Analysis of Hazards on Building Construction Sites: A Survey of Construction Artisans in Small and Medium-sized Construction Firms in Ghana

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Abstract: Eliminating hazards on construction sites has been a challenge for small and medium-sized contractors. This has contributed to the high rate of incidents that have resulted in injuries, emotional stress, and even fatalities among construction artisans. To avoid these incidences on construction sites, hazards need to be easily identified by these workers. This study sought to analyse hazards that artisans in small and medium-sized construction firms in Ghana are exposed to during project delivery. A cross-sectional design was adopted in this study. In total, one hundred and twenty (120) construction artisans were involved in the study. Data analysis revealed that several hazards exist on construction sites, and experienced workers are more likely to identify hazardous situations on construction sites than inexperienced workers. The study categorized the identified hazards on construction sites into task-induced, site-induced, and human-induced hazards. Most of the identified hazards were related to task-induced hazards. Even though contractors implement measures to eliminate hazards, most of these measures are geared towards making the working space safe rather than addressing hazards that occur during the performance of tasks. It was recommended that teamwork and collaboration among workers be encouraged to ensure safe and hazard-free sites during project execution. It was also recommended that contractors allocate resources to tackle hazards that occur during the performance of tasks and provide psychological training and counselling for their skilled workers.

Keywords: Hazards, Construction site, Task-induced, Site-induced, Human-induced

I. Introduction

The construction sector is an important contributor to the socioeconomic development of Ghana. It accounts for approximately $8 billion, which is more than 15% of Ghana's annual gross domestic product (GDP). The sector employs about 437,870 people, which translates to 3.7% of the country's working-class [1]. It is however characterized by several small and medium-sized firms, since there are fewer restrictions on the registration and operationalization procedures for new contractors [2]. Although Ghana has cheap labour, the demand for construction skills is relatively high as most of the needed expertise are partially met. This is especially true for construction artisans, where the majority are either unskilled or semi-skilled [3].

Most of the activities in this sector are manually executed on the sites. A construction site is any piece of land where all physical construction activities related to a proposed project are carried out, whether new building or repair works. During project execution, construction sites become increasingly active with several activities. Artisans who work on construction sites regularly use tools, heavy machinery, and cranes to lift and transport objects from one place to another, while others work at heights, in confined spaces, and in difficult environments, exposing them to numerous hazardous situations. Construction sites can be dangerous to both workers and third parties during project execution [4], [5]. A lot of construction artisans have suffered several injuries; others have been maimed, while others have died, as reported in several studies [6] – [8]. In 2014, the construction industry in Africa was ranked as the most hazardous sector, with a fatality rate of 16.6 per 100,000 persons in the labour force [8].

To forestall such incidences, contractors are being encouraged to enforce hazard identification and elimination strategies during the execution of projects. This position was clearly emphasized by Hoła and Szóstak [9] when they posited that proper understanding and a sequential mode of identifying construction hazards can ensure safety on construction sites.

Tobias [10] revealed that hazard identification has several indirect benefits. This includes a reduction in construction-related costs such as healthcare bills and lower insurance premiums. Other benefits include an improved public perception of the construction industry, which can attract a healthy, safe, and satisfied workforce.

As building construction activities surge on sites after the devastation caused by the COVID-19 pandemic and the global

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economic downturn, the role of construction artisans will be much needed. As such, situations or conditions that tend to make sites hazardous should be identified and eliminated to protect the lives of these artisans. Although hazards have been explored generally at various workplaces, this study explores construction-related hazards from the perspectives of artisans who are directly involved with activities on sites. Understanding hazards from the viewpoint of these artisans can have significant impacts on their elimination during construction. This study, therefore, aims to analyze construction-related hazards that are prevalent during project execution.

II. Literature Review

A. Construction Sector in Ghana and Workplace Hazards

The construction sector in Ghana operates with minimal supervision from industry players and even on-site supervision [3]. It is relatively dynamic with the different players' and cultural diversity. This situation, among other notable drivers such as a changing site environment, high employee turnover, and non-compliance with work safety standards [11], makes construction a hazard-prone sector [13], [16].

A hazard can be described as anything that can cause harm, illness, or death to personnel or damage to and loss of equipment, property, and the environment [14]. Hazards can also mean any specific condition that is related to a work activity and may result in an accident at work or an occupational disease [15]. In a more specific manner, construction hazards are situations that are directly associated with activities on sites and have the tendency to cause loss of life and a decline in the health status of workers.

B. Classification of Hazards

Generally, construction-related hazards can be classified based on varying factors, situations, and characteristics. The mode of classifying workplace hazards in literature has always been directly related to the source of the presumed hazards. Studies [14], [17], [39] classified construction hazards into four distinct classes: chemical hazards, physical hazards, biological hazards, and social hazards.

Particulate matter, fumes, dust, gaseous compounds, radioactive compounds, mists, and vapours that occur during earthworks and working with chemicals are classified as chemical hazards since they can adversely impact the health of workers [36]. Chemical hazards sometimes comprise solvents, heavy metals, and other compounds that have the potential to cause acute or long-term detrimental health effects on workers. These hazards may cause lung, larynx, urinary tract, breast, prostate, and skin cancer due to long-term exposure to chemicals [20]. Some notable hazardous chemicals used on construction sites include asbestos, silica, diisocyanates, lead, admixtures, exhaust fumes, fuels, chloroprene, and mercury, among others. Physical hazards, including heat, cold, radiation, noise, vibrations, and unhealthy microclimatic conditions, have possible cumulative or immediate effects on the health of employees as they cause harm with or without contact [21]. The location of construction projects exposes construction workers to a wide variety of biological hazards, which include attacks from animals, microorganisms like histoplasmosis, and an infection of the lungs caused by a common soