

Assessing health and safety compliance and risk conditions in higher education buildings: A mixed-methods case study of a public university in the Free State, South Africa

Mojabeng Vinolia Mokgobo¹, France Raphela² and Rotondwa Nemakhavhani³

¹Department of Life Sciences, Faculty of Health and Environmental Sciences, Central University of Technology, Free State, South Africa

²Department of Clinical Sciences, Faculty of Health and Environmental Sciences, Central University of Technology, Free State

³Department of Built Environment, Central University of Technology, Free State, South Africa

DOI: 10.36108/cbpm/2026.0136

Abstract

Purpose: This study aims to assess health and safety compliance and risk conditions within buildings at a public higher education institution in the Free State Province, South Africa. Universities represent complex built environments where inadequate health and safety management can negatively affect user wellbeing, institutional performance, and regulatory compliance.

Design: A descriptive cross-sectional research design adopting a mixed-methods approach was employed to assess health and safety conditions within university buildings at a specific point in time. The mixed-methods approach integrated quantitative questionnaire surveys, qualitative semi-structured interviews, and building inspection checklists to obtain both numerical and experiential data. Semi-structured interviews were conducted with four purposively selected health and safety professionals to identify regulatory requirements, management practices, and key risk areas. Furthermore, completed questionnaires were obtained from 372 students and 235 staff members to assess perceptions of health and safety conditions within university buildings. A checklist was also used to evaluate building safety conditions.

Research Limitations and Implications: The study focuses on a single institution, which may limit generalisability. However, the findings provide context-specific insights applicable to similar public higher education institutions in South Africa.

Findings: The findings showed that while formal health and safety systems exist, their implementation across buildings is inconsistent. Key occupational hazards included blocked emergency exits, inadequate fire safety measures, poor ventilation, insufficient lighting, and ageing infrastructure. Non-compliance was associated with limited safety awareness, delayed maintenance, and weak monitoring, while management commitment supported better compliance. Existing control measures were present but inconsistently applied, reducing their effectiveness and resulting in uneven health and safety compliance across buildings.

Practical Implications: The study proposes evidence-based recommendations to strengthen health and safety management systems, enhance compliance monitoring, and support risk-informed decision-making in higher education facilities.

Keywords: Facilities governance, Institutional resilience, Occupant safety, Regulatory compliance, Risk prioritisation.

1. Introduction

Higher education institutions operate within complex environments that can handle a higher capacity of students, staff, and visitors, and they are mostly old and highly occupied structures. Becher and Kogan (2025) assert that the high capacity of the occupants presents a high risk of health and safety, which includes structural risks, fire hazards, inadequate maintenance, overcrowding, and insufficient emergency preparedness. Savolainen (2023) further indicates that these facilities accommodate large

populations of students, staff, and visitors and therefore require effective health and safety management to ensure safe learning and working environments.

In South Africa, institutions are legally required to maintain safe working environments through compliance with occupational health and safety legislation. The Occupational Health and Safety Act (Act 85 of 1993) of South Africa requires employers to provide and maintain working conditions that are safe and without risk to the health of employees and other occupants (Republic of South Africa, 1993). In

¹ Corresponding Author

Email address: vmokgobo@cut.ac.za

addition, the National Building Regulations and Building Standards Act (Act 103 of 1977) establishes requirements related to building safety, including ventilation, lighting, fire protection, and structural integrity (Republic of South Africa, 1977). Kovalenko *et al.* (2021) argue that despite the existence of these legislative frameworks, several higher education institutions face challenges in achieving consistent health and safety compliance within institutional buildings. Previous studies have shown that ageing infrastructure, inadequate maintenance practices, and fragmented organisational responsibilities contribute to safety deficiencies within university facilities (Loosemore *et al.*, 2019).

University buildings present a wide range of potential hazards due to their diverse functions. These hazards may include slips, trips, and falls, electrical hazards, fire risks, poor ventilation, and inadequate lighting (Kong *et al.*, 2013). If these hazards are not effectively managed, they may compromise the safety and well-being of building occupants and negatively affect the quality of learning environments (Almaskati *et al.*, 2024). This study, therefore, assesses health and safety compliance and risk conditions within buildings at a public higher education institution in the Free State Province of South Africa. The study evaluates the current state of safety conditions, identifies hazards within institutional buildings, and examines factors influencing compliance with occupational health and safety standards.

