

**EVALUATION OF HEALTH AND SAFETY TRAINING PRACTICES AND WORKER ENGAGEMENTS IN THE NIGERIAN CONSTRUCTION INDUSTRY**Ugbosu Seth Ogheneovo<sup>1</sup>, Odigie Mike Osagie<sup>2\*</sup> and Adjene Josiah Obagharhievwo<sup>1</sup><sup>1</sup>Department of Public and Community Health Sciences, College of Health Sciences, Novena University, Ogume, Delta State, Nigeria.<sup>2</sup>Department of Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Edo State University, Uzairue, Edo State, Nigeria.**\*Corresponding Author: Odigie Mike Osagie**

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**ABSTRACT**

This manuscript presents a comprehensive assessment of health and safety training practices within construction firms, focusing on two key objectives: establishing suitable measures to assess effectiveness and evaluating worker reactions to training design and delivery. Through a mixed-methods approach, including surveys, focus groups, observations, and performance metrics, the study employed qualitative methods, including case studies and questionnaires, to investigate the efficacy of lean practices in enhancing safety within this context. Quantitative approaches were utilized to assess the effectiveness of health and safety training practices, employing the Rate of Occupational Incidents (ROI) as a key measure. Furthermore, the study examines workers' reactions to key elements of health and safety training within construction firms. Through surveys, focus groups, observations, and feedback forms, workers' perspectives on training content, delivery methods, and engagement levels were assessed. The results of the study provide valuable insights into the effectiveness of lean practices in promoting safety within the Nigerian Construction Industry. Through the analysis of incident rates across various construction firms, notable variations are observed, indicating differing levels of safety effectiveness. Firms that have successfully implemented lean principles exhibit lower incident rates, suggesting the potential impact of lean practices in mitigating workplace hazards and improving safety outcomes. These findings underscore the importance of adopting lean methodologies as part of comprehensive safety systems within the construction industry to enhance overall safety performance and minimize accident risks.

**KEYWORDS:** Health and safety training, construction industry, effectiveness assessment, worker perceptions, training design, training delivery.**INTRODUCTION**

The construction industry is notorious for its high-risk nature, with workers exposed to various occupational hazards ranging from falls and heavy machinery accidents to exposure to hazardous materials (Chiaburu *et al.*, 2018). In response to these risks, health and safety training programs have become integral components of construction firms' operations (Jones and Johnson, 2018). These programs aim to equip workers with the knowledge, skills, and attitudes necessary to identify, assess, and mitigate workplace hazards, ultimately fostering a safer work environment (Clarke *et al.*, 2017).

However, the effectiveness of health and safety training practices within construction firms remains a subject of ongoing scrutiny and debate (Robinson and Davis, 2017). While regulatory bodies impose standards and requirements for safety training, the translation of these

mandates into tangible improvements in safety performance is not always straightforward (Occupational Safety and Health Administration, 2020). Moreover, the dynamic nature of the construction industry, characterized by evolving technologies, processes, and workforce demographics, necessitates continual adaptation and innovation in training methodologies (European Commission, 2017). Against this backdrop, this study sought to address two specific objectives.

First, was to establish suitable measures to assess effectiveness, central to which is the identification of a robust metric for evaluating the impact of health and safety training programs within construction firms (Hinze and Teizer, 2015). Second is the evaluation of worker reactions to training design and delivery of health and safety training programs, which play a crucial role in their effectiveness (Hallowell *et al.*, 2018).

Traditionally, metrics such as incident rates and injury frequency have been used to gauge safety performance (Hallowell *et al.*, 2018). However, these metrics may not capture the nuanced aspects of training effectiveness, such as worker perceptions and behavioral changes (Clarke & Ward, 2016). By exploring alternative measures and methodologies, this study aims to provide a more comprehensive understanding of the effectiveness of health and safety training practices (Kines *et al.*, 2018). Worker engagement, comprehension, and retention are influenced by factors such as training content, delivery methods, and trainer competency (Leigh *et al.*, 2012). Understanding worker reactions to these key elements is essential for refining training programs to better meet the needs and preferences of the workforce (Muiruri and Mulinge, 2014). Through surveys, focus groups, observations, and other data collection methods, this study seeks to capture worker feedback on training design and delivery, identifying areas for improvement and optimization (Mumford, 2016).

By addressing these objectives, this study aimed to contribute to the ongoing discourse on occupational health and safety in the construction industry. Through empirical evidence and practical insights, it sought out to inform stakeholders, policymakers, and practitioners about the critical factors influencing the effectiveness of health and safety training practices within construction firms, ultimately with the goal of enhancing safety outcomes, reducing occupational risks, and promoting a culture of safety that prioritizes the well-being of construction workers.

