Health Scope. 2025 August; 14(3): e161682 https://doi.org/10.5812/healthscope-161682

Published Online: 2025 July 14 **Brief Report**

Ergonomic Risk Factors in University-Level Teachers in Sonora, Mexico: Towards a Sustainable Environment

Nancy Esmeralda Sánchez Duarte [1], Hugo César De La Torre Valdéz [1], Daniel Morales Romero [1], Mabeth Burgos Hernandez [1], Judith Valeria Martínez Acosta [1], Maribel Pallanez Murrieta [1,*]

[1] Universidad Estatal de Sonora, Sonora, Mexico

[*] ***Corresponding Author:*** Universidad Estatal de Sonora, Sonora, Mexico. Email: maribel.pallanez@ues.mx

Received: 29 April, 2025; **Revised:** 15 June, 2025; **Accepted:** 22 June, 2025

Abstract

Background: A sustainable environment plays a crucial role in mitigating musculoskeletal disorders, visual fatigue, stress, and exhaustion. Consequently, it enhances productivity and promotes greater work efficiency, contributing to workers' overall well-being. While ergonomic risk studies are widely documented in the literature, most focus on the industrial sector, with limited ergonomic assessments available in the educational sector.

Objectives: Evaluate ergonomic risk factors among teachers to foster a sustainable environment.

Methods: A quantitative study employed an observational, cross-sectional design to measure the ergonomic risk between April and June 2023. The Rapid Office Strain Assessment (ROSA) method was employed using the ERGONIZA software to assess full-time professors (FTP) in a university in Sonora, Mexico, through a statistically representative survey applied with 92% reliability and a maximum allowed error (α) of 0.08.

Results: The results indicated that out of 158 FTP, 48.7% are at very high risk, 23.1% at high risk, and 28.2% at improvable risk.

Conclusions: A sustainable environment contributes to improving worker well-being, combating absenteeism and medical costs, increasing productivity, and, therefore, leading to greater work efficiency. The ROSA method does not consider some parameters like environmental elements (lighting and temperature).

Keywords: Health, Occupational Hazards, Sustainability and Workplace

1. Background

There is a correlation between worker health and productivity and natural resource management; therefore, it is necessary to pioneer sustainable environmental practices that increase productivity and reduce natural resource consumption (1). There is an increasing body of literature devoted to the study of ergonomics and musculoskeletal disorders, which indicates the growing problem this topic represents in various fields (2, 3). Hence, the importance of conducting sufficient analysis to assess the ergonomic risk to which teachers are exposed in their academic activities and propose mitigation measures.

Several methods for determining ergonomic risk were explored [LEST, RULA, REBA, and Rapid Office Strain Assessment (ROSA)]. The ROSA method was selected because it offers a rapid assessment with urgent action steps if necessary. It is applicable to jobs where the worker sits in a chair, at a desk, and operates a computer with a screen. These activities are closely related to the academic practices that faculty implement in their work. Furthermore, the ROSA method has been used to assess ergonomic risk among faculty (4, 5). Likewise, the ERGONIZA software is a tool that helps identify ergonomic risks present in the workplace (4).

2. Objectives

How to Cite: Sánchez Duarte N E, De La Torre Valdéz H C, Morales Romero D, Burgos Hernandez M, Martínez Acosta J V, et al. Ergonomic Risk Factors in University-Level Teachers in Sonora, Mexico: Towards a Sustainable Environment. Health Scope. 2025; 14 (3): e161682. https://doi.org/10.5812/healthscope-161682.

Evaluate ergonomic risk factors among teachers to foster a sustainable environment.

3. Methods

3.1. Study Design

A quantitative study employed an observational, cross-sectional design to measure the ergonomic risk of full-time professors (FTP) at the Sonora State University, Hermosillo Campus. Data were collected through surveys in their workspaces, direct observational logs, and with the support of the ROSA method.

3.2. Participants and Sampling

The target population for this study comprised all 158 FTP assigned to the Sonora State University, Campus Hermosillo. Thus, a statistically representative survey was applied with 92% reliability and a maximum allowed error (α) of 0.08. The calculation resulted in a required sample of 76 FTPs. Participant recruitment and data collection for the FTPs occurred between April and June 2023.

Inclusion criteria: (A) be a full-time professor (PTP) in one of the programs at the Sonora State University, Hermosillo Campus; (B) be present during the evaluation and ergonomic assessment; (C) have a workspace (cubicle) to perform their duties; (D) allow direct observation in their workspace to generate reports and apply the ROSA method; There were no specific exclusion criteria beyond not meeting the outlined inclusion criteria. All selected participants provided informed consent prior to data collection.

3.3. Measures and Data Analysis

Once the data on ergonomic risks was collected, the ERGONIZA software was applied for analysis. The data obtained from the surveys was automatically compiled into a Google spreadsheet linked to the form.

4. Results

4.1. Survey Results

Teachers spend an average of 4 hours a day in front of the computer during their workday, and 75.3% of them report that the breaks they take are involuntary or unconscious, as they use them to satisfy their physiological needs. Break times range from 5 to 15 minutes, although the majority (64.5%) report taking breaks of 5 to 10 minutes, while 24.7% of teachers surveyed stated they do not take breaks during their workday. Considering the importance of the type of chair in measuring ergonomic risk, teachers were asked about the seat they use. The responses show that 67.9% of teachers use swivel chairs and 32.1% sit in fixed chairs.

4.2. Results of the Rapid Office Strain Assessment Method

To evaluate the chair, screen, and peripheral elements referred to above, the ROSA method uses a weighting between 1 and 10 that measures the level of risk. Number 1 corresponds to negligible risk, while numbers 9 - 10 indicate extreme risk.

