on their eyes functionality. Furthermore, respondents' hand-arm vibration mean score was 3.307 which depicts indifferent. Respondents were not sure of this as they work in the universities. Lastly, bruises mean score 2.583 represents infrequent. Therefore, it is established that respondents rarely had bruises from work-related activities.

Table 2. Work-Related Musculoskeletal Disorder and Staff Healthy Living Yardsticks

Items	Mean	Standard Deviation
Back pains	3.515	1.2051
Muscular pains	2.477	1.3166
Fracture	2.174	1.2052
Neck injuries	2.705	1.4708
Eyes dysfunctionality	3.413	.9750
Hand-arm vibration	3.307	1.1927
Bruises	2.583	1.3540

Source: Processed Data Output (2024)

Test of Hypotheses

Two null hypotheses were derived from the literature reviewed and are stated as follow:

$H0_1$: There is no significant relationship between work-related musculoskeletal disorders caused by defective workplace ergonomics and non-teaching staff healthy living

$H0_2$: All the seven selected work-related musculoskeletal disorders do not contribute to non-teaching staff healthy living

The first hypothesis of the study assessed the relationship between work-related musculoskeletal disorders caused by defective workplace ergonomics and non-teaching staff healthy living.

The results in Table 3(a) show that work-related musculoskeletal disorders via defective workplace ergonomics had significant influence on non-teaching staff healthy living and explained 51% of the variation (R2=.051). This implies that 51% variation in non-teaching staff healthy living is explained by work-related musculoskeletal disorders via defective workplace ergonomics. Table 3(b) reveals the standardized regression coefficient (β) value of work-related musculoskeletal disorders via defective workplace ergonomics which was β=.044 which was highly statistically significant. The hypothesis that there is no significant relationship between work-related musculoskeletal disorders

Table 3a. Work-related musculoskeletal disorders via workplace ergonomics and non-teaching staff healthy living

R	R Square	F	Sig
.227a	.051	1.979	.000

Source: Processed Data Output (2024)

caused by defective workplace ergonomics and non-teaching staff healthy living does not hold.

The second hypothesis assumed that the seven selected work-related musculoskeletal disorders via defective workplace ergonomics (back pains, muscular pains, fracture, neck injuries, eyes dysfunctionality, hand-arm vibration, and bruises) contribute to non-teaching staff healthy living.

Results in Table 4 revealed that measures of work-related musculoskeletal disorders via defective workplace ergonomics explain variation in non-teaching staff healthy living. The results show that 40% of the variation in non-teaching staff healthy living was explained by back pains. When muscular was added there was an R2 change of 0.000. However, when fracture was added, there was a minimal R2 change of only 0.006. This suggests that 80% of the variation in non-teaching staff healthy living can be explained by muscular pains and fracture. When neck injury was included, there was an increase of R2 of 0 when introduced, 000. However, when the variable of eye dysfunctionality was incorporated, the minimal R2 remains 0. 000. This implies that unhealthy living standard percent or 7.015 among non-teaching staff can be attributed to eye dysfunction as well as neck injuries. When hand-arm vibration was added there was an R2 change of 0.001 and remains 0.001 when bruises were added also, the value 000 appears again hence appreciating the work done to enhance the software multi-language capabilities. This means 35% of the variation in non-teaching staff healthy living can be attributed to either hard-arm vibration or bruise.

Table 3b. Regression results for the relationship between work-related musculoskeletal disorders via defective workplace ergonomics and non-teaching staff healthy living

R	R Square	F	Sig
.227a	.051	1.979	.000

Predictors: (Constant): Work-related musculoskeletal disorders via defective workplace ergonomics
Dependent Variable: Non-teaching staff healthy living
Source: Processed Data Output (2024)

DISCUSSION

This study established that WMSDs, which result from defective workplace ergonomics, largely affect the healthy living of non-teaching staff. The measures for WMSDs in terms of back pains resulting from defective ergonomic conditions showed significant differences in their effects on the health of non-teaching staff. This is supported by recent studies including (Kader Jilani *et al*., 2020; Abdulmujeeb *et al*., 2023; Ilmidin, Situmeang and Sarasnita, 2023; Saptiansyah, Haqi and Juwono, 2023). These studies put much emphasis on the fact that WMSDs, in particular back pains, are common among non-teaching employees of the institution, hence requiring work ergonomics.

