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DEVELOPING A CONCEPTUAL FRAMEWORK FOR OCCUPATIONAL SAFETY, HEALTH, AND ENVIRONMENTAL COMPLIANCE IN SCHOOLS

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Abstract:

This study seeks to ascertain the implementation of safety, health, and physical environmental management in Malaysian primary schools to establish a secure learning environment. The researcher utilized grounded theory research. The researcher formulates the analytical framework for the study's questions and objectives grounded in the applied theory. This researcher created thematic tables that offer detailed information on the analysed element. The present implementation of the safety and health management component in Malaysian elementary schools was illustrated. Moreover, it is feasible to discern the challenges faced by Malaysian primary schools in managing the physical environment. Moreover, a viable framework exists that primary schools can utilize to improve the execution of occupational safety and health, so rendering Malaysian schools safer. It is feasible to conclude that, both conceptually and practically, every element of safety and health management is interrelated.

Keywords:

Safe School; Safety Management; Physical Environment; Occupational Safety, Health, Environment (OSHE)

Introduction

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A safe school is a place where pupils may study in a tranquil and secure atmosphere. School serves as a forum for students, instructors, and staff to congregate for the purposes of learning and instruction. To develop a safe school idea, one must first understand the definition of a safe school. Triggers related to safety in the school vicinity, both external and internal, give rise to concerns over school safety. A secure educational institution is intrinsically connected to legislation and regulations, including the Environmental Quality Act of 1974 and the Occupational Safety and Health Act of 1994, as well as protocols such as OHSAS 18001 or ISO 45001.

A secure school is one in which kids may study and educators can instruct in a protected environment. Neil asserts that a safe school is a serene setting in which students and educators may engage in learning and teaching without the apprehension of bodily or social harm. Griffin (2002) characterizes a safe school as one that emphasizes friendliness, a nurturing disposition, and explicit behavioral standards, while still maintaining constant fairness towards children. The 11th Sustainable Development Goals also indicate that sustainable cities and communities are associated with the concept of a safe school system.

Ensuring safe, healthy, and sustainable learning environments in schools has become a critical concern worldwide, particularly in developing countries such as Malaysia. Schools are not only centers for academic development but also workplaces that involve teachers, staff, and a large population of children who are vulnerable to safety and health risks. Despite the existence of legal frameworks such as the Occupational Safety and Health Act (OSHA) 1994**,** enforcement and compliance within Malaysian schools remain inconsistent due to limited resources, insufficient training, and competing administrative priorities (Department of Occupational Safety and Health Malaysia [DOSH], 2022).

Previous studies indicate that while teachers and administrators demonstrate positive attitudes toward environmental education and safety awareness, actual implementation in daily school operations is still moderate (Yaacob & Abdullah, 2023; Mohd Yusof, 2024). Furthermore, challenges such as poor infrastructure maintenance, exposure to environmental hazards, and inadequate emergency preparedness underscore the need for a more structured approach (WHO, 2021; UNESCO, 2022). Therefore, developing a conceptual framework for occupational safety, health, and environmental (OSHE) compliance in schools is necessary to provide clear guidance, strengthen monitoring, and align school practices with international standards such as ISO 45001 and ISO 14001 (ISO, 2018). Such a framework would not only safeguard students and staff but also support education for sustainable development (ESD) in Malaysia and beyond.

Problem Statement

Ensuring safe, healthy, and sustainable school environments is a global priority, as schools are not only places of learning but also workplaces that involve teachers, staff, and children who are vulnerable to accidents, communicable diseases, and environmental hazards. International guidelines, such as those provided by the World Health Organization (WHO, 2021) and UNESCO (2022), emphasize the importance of integrating safety, health, and environmental practices in schools to promote well-being and support education for sustainable development (ESD). However, many countries still struggle with limited resources, ageing infrastructure, and weak enforcement mechanisms, which hinder the full implementation of safety and environmental standards.

