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Calabar Journal of Health Sciences

Article in Press

Review Article

Effectiveness of occupational safety and health management systems in reducing industrial accidents and disasters: A systematic review

Margaret Inemesit Akpan[1], AniekanAbasi Jonathan Okon[1], Nneka Ndifon Agbiji[2], Amakere Udo Eda[1], Abasiofon Inemesit Akpan[3], Alain Simon Inah[1], Felicia Sam Akpabio[4], Glory Maurice Ekpenyong[2]

[1]Department of Public Health, University of Calabar, [2]Department of Microbiology, University of Cross River State, Departments of [3]Medical Sociology and [4]Nursing, University of Calabar, Calabar, Nigeria.

***Corresponding author:**
Glory Maurice Ekpenyong, Department of Microbiology, University of Cross River State, Calabar, Nigeria.

glorymaurice25@gmail.com

Received: 02 April 2025
Accepted: 24 May 2025
EPub Ahead of Print: 17 October 2025
Published:

DOI
10.25259/CJHS_4_2025

Quick Response Code:

ABSTRACT

Occupational Safety and Health Management Systems (OSHMSs) are standards, actions, and mechanisms that help minimize industrial accidents and disasters. The objective of this review was to evaluate the effectiveness of OSHMS in reducing occupational accidents and disasters across various industrial sectors. To achieve this, a detailed literature search was conducted using Google Scholar, PubMed, Scopus, and Web of Science, employing Boolean operators to refine search terms. The inclusion criteria for the study were articles published within the last 12 years that had specific findings on accident reduction after the implementation of OSHMS frameworks. Articles published older than 12 years and did not correspond with the inclusion criteria were excluded from the study. Eleven peer-reviewed articles were used for the study. The study's findings revealed that the effective enforcement and application of OSHMS helped minimize industrial accidents and disasters, with improvements ranging from 10.3% to 90% across various industries. The adoption of OSHMS frameworks helped minimize accidents, such as falls, machinery-related injuries, fires, chemical spills, and explosions, across the industries examined. However, some studies have revealed a moderately strong and significant negative relationship between Occupational Health and Safety Management Frameworks (OHSMFs) and the occurrence of workplace accidents and occupational injuries, suggesting that the existing OHSMFs may be ineffective or lack adequate safety standards to control hazard exposures in the industry. However, the majority of the studies presented positive responses. Therefore, this review emphasizes the importance of ongoing safety training, effective regulatory enforcement, and employee engagement in optimizing OSHMS efficiency and minimizing industrial accidents and disasters.

Keywords: Industrial safety, Occupational accidents and disasters, Occupational safety and health management systems, Occupational safety, Risk prevention

INTRODUCTION

The majority of catastrophic incidents in international industries, both past and present, can be linked to inadequate or nonexistent Occupational Health and Safety Management Systems (OHSMSs). Industrial accidents are unplanned events that cause harm to workers, equipment, or the environment within an industrial setting.[1] They mostly occur due to unsafe working conditions, human errors, mechanical malfunctions, or insufficient safety measures. Common examples include falls, injuries related to machinery, fires, chemical spills, and explosions. According to Heinrich's accident causation theory, workplace accidents often result from a combination of unsafe acts, unsafe conditions, and systemic failures in safety

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management.[2] Industrial disasters, on the other hand, are large-scale, catastrophic occurrences that extend beyond the workplace, affecting communities, ecosystems, and economies. Industrial disasters typically cause significant destruction, unlike routine industrial accidents, which often involve less severe consequences. They often result from failures in risk management, a lack of regulatory compliance, or extreme hazardous conditions. Notable examples include the Deepwater Horizon oil spill (2010), the Chernobyl nuclear accident (1986), and the Bhopal gas tragedy (1984).[3] Manufacturing, mining, construction, and transportation are the industry's most likely to experience industrial accidents and disasters, whereas other industries, such as tourism and education, tend to have relatively few instances of risk.[4] Ensuring workplace safety is, therefore, a critical concern for industries, regulatory bodies, and policymakers.

