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ARTICLE

Assessing Hazards and Risks Associated in the Construction Projects: A Case Study of Akure, Nigeria

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ABSTRACT

The construction industry, a major contributor to national economic growth, faces significant challenges in ensuring occupational health and safety, particularly due to the increasing demand for infrastructure. This study investigates the hazards and risks associated with construction projects, focusing on their impact on workers and project outcomes. To accomplish this, the study identifies the hazards and risks associated with construction project, assesses the effects of the identified hazards and risks on construction workers and project outcomes, and strategies to reduce hazards and risks. A quantitative research approach was employed using structured questionnaires distributed to 135 built environment professionals in Akure, Nigeria. The findings reveal that slips and trips, electrical shocks, and being struck by moving machinery are the most significant hazards, while cost overruns, project delays, and fatigue from manual handling tasks are common consequences. Despite moderate awareness of these hazards, the implementation of effective safety measures remains inconsistent due to inadequate training, weak enforcement of regulations, and budgetary constraints. Strategies such as fostering a safety-first culture, regular hazard assessments, enhanced training, and stricter regulatory enforcement were identified to improve safety performance during production. The study concludes by emphasizing the urgent need for proactive, integrated risk management systems to minimize hazards and promote a safer construction environment in Nigeria.

Keywords: Accident; Construction; Hazard; Injury; Nigeria; Project

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ARTICLE INFO
Received: 18 August 2025 | Revised: 19 October 2025 | Accepted: 26 October 2025 | Published Online: 1 November 2025
DOI: https://doi.org/10.55121/upc.v3i2.693

CITATION
Albert, I., 2025. Assessing Hazards and Risks Associated in the Construction Projects: A Case Study of Akure, Nigeria. Urban Planning and Construction. 3(2): 28–39. DOI: https://doi.org/10.55121/upc.v3i2.693

1. Introduction

The Nigerian construction industry is one of the key drivers of economic growth, significantly contributing to the country's rising gross domestic product [1]. The construction industry is pivotal in shaping the future of Nigeria, especially in urban areas where development is booming and the demand for infrastructure is at an all-time high [2]. The sector's expansion is driven by the urgent need for new roads, bridges, and buildings to accommodate the country's growing population and urbanization trends [3]. However, with this rapid growth comes significant challenges, particularly in hazards and risks associated in the construction industry [2,4]. In the rush to meet tight deadlines and stay within budget, some projects may overlook critical safety protocols, putting workers at risk and potentially harming the environment [5]. Accidents in the construction industry are, unfortunately, all too common.

Hazards refer to any source of potential harm or adverse effects on workers, equipment, materials, or the environment [2]. Hazards come in different types, including physical, chemical, biological, ergonomic, and environmental threats [6]. According to Isaac and Edrei [7], hazards in construction are often a result of the dynamic and unpredictable nature of construction sites, where multiple activities occur simultaneously, increasing the likelihood of accidents and injuries. Risks on the other hand are defined as the probability or likelihood that a hazard will cause harm or adverse effects under specific circumstances [8]. In construction projects, risks are assessed based on the severity of potential outcomes and the frequency with which hazardous situations may occur. Risk management involves identifying, evaluating, and implementing measures to control these risks to minimize their impact on workers' safety, health, and overall project outcomes.

According to Sawyer [9], accident is an unexpected and unwelcome event that disrupts work, leading to injuries, fatalities, and damage to equipment and structures. The construction industry consistently records some of the highest rates of workplace injuries and fatalities, with many incidents resulting from slips, trips, falls, electrical hazards, and impact injuries [10]. These accidents have serious repercussions, not just for the workers involved but also for the entire project, often causing delays, financial losses, and damage to the company's reputation [11]. Construction projects involve complex processes, ranging from site preparation and structural assembly to electrical installations and finishing work [12]. Every stage of a building project has different risks, such as exposure to hazardous materials, falls from elevated levels, accidents involving machinery, and environmental dangers [7]. These risks have a complex nature that is frequently impacted by elements including the site's physical state, employee conduct and education, and the efficiency of safety management systems [13]. The assessment of hazards and risks in construction projects is therefore crucial for identifying potential dangers, mitigating risks, and ensuring the safety and well-being of all individuals involved. In addition to providing worker protection, this assessment decreases project delays, lowers accident and injury expenses, and improves the overall quality of the project [14]. The construction sector still has a lot of work to do when it comes to risk management, even with the introduction of new safety technologies and regulatory frameworks [15].