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In Malaysia, similar challenges exist, particularly in ensuring compliance with the Occupational Safety and Health Act (OSHA) 1994. Although this legislation provides the foundation for workplace safety, its application in schools remains inconsistent due to limited monitoring and the absence of dedicated safety personnel (Department of Occupational Safety and Health Malaysia [DOSH], 2022). Studies indicate that while teachers and school administrators generally demonstrate positive attitudes and awareness toward safety and environmental education, their actual implementation in daily school practices is only moderate (Yaacob & Abdullah, 2023). Many schools continue to face infrastructure-related concerns such as poor ventilation, inadequate sanitation, insufficient fire safety measures, and ageing facilities, which increase risks for both students and staff (Mohd Yusof, 2024). Environmental issues including improper waste management, limited energy efficiency, and unsafe drinking wateralso remain a persistent concern (UNESCO, 2022). Furthermore, lessons learned from the COVID-19 pandemic have highlighted the importance of improving occupational health measures, particularly in the areas of hygiene, air quality, and disease prevention (WHO, 2021). At present, OSHE practices in Malaysian schools remain fragmented, with safety, health, and environmental aspects managed separately rather than through an integrated framework, making it difficult to align with international standards such as ISO 45001 and ISO 14001 (ISO, 2018).

Literature Review

This discussion will focus on two fundamental elements: safety management and the physical environment. In safety management, there are five aspects, however in physical environmental management, there are three elements.

Element Of Safety Management

Policy And Commitment

In accordance with section 20 of the 2005 Act, the organization must formulate an occupational safety and health policy program (Health and Safety Authority, 2006). Robust safety and health policies must delineate a clear trajectory for the organization.

A policy is crucial in the classroom since it provides a framework for all individuals, including students, educators, staff, and visitors. The school administration must focus on the policies that must be followed. Adhere to all mandates set out by the authorities, including those pertaining to Urban Wellbeing, Housing, and Local Government. They will assess the suitability and safety of the area for pupils. This may also be attributable to the school's physical location. The Federation of National Associations of al-Quran Tahfiz Institutions reports that over fifty percent of the nation's 1,200 private Islamic schools lack registration. The majority of unregistered schools do not adhere to the requisite safety management protocols, believing them to be unnecessary. The school had a fire incident in 2017, resulting in the deaths of 25 individuals who were trapped inside by grills owing to inadequate safety regulations (The Straits Times, 2017).

Planning

The organization must formulate a plan for executing the Safety Statement of the health and safety policy; nevertheless, an effective management structure and procedures are essential for the policy's implementation (Health and Safety Authority, 2006). Emphasize long-term strategic planning for the institution's safety and health.

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All managers and personnel should establish safety and health goals and targets. The school must be equipped to address any threats to the safety of all children. The school administration must consistently maintain a safety strategy to safeguard children and mitigate the danger of harm. This is because calamities might happen at any moment. Leveraging its disaster response capabilities both domestically and globally, MERCY Malaysia has developed a School Preparedness Programme (SPP) to disseminate its knowledge and enhance resilience among students and educators in the event of natural disasters (Mercy Malaysia, 2021).

The effort seeks to enhance the ability of schools and students to react to catastrophes, while simultaneously fostering disaster preparation among both students and educators. In 2012, fifteen schools effectively executed the School Performance Profile (SPP) in three stages. Disaster risk reduction (DRR) exercises were conducted in the classrooms of the SPP training participants. MERCY Malaysia further offered volunteer trainers a refresher training on SPP procedures. Despite its closeness to the Pacific Ring of Fire, Malaysia is lucky to be devoid of natural calamities like earthquakes and volcanoes, because to the safeguarding offered by its neighboring countries (Mercy Malaysia, 2021). Nonetheless, monsoon flooding and flash floods often occur in many regions of Malaysia.

Implementation And Operation

A robust safety and health management system must be established to execute the safety and health policy systematically and strategically. The objective should be to minimize hazards.

Risk assessment approaches should be used to define priorities and establish targets for hazard reduction and risk mitigation, with the aim of minimizing risks as much as possible via the selection and design of buildings, equipment, and procedures (Health and Safety Authority, 2006). If hazards cannot be eradicated, they should be mitigated to the maximum extent feasible by the implementation of physical controls and safe work procedures, or, as a last option, by supplying personal protective equipment.

Performance benchmarks must be established and used to evaluate progress. Concrete measures must be established to foster a constructive safety and health culture. The school may monitor the frequency of incidents and identify their sources. All individuals inside the business must be aware of its vision, objectives, and values. The headmaster's evident and proactive leadership fosters a constructive culture of safety and health.

Measuring Performance

The organization's safety and health performance must be assessed, tracked, and reviewed, with the results compared to established standards to identify areas for improvement (Health and Safety Authority, 2006). The efficacy of the health and safety management system is shown by proactive self-assessment.

Self-monitoring encompasses both hardware and software, including premises, plants, and chemicals, as well as individuals, processes, and systems, which include personal behavior and performance. In the event of control failures, reactive monitoring must examine the accidents, illnesses, or incidents that may have caused injury or loss to ascertain the reasons for their failure.