2. Literature Review

Health and safety compliance in higher education learning buildings is critical, especially when supported by a well-structured health and safety management system and institutional leadership commitment (Mtikitiki *et al.*, 2025). Universities that integrate safety into the governance structures demonstrate higher health and safety compliance because they are enforced and formalized rather than seen as voluntary. Higher education institutions with strong health and safety regulations, policies, responsibilities, and accountabilities are at the forefront of compliance. According to ISO 45001:2018, leadership commitment supports the integration of health and safety objectives into organisational strategy, resource allocation, and performance monitoring, thereby improving regulatory compliance. A Health and Safety Management System (HSMS) will help to clarify roles and responsibilities within a dynamic environment that involves various stakeholders. This will help to remove any ambiguity.

Furthermore, risk assessment and hazard identification provide the technical basis for proactive health and safety practices. Buildings in universities consist of laboratories, workshops, residences, offices, and public spaces, each of which provides distinctive hazards that consist of chemical exposure, electrical risks,

overcrowding, and slips and falls. Systematic health and safety hazard identification enables the institutions to identify unsafe conditions before incidents occur and ensures regulatory compliance as per risk management requirements. Everett *et al.* (2021) state that organisations conducting regular risk assessment experience enhanced regulatory compliance since safety controls are implemented proactively rather than reactively. Furthermore, training, awareness, and safety culture also play a very crucial role in health and safety compliance. Even when the infrastructure adheres to the technical standards, non-compliance frequently arises from behavioural factors, which consist of unsafe practices, ignorance, and risk-taking attitudes. Cooper (2015) states that continuous safety education, which consists of inductions, signage, emergency drills, and student orientation, enhances shared understanding of responsibilities and enhances voluntary adherence to rules and regulations. In higher learning institutions, the transient student population makes awareness programmes particularly critical, as compliance depends on continuous awareness and participation.

The study was guided by the Plan-Do-Check-Act (PDCA) model, which served as the conceptual framework underpinning health and safety management within institutional buildings. The model supports continuous improvement through planning safety objectives, implementing control measures, monitoring compliance, and introducing corrective actions to improve institutional health and safety performance (Morgado *et al.*, 2019).

3. Research Methodology

This study adopted a descriptive cross-sectional research design and applied a mixed-methods approach to assess health and safety conditions within university buildings. The mixed-methods approach integrated quantitative questionnaire surveys with qualitative semi-structured interviews and building inspection checklists to obtain both numerical and experiential data on health and safety conditions within institutional buildings. The research design was appropriate for assessing existing health and safety conditions within institutional buildings at a specific point in time. The cross-sectional design was appropriate because the study aimed to assess health and safety conditions and compliance levels as they existed during the period of data collection without manipulating the study environment. The research was conducted at a public higher education institution located in the Free State Province of South Africa. The campus consists of academic buildings, laboratories, administrative facilities, and student residences that are used daily by staff and students. The study population included students, staff members, health and safety professionals, and selected buildings on campus. A questionnaire survey was administered to students and staff to examine perceptions of health and safety

conditions within university buildings. The survey included 372 students and 235 staff members, representing individuals who regularly use institutional facilities. For the questionnaires, staff and students were recruited through convenience sampling while purposive sampling was used to select participants for the interviews. Semi-structured interviews were conducted with four health and safety professionals employed at the institution to explore regulatory requirements, management practices, and safety

The inspection checklist identified several recurring safety deficiencies within the buildings. These included expired fire extinguishers, blocked emergency exits, inadequate ventilation, poor lighting conditions, weak waste management practices, and insufficient safety signage. Such deficiencies pose potential risks to building occupants and highlight gaps between regulatory requirements and the actual condition of facilities (Table 1).