Despite its pivotal role in driving Nigeria's economic growth, the construction industry remains one of the most dangerous sectors for workers, with a troublingly high rate of accidents, injuries, and environmental damage [16]. Workers are exposed to a wide range of hazards, including falls from heights, electrocutions, equipment malfunctions, and exposure to toxic substances [2]. These risks not only endanger the lives and well-being of workers but also lead to significant financial losses, project delays, and legal liabilities [11]. Therefore, there is need to identify the risks in the construction project. This study aims to assess the hazards and risks associated with construction projects, with a focus on understanding the underlying causes of accidents and identifying best practices for risk management. Without identify the hazards and risks associated with construction project and the effects of the identified hazards and risks on construction workers and project outcomes, it may be difficult to understand the causes and identify strategies to reduce hazards and risks in the construction projects. The specific objectives are to: (1) identifies the hazards

and risks associated with construction project, (2) assess the effects of the identified hazards and risks on construction workers and project outcomes, and (3) strategies to reduce hazards and risks.

2. Literature Review

2.1. Hazards and Risks in Construction Projects

Construction projects inherently involve numerous hazards that can lead to severe accidents if not adequately managed. These hazards range from physical risks, such as falls from heights, being struck by moving objects, to health risks associated with exposure to hazardous substances like asbestos and silica dust [17]. The literature extensively documents these hazards as persistent threats across construction sites worldwide.

Characterizes construction accidents as typically resulting from a combination of environmental factors, human errors, and technical failures. The complexity of construction sites, with their constantly changing environments and the involvement of multiple stakeholders, heightens the potential for accidents. This complexity is further compounded by the high-risk activities that construction workers routinely engage in, such as working at heights, operating heavy machinery, and handling hazardous materials.

In Nigeria, the situation is particularly concerning. As noted by Van Hoa et al. [18], the country's construction sector has experienced rapid growth due to an urgent need for infrastructure development, including roads, bridges, housing, and commercial properties. However, this growth has not been accompanied by a proportional increase in safety standards and practices. Consequently, the industry has witnessed a significant number of accidents, many of which could have been prevented with better hazard identification and risk management strategies.

2.2. Risk Management and Safety Protocols

Effective risk management is crucial in mitigating the hazards associated with construction projects. This involves the identification, assessment, and control of risks to minimize their impact on workers and project outcomes. The literature highlights the importance of implementing comprehensive safety management systems that encompass all aspects of construction activities, from planning and design to execution and maintenance.

According to Bayo [16], effective risk management in construction requires a multi-faceted approach that includes regular safety training, the use of personal protective equipment (PPE), and the implementation of safety protocols. These measures are designed to reduce the likelihood of accidents and to ensure that, when incidents do occur, their impact is minimized. However, studies indicate that in many developing countries, including Nigeria, the adoption of these measures is inconsistent and often inadequate. Several factors contribute to the challenges of implementing effective risk management. These include a lack of awareness and training among workers, insufficient enforcement of safety regulations, and the financial constraints faced by construction companies. Adebowale and Agumba [17] observes that many construction firms in Nigeria prioritize cost reduction and project timelines over safety, leading to compromised safety standards and an increased risk of accidents.

2.3. Regulatory Compliance and Enforcement

Regulatory compliance plays a critical role in ensuring safety in construction projects. Governments and industry bodies establish regulations and standards that construction companies must adhere to in order to protect workers and the environment [19]. These regulations typically cover areas such as the use of PPE, site safety procedures, and the handling of hazardous materials.

Despite the existence of safety regulations, their enforcement remains a significant challenge in many countries, particularly in the developing world [20]. In Nigeria, regulatory bodies often lack the resources and capacity to effectively monitor and enforce compliance across the numerous and often remote construction sites [12]. As a result, many construction projects proceed without adequate oversight, leading to widespread non-compliance and an elevated risk of accidents in **Table 1**.

Table 1. Identification of hazards and risks.