It is through these studies that back pain was associated with prolonged sitting, incorrect seating positions, and the repeat strains involved in various office tasks. Budhwar *et al*. (2023) have shown that improper ergonomic set ups may leave a person with chronic cases of back pain that eventually

Table 4. Regression Test Result

Model	R	R2	Adjusted R2	Std Error of the Estimate	Change Statistics				
					R 2 Change	F Change	Df1	Df2	Sig F Change
Back pains	.040a	.002	-.002	1.3985	.002	.429	1	262	.513
Muscular pains	.017a	.000	-.004	1.3994	.000	.074	1	262	.786
Fracture	.080a	.006	.003	1.3952	.006	1.675	1	262	.197
Neck injuries	.017a	.000	-.004	1.3994	.000	.073	1	262	.787
Eyes Dysfunctionality	.007a	.000	-.004	1.3996	.000	.011	1	262	.915
Hand-arm vibration	.023a	.001	-.003	1.3992	.001	.142	1	262	.706
Bruises	.035a	.001	-.003	1.3988	.001	.315	1	262	.575

Dependent variable: Non-teaching staff healthy living
Source: Processed Data Output (2024)

affect his quality of life and even his productivity to a large extent. Budhwar *et al*. (2023) indicated that ergonomic interventions, including adjustable chairs and desks, can significantly reduce back pain incidence among office workers. Thoti and Saufi (2016) pointed out on the need for ergonomic training in provision of information to staff on how to maintain proper posture as well as adjustment of workstation to avoid straining of the backs. Wissemann *et al*. (2022) supported these conclusions with an example that frequent workplace ergonomic assessment and alteration generally reduced back pain and improved the workers' health in the hospital setting. Specifically, the researchers of the study found that back pain was the major determinant for non-teaching staff to live a healthy lifestyle at the university, which had very serious consequences on daily activities and long-term health. The finding agrees with prior research conducted by Wissemann *et al*. (2022) and Saptiansyah, Haqi and Juwono (2023) which also acknowledged that ergonomic improvements are important to the alleviation of back pain. The contradiction raise is due to the studies that diminish the contribution of ergonomics to back pains; this calls for further research and intervention into the field.

The study also finds that muscular pain contributes a little to the health living of non-teaching staff. This indicates that a small amount of muscular pain has an effect on the general health and well-being of the subjects. Several researchers have also done work to this end. For example, Smithson (2021) revealed that even mild muscular pain is able to reduce young office workers' productivity and quality of life. Equally, Berhanu, Gebrehiwot and Gizaw (2019) explained how minor muscular discomfort may add up over some time to cause serious health problems if not properly handled. Basically, this means that even mild muscular pains should be dealt with to ensure the healthy well-being and working conditions of non-teaching staff. This is contrary to the view of some studies that would under-declare the contribution of muscular pain to impairment in health. For example, Cooke, Dickmann and Parry (2022) claimed that having occasional muscular discomfort was no big deal and thus does not substantially affect health outcomes. Also, Zoellner and Sulikova (2022), postulated that the resultant effect of muscular pains on health is almost at a minimal compared to other causes. These studies indicate a more complex relationship between muscular pain and health outcomes among non-teaching staff, which warrants further study to understand the full set of implications for health and well-being.

Additionally, universities should increase productivity through specific ergonomic interventions, such as workstations adjustment to suit the physical demands of staff at work, use of an ergonomic chair, desk, and computer, and break the employee out from continuous responsibilities which have some strains that lead to discomfort. More significantly, providing training on proper posture, lifting techniques, and adjustment of workstations makes an employee capable of taking responsibility for their body comfortability. This can be achieved by the university through the creation of a healthier work environment by making ergonomic improvements that minimize absenteeism, improve performance, generally enhance job satisfaction, and hence increase productivity, providing a better working experience for the non-teaching staff.

Furthermore, the non-teaching staff in Nigerian universities reported that fractures are rarely encountered and their contribution to unhealthy living is therefore minimal. This finding agrees with that of Chopra, Sahoo and Patel (2023) which proved that fractures were relatively rare amongst office workers and therefore did not significantly influence the workers' lives in relation to health matters. The study by Berhan (2020) also confirmed this, stating that the population under study had an extremely low fracture prevalence that did not make any effective difference in their quality of health. Therefore, it means that, at least for non-teaching staff, this kind of trauma due to fractured bones becomes an uncommon problem; even in isolated cases, it is not likely to involve much concern for health. This contradicts, however, the findings by some studies that viewed that fractures inflict a more significant impact on the health of the non-teaching staff. Findings from Emsley *et al*. (2022) showed that even the rare incidents of factures led to reduced health status and diminished quality of life. It was further suggested by Fang Lee Cooke, Dickmann and Parry (2022) that, though rare, the occurrence of fractures is serious and needs to be taken seriously regarding the consequences on general health. The divergent views indicate that the effect of fractures on the health of non-teaching staff may be contextual and therefore calls for further exploration. Secondly, neck injuries were indicated to be a rare case amongst the respondents in this study and, therefore, give further evidence that they