4.3. Chair Results

The chair analysis corresponds to reviewing the seat, armrest, and backrest data. After analyzing the information collected, the risk intervals were determined. We found that 43.6% of FTPs are at a risk level of 2, 3, and 4. There were 24.4% of FTPs at risk level 5, and finally, 32.1% of FTPs at levels 6, 7, and 8.

4.4. Screen and Peripheral Results

The general risk level is weighed according to the data collected with the application of the ROSA method. We found that 51.28% of the FTPs are at risk levels 2, 3, and 4; there is 24.36% at risk level 5; and finally, 23.08% at risk levels 6, 7, and 8.

The study suggests that 71.8% of the FTPs at Sonora State University, Campus Hermosillo, are at a high or very high level of ergonomic risk (Table 1). Therefore, strategies that improve the conditions for academic desk work are required.

Table 1. Data on the Different Risk Levels Was Obtained from the Rapid Office Strain Assessment Method — from My Own Source

Level Risk	FTPs Corresponding to the Sample (%)	Risk	Actions
1	28.2	Improvable	Some elements of the position can be improved.
2	23.1	High	Action is necessary.
3	48.7	Very high	Action is necessary as soon as possible.

Abbreviation: FTP, full-time professors.

5. Discussion

The education sector is not exempt from ergonomic risks, and teachers face challenges during their activities (6). Among the main causes of musculoskeletal disorders are inadequate and sustained posture for too long and repetitive work (5). The results obtained by the ERGONIZA software with the ROSA method align with the perception of teachers obtained through the survey. While 73.1% of FTPs assume that they do not maintain an adequate posture when working, the application of the ROSA method estimated that 71.8% of teachers are at high and very high risk.

The available evidence indicates that teachers who teach online and telework frequently experience musculoskeletal disorders (7, 8). This is consistent with our study, as 76.9% of teachers have experienced back, shoulder, or neck pain in the past six months. Some studies measuring work-related musculoskeletal disorders and ergonomic risk factors in special education teachers and students indicate that 86% of those evaluated have musculoskeletal disorders, a higher percentage than the one found in this study (8).

Providing adequate facilities for academic practice is essential for positively impacting workers, improving productivity, health, and creating a sustainable environment (6, 7, 9). The above contributes to improving worker well-being, combating absenteeism and medical expenses, increasing productivity, and, therefore, greater work efficiency, while reducing the use of natural resources.

Footnotes

Authors' Contribution: The study concept and design and critical revision of the manuscript for important intellectual content: N. E. S. D.; Analysis and interpretation of data and study supervision: M. P. M. and D. M. R.; Drafting the manuscript: J. V. M. A.; Statistical analysis: H. C. V.; Administrative, technical, and material support: M. B. H.

Conflict of Interests Statement: The authors declare no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after its publication.

Funding/Support: The present study received no funding/support.

Informed Consent: Written informed consent was obtained.

References

1. Hardt L, Barrett J, Taylor PG, Foxon TJ. Structural Change for a Post-Growth Economy: Investigating the Relationship between Embodied Energy Intensity and Labour Productivity. *Sustainability*. 2020;**12**(3). https://doi.org/10.3390/su12030962.
2. Sabino I, Fernandes MDC, Cepeda C, Quaresma C, Gamboa H, Nunes IL, et al. Application of wearable technology for the ergonomic risk assessment of healthcare professionals: A systematic literature review. *International Journal of Industrial Ergonomics*. 2024;**100**. https://doi.org/10.1016/j.ergon.2024.103570.
3. Bevan S. Economic impact of musculoskeletal disorders (MSDs) on work in Europe. *Best Pract Res Clin Rheumatol*. 2015;**29**(3):356-73. [PubMed ID: 26612235]. https://doi.org/10.1016/j.berh.2015.08.002.
4. Diego-Mas JA. Evaluación de puestos de oficina mediante el método ROSA. *Ergonautas, Universidad Politécnica de Valencia*. 2019.
5. Gumasing MJJ, Sanchez AA. Ergonomic Risk Assessment of Factors Affecting Musculoskeletal Disorder of Engineering Students During Online Setup. *Industrial Engineering and Applications*. 2023. https://doi.org/10.3233/atde230079.
6. Jeffree MS, Abdul Rahim AA, Daud DMA, Pang N, Sazali MF, Sudi S, et al. Predictors of musculoskeletal disorders among special education teachers in Sabah, Malaysia. *Heliyon*. 2024;**10**(10). e30873. [PubMed ID: 38826737]. [PubMed Central ID: PMC11141249]. https://doi.org/10.1016/j.heliyon.2024.e30873.
7. Borbor AMC, Villamarín SMG, Moncayo JCN, Moreta JFA. Ergonomía en docente universitario durante la pandemia generada por la COVID-19. *Revista Conrado*. 2021;**17**(S3):139-45.
8. Chan VCH, Ross GB, Clouthier AL, Fischer SL, Graham RB. The role of machine learning in the primary prevention of work-related musculoskeletal disorders: A scoping review. *Appl Ergon*. 2022;**98**:103574. [PubMed ID: 34547578]. https://doi.org/10.1016/j.apergo.2021.103574.
9. Daniel Celis-Gurmendi R, Morelia Figueroa Nole F, Carlos Quiroz-Flores J. An Analysis of Ergonomic Risks of Undergraduate Students During Virtual Education in the wake of the COVID-19 Pandemic: A Prospective Review. *Proceedings of the International Conference on Industrial Engineering and Operations Management*. 2023.