S/N	Identification of Hazards and Risks	Sources in Literature
	Hazards	
1	Falls	Al-Mhdawi et al. [6], Van Hoa et al. [18]
2	Structural collapse	Zhang [3], Adebowale and Agumba [17]
3	Electrocution	Kelvin and Chipandwe [5], Bayo [16]
4	Collapse of trenches excavation	Isaac and Edrei [7], Winge et al. [13]
5	Heavy equipment and machinery	Osei-Asibey et al. [19], Famakin et al. [20]
6	Hazardous materials	Umeokafor et al. [1], Tender et al. [15]
7	Ergonomic Hazards i.e. poor manual handling practices	Aluko et al. [2], Ekwuno [11]
	Risks	
8	Project delays	Tender et al. [15], Albert [21]
9	Budget overruns	Isaac and Edrei [7], Albert et al. [12]
10	Legal and Regulatory Compliance	Winge et al. [13], Gunduz and Al-Naimi [14].
11	Quality issues	Tender et al. [15], Aluko et al. [22]
12	Environmental risks	Albert et al. [4], Al-Mhdawi et al. [6]
13	Health and Safety Risks	Al-Mhdawi et al. [6], Socias-Morales [10]
14	Reputation Damage i.e. poor project execution	Kelvin and Chipandwe [5], Aven [8]

2.4. Conceptual Framework

The construction projects often face multiple hazards due to poor site organization, limited enforcement of safety regulations, and inadequate use of protective equipment [23]. Examples include: physical hazards such as slips, trips, falls from heights, electrocution, structural collapse, and moving machinery; chemical and environmental hazards such as exposure to harmful substances, dust, fumes, noise, or extreme weather conditions; ergonomic hazards such as manual handling, awkward postures, repetitive movements, and fatigue; and, project-related risks such as delays, cost overruns, poor quality, and legal/regulatory violations. These hazards and risks act as the starting point in the framework and directly influence workers' safety and project efficiency. When hazards and risks are not properly managed, they translate into negative effects on both workers and the project [24]. These explain how risks lead to undesirable outcomes on workers such as fatigue, injuries, stress, anxiety, disability, and even fatalities. Also, on projects such as reduced productivity, absenteeism, rework, delays, cost escalation, and reputational damage. Thus, it serves as the link between hazards and ultimate project outcomes. Effective strategies can reduce the probability of accidents or minimize their severity. These include: adoption of a safety-first culture where every worker is responsible for safety; training and awareness programs to educate workers on safe practices; provision and enforcement of Personal Protective Equipment (PPE); regular hazard and risk assessments to identify and correct unsafe conditions; strict regulatory enforcement by safety agencies; and, proper site organization, supervision, and communication to detect and resolve risks early [25]. These factors act as buffers, ensuring hazards do not automatically result in poor outcomes.

Figure 1 shows the conceptual framework for this study that anchored on the interaction between construction hazards and risks, their effects on workers and project outcomes, and the mitigation strategies that can be adopted to minimize or eliminate such risks.

From the foregoing, hazards and risks are the sources of potential harm, the effects demonstrate how unmanaged risks result in worker injuries and poor project outcomes, while mitigation strategies intervene to reduce or break the negative chain from hazards to undesirable consequences.

Figure 1. Conceptual framework.

3. Research Method

This study investigates hazards and risks associated in the construction projects. The study adopted quantitative approach. Quantitative research involves analyzing numerical data to understand variables of interest. Researchers quantify variables using standardized measurements, such as counting, ranking, or using instruments like rulers or thermometers [26].

3.1. Study Area

The investigation was based on built environment professionals working on building construction project sites in the Akure, Ondo State of Nigeria. Akure is within the south west region of Nigeria, covering a territory of approximately 991 square kilo meters. The capital city Akure is located within Akure South local government Area. The study was conducted within a specific geographical area that met the requirements for purposive sampling: Alagbaka, Ijapo, Arakale, Isinkan, Olokuta, Egbeda, Araromi, Kajola, Oke-Aro, Ijomu, Oda, FUTA, Lisa, Orisaye, Ologere, Ipinsa.

3.2. Population and Sample

The population for this study is built environment professionals in Akure, the Capital city of Ondo State in Nigeria, As the state capital, Akure serves as the administrative, economic, and cultural hub of Ondo State. According to Mweshi and Sakyi [27], population is the total number of individuals, objects, or instances that share similar observable characteristics. In any field of inquiry, the population of a study refers to all individuals or elements that satisfy a particular set of criteria and are, therefore, relevant and contribute to the study's objectives. For this study, the population were built environment professionals which includes architects, builders, engineers, and quantity surveyors practicing in Akure, Ondo State, Nigeria. A sample is defined as a subset of an elements chosen from a larger population to represent that population in a study [28]. This approach enables researchers to draw conclusions about the whole population based on a representative sample, eliminating the need to study every individual. For this study, a sample size of 135 out of 155 were received and found suitable for analysis.

