

IDENTIFYING SAFETY RISKS AND FUTURE RESEARCH DIRECTIONS IN THE PURSUIT OF ZERO HARM: A REVIEW OF MINE HEALTH & SAFETY COUNCIL INITIATIVES

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Introduction

- South African mines continue to face persistent safety and health risks
- MHSC oversees nine thrust areas aimed at achieving zero harm.
- Study examines 70 funded projects (2010–2025) using systems thinking.



Systems Thinking Framework

- Holistic approach examining interactions and interdependencies.
- Key concepts: holism, feedback loops, stocks and flows.
- More suitable than reductionist approaches for complex mine systems.



Data and Methods

- Data sourced from MHSC project summaries and MHSI annual reports.
- 70 research projects categorised across nine thrust areas.
- Analysis focused on identifying interdependencies and systemic gaps.



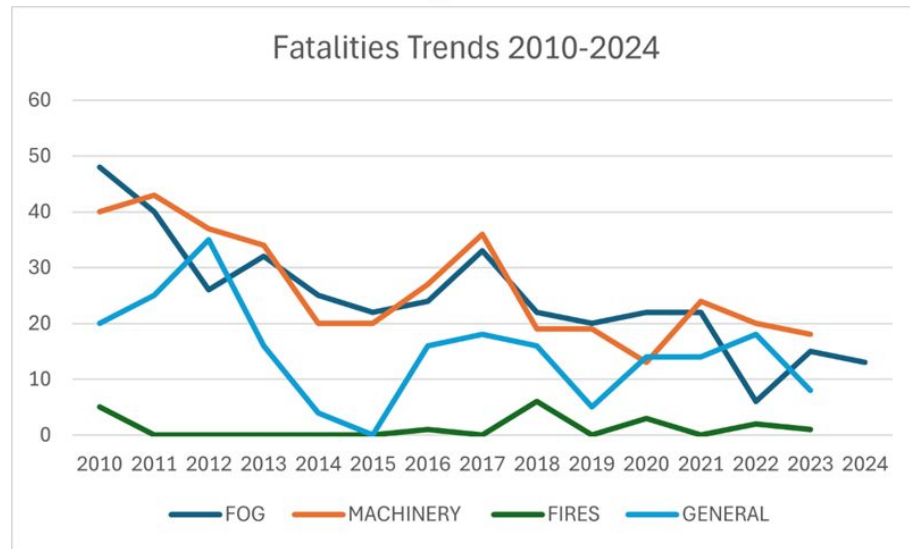
MHSC Thrust Areas

- **Thrust areas:** Human factors & behavioural safety, Falls of ground, Rockbursts, Transport & Machinery, Airborne pollutants, Physical hazards, Occupational diseases, Explosions & fires, Special projects
- **Activity:** Uneven research activity over 2010–2025.
- **Focus:** High focus on rockfalls, rockbursts, machinery & transport.
- **Most activity:** Occupational diseases had the highest number of projects.



Safety Statistics (2010-2024)

- Significant reduction in fall-of-ground and machinery-related fatalities.
- Fire-related fatalities remain low after 2011.
- General fatalities fluctuate but show long-term improvement.



Interdependencies & Systems Analysis

- Thrust areas are interconnected; interventions in one influence others.
- Current siloed approach limits effectiveness.
- Leadership, safety culture, technology and regulations interact dynamically.



Proposed System-Based Thrust Areas



Risk governance, leadership and behavioural systems.

Operational & machinery interaction systems.

Geotechnical hazard systems.

Atmospheric & environmental exposure systems.

Health outcome and disease systems.

Emergency response and resilience systems.

Special and emerging technologies.

Conclusion



MHSC initiatives have reduced accidents but zero harm not yet achieved.



Siloed hazard-based approach no longer sufficient.



Systems thinking enables integrated, proactive risk mitigation.



Future research must track implementation impact and interdependencies.



Thank You