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The objective of active and reactive monitoring is to identify the immediate and underlying reasons of inadequate performance, together with the implications for the design and operation of the safety and health management system (Health and Safety Authority, 2006). Long-term objectives should also be monitored. Active monitoring and reactive monitoring are the two categories of performance measuring systems (Occupational Safety and Health, 2008). Proactive monitoring provides insights into safety performance prior to any incidents occurring. It entails a safety assessment of the school premises to ascertain the absence of potentially harmful circumstances.

Auditing And Revieing Performance

The school safety management system must undergo frequent reviews to guarantee its effectiveness and alignment with overall security and health goals. The school administration effectively executes its responsibilities by establishing regulations, assessing health and safety adequacy, and determining the type and timing of necessary modifications (Occupational Safety and Health, 2008). The management system serves as a crucial source of information for evaluation.

We examine factors such as adherence to standards, incidents, health issues, and data on occurrences, alongside the analysis of both immediate and root causes, trends, and prevalent characteristics, advancements in corrective measures identified through proactive and reactive monitoring, and a comparative assessment of safety and health performance (Occupational Safety and Health, 2008).

Element Of Physical Environmental Management

Physical Structures, Infrastructure, Furniture

School designers have always grappled with the appropriate design of educational institutions or systems including several campuses that facilitate the learning process. While not unfeasible, it requires a comprehensive understanding of the prevailing conditions, the expectations of all stakeholders, and the optimal method for fulfilling those expectations. Regarding facilities, it is essential to establish uniform quantitative metrics or standards to allow planners to identify anomalies within the current school or system, enabling designers to offer changes that address both immediate and long-term objectives. According to UNESCO (2021), an adequate quantity of classroom furniture should be provided, along with a system for the regular replacement of damaged items. Consequently, portable goods are advantageous since they provide more adaptable learning approaches, and furnishings must be proportionate to the children's age (UNESCO, 2021).

The Use And The Presence Of Chemical Chemicals And Biological Agents

Approximately 75,000 chemical compounds are now used in the commercial sector. Numerous chemical substances are hazardous or harmful to humans and other organisms. Toxic chemicals have been associated with cancer, neurological abnormalities, reproductive issues, organ damage, and asthma, among other significant health concerns (EPA, 2006). Children and adolescents are particularly susceptible to hazardous substances that persist in the environment and bioaccumulate within the food chain. Chemicals may irritate the skin, eyes, nose, and throat, among other areas. Certain compounds are dangerous owing of their potential to generate flames or explosions.

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School buildings contain several harmful compounds. Chemical producers provide Material Safety Data Sheets (MSDS) that delineate the physical qualities, health effects, and other features of chemicals, along with protocols for handling, storage, and disposal. Chemical manufacturers must provide Material Safety Data Sheets (MSDSs) with every shipment of chemicals sent to your school. Ensuring a healthy environment for students and the public necessitates meticulous use and oversight of these chemicals, along with the products that include them.

The Site On Which School Is Located And The Surrounding Environment

It is essential to focus on the institution's location. Additionally, the safety of the pupils' surroundings at that school, including both indoor and outdoor air quality, is a concern. Schools should be situated no more than 3 km from students' residences to optimize accessibility and attendance, and closer for younger children, when locations must be selected with safety and health considerations (UNESCO, 2021).

An enclosure or suitable barrier may ensure children's safety and maintain their presence on school grounds. The school's location should be prioritized since it influences students' capacity to study in a pleasant, pollution-free environment, particularly with noise pollution. UNESCO (2021) asserts that noise distraction might impede learning; thus, trains, high-traffic zones, and loud businesses should be situated away from schools.