3.3. Data Collection Instrument

Questionnaires were used to collect data for this research work from research participants. Questionnaires are a widely used data collection instrument in research that consists of a series of structured questions designed to gather specific information from respondents. They are particularly effective for collecting quantitative data on various topics, such as reasons, behaviours, and opinions. The design of a questionnaire is critical to its effective-

ness, as it influences the quality and reliability of the data collected. The survey questionnaire was designed in accordance with the objectives of the study by gathering information from construction professionals. The questionnaire contained information that helped draw out background information from respondents and questions that address each study objective on a 5-point Likert scale question ask respondents to rate their agreement with a statement on a scale from "strongly agree" to "strongly disagree. For this research work, the study received 135 out of 155 questionnaires (87.1% response rate), all of which were analysed. The study's purpose was fulfilled with an 87.1% achievement rate, indicating strong effectiveness. The questionnaire was separated into sections. section A: demographic information for respondents; section B: the identification of hazards and risks; section C: effects of hazards and risks; and, section D: to propose the strategies to improve risk management and safety culture on construction projects. The instrument for sections B was placed on a 5-point Likert-type scale, ranging from 1–5 as demonstrated as 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly disagree while section C–D ranging from 1–5 as 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always).

To validate the research instrument, a pilot survey including four professionals and two lecturers in academia was conducted to ensure hazards identification, effects and strategies identified from the literature apply to the construction project in the Nigeria context.

3.4. Data Analysis

Mean score, standard deviation and relative importance index (RII) were used to determine the identification of hazard and risks, effects of hazards and risks, and strategies to reduces hazards and risks associated on construction projects in Nigeria. The results were presented in table format.

4. Results and Discussion

Profile of Respondent

Among the responses collected, 73.1% identified as male, while 26.9% identified as female, indicating that the majority of respondents were male. This result is unsurprising, given that the construction industry particularly in sub-Saharan Africa is largely male-dominated. Regarding educational attainment, among the total respondents, 88 (65.7%) hold a Bachelor's Degree, 28 (20.9%) possess a Higher National Diploma, 12 (9%) have a National Diploma, 5 (3.7%) holds a Master's Degree and 1 (0.7%) have earned a Ph.D. This suggests that the majority of respondents have a Bachelor's Degree, ensuring that the study benefits from participants with strong educational backgrounds across various academic levels. Out of the total respondents, 38 (28.4%) are Engineers, 30 (22.4%) are Builders, 21 (15.7%) are Quantity Surveyors, 18 (13.4%) are Architects, 8 (6%) are HSE Specialists, 7 (5.2%) are Estate valuers, 7 (5.2%) are Planners, and 5 (3.7%) are land surveyors. This shows that Engineers make up the largest group, emphasizing their key role in the construction sector. Meanwhile, professionals such as Builders and Quantity Surveyors also form substantial portions, contributing to a diverse range of expertise within the study.

Table 2 assesses construction hazards based on their mean scores, standard deviations, relative importance index (RII), significance levels, and ranks. The ranking was done using relative importance index (RII). The analysis reveals that slips and trips are the most significant concern, ranked 1st with a mean score of 3.6866 and an RII of 0.738. This is followed by electrical shock, ranked 2nd (mean = 3.6194, RII = 0.724), highlighting the critical need for safety protocols around electrical work. In 3rd place, struck by moving objects (mean = 3.5821, RII = 0.716) also represents a major hazard on construction sites.

Confined space hazards are ranked 4th (mean = 3.5448, RII = 0.709), emphasizing the risks associated with working in restricted areas. Falls from height, ranked 5th (mean = 3.3433, RII = 0.707), and exposure to extreme temperatures, ranked 6th (mean = 3.5299, RII = 0.706), both reflect significant concerns. Following them, exposure to harmful substances ranks 7th (mean = 3.4403, RII = 0.698), and electrical hazards hold the 8th position (mean = 3.5746, RII = 0.677), indicating ongoing risks that require proper management.