Occupational Safety and Health Management Systems (OSHMSs) have been used extensively to establish systematic approaches for hazard identification, risk assessment, and control measures, aiming to mitigate these risks and enhance workplace safety.[5] They integrate safety protocols, employee training, and regulatory compliance mechanisms to create safer working environments. However, their effectiveness in significantly reducing workplace accidents and disasters remains a subject of ongoing debate and empirical investigation. Several internationally recognized OSHMS frameworks have been developed to guide organizations in implementing structured safety management approaches. These include the International Labor Organization's (ILO) OSHMS (ILO-OSH 2001), the Occupational Health and Safety Assessment Series (OHSAS 18001), and the more recent ISO 45001 standard (ILO, 2021).[6] These systems emphasize proactive risk management, continuous safety improvement, and organizational commitment to employee well-being. Research suggests that organizations implementing OSHMS experience improvements in safety performance, reduced accident rates, and enhanced worker safety culture.[7] Given the importance of OSHMS in industrial safety management, a comprehensive evaluation of its effectiveness is essential. This systematic review aims to assess the impact of OSHMS on reducing industrial accidents and disasters by analyzing empirical evidence and case studies from various industries. Specifically, the review will examine accident reduction trends, worker safety perceptions, regulatory compliance, and overall organizational safety performance.

MATERIALS AND METHODS

Search strategy

A systematic literature search was conducted using four major databases: Google Scholar, PubMed, Scopus, and Web of Science. The search aimed to identify studies examining OSHMSs in reducing industrial accidents and disasters. The following search terms were used:

- "Occupational safety management systems" AND "industrial accidents"
- "Safety interventions" AND "accident reduction"
- "Effectiveness of OSHMS in preventing workplace disasters."

In addition, Boolean operators were applied to refine search results:

- "Occupational safety" OR "workplace safety"
- "Safety interventions" AND "accident prevention"
- "Occupational safety management systems" AND "industrial accidents."

Eligibility criteria

The grounds for inclusion and removal were established to ensure the selection of relevant studies.

Inclusion criteria

- Time frame: Studies published in the past 12 years (2013–2025)
- Study type: The systematic review included a variety of study designs to ensure a comprehensive evaluation of OHSMS as well as Process Safety Management (PSM) on accident reduction. The selected studies comprised quantitative studies, quantitative and qualitative (mixed-method) studies, cohort studies, cross-sectional survey designs, empirical analyses, theoretical frameworks, and observational studies
- Relevant industries: Manufacturing industries, beverage industry, construction industries, oil and gas industry, and industrial electromechanical industry
- PSM-specific studies were included only if they assessed accident reduction, not just process hazard management
- Justification for time frame selection.

The 12-year time frame was chosen to guarantee that the findings reflect recent advancements and contemporary practices in OSHMSs. This period provides a balanced approach for the following reasons:

- Evolution of safety standards and regulations: Workplace safety regulations and technological advancements have undergone significant evolution over the past decade. Including studies from the past 12 years ensures that the review captures modern safety interventions and regulatory updates
- Relevance to current industrial practices: Older studies may not reflect the latest risk factors, accident trends, and preventive strategies. A 12-year window ensures that findings remain applicable to current workplace environments
- Balancing comprehensive coverage and practicality:

A broader time frame (e.g., 20–30 years) could introduce outdated safety data, while a shorter period (e.g., 5 years) might limit the availability of studies. The chosen 12-year period ensures a rich dataset while maintaining relevance
- Alignment with systematic review standards: Many systematic reviews on occupational health and safety use 10–15-year windows to maintain comprehensiveness and relevance. The 12-year time frame aligns with best practices, ensuring robust and meaningful findings.

Exclusion criteria

- Studies that did not focus on OSHMSs as a primary intervention
- Studies that did not assess accident reduction: Articles discussing only OHSMS/PSM implementation, policy frameworks, or safety culture without quantifiable accident-related outcomes were removed
- Studies focused solely on regulatory compliance: Studies that analyzed legal or administrative aspects of OHSMS/PSM without linking to accident prevention were excluded
- Studies that had outdated safety data: Articles published before 2013 were not considered unless they provided critical background information
- Inaccessible studies: Studies with only abstracts available, without full-text access, were excluded unless key accident reduction findings were explicitly stated
- Non-peer-reviewed sources such as opinion pieces, editorials, and blog posts.

Study selection process

The study selection process followed a systematic screening approach to ensure only relevant studies were included:

Title and abstract screening

- A total of 30 articles were initially retrieved
- These were screened based on their titles and abstracts, resulting in the exclusion of ten studies that lacked relevance
- Twenty articles were shortlisted for full-text review.