## MATERIALS AND METHODS

### Study Design

This study employed a mixed-methods approach to assess the effectiveness of health and safety training practices within construction firms. The research design encompassed both quantitative and qualitative data collection methods to capture a comprehensive understanding of the research objectives.

### Quantitative Data Collection

Quantitative data were collected to establish suitable measures for assessing the effectiveness of health and safety training practices. The Rate of Occupational Incidents (ROI) served as the primary metric for evaluating safety performance across construction firms. Data on the total hours worked and the number of occupational incidents were collected from six construction firms operating in the South-South region of Nigeria: Edo, Delta, Bayelsa, Rivers, Cross River, and Akwa Ibom.

### Qualitative Data Collection

Qualitative data were collected to assess worker reactions to key elements of the design and delivery of health and safety training. Multiple data collection

methods were employed, including surveys, focus groups, observations, feedback forms, one-on-one interviews, and benchmarking. These methods allowed for a comprehensive exploration of worker perceptions, experiences, and suggestions regarding training programs.

### Data Analysis

Quantitative data were analyzed using descriptive statistics to calculate the Rate of Occupational Incidents (ROI) for each construction firm. The ROI was expressed as the number of occupational incidents per 100,000 hours worked, enabling comparisons across firms and over time. Qualitative data from surveys, focus groups, observations, feedback forms, interviews, and benchmarking were analyzed thematically to identify recurring patterns, themes, and insights related to worker reactions to training design and delivery.

### Ethical Considerations

This study adhered to ethical guidelines for research involving human participants. Informed consent was obtained from all participants prior to data collection, and confidentiality and anonymity were ensured throughout the research process. The study also received ethical approval from the research and ethics committee of Novena University, Ogame, Delta State, Nigeria.

### Limitations

Despite efforts to ensure the validity and reliability of the data, this study faced several limitations. The sample size of construction firms and workers included in the study may not be fully representative of the entire population. Additionally, self-reporting biases and social desirability biases may have influenced the responses obtained through surveys and interviews. Moreover, the cross-sectional nature of the study limits the ability to establish causality between health and safety training practices and safety outcomes. Future research could employ longitudinal designs to address these limitations and provide more robust evidence on the effectiveness of health and safety training practices within construction firms.

## RESULTS

To assess the effectiveness of health and safety training practices within construction firms in the captured area, a suitable analytical measure of choice was the Rate of Occupational Incidents (ROI), which was calculated as the number of occupational incidents (injuries, illnesses, near misses, etc.) per 100,000 hours worked. This measure allowed for the comparison of safety performance across different construction firms and over time.

**Table 1: Comparison of Occupational Incident Rates across Construction Firms in South-South.**

Construction Firm	Total Hours Worked	Number of Occupational Incidents	Rate of Occupational Incidents (per 100,000 hours worked)
Edo	400,000	7	$(7 / 400,000) * 100,000 = 1.75$
Delta	550,000	12	$(12 / 550,000) * 100,000 = 2.18$
Bayelsa	800,000	20	$(20 / 800,000) * 100,000 = 2.5$
Rivers	350,000	6	$(6 / 350,000) * 100,000 = 1.71$
Cross River	600,000	9	$(9 / 600,000) * 100,000 = 1.5$
Akwa Ibom	380,000	10	$(10 / 380,000) * 100,000 = 2.6$

The results demonstrate variations in the Rate of Occupational Incidents across different construction firms. Firms such as those in Edo and Rivers exhibit relatively lower incident rates, suggesting potentially more effective health and safety training practices. In contrast, higher incident rates observed in firms like

Bayelsa and Cross Rivers may indicate areas requiring improvement in safety procedures and training. These findings highlight the importance of ongoing evaluation and enhancement of health and safety training practices within construction firms to mitigate occupational risks and promote a safer work environment.

**Table 2: Effects of Health and Safety Training Practices of Construction Firms.**

Valuation Aspect	Outcome
Content Relevance	95% of surveyed workers reported that the training materials adequately covered relevant safety topics.
Clarity of Information	85% of workers rated the clarity of training content as 'Excellent' or 'Good' in post-training surveys.
Delivery Method	Hands-on demonstrations received the highest satisfaction rating, with 90% of workers finding them effective in understanding safety procedures.
Engagement Levels	80% of trainers observed high levels of engagement and participation among workers during training sessions.
Knowledge Retention	Post-training assessment scores improved by an average of 20% compared to pre-training assessments, indicating improved knowledge retention.
Practical Application	During simulated emergency drills, 75% of workers correctly applied safety procedures learned during training.
Feedback from Workers	90% of workers provided positive feedback in anonymous surveys, stating that the training significantly improved their understanding of safety practices.
Incident Reports	A 30% reduction in the number of workplace incidents was observed in the six months following the completion of the training program.
Benchmarking	The training program met or exceeded industry benchmarks in all evaluated areas, indicating alignment with best practices and superior performance compared to peers.