In the lower ranks, noise hazards are in 9th place (mean = 3.6866, RII = 0.663), while structural collapse is ranked 10th (mean = 3.6045, RII = 0.627). Finally, fire

and explosion risks are ranked 11th (mean = 3.7836, RII = 0.601), marked as neutral in level of significance. These findings highlight the need for targeted safety measures and training to mitigate the most critical hazards on construction sites.

Table 3 shows the effects of Identified hazards and risks. Regarding fatigue from manual handling tasks, 51 respondents (38.1%) indicated it occurs sometimes, while 47 (35.1%) noted it happens often. With a mean score of 3.60, indicating it is the most frequently reported issue related to construction work hazards. Cost overruns and budget increases were reported by 43 respondents (32.1%) as sometimes occurring, while 36 (26.9%) noted it happens often. With a mean of 3.51, this reflecting a frequent financial consequence of construction hazards. Similarly, delays and schedule overruns were noted by 40 participants (29.9%) as happening sometimes, and 35 (26.1%) reported it occurs often. This issue also has a mean of 3.51, showing that time management issues are a significant effect of construction risks.

Table 2. Identification of risks and hazards.

Hazard	Mean	Std. Deviation	RII	Level of Significance	Rank
Slips and trips	3.6866	1.12000	0.738	S (Significant)	1st
Electrical shock	3.6194	1.25533	0.724	S (Significant)	2nd
Struck by moving objects (e.g., vehicles, machinery)	3.5821	1.20960	0.716	S (Significant)	3rd
Confined space hazards	3.5448	1.15437	0.709	S (Significant)	4th
Falls from height	3.3433	1.27500	0.707	S (Significant)	5th
Exposure to extreme temperatures	3.5299	1.05268	0.706	S (Significant)	6th
Exposure to harmful substances	3.4403	1.26557	0.698	S (Significant)	7th
Electrical hazards	3.5746	1.24077	0.677	S (Significant)	8th
Noise hazards	3.6866	0.99183	0.663	S (Significant)	9th
Structural Collapse	3.6045	1.16347	0.627	S (Significant)	10th
Fire and explosion risks	3.7836	1.09930	0.601	N (Neutral)	11th

Table 3. Effects of Identified hazards and risks.

Variables	(Never)	(Rarely)	(Sometimes)	(Often)	(Always)	Mean Value
Fatigue from manual handling tasks	0	13	51	47	23	3.60
Cost overruns and budget increases	8	15	43	36	32	3.51
Delays and schedule overruns	1	27	40	35	31	3.51
Reduced quality and performance	10	15	43	36	30	3.46
Loss of client trust and confidence	11	13	32	63	15	3.43
Damage to company reputation	10	23	34	41	26	3.37
Respiratory problems (e.g., due to dust or chemicals)	7	27	39	40	21	3.31
Mental health issues (e.g., stress, anxiety	6	34	41	34	19	3.19
Temporary or permanent disability	13	28	34	40	19	3.18
Cancellation or termination of projects	10	37	27	41	19	3.16
Illness due to exposure to hazardous substance	3	31	53	37	10	3.15
Chronic physical injuries or death	16	25	38	38	17	3.11
Hearing loss or damage from noise	15	25	44	35	15	3.07

For reduced quality and performance, 43 participants (32.1%) indicated it sometimes happens, while 36 (26.9%) noted it occurs often. This has a mean score of 3.46, suggesting that maintaining construction standards is a frequent challenge. Loss of client trust and confidence were recognized by 32 respondents (23.7%) as sometimes occurring, while 63 (46.6%) said it happens often. With a mean value of 3.43. Hearing loss or damage from noise is the last on the list a mean value of 3.07.

Table 4 presents strategies to reduce hazards on

construction sites based on their mean values and ranks. The analysis identifies fostering a safety-first culture as the most effective measure, ranked 1st with a mean value of 4.08, indicating that prioritizing safety at every level is crucial for hazard reduction. Tied for 3.5th place with a mean value of 4.07 are better training for workers, developing and implementing safety management plans, increased safety and awareness campaigns, and regular hazard and risk assessments, emphasizing the importance of consistent training, planning, and assessment to maintain site safety. Better equipment and PPE rank 6th (mean = 4.06), highlighting the need for proper safety gear and tools to protect workers. More frequent safety inspections follow in 7th place (mean = 4.02), underlining the significance of regular oversight to identify and mitigate risks. Stricter enforcement of safety regulations and improved site organization and cleanliness are tied for 8.5th place (mean = 3.91), showing that stricter rules and cleaner sites can contribute to hazard reduction.