Full-text review

- The 20 selected articles underwent full-text assessment to determine their suitability
- Nine studies were excluded due to methodological weaknesses or irrelevance
- Eleven studies met the inclusion criteria and were included in the final review.

Data extraction and qualitative synthesis

A structured table was created to summarize key details from the selected studies, including:

- Authors and year of publication
- Study type (e.g., observational study, case study, experimental research, and systematic review)
- Industry/occupation
- Key findings: Whether OSHMS reduced accidents and, if available, the extent of reduction.

Rather than conducting a quantitative data analysis, the findings from these studies were synthesized qualitatively to identify common themes, patterns, and effectiveness trends of OSHMS in reducing industrial accidents. The results were discussed in relation to industry-specific safety interventions and their practical implications.

Preferred reporting items for systematic reviews and meta-analyses flow diagram

All study selection, screening, and synthesis were conducted independently by the author.

RESULTS

Study selection and characteristics

A total of 30 studies were initially identified through database searches (Google Scholar, PubMed, Scopus, and Web of Science). After screening based on title and abstract, 20 studies were selected for full-text review. Following the application of the inclusion and exclusion criteria, 11 studies were included in the final synthesis. The selected studies range from various industries, including manufacturing, construction, oil and gas, food and beverage production, and industrial electromechanical sectors, providing a comprehensive assessment of the impact of OSHMSs on workplace safety [Figure 1].

Identification Records identified through database searching (Google Scholar, PubMed, Scopus, Web of Science) (^{v}=30) Duplicates removed (n=0)
↓
Screening Records screened (n=30) Records excluded (based on title and abstract) (n=10)
↓
Eligibility Full-text articles assessed for eligibility (n=20) Full-text articles excluded (n=9) (due to irrelevance or methodological weaknesses)
↓
Included Studies included in the qualitative synthesis (n=11)

Figure 1: The study selection process based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Effectiveness of OSHMS in reducing workplace accidents

Manufacturing industry

Abidin *et al.*[8] conducted a qualitative study in Indonesia's manufacturing industry in the Sleman area of the Yogyakarta Special Region, Indonesia. They found that the effective implementation of OSHMS resulted in a reduction in work-related accidents, largely due to the structured safety training and hazard prevention measures in place. Companies that actively implemented these safety measures experienced fewer incidents, resulting in decreased losses associated with workplace accidents. These findings also indicate that a one-criterion increase in OSH application compliance will result in a 12-case decrease in work accidents.

Kessy and Raymond[9] conducted a quantitative study that utilized a survey methodology. The focus of the study was on the manufacturing industry in Tanzania. Specifically, data were gathered from the five largest manufacturing companies located in Dar es Salaam, the country's largest city and industrial hub. The study reported that in Tanzania's manufacturing sector, OSHMS interventions, including regular risk assessments, worker training, and emergency preparedness, contributed to a significant decrease in work-related injuries and risks. Effective implementation of OHS guidelines, programs, and administrative structures significantly contributes to the reduction of workplace accidents, injuries, property damage, and work-related illnesses. Companies that actively applied these OHS components experienced a notable decrease in workplace hazards.

Their research highlights the importance of a proactive approach to Occupational Safety and Health (OSH), emphasizing that regular training, thorough safety audits, and robust incident reporting systems are essential in minimizing workplace hazards.

Construction industry

A study by Yoon *et al.*[4] from South Korea's construction industry employed a mixed-methods approach, combining quantitative analysis of accident rates with a qualitative survey to assess awareness levels before and after the implementation of OSHMS. Specifically, the KOSHA 18001 certification – a standard developed by the Korea Occupational Safety and Health Agency. The study reveals significant reductions in both general and fatal accident rates following the implementation of an Occupational Health and Safety Management System (OHSMS). For the general accident rate**, a**mong the top 100 construction companies, those with OHSMS certification experienced a 67% reduction in the average annual accident rate compared to non-certified companies during the 2006–2011 period.

For the fatal accident rate**, c**ertified companies saw a 10.3% decrease in the average annual fatal accident rate compared to their non-certified counterparts over the same timeframe.

Oil and gas industry

A cross-sectional study was designed to investigate the relationships, as reported in a study by Liu *et al.*,[10] which found a relatively strong and significant negative correlation between the prevalence of workplace accidents and occupational injuries and the Occupational Health and Safety Management Frameworks (OHSMF) in Ghana's oil and gas sector. The findings suggest that the OHSMF may not be sufficient or effective in regulating industry hazard exposures. Therefore, the application of the current OHSMS did not effectively reduce workplace hazards.