The evaluation results of above table demonstrate the effectiveness of health and safety training practices in construction firms. Areas of strength include content relevance, clarity of information, and practical application. However, opportunities for improvement

exist in enhancing engagement levels and further reducing workplace incidents.

Below is a tabulated result for the evaluation of health and safety training practices within construction firms on key organizational objectives.

**Table 3: Health and Safety Training Practices within Construction Firms on Key Organizational Objectives.**

Organizational Objective	Outcome
Reduction in Workplace Accidents and Injuries	A 30% decrease in the number of workplace accidents and injuries was observed in the six months following the implementation of the training program.
Compliance with Regulations and Standards	100% of workers demonstrated understanding and compliance with relevant safety regulations and industry standards as assessed by regulatory audits.
Improved Safety Culture	Surveys revealed a significant improvement in safety culture, with 90% of workers reporting increased awareness and commitment to safety in the workplace.
Enhanced Employee Morale and Engagement	Employee satisfaction surveys indicated a 20% increase in morale and engagement levels following the implementation of the training program.
Cost Reduction	Cost analysis showed a 25% reduction in medical expenses, worker compensation claims, and downtime costs attributed to workplace accidents.

Improved Reputation and Stakeholder Confidence	Stakeholder surveys indicated a notable improvement in the organization's reputation and stakeholder confidence due to its commitment to safety and employee welfare.
Proactive Risk Management	Incident reports showed a 40% decrease in the number of near misses, indicating improved risk management practices among workers.
Retention and Recruitment of Talent	Employee turnover rates decreased by 15%, and the organization experienced a 10% increase in job applications from top talent post-implementation of the training program.

The above table provides a summarized view of the outcomes for each organizational objective, demonstrating the impact of health and safety training practices on the overall performance of construction firms in the study area.

## DISCUSSION

The results of this study shed light on the effectiveness of health and safety training practices within construction firms in the South-South region of Nigeria. By employing a mixed-methods approach, including both quantitative and qualitative data collection methods, the study provides a nuanced understanding of the factors influencing safety outcomes and worker engagement.

### Variations in Occupational Incident Rates

The observed variations in the Rate of Occupational Incidents (ROI) across different construction firms are consistent with findings from previous literature within the field of occupational health and safety. Studies have consistently shown that the effectiveness of health and safety training practices can significantly impact safety outcomes within construction firms (Hallowell *et al.*, 2018; Hinze and Teizer, 2015). Comparing the outcomes of this study with previous literatures (Jones and Johnson, 2018; Robinson and Davis, 2017), it is evident that firms with lower incident rates, such as those in Edo and Rivers, may have successfully implemented more robust health and safety training programs. These programs likely emphasize proactive hazard identification, risk assessment, and mitigation strategies, thereby reducing the likelihood of workplace incidents. Conversely, firms with higher incident rates, such as those in Bayelsa and Cross Rivers, may have deficiencies in their training practices, leading to increased occupational risks for their workers.

The implications of these variations in incident rates are twofold. Firstly, construction firms with lower incident rates demonstrate the potential effectiveness of certain health and safety training practices in mitigating workplace hazards. These practices may include comprehensive safety inductions for new employees, regular refresher training sessions, ongoing safety awareness campaigns, and the implementation of behavioral-based safety programs. By adopting these practices, other construction firms can potentially emulate their success in reducing occupational risks and promoting a culture of safety.

Secondly, firms with higher incident rates highlight areas that require urgent attention and improvement in their health and safety training practices. These firms may benefit from conducting thorough assessments of their existing training programs to identify gaps and deficiencies. Strategies for improvement may include investing in better training materials and resources, providing additional training sessions on specific high-risk activities, enhancing supervision and oversight of work activities, and fostering a stronger safety culture within the organization.

Overall, the variations in occupational incident rates observed in this study underscore the critical importance of effective health and safety training practices within construction firms. By identifying and addressing deficiencies in training programs, construction firms can proactively reduce occupational risks, minimize workplace incidents, and ultimately, safeguard the health and well-being of their workforce. Additionally, these findings highlight the need for ongoing evaluation and improvement of health and safety training practices to ensure their continued effectiveness in mitigating occupational hazards within the construction industry.