are not common incidence among non-teaching staff. It agrees with the finding of Dede and Oluoch (2021) who also reported a low prevalence of neck injury in office workers. It, however, disagrees with the works of Abdul *et al*. (2020) who reportedly had a higher prevalence of neck injury in their study population. The implication is that further studies to determine the prevalence and burden of neck pain among non-teaching staff in Nigerian universities are necessary.

This means that, among the non-teaching staff, there was a high rate of incidence of eye malfunction, which can sufficiently indicate the origin of their unhealthiness from this problem. This confirms the results of Figueroa *et al*. (2019), who reported a strong association of workplace factors with the eyes' dysfunctionality for office workers. The study by Berhanu, Gebrehiwot and Gizaw (2019) supported this notion by pointing out that exposure to computer screens for a long time and insufficient lighting is what caused the eye problems in staff. A number of these studies identify the need to address the ergonomic factors as a way to forestall eye dysfunctionality among nonteaching staff. On the contrary, a number of positions mediated that eye dysfunctionality was not a key concern for staff. Low hand-arm vibration, as found among the respondents in this study, is not an issue when one considers healthy living for non-teaching staff in Nigerian universities. It fulfills findings where Cooke, Dickmann and Parry (2022), reported low levels of hand-arm vibration among office workers. This is, however, contrary to the submission of Brolin, Lanner and Halldin (2021) which opined that even low levels of hand-arm vibration can cause negative health effects. Bruises amongst the respondents were found to be very rare, indicating that they are not a serious problem amongst the non-teaching staff in Nigerian universities. This is, therefore, in line with the research by Akparopue, Omotayo and Ajala (2021) where it was reported that there were very few cases of bruise conditions among office workers. It, however, contrasts with Brolin, Lanner and Halldin (2021) who reported a higher prevalence among their study population. This further underscores the fact that more studies are needed to establish up to date prevalence and effect of bruises on the health of non-teaching staff.

CONCLUSIONS

Staff healthy living has been discussed to be highly dependent on the state of workplace ergonomics. This study is a shift from what most studies have concentrated on such as individual lifestyle, diet, behavior, and hereditary, among others which they reported to have been responsible for deteriorated health status of many employees without looking into office settings, furniture, working tools, and work design. Therefore, the human factor when it comes to man-machine relationship at work, furniture to be used by employees, office settings, and work design must be considered from organization inception and be reviewed from time to time to preserve employees' health. It is important to note that frequent incidences of work-related musculoskeletal disorders such as back pains, fracture, neck injuries, eye dysfunctionality, muscular pains, bruises, and hand-arm vibration among employees will negatively affect university performance. As such, this must be guided against.

CONFLICT OF INTEREST

There is no conflict of interest as regard this research.

AUTHOR CONTRIBUTION

*AJ is the lead researcher as he coordinated the research cluster. He wrote the introduction and prepared the full manuscript upon research completion.

*DJ carried out the statistical analysis and interpreted it.

*OO led the design of research methods and coordinated data gathering.

*A'M assisted on data collection and interpretation.

* O-OI worked on discussion of results and conclusion.

*OO read through the manuscript and edited it.

ACKNOWLEDGMENTS

The authors acknowledged all cited literature in this work and thank all the respondents that participated in the study.

REFERENCES

Abdul, H. *et al*. (2020) 'Industrial Hazards and Safety Management in Pharmaceutical Industry', *International Journal of Applied Research*, 6(5), pp. 01–07.

Abdulmujeeb, A. *et al*. (2023) 'Risk Factors for Work-related Musculoskeletal Disorders among Sugar Factory Workers in Jinja, Eastern Uganda: A Cross-sectional Study', *The Indonesian Journal of Occupational Safety and Health*, 12(1), pp. 156–166. doi: https://doi.org/10.20473/ijosh.v12i1.2023.156-166

Ahmad, S. A. *et al*. (2022) 'Musculoskeletal Disorders and Ergonomic Factors among the Cabin Crews of the National Airline of Bangladesh', *The Indonesian Journal of Occupational Safety and Health*, 11(2), pp. 161–167. doi: https://doi.org/10.20473/ijosh.v11i2.2022.161-167

Akparopue, S., Omotayo, O. A.-R. and Ajala, A. A. (2021) 'Occupational Health and Safety Practices and Public Sector Commitment of Lagos State, Nigeria', *International Journal of development and Mangement Review (INJODEMAR)*, 16(1), pp. 59–74.