Their findings also suggest that effective implementation of OHSMF can be associated with a reduction in such incidents. The study therefore recommends that management invest in regular safety orientations and training to increase workers' safety knowledge, since this has been shown to significantly mitigate the link between OHSMS and workplace accidents and injuries.

Chemical industry

Yoo and Shim[11] conducted a study that encompassed various industries subject to PSM regulations in South Korea, with a particular focus on the chemical industry. The PSM system, introduced in South Korea in 1996, aims to prevent major industrial accidents by requiring companies to organize and manage chemical accident prevention measures voluntarily. The key components of the PSM system include risk assessment, safety operation procedures, facility maintenance, safety work permits, management of change, and emergency control plans.

The study's findings indicate a significant correlation between PSM assessment scores and the frequency of significant industrial mishaps. Notably:

- Company size: 36% of all businesses were small and medium-sized, with <100 employees, analyzed accidents, suggesting a higher incidence rate compared to larger companies
- PSM evaluation grades: Companies receiving inadequate PSM levels, rated as M-grade (M+ and M−), constituted 67% of the analyzed cases, indicating a higher likelihood of major industrial accidents among these organizations.

Similarly, an analysis of major industrial accidents in South Korea's oil and gas sector highlighted that companies with a well-established PSM System had significantly fewer catastrophic events compared to those with weak safety structures.

Beverage and electromechanical industries

A case study in Harare's beverage industry conducted by Musungwa and Kowe[12] showed that post-OSHMS implementation, accident rates dropped by 28% due to better compliance with safety protocols and improved hazard communication. The OHSMS interventions include regular audits, safety training programs, and incident reporting systems. The study's findings indicated that there was no significant association between the occurrence of accidents and the implementation of OHSMS audits (Chi-square $P > 0.05$). The primary cause of accidents was identified as employee noncompliance with safe operating procedures (unsafe activities). The research suggests that while OHSMS audits are essential, their effectiveness in accident prevention may be limited without addressing underlying behavioral factors. The study recommends interventions focused on modifying employee behavior, enhancing safety procedures, and fostering a robust safety culture within the company.

Grandez *et al.*[13] conducted research in the electromechanical industry and demonstrated that the adoption of OSHMS resulted in a reduction in occupational accidents of approximately 87.5% (from eight accidents to just one). The research was an empirical study that aimed to develop an Occupational Safety and Health Management System (OSHMS) to reduce the rate of occupational accidents among workers at an industrial electromechanical company. The proposed implemented system took into consideration the following five phases: Policy, scope, planning, implementation, and verification. The implementation of the OSHMS led to a significant reduction in workplace accidents. By systematically identifying and addressing the probable causes of accidents, the company was able to enhance its safety performance.

Multi-industry analysis

Kim[14] conducted a study that encompassed various industries across South Korea, with a focus on comparing the effects of KOSHA 18001 implementation across different sectors and enterprise sizes. The primary intervention evaluated was the implementation of the KOSHA 18001 Occupational Health and Safety Management System (OHSMS). This system provides a structured framework for organizations to manage and continually improve their occupational health and safety risks. The study evaluated the impact of adopting this system on reducing industrial accidents. The study found that, compared to the period before KOSHA 18001 was implemented, the accident rate decreased more than it had previously. In particular, T was defined as the year when a business started using KOSHA 18001. According to an industry-specific study, manufacturing ($P = 0.020$) and other firms ($P = 0.011$) had higher accident reduction rates between T and T+1 than between T-2 and T-1. According to size-specific studies, businesses with 299 or fewer employees had a higher accident reduction rate between T and T+1 than between T-2 and T-1 ($P = 0.008$), as did businesses with 300 or more employees ($P = 0.043$). Nonetheless, there were differences in the accident rates between businesses that adopted KOSHA 18001 and those that did not, based on size and industry.

Wachter and Yorio[15] also conducted theoretical and practical research aimed at developing a comprehensive system of safety management practices, focusing on general organizational settings. According to the report, higher levels of worker engagement are significantly associated with lower accident rates. Engagement serves as a mediator between safety management systems and safety performance outcomes, indicating that the effectiveness of safety practices in reducing accidents is enhanced when workers are actively engaged. The research suggests that organizations aiming to reduce workplace accidents should focus on both implementing comprehensive safety management practices and fostering a culture of worker engagement.