Table 1: The Scheme Of OSHE Management

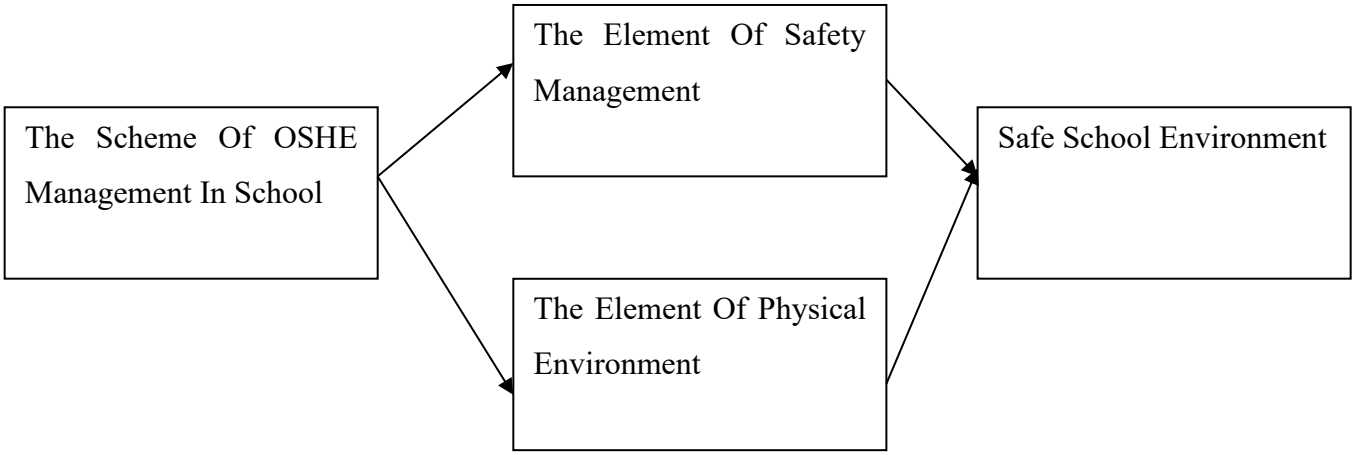

Table 1 pertains to the framework of OSHE management. To establish a secure school environment, two critical elements must be prioritised: safety and the physical environment. For the element of safety management, there are five elements, which are policy and commitment, planning, implementation, and operation, measuring performance and auditing, and reviewing performance. Meanwhile, for the element of physical environment. The first element is physical structure, infrastructure, and furniture. The second element is the use and presence of chemicals and biological agents, and the last element is the site on which the school is located and the surrounding environment.

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Literature Review

Past studies on safety, health, and environmental management in Malaysian schools reveal that while awareness of occupational safety and health issues exists, implementation remains limited and inconsistent. According to the Department of Occupational Safety and Health (DOSH, 2022), the Occupational Safety and Health Act (OSHA) 1994 is applicable to educational institutions, yet enforcement and compliance in schools are still weak due to the absence of designated safety officers and systematic monitoring. Mohd Yusof (2024) found that although school leaders demonstrate positive attitudes toward safety policies, they often struggle with limited resources and workload pressures, which hinder effective practice. Similarly, Yaacob and Abdullah (2023) reported that teachers possess adequate knowledge and positive attitudes toward environmental education, but actual integration of sustainable practices at the school level remains only moderate.

In addition, several studies highlight ongoing safety concerns linked to school infrastructure and facilities. A review of incidents between 2016 and 2017 reported 54 safety-related cases in schools, including fires, food poisoning, mercury spills, snake bites, and falls, suggesting gaps in preventive measures and emergency preparedness (ResearchGate, 2017). Data from the Ministry of Education (Statista, 2022) further indicates that more than 78% of public primary schools in Malaysia are over 30 years old, with about 10% lacking proper water and electricity facilities, raising concerns about structural safety and health risks. On the global front, UNESCO (2022) and WHO (2021) advocate for the integration of health-promoting and sustainable practices into schools, while international standards such as ISO 45001 (Occupational Health and Safety) and ISO 14001 (Environmental Management) provide structured frameworks that are not yet fully adopted in Malaysian schools.

Taken together, these studies underscore a gap between policy frameworks, awareness, and actual practice. While there is growing recognition of the importance of safety, health, and environmental management, Malaysian schools continue to face challenges in achieving comprehensive OSHE compliance. This highlights the need for an integrated framework that can support schools in systematically addressing these issues to ensure a safe, healthy, and sustainable learning environment.

Table 2: The Past Studies

Author / Source	Year	Focus Area	Key Findings / Issues
DOSH (Department of Occupational Safety and Health Malaysia)	**2022**	**Legal & compliance**	**OSHA 1994 applies to schools, but enforcement and monitoring are inconsistent; lack of safety officers.**
Yaacob & Abdullah	**2023**	**Environmental education**	**Teachers have high knowledge and positive attitudes, but implementation of sustainable practices is moderate.**
Mohd Yusof	**2024**	**Safety management in schools**	**School leaders show positive attitudes toward safety policies, but workload and limited resources hinder implementation.**