Arif Maspul, K. (2023) 'A Harmonious Symphony of Fourth-Wave Coffee Culture: How The Relationship Between Coffee and Local Wisdom Contributes to Sustainability and Ethical Practices in Community', *Jurnal Ilmiah Multidisiplin*, 2(5), pp. 1896–1922.

Aulianingrum, P. and Hendra, H. (2022) 'Risk Factors of Musculoskeletal Disorders in Office Workers', *The Indonesian Journal of Occupational Safety and Health*, 11(1), pp. 68–77.

Ayub, Y. and Shah, Z. A. (2018) 'Assessment of Work Related Musculoskeletal Disorders in Manufacturing Industry', *Journal of Ergonomics*, 08(03). doi: 10.4172/2165-7556.1000233

Berhan, E. (2020) 'Prevalence of Occupational Accident; and Injuries and their Associated Factors in Iron, Steel and Metal Manufacturing Industries in Addis Ababa', *Cogent Engineering*, 7(1). doi: 10.1080/23311916.2020.1723211

Berhanu, F., Gebrehiwot, M. and Gizaw, Z. (2019) 'Workplace Injury and Associated Factors among Construction Workers in Gondar Town, Northwest Ethiopia', *BMC Musculoskeletal Disorders*, 20(1), pp. 1–9. doi: 10.1186/s12891-019-2917-1

Brandi, C. *et al*. (2024) 'Comparing Risk Assessment Methods for Work-related Musculoskeletal Disorders with in Vivo Joint Loads during Manual Materials Handling', *Scientific Reports*, 14(1), pp. 1–11. doi: https://doi.org/10.1038/s41598-024-56580-7

Brolin, K., Lanner, D. and Halldin, P. (2021) 'Work-related Traumatic Brain Injury in the Construction Industry in Sweden and Germany', *Safety Science*, 136, p. 105147. doi: 10.1016/j.ssci.2020.105147

Budhwar, P. *et al*. (2023) 'Human Resource Management in the Age of Generative Artificial Intelligence: Perspectives and Research Directions on ChatGPT', *Human Resource Management Journal*, 33(3), pp. 606–659. doi: 10.1111/1748-8583.12524

Chopra, A., Sahoo, C. K. and Patel, G. (2023) 'Exploring the Relationship between Employer Branding and Talent Retention: The Mediation Effect of Employee Engagement', *International Journal of Organizational Analysis*, 32(4), pp. 702–720, doi: 10.1108/IJOA-02-2023-3638

Cooke, F. L, Dickmann, M. and Parry, E. (2022) 'Building Sustainable Societies through Human-Centred Human Resource Management: Emerging Issues and Research Opportunities', *International Journal of Human Resource Management*, 33(1), pp. 1–15. doi: https://doi.org/10.1080/09585192.2021.2021732

Cooke, Fang Lee, Dickmann, M. and Parry, E. (2022) 'Building Sustainable Societies through Human-centred Human Resource Management: Emerging Issues and Research Opportunities', *International Journal of Human Resource Management*, 33(1), pp. 1–15. doi: 10.1080/09585192.2021.2021732

Dede, J. A. and Oluoch, M. (2021) 'A Synposis of Training, Employee Retention and Performance', *Global Journal of Human Resource Management*, 9(2), pp. 73–85.

Emsley, E. *et al*. (2022) 'Trauma-informed Care in the UK: Where are We? A Qualitative Study of Health Policies and Professional Perspectives', *BMC Health Services Research*, 22(1), pp. 1–12. doi: 10.1186/s12913-022-08461-w

Faez, E. *et al*. (2021) 'An Assessment of Ergonomics Climate and its Association with Self-reported Pain, Organizational Performance and Employee Well-Being', *International Journal of Environmental Research & Public Health*, 18, p. 2610. doi: https://doi.org/10.3390/ijerph18052610

Farrants, K. *et al*. (2023) 'Health and Morbidity among People in Paid Work after 64 Years of Age: A Systematic Review', *Social Sciences & Humanities Open*, 8, p. 100571. doi: https://doi.org/10.1016/j.ssaho.2023.100571