Table 1: Observed Safety Deficiencies in University Buildings

Safety Issue	Observed Condition	Potential Risk
Fire safety equipment	Expired or poorly maintained fire extinguishers	Increased fire risk and ineffective emergency response
Emergency exits	Blocked or poorly marked exits	Delayed evacuation during emergencies
Ventilation	Inadequate airflow in some buildings	Poor indoor air quality and discomfort
Lighting	Insufficient lighting in corridors and workspaces	Increased likelihood of accidents
Waste management	Inconsistent waste disposal practices	Environmental and health hazards

challenges affecting institutional buildings. Participants were purposively selected based on their involvement, experience, and responsibilities in institutional health and safety management practices. The study was approved by the Health Science Research Ethics Committee of the University of the Free State (UFS-HSD2024/2525/2502). Participation was voluntary, and confidentiality and anonymity of participants were maintained throughout the study. Quantitative data obtained from questionnaires were analysed using descriptive statistics, correlation analysis, regression analysis, and ANOVA tests, while qualitative interview data were analysed through thematic analysis in Atlas.ti.

4. Findings and Discussion

This section presents the findings of the study and discusses them in relation to occupational health and safety practices in higher education institutions. The findings are derived from three main data sources: questionnaire surveys administered to students and staff, semi-structured interviews with health and safety professionals, and Environmental Health and Safety (EHS) building inspection checklists conducted across selected buildings within the institution.

4.1. Observations

4.1.1. Health and Safety Compliance in Institutional Buildings

The results of the Environmental Health and Safety building inspections revealed that compliance with health and safety standards across the assessed buildings was partial rather than complete. Compliance scores ranged between 45% and 67%, indicating that several buildings did not fully meet the expected health and safety requirements.

These findings indicate that although institutional health and safety systems exist, infrastructure maintenance and operational monitoring require improvement to ensure consistent compliance across buildings.

4.2. Questionnaire findings

4.2.1. Factors associated with compliance and non-compliance

The findings indicated that compliance was primarily driven by institutional conditions rather than individuals' attitudes and knowledge. Regression analysis showed that training, operational controls, and resource placement accounted for 89% of the variance in compliance. Meanwhile, perceptions like familiarity, feelings of safety, and institutional effectiveness lost predictive value when controlled for by structural variables. Tukamuhabwa (2012) asserts that compliance failures cannot be attributed to individual unwillingness but rather to insufficient institutional support and weak operational systems. Interviews corroborated these findings, with safety professionals describing leadership as reactive, communication as fragmented, committees as inactive, and follow-up on reported hazards as inconsistent. These findings suggest that the institution's governance systems were not adequately configured to support consistent compliance across buildings (Imrie & Street, 2009).

Limited engagement with students further exacerbated the compliance gap. Only 22% of students reported receiving safety training, while 89% were unaware of safe places, and 40.1% had never been informed about safety issues. Faculty-level disparities in staff perceptions and experiences, evidenced by significant ANOVA differences across measured variables, further illustrated inconsistent implementation of safety

programmes. These findings indicate that compliance was largely influenced by local management practices rather than uniform institutional standards.

4.3. Interview Findings

4.3.1. Influence and Motivation Factors for Compliance

The interviewees emphasized the impact of line managers in influencing staff compliance with safety practices, as individuals tend to follow the safety attitudes and practices adopted by line managers. This refers to a decentralised culture in which individuals are influenced by what is practised around them rather than what is practised in an organisation in general (Atkinson *et al.*, 2000). Additionally, participants described compliance as largely reactive, noting that staff “become mindful only after injuries occur.” This, in essence, shows a lack of proactive motivational strategies, which means that the safety behaviours are being triggered by incidents rather than reinforcement. The findings suggest that the institution is not providing sufficient positive reinforcement to sustain safety behaviours among employees. Safety is not integrated into institutional events, communication campaigns, or leadership messaging, limiting opportunities to shape user motivation (Lundgren & McMakin, 2018). The lack of behavioural reinforcement is especially detrimental when coupled with inadequate institutional controls and lack of leadership engagement. These factors, in combination, can create a situation in which motivation is lacking and a culture of episodic compliance persists.

The implications of this theme highlight the importance of cultural change and leadership modelling. Theoretically, the findings validate behavioural safety frameworks that highlight the importance of

reinforcement and role modelling. In practice, safety should be incorporated into regular institutional communication, leadership briefings, and staff development activities. Policy alignment requires embedding safety expectations into managerial roles, ensuring that supervision meets OSHA requirements and conforms to ISO 45001 principles of worker participation and engagement.