Impact of certification programs on workplace safety

Several studies examined the role of OSHMS certification programs such as ISO 45001:2018 and the Certificate of Recognition (COR) program.

- Črv *et al.*[16] carried out research on a wide range of industries across the European Union (EU), analyzing data on occupational accidents and ISO 45001:2018 certifications without restricting to specific sectors. The primary intervention evaluated is the implementation of an ISO 45001:2018-certified Occupational Health and Safety Management System (OHSMS). ISO 45001:2018 provides a framework for organizations to proactively improve employee safety, reduce workplace risks, and create better, safer working conditions. The study examines the relationship between the adoption of this certified system and the incidence of workplace accidents. The study reveals a significant relationship between the number of ISO 45001:2018-certified organizations and the reduction of occupational accidents in EU member states. In 2020, there were 30,849 organizations in the EU with ISO 45001:2018 certification, with Italy having the highest number of certificates issued per 100,000 employed persons. The analysis suggests that an increase in the number of certified organizations is associated with a decrease in the incidence rate of workplace accidents. Specifically, the study confirms a moderate negative correlation between the ISO 45001:2018 certificate rate and the incidence rate, suggesting that the adoption of certified OHSMS contributes to improved workplace safety.

- McLeod and Macpherson[17] conducted an observational study that analyzed the impact of the COR program, a voluntary OHSMS certification, on work-related injury rates among firms in Alberta, Canada. The study compared injury rates before and after COR implementation to assess its effectiveness. The study encompassed various industries within Alberta, Canada, where firms voluntarily adopted the COR program to enhance workplace safety.

The reported stated that firms participating in the COR program experienced a significant reduction in work-related injuries. Furthermore, there was a notable decline in both the frequency and severity of injuries post-COR implementation.

Common trends and challenges

Across industries, key trends in OSHMS effectiveness include:

- Proactive hazard assessment and control measures leading to accident prevention
- Employee training and safety knowledge as a critical factor in reducing workplace injuries
- Regular audits and compliance monitoring ensure sustained improvements in safety.

However, challenges such as a lack of management commitment, financial constraints, and resistance to change were identified as barriers to the full implementation of OSHMS in some organizations. Overall, the systematic review confirms that OSHMS plays a crucial role in reducing workplace accidents and enhancing occupational safety across various industries. The findings support the need for continuous investment in safety management frameworks, regulatory compliance, and worker training to maximize the benefits of OSHMS interventions [Table 1].

DISCUSSION

The systematic review analyzed 11 studies examining the OSHMSs efficacy in reducing industrial accidents and disasters across various industries. The industries studied included manufacturing, beverage production, construction, oil and gas, and the electromechanical industry. From the findings of the review, substantial evidence has been provided regarding the implementation of OSHMSs and their significant contribution to minimizing industrial accidents and disasters. Across various industries, including manufacturing, construction, healthcare, and mining, the studies demonstrate that structured safety management practices lead to measurable improvements in workplace safety outcomes.

A common observation among the findings of the studies is the correlation between OSHMS implementation and a decline in accident rates. For instance, studies conducted by Kessy and Raymond[9] and Abidin *et al.*[8] indicate that organizations that adopted OSHMS experienced a significant decrease in workplace incidents compared to those that did not adopt it. These findings align with previous research emphasizing the role of systematic safety procedures, hazard identification, and employee training in mitigating workplace risks. However, some studies revealed variation in OSHMS effectiveness across different industries, suggesting that industry-specific adaptations may be necessary. For example, research in the construction sector, as reported by Yoon *et al.*,[4] revealed that customized safety protocols tailored to high-risk environments resulted in greater accident reduction than generic OSHMS models. Similarly, studies by Liu *et al.*[10] and Musungwa and Kowe[12] further identified a critical gap in the effectiveness of OHSMSs in mitigating workplace hazards in Ghana's oil and gas industry. Despite the implementation of OHSMS, accidents and injuries at work remained prevalent, suggesting that the existing frameworks were either inadequate or poorly enforced. This aligns with broader research indicating that the mere presence of safety management systems does not automatically translate into improved safety outcomes unless they are effectively implemented, regularly evaluated, and supported by a strong safety culture (Abubakar *et al*).[18]

Furthermore, a significant aspect highlighted from the analyzed studies is the role of leadership and organizational commitment in the effectiveness of OSHMS. Research by Wachter and Yorio[15] emphasizes that employers and management's proactive involvement in safety practices, including regular audits and employee engagement, encourages a culture of security that extends beyond compliance with regulations. This highlights the need for organizations to integrate OSHMS as a core aspect of their operational framework, rather than merely meeting a regulatory requirement.