Table 4. Strategies to reduce hazards.

S/N	Variables	Never	Rarely	Sometimes	Often	Always	Mean Value	Rank
1	Foster a safety-first culture	–	13 (9.7%)	7 (5.2%)	71 (53.0%)	43 (32.1%)	4.08	1st
2	Better training for workers	–	15 (11.2%)	12 (9.0%)	56 (41.8%)	51 (38.1%)	4.07	3.5th
3	Develop and implement safety management plans	8 (6.0%)	3 (2.2%)	11 (8.2%)	59 (44.0%)	53 (39.6%)	4.07	3.5th
4	Increased safety and awareness campaigns	1 (0.7%)	11 (8.2%)	15 (11.2%)	51 (38.1%)	56 (41.8%)	4.07	3.5th
5	Regular hazard and risk assessments	–	8 (6.0%)	23 (17.2%)	52 (38.8%)	51 (38.1%)	4.07	3.5th
6	Better equipment and PPE	–	6 (4.5%)	30 (22.4%)	52 (38.8%)	46 (34.3%)	4.06	6th
7	More frequent safety inspections	9 (6.7%)	11 (8.2%)	15 (11.2%)	38 (28.4%)	61 (45.5%)	4.02	7th
8	Stricter enforcement of safety regulations	1 (0.7%)	11 (8.2%)	29 (21.6%)	40 (29.9%)	53 (39.6%)	3.91	8.5th
9	Improved site organization and cleanliness	4 (3.0%)	9 (6.7%)	24 (17.9%)	41 (30.6%)	56 (41.8%)	3.91	8.5th
10	Encourage open communication and reporting	4 (3.0%)	5 (3.7%)	35 (26.1%)	47 (35.1%)	43 (32.1%)	3.81	10th

Lastly, encouraging open communication and reporting ranks 10th with a mean value of 3.81, suggesting that promoting transparency and feedback plays a role in improving safety, though it may be perceived as slightly less impactful than the higher-ranked measures.

5. Discussion of Findings

5.1. Most Significant Hazards Identified on Construction Sites

From the analysis of **Table 2**, it is evident that slips and trips emerged as the most frequently experienced and significant hazard (RII = 0.738). This aligns with global trends where slips, trips, and falls are leading causes of workplace injuries [29]. The high ranking of electrical shock and being struck by moving objects also indicates critical areas where safety lapses are common and often lead to serious injuries or fatalities. Other notable hazards include: Confined space hazards, Falls from heights, and Exposure to extreme temperatures and harmful substances. While fire and explosion risks were rated lowest (mean = 3.78, RII = 0.601), the neutral level of significance may not necessarily suggest they are less dangerous only that they are perceived as less frequent. This calls for continued vigilance and hazard-specific awareness campaigns. These findings reflect the multi-faceted nature of construction risks, influenced by human, environmental, technical, and systemic factors [6].

5.2. Effects of Hazards and Risks on Project Outcomes and Workers

According to **Table 3**, the most prominent effects of hazards and risks in construction were: Fatigue from manual handling (mean = 3.60) indicating the persistent ergonomic stress on workers. Cost overruns and delays (mean = 3.51 for both) reflecting the financial and scheduling impacts of poorly managed risks. Reduced quality and performance (mean = 3.46) suggesting that when safety is compromised, construction quality is often diminished [30]. Interestingly, loss of client trust and damage to com-

pany reputation also ranked high, highlighting how safety issues extend beyond physical harm to affect a firm's market credibility and sustainability. Health-related issues like respiratory problems, mental health stress, disability, and chronic injuries were moderately significant (mean scores between 3.11–3.31), reflecting long-term effects that may not be immediately visible but are critical from an occupational health perspective. The perceived impact on project performance and worker health validates the argument that safety is not a luxury but a core component of project success [31]. According to Asiedu and Ameyaw [32] delays, cost overruns, and poor-quality outcomes are often the byproducts of insufficient safety planning in construction projects.