Hoffmeister, K. *et al*. (2015) 'Ergonomics Climate Assessment: A Measure of Operational Performance and Employee Well-Being', *Applied*

Ergonomics, 50, pp. 160–169. doi: https://doi.org/10.1016/j.apergo.2015.03.011

Hossan, D., Dato' Mansor, Z. and Jaharuddin, N. S. (2023) 'Research Population and Sampling in Quantitative Study', *International Journal of Business and Technopreneurship (IJBT)*, 13(3), pp. 209–222. doi: 10.58915/ijbt.v13i3.263

Ilmidin, I., Situmeang, I. F. and Sarasnita, N. (2023) 'The Prevalence and Risk Factors of Low Back Pain among Healthcare Workers in Asia', *The Indonesian Journal of Occupational Safety and Health*, 12(3), pp. 449–456. doi: https://doi.org/10.20473/ijosh.v12i3.2023.449-456

Kader Jilani, M. M. A. *et al*. (2020) 'The Influence of Knowledge Sharing on Sustainable Performance: A Moderated Mediation Study', *Sustainability (Switzerland)*, 12(3). doi: 10.3390/su12030908

Kumar, K. (2017) 'Importance of Healthy Lifestyle in Healthy Living', *Juniper Online Journal of Public Health*, 2(5), pp. 1–3.

Lakens, D. (2022) 'Sample Size Justification', *Collabra: Psychology*, 8(1), pp. 1–31. doi: 10.1525/collabra.33267

Marková, P. and Škurková, K. L. (2023) 'The Impact of Ergonomics on Quality of Life in the Workplace', *Sciendo*, 5(11), pp. 121-129.

Marras, W. S. and Karwowski, W. (2023) 'Managing Low-back Disorder Risk in the Workplace', In Salvendy, G. and Karwoski, W. (eds.), *Handbook of Human Factors and Ergonomics*, 5th ed. .Wiley.

Pratiwi, D., Haqi, D. N. and Dwicahyo, H. B. (2022) 'Implementation of Occupational Health and Safety Standards for Office Buildings in Universitas Airlangga Rectorate Building', *The Indonesian Journal of Occupational Safety and Health*, 11(2), pp. 224–238. doi: https://doi.org/10.20473/ijosh.v11i2.2022.224-238

Reiman, A. *et al*. (2021) 'Human Factors and Ergonomics in Manufacturing in the Industry 4.0 Context – A Scoping Review', *Technology in Society*, 65(C). doi: https://doi.org/10.1016/j.techsoc.2021.101572

Sahito, W. S., Bazuhair, R. W. and Mimesh, H. (2022) 'Workstation Evaluation Regarding Ergonomic Awareness and Work-Related Musculoskeletal Disorders Among Coal Mine Workers', *Engineering, Technology and Applied Science Research*, 12(2), pp. 8284–8288. doi: 10.48084/etasr.4668

Saptiansyah, R., Haqi, D. N. and Juwono, K. F. (2023) 'Proposed Workstation Design in Laboratory for Musculoskeletal Disorder Complaints', *The Indonesian Journal of Occupational Safety and Health*, 11(3), pp. 382–390. doi: . https://doi.org/10.20473/ijosh.v12i3.2023.382-390

Smithson, D. (2021) 'Effective Leadership, Management and Supervision in Health and Social Care (3rd ed.)', *Aotearoa New Zealand Social Work*, 33(2), pp. 123–124. doi: 10.11157/anzswj-vol33iss2id876

Thoti, K. K. and Saufi, R. B. A. (2016) 'Empirical Study on Work Life Integration Practices in Electronic Industry', *International Journal of Research in Economics and social sciences (IJRESS)*, 6(11), pp. 275–284.

Wissemann, A. K. *et al*. (2022) 'Strategic Guidance and Technological Solutions for Human Resources Management to Sustain an Aging Workforce: Review of International Standards, Research, and Use Cases', *JMIR Human Factors*, 9(3), pp. 1–18. doi: 10.2196/27250

Yudisianto, I., Tualeka, A. R. and Widajati, N. (2021) 'Correlation between Individual Characteristics and Work Position with Work Fatigue on Workers', *The Indonesian Journal of Occupational Safety and Health*, 10(3), pp. 350–360. doi: https://doi.org/10.20473/ijosh.v10i3.2021.350-360

Zoellner, K. and Sulikova, R. (2022) 'Enhancing Employees' Motivation Amid the Crisis of COVID-19', *Journal of Human Resources Management Research*, 20(22), pp. 1–25. doi: https://doi.org/10.5171/2022.486239