5. Conclusion and Further Research

This study assessed health and safety compliance and risk conditions within buildings at a public higher education institution in the Free State Province of South Africa. The study was motivated by concerns regarding the gap that often exists between legislative health and safety requirements and the actual safety conditions experienced within institutional buildings. Factors such as leadership commitment, effective communication, availability of resources, and maintenance practices were identified as key determinants of safety performance within the institution. The results revealed that only 22% of students reported receiving safety training while the training of the staff was inconsistent. Based on these findings, institutions should implement mandatory safety training programmes for staff and students, strengthen routine building inspections, improve hazard reporting systems, and prioritise preventive maintenance to address recurring risks such as blocked emergency exits, expired fire extinguishers, and inadequate ventilation. The results of this study are expected to benefit several stakeholders within higher education institutions. University management and facilities management departments may use the findings to improve safety governance and infrastructure maintenance strategies.

References

- Adusi, C. (2022). Health and safety compliance in educational institutions: The role of training and leadership. *Safety Science*, 148, 105654.
- Almaskati, D., Kermanshachi, S., Pamidimukkala, A., Loganathan, K. and Yin, Z., 2024. A review on construction safety: hazards, mitigation strategies, and impacted sectors. *Buildings*, 14(2), p.526.
- Atkinson, S., Medeiros, R.L.R., Oliveira, P.H.L. and De Almeida, R.D., 2000. Going down to the local: incorporating social organisation and political culture into assessments of decentralised health care. *Social science & Medicine*, 51(4), pp.619-636.
- Becher, T. and Kogan, M., 2025. *Process and structure in higher education*. Taylor & Francis.
- Cooper, H., 2015. *Research synthesis and meta-analysis: A step-by-step approach*. Sage Publications.
- Everett, H.E., Lean, F.Z., Byrne, A.M., van Diemen, P.M., Rhodes, S., James, J., Mollett, B., Coward, V.J., Skinner, P., Warren, C.J. and Bewley, K.R., 2021. Intranasal infection of ferrets with SARS-CoV-2 as a model for asymptomatic human infection. *Viruses*, 13(1), p.113.
- Imrie, R. and Street, E., 2009. Regulating design: the practices of architecture, governance and control. *Urban Studies*, 46(12), pp.2507-2518.
- Kong, P.W., Suyama, J. and Hostler, D., 2013. A review of risk factors of accidental slips, trips, and falls among firefighters. *Safety Science*, 60, pp.203-209.

- Kovalenko, M., Rusnak, A. and Lomonosov, D., 2021. Ways of ensuring the compliance of the activities of higher education institutions with modern challenges. *Baltic Journal of Economic Studies*, 7(5), pp.104-113.
- Loosemore, M., Sunindijo, R.Y., Lestari, F. and Kusminanti, Y., 2019. Improving occupational health and safety in the public sector: A facilities management perspective. *Safety Science*, 120, pp.83-94.
- Machabe, A. P. and Indermun, V., 2013. Management perceptions of the occupational health and safety system in a steel manufacturing firm in Johannesburg, South Africa. *Arabian Journal of Business and Management Review (Nigerian Chapter)*, pp.26–39.
- Morgado, L. S., Silva, F.J.G. and Fonseca, L.M., 2019. Mapping occupational health and safety management systems in Portugal: Outlook for ISO 45001: 2018 adoption. *Procedia Manufacturing*, pp. 755-764.
- Mtikitiki, N., Madonsela, B.S., Maphanga, T., Shale, K., Grangxabe, X.S. and Baloyi, T.M., 2025. Occupational health and safety management system of a South African University setting. *Safety*, 11(2), p.34.
- Republic of South Africa. (1977). National Building Regulations and Building Standards Act, No. 103 of 1977. Pretoria: Government Printer.
- Republic of South Africa. (1993). Occupational Health and Safety Act, No. 85 of 1993. Pretoria: Government Printer.
- Savolainen, T., 2023. A safe learning environment from the perspective of Laurea University of Applied Sciences safety, security and risk management students and staff. *Heliyon*, 9(3).
- Tukamuhabwa, B.R., 2012. Antecedents and consequences of public procurement non-compliance behavior. *Journal of Economics and Behavioral Studies*, 4(1), pp.34-46.