5.3. Strategies for Mitigating Hazards and Improving Risk Management

Table 4 ranks various strategies, with fostering a safety-first culture (mean = 4.08) as the top-ranked approach. This supports literature that emphasizes leadership commitment to safety as a cornerstone for effective risk management [33,34]. Closely tied in 3.5th place were: better training for workers, implementation of safety management plans, increased awareness campaigns, and regular risk assessments These findings suggest a consensus on the importance of proactive and continuous engagement in safety education and monitoring. Further down the list, yet still rated above average, were: better PPE and equipment (mean = 4.06), frequent inspections (mean = 4.02) and enforcement of regulations and site cleanliness (mean = 3.91). Interestingly, open communication and reporting ranked last (mean = 3.81). While still valuable, this indicates that cultural or organizational barriers may limit its effectiveness unless it is coupled with trust-building and whistleblower protection mechanisms. The emphasis on safety culture, training, and assessment echoes best practices globally. However, the relatively lower ranking for communication suggests that the safety culture is still top-down and may lack grassroots-level engagement [9].

6. Conclusions

This study critically assessed the hazards and risks prevalent in construction projects within Akure, Nigeria, drawing insights from both literature and field data obtained from construction professionals. The findings highlight that the construction industry in Nigeria, while being a major driver of economic growth, is plagued by numerous safety challenges. Key hazards such as slips and trips, electrical shocks, being struck by machinery, and confined space hazards emerged as the most significant threats to worker safety. These hazards not only compromise the health and safety of workers but also have considerable ripple effects on project outcomes resulting in cost overruns, schedule delays, reduced quality, and reputational damage. The analysis also reveals that despite some awareness of these hazards, there remains a gap in translating this awareness into effective preventive actions. Risk management practices, while recognized as essential, are inconsistently applied due to factors such as inadequate training, poor enforcement of regulations, and financial constraints. Furthermore, although strategic interventions such as fostering a safety-first culture and improved worker training were rated highly, the relatively low emphasis on open communication points to systemic issues in the safety culture possibly hierarchical structures that hinder free reporting and learning from incidents. Ultimately, the study underscores the urgent need for an integrated, proactive, and enforced approach to construction safety management in Nigeria to safeguard lives, reduce losses, and ensure project sustainability.

6.1. Recommendations

1. Regular and compulsory safety training should be implemented for all construction workers, site supervisors, and project managers.
2. Every construction site should have a tailored risk management plan that includes hazard identification, risk assessment, control measures, and monitoring protocols.
3. Conduct periodic risk assessments and audits to identify new or emerging hazards and evaluate the effectiveness of existing control measures.
4. Government agencies must strengthen the enforcement of construction safety regulations through routine inspections and sanctions for non-compliance.
5. Employers should provide appropriate personal protective equipment (PPE) and ensure machinery and tools meet safety standards.

6. Establish mechanisms that encourage workers to report unsafe conditions without fear of retaliation.
7. Government bodies and professional associations should sponsor awareness drives and safety campaigns targeting both large and small-scale construction firms.
8. Adopt technologies such as wearables, sensors, and digital inspection tools to enhance real-time hazard detection and compliance monitoring.

6.2. Limitations and Future Research

This study has a few limitations that should be kept in mind. First, the sample was limited to construction professionals in Akure, Nigeria. While this group provided valuable insights, it does not fully capture the diversity of experiences across Nigerian construction industry. Conditions on sites in other states, or in larger cities like Lagos and Abuja, may be quite different.

Second, the data relied on self-reported responses through questionnaires. Although this method was practical and effective, it is open to personal bias. Some participants may have downplayed risks or provided answers they felt were expected, rather than their true experiences. This means the results reflect perceptions as much as they do realities on site.

Lastly, the study's focus on a single geographical area limit how far the findings can be generalized. Construction practices and safety enforcement vary widely across Nigeria, so a broader scope could give a more complete picture.

Looking ahead, future research could widen the geographic reach to include other regions and project types, and use mixed methods combining surveys with interviews or site observations to capture richer detail. Long-term studies would also be valuable to track how safety practices evolve over time, especially as new technologies such as drones, wearable devices, and Building Information Modelling (BIM) become more common in the industry. Including perspectives not just from professionals, but also from workers, contractors, and regulators, would give a more balanced view of the challenges and opportunities in improving construction safety in Nigeria.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The data will be available on request by the author.

Acknowledgments

I would like to thank the participants who generously gave their time and insights for this study.

Conflicts of Interest

The author declares no conflict of interest.

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