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Author / Source	Year	Focus Area	Key Findings / Issues
ResearchGate study on infrastructure risks	2017	School safety incidents	Between 2016–2017, 54 incidents reported, including fire, food poisoning, mercury spills, snake bites, and falls.
Statista / MOE Data	2022	Infrastructure condition	7,778 public primary schools; 78% over 30 years old; 10% without proper water/electricity access.
WHO	2021	Global health in schools	Promotes *Health Promoting Schools* model—emphasizing air quality, hygiene, and disease prevention.
UNESCO	2022	Education for Sustainable Development	Calls for integration of safety, health, and environment into school curricula and operations.
ISO (45001 & 14001)	2018	International standards	Provides frameworks for occupational health & safety (45001) and environmental management (14001), but not yet fully adopted in Malaysian schools.

Theoretical Framework

The research is underpinned by the Domino Theory. In 1983, H.W. Heinrich formulated a theory regarding accident causation and control, positing that all accidents, whether occurring at home or in the workplace, result from a chain of events. This sequence encompasses: ancestry and social environment, individual error, a hazardous activity and/or physical danger, the accident itself, and the resultant injury stemming from these preceding factors (International Risk Management Institute, 2022).

These components are termed dominoes, and the removal of a single one can prevent an accident. According to SKYBray (2022), Heinrich's law posits that the frequency of accidents is inversely related to their severity, suggesting that a reduction in minor incidents will lead to a decrease in big accidents, a premise that is not universally valid. All domino theories consist of three parts. The factors include: Social Environment and Ancestry, Personal Fault, Dangerous Act or Mechanical or Physical Hazard, Accident, and Injury. Heinrich elucidates each of these "dominoes" and provides strategies to mitigate or eradicate their occurrence in the sequence (Brown, 2020).

Methodology

This paper adopts a systematic literature review (SLR) and meta-analysis methodology to synthesize knowledge on occupational safety, health, and environmental management in schools. An SLR is a structured procedure designed to collect relevant studies on a particular topic that meet predetermined eligibility criteria, thereby providing evidence-based answers to formulated research questions. A meta-analysis complements this approach by applying

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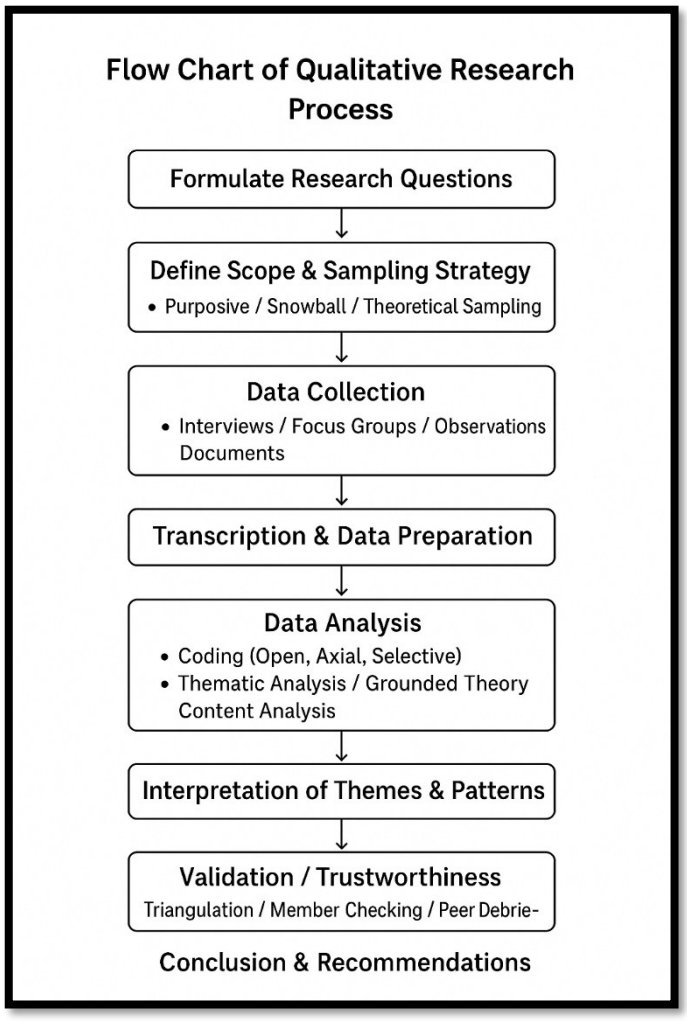
statistical methods, both descriptive and inferential, to integrate findings from multiple studies on a given issue. Traditionally, the SLR process follows four fundamental steps under the SALSA framework: search (defining databases and search strings), appraisal (establishing inclusion and exclusion criteria with quality assessment), synthesis (extracting and categorizing data), and analysis (interpreting and drawing conclusions). However, recent developments expand this methodology by adding two more critical stages: defining the research scope as the initial step to clarify boundaries and objectives, and reporting outcomes as the final step, which requires transparent documentation of the process and dissemination of findings to the public. Together, these steps ensure methodological rigor, transparency, and replicability in reviewing and consolidating prior research.