Another key finding from these studies is the mediation role of safety knowledge and adherence to safe operating procedures. It suggests that without adequate training, workers may not fully understand or adhere to safety protocols, thereby diminishing the potential benefits of OHSMS. This is similar to findings from other industries, where safety programs for awareness and training significantly reduce accident rates (Gyekye and Salminen).[19] Thus, integrating comprehensive safety education into OHSMS may enhance hazard control and compliance. Furthermore, the findings from these studies highlight the importance of the enforcement of regulations and continuous improvement of safety frameworks. Weak enforcement mechanisms and limited organizational commitment may result in a gap between policy and practice, which has been observed in various high-risk industries

Table 1: A summary of the included studies, highlighting key findings on accident reduction

Study	Authors and year	Study type	Industry	OSHMS interventions	Findings on accident reduction
1.	Kessy and and Raymond[9]	Quantitative study	Manufacturing industry	Establishment and enforcement of clear safety policies, implementation of training sessions, workshops, and continuous education, formation of dedicated OHS units or departments responsible for monitoring compliance, conducting regular safety audits, and managing incident reporting systems.	Significant reduction of workplace accidents, injuries, property damage, and work-related illnesses, and a notable decrease in workplace hazards.
2.	Musungwa and Kowe[12]	Qualitative and quantitative study	Food and beverage industry	Regular audits, safety training programs, and establishment of incident reporting systems.	There was no significant association between the occurrence of accidents and the implementation of OHSMS audits (Chi-square $P>0.05$). The primary cause of accidents was identified as non-adherence to safe operating procedures (unsafe acts) by employees.
3.	Abidin *et al*.[8]	Qualitative study	Manufacturing industry	Safety training and education, safety audits and inspections, and incident reporting systems.	Effective implementation of OSHMS components significantly contributed to a reduction in work-related accidents. Companies that actively applied these safety measures experienced fewer incidents, leading to decreased losses associated with workplace accidents.
4.	Yoon *et al*.[4]	Mixed-methods approach, combining quantitative analysis and qualitative survey to assess awareness levels.	Construction industry	The primary intervention analyzed is the implementation of the OHSMS, specifically the KOSHA 18001 certification – a standard developed by the Korea Occupational Safety and Health Agency.	Significant reductions in both general and fatal accident rates following the implementation of OHSMS: General Accident Rate: Among the top 100 construction companies, those with OHSMS certification experienced a 67% reduction in the average annual accident rate compared to non-certified companies during the period from 2006 to 2011. Fatal Accident Rate: Certified companies saw a 10.3% decrease in the average annual fatal accident rate compared to their non-certified counterparts over the same timeframe.

(Contd...)

Table 1: *(Continued)*

Study	Authors and year	Study type	Industry	OSHMS interventions	Findings on accident reduction
5.	Kim[14]	Cohort study	Multi-industry analysis	The primary intervention evaluated was the implementation of the KOSHA 18001 Occupational Health and Safety Management System (OHSMS).	The study found that, compared to the period before implementation, the accident reduction rate was greater after KOSHA 18001 was implemented.
6.	Črv *et al*.[16]	Empirical study	Multi-industry analysis	The primary intervention evaluated is the implementation of an ISO 45001:2018-certified Occupational Health and Safety Management System (OHSMS). ISO 45001:2018 provides a framework for organizations to proactively improve employee safety, reduce workplace risks, and create better, safer working conditions.	The study reveals a significant relationship between the number of ISO 45001:2018-certified organizations and the reduction of occupational accidents in European Union member states.
7.	Liu *et al*.[10]	Cross-sectional study	Oil and gas industry	The primary intervention evaluated is the implementation of OHSMF within the organizations. The study also examines the role of safety training as a critical component in enhancing employees' safety knowledge, which in turn is hypothesized to influence the rate of workplace accidents and injuries.	The study's findings indicate a moderately strong negative and significant relationship between OHSMF and the occurrence of workplace accidents and occupational injuries.
8.	Wachter and Yorio[15]	Empirical and theoretical study	Multi-industry analysis	Management commitment, safety training, employee involvement, safety communication and feedback, safety goals and objectives, safety policies and procedures, safety personnel, safety program evaluation, safety reward systems, employee safety control.	The study found that higher levels of worker engagement significantly predict lower accident rates. Engagement serves as a mediator between safety management systems and safety performance outcomes, indicating that the effectiveness of safety practices in reducing accidents is enhanced when workers are actively engaged. The research suggests that organizations aiming to reduce workplace accidents should focus on both implementing comprehensive safety management practices and fostering a culture of worker engagement.

(Contd...)

Table 1: *(Continued)*

Study	Authors and year	Study type	Industry	OSHMS interventions	Findings on accident reduction
9.	Grandez *et al*.[13]	Empirical study	Industrial electromechanical industry	Establishing a safety policy that reflects the company's commitment to occupational health and safety, defining the extent and boundaries of the OSHMS within the organization, identifying hazards, assessing risks, and determining necessary controls, executing the planned safety measures and controls, as well as monitoring and evaluating the effectiveness of the implemented safety measures.	The implementation of the OSHMS led to a significant reduction in workplace accidents.
10.	Yoo and Shim[11]	Empirical study	Multi-industry analysis	The primary intervention evaluated is the PSM system, which was introduced in South Korea in 1996. Key components of the PSM system include risk assessment, safety operation procedures, facility maintenance, safety work permits, management of change, and emergency control plans.	The study's findings indicate a significant correlation between PSM evaluation grades and the occurrence of major industrial accidents. Notably: • Company size: SMEs with fewer than 100 employees accounted for 36% of all analyzed accidents, suggesting a higher incidence rate compared to larger companies. • PSM evaluation grades: Companies receiving inadequate PSM levels, rated as M-grade (M+and M−), constituted 67% of the analyzed cases, indicating a higher likelihood of major industrial accidents among these organizations.
11.	McLeod and Macpherson[17]	Observational study	Multi-industry analysis	The primary intervention evaluated was the COR program, which requires firms to develop and implement a comprehensive Occupational Health and Safety Management System (OHSMS). Key components of the COR program include hazard assessment and control, emergency response planning, employee training and competency development, and regular audits and evaluations.	The study found that firms participating in the COR program experienced a significant reduction in work-related injuries. Specifically, there was a notable decline in both the frequency and severity of injuries post-COR implementation.

OHSMS: Occupational health and safety management system, KOSHA: Korea occupational safety and health agency, OHSMF: Occupational health and safety management frameworks, PSM: Process safety management, SMEs: Small and medium-sized enterprises, COR: Certificate of recognition.

(Ismail *et al*).[20] Strengthening monitoring mechanisms, conducting periodic safety audits, and fostering a culture of accountability could optimize the performance of OHSMS in reducing workplace hazards.

Overall, the systematic review confirms that OSHMS plays a pivotal contribution in reducing industrial accidents and disasters in one way or the other. However, for optimal results, organizations must ensure proper implementation, continuous improvement, and adaptation to industry-specific risks. Future research should focus on longitudinal studies to assess the sustained impact of OSHMS and present innovative approaches for enhancing safety management in evolving work environments.

CONCLUSION

This systematic review highlights the effectiveness of OHSMSs in fostering a safer working environment and lowering workplace accidents. While the implementation of OHSMS audits and policies is crucial, findings suggest that their success in accident prevention is influenced by employee behavior and adherence to safety protocols. The study highlights the importance of integrating behavioral interventions, continuous safety training, and a strong safety culture alongside formal Occupational Health and Safety Management System (OHSMS) measures. Future research should explore strategies to enable compliance with safety procedures and assess the long-term impacts of OHSMS on workplace safety.

Ethical approval: Institutional Review Board approval is not required.
Declaration of patient consent: Patient's consent not required as there are no patients in this study.
Financial support and sponsorship: Nil.
Conflicts of interest: There are no conflicts of interest.
Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Akpan MI, Okon AJ, Agbiji NN, Eda AU, Akpan AI, Inah AS, *et al*. Effectiveness of occupational safety and health management systems in reducing industrial accidents and disasters: A systematic review. Calabar J Health Sci. doi: 10.25259/CJHS_4_2025