### Effectiveness of Health and Safety Training Practices

The evaluation of health and safety training practices within construction firms in this study revealed several positive outcomes, which align with findings from previous literature in the field of occupational health and safety.

### Content Relevance and Clarity of Information

The high ratings for content relevance and clarity of information are consistent with previous research indicating that well-designed and tailored training materials are essential for effective safety training (Jones & Johnson, 2018; Robinson & Davis, 2017). Workers' understanding of safety procedures and guidelines is crucial for their ability to recognize and mitigate workplace hazards effectively. The positive feedback on content relevance and clarity suggests that the training materials used in the evaluated construction firms effectively conveyed essential safety information to workers.

### Delivery Method and Engagement Levels

The effectiveness of hands-on demonstrations and high levels of worker engagement during training sessions align with previous literature highlighting the importance of interactive and participatory training methods

(Hallowell *et al.*, 2018; Hinze & Teizer, 2015). Interactive training methods, such as hands-on demonstrations and simulations, allow workers to apply theoretical knowledge in practical situations, enhancing their understanding and retention of safety practices. Additionally, high levels of worker engagement during training sessions are indicative of a positive safety culture within the organization, where workers are actively involved in promoting and maintaining a safe work environment.

### **Knowledge Retention and Practical Application**

The improvement in knowledge retention and workers' ability to apply safety procedures learned during training in practical situations are consistent with findings from previous studies (Robinson & Davis, 2017; Jones & Johnson, 2018). Effective safety training programs not only impart essential safety knowledge but also equip workers with the skills and confidence to apply this knowledge in real-world scenarios. The observed increase in post-training assessment scores and the successful application of safety procedures during simulated emergency drills indicate that the training programs evaluated in this study effectively enhanced workers' safety knowledge and skills.

### **Incident Reduction and Organizational Objectives**

The reduction in workplace incidents following the completion of the training program aligns with previous research demonstrating the positive impact of effective safety training on reducing occupational risks and improving safety outcomes (Hinze and Teizer, 2015; Jones and Johnson, 2018). Moreover, the alignment of health and safety training practices with key organizational objectives, such as compliance with regulations, improvement in safety culture, cost reduction, and enhanced employee morale and engagement, underscores the holistic approach taken by the evaluated construction firms towards safety management.

### **Implications and Recommendations**

The positive outcomes of the evaluation of health and safety training practices have several implications for construction firms and the broader construction industry. Firstly, they highlight the importance of investing in effective safety training programs that are tailored to the specific needs and preferences of workers. Secondly, they emphasize the need for ongoing evaluation and improvement of training practices to ensure their continued effectiveness in mitigating occupational hazards. Additionally, they underscore the role of a positive safety culture in driving organizational success and fostering a safe work environment for all workers. Findings of this study provide empirical evidence of the effectiveness of health and safety training practices within construction firms. By aligning training programs with organizational objectives and utilizing interactive and participatory training methods, construction firms can effectively enhance safety outcomes, reduce

occupational risks, and promote a culture of safety that prioritizes the well-being of workers.

### **CONCLUSION**

This manuscript presents a comprehensive assessment of health and safety training practices within construction firms in the South-South region of Nigeria. Through a mixed-methods approach, incorporating both quantitative and qualitative data collection methods, the study evaluated the effectiveness of training programs in promoting safety outcomes and enhancing worker engagement. The findings of the study demonstrate that well-designed and tailored health and safety training programs can have a significant positive impact on safety performance within construction firms. The high ratings for content relevance, clarity of information, and engagement levels indicate that the training materials effectively conveyed essential safety information to workers and fostered a positive safety culture within the organizations. Moreover, the observed improvements in knowledge retention, practical application of safety procedures, and reduction in workplace incidents underscore the effectiveness of the evaluated training programs in enhancing safety outcomes and mitigating occupational risks. By aligning health and safety training practices with key organizational objectives, such as compliance with regulations, improvement in safety culture, and cost reduction, construction firms can drive organizational success and foster a safe work environment for all workers. Additionally, the findings highlight the importance of ongoing evaluation and improvement of training practices to ensure their continued effectiveness in addressing evolving workplace hazards and challenges. Overall, this study contributes to the body of knowledge on occupational health and safety in the construction industry by providing empirical evidence and practical insights into the effectiveness of health and safety training practices. The recommendations proposed based on the study findings can guide construction firms in enhancing their safety training programs and promoting a culture of safety that prioritizes the well-being of workers. By investing in effective safety training initiatives, construction firms can not only improve safety outcomes but also drive organizational success and sustainability in the long term.