Table 3: Flow Chart Of Process



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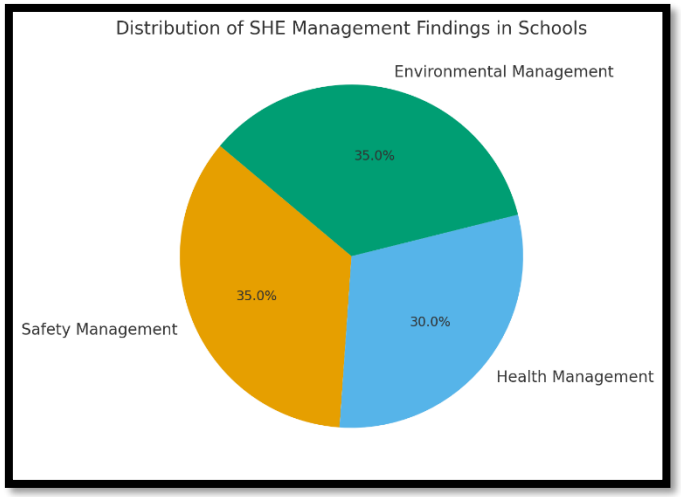
Findings

Table 4: The Pie Chart



The findings of this study reveal that safety management in schools is generally acknowledged as important, with most institutions having basic safety policies such as fire drills, first aid kits, and designated emergency exits. However, enforcement and consistency remain a challenge. Teachers and students were aware of safety procedures, but their compliance was not uniform, especially in high-risk areas such as science laboratories and during co-curricular activities. This aligns with the findings of Chong et al. (2013), who noted that schools with structured safety committees reported fewer accidents compared to those without formal safety systems.

In terms of health management, the study found that schools with regular health programs, including screenings, hygiene campaigns, and counseling services, demonstrated improved student attendance and overall well-being. Health education campaigns were effective in raising awareness of nutrition, physical activity, and disease prevention. Nevertheless, challenges persisted in certain areas, particularly in maintaining canteen hygiene, which was highlighted as a significant concern by Abdullah and Kassim (2019).

Environmental management practices varied across schools. Those that implemented structured green initiatives, such as recycling programs, energy conservation measures, and the establishment of eco-clubs, displayed higher levels of environmental awareness among students. However, not all schools had adequate waste segregation systems, which limited the effectiveness of their environmental programs. This finding supports Uline and Tschannen-Moran (2008), who emphasized that a well-maintained environment positively influences both student behaviour and academic performance. The application of theoretical perspectives provided further insight into the interconnectedness of SHE management. Systems Theory demonstrated that weaknesses in one area, such as poor waste management, could adversely affect health and safety outcomes. The Health Belief Model explained why some students and teachers were more likely to adopt safety practices, as their actions were influenced by their perception of risks and benefits. Similarly, Ecological Systems Theory highlighted the importance of external stakeholders including parents, communities, and government agencies in shaping the success of school based SHE programs.

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Overall, the findings suggest that schools with well-structured SHE frameworks experience fewer accidents, improved student health, and stronger environmental awareness. However, inconsistencies in enforcement and limitations in resources remain significant challenges. The evidence indicates that integrating SHE management into school culture is critical for sustainable improvement in creating safe, healthy, and environmentally responsible learning environments.

Conclusion

In conclusion, the Safe School Framework successfully achieves its objectives by significantly enhancing the safety, health, and environmental aspects for both students and teachers. Through the establishment of a secure school environment, it effectively contributes to the attainment of the 4th Sustainable Development Goal, Quality Education while simultaneously fostering the academic success and well-being of the entire school community. By focusing on these key areas, the framework ensures that educational institutions, both urban and rural, can operate in a manner that aligns with the 11th Sustainable Development Goal, Sustainable Cities and Communities. As a result, the implementation of this framework has successfully reduced the risk of accidents in schools, thus demonstrating its effectiveness in achieving the desired outcomes.

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