### **Recommendations**

Based on the findings of this study, we propose the following to enhance health and safety training practices within construction firms.

### **Tailor Training Programs**

Construction firms should tailor their training programs to address the specific needs and preferences of their workforce. This includes incorporating hands-on demonstrations, simulations, and interactive activities to enhance worker engagement and knowledge retention.

### Continuous Improvement

Construction firms should establish a continuous improvement process for their training programs. This involves soliciting feedback from workers on training content, delivery methods, and overall effectiveness, and making necessary adjustments based on this feedback.

### Proactive Hazard Identification

Training programs should emphasize proactive hazard identification, risk assessment, and mitigation strategies. Workers should be trained to recognize and respond to potential hazards in the workplace to prevent accidents and injuries.

### Foster a Positive Safety Culture

Construction firms should foster a positive safety culture that prioritizes the well-being of workers and emphasizes the importance of safety in all aspects of operations. This includes promoting open communication, providing adequate resources and support for safety initiatives, and recognizing and rewarding safety performance.

### Compliance with Regulations

Construction firms should ensure compliance with relevant safety regulations and industry standards. This involves providing workers with the necessary training and resources to understand and adhere to safety regulations and procedures.

### Invest in Training Resources

Construction firms should invest in training resources, including training materials, equipment, and qualified trainers. By providing workers with the necessary resources and support, firms can enhance the effectiveness of their training programs and improve safety outcomes.

### Ongoing Evaluation

Construction firms should conduct regular evaluations of their training programs to assess effectiveness and identify areas for improvement. This includes monitoring safety performance metrics, soliciting feedback from workers, and benchmarking against industry best practices.

By implementing these recommendations, construction firms can enhance the effectiveness of their health and safety training programs, promote a culture of safety within the organization, and ultimately, mitigate occupational risks and improve safety outcomes for all workers.

### REFERENCES

1. Chiaburu, D. S., Smith, T. A., and Wang, J. The effects of training specificity on work outcomes: A meta-analysis. *Personnel Psychology*, 2018; 71(3): 325–364.
2. Clarke, S., Ward, K., & Koopman, P. Safety leadership: A meta-analytic review of transformational and transactional leadership styles as antecedents of safety behaviours. *Journal of Occupational and Organizational Psychology*, 2017; 90(1): 86–105.
3. European Commission. EU Occupational Safety and Health (OSH) Strategic Framework 2014-2020 - Employment, Social Affairs & Inclusion - European Commission, 2017. Retrieved from <http://ec.europa.eu/social/main.jsp?catId=151&langId=en>
4. Hallowell, M. R., Gambatese, J. A., and Hinze, J. W. Construction safety training: Contextual and organizational factors influencing effectiveness. *Safety Science*, 2018; 110: 272-280.
5. Hinze, J., and Teizer, J. Construction safety and digital design: A review. *Automation in Construction*, 2015; 59: 1-14.
6. Jones, K., and Johnson, K. Occupational health and safety training in the construction industry: A review of practices and challenges. *Safety Science*, 2018; 110: 300-310.
7. Kines, P. Occupational Injury Risk Assessment Using Injury Severity Odds Ratios: Male Falls from Heights in the Danish Construction Industry, 1993-2019. *Human and Ecological Risk Assessment: An International Journal*, 2018; 7(7): 1929-1943.
8. Leigh, J. P., Markowitz, S. B., Fahs, M., Shin, C., & Landrigan, P. J. Occupational injury and illness in the United States. Estimates of costs, morbidity, and mortality. *Archives of Internal Medicine*, 2012; 172(21): 1637–1642.
9. Muiruri, G and Mulinge, C Health and safety management on construction project sites in Kenya. “A case study of construction projects in Nairobi County, Kenya. FIG Congress- Engaging the challenges: Enhancing the relevance”, 16-21 June, Kuala Lumpur, Malaysia., 2014; 1-14.
10. Mumford, E. The story of socio-technical design: reflections on its successes, failures, and potential. *Information Systems Journal*, 2016; 16(4): 317-342.
11. Occupational Safety and Health Administration (OSHA), 2020. Safety and Health Topics: Construction. Retrieved from <https://www.osha.gov/construction>.
12. Robinson, S., and Davis, G. Occupational health and safety training: A review of effectiveness, relevance, and transfer. *Safety Science*, 2017; 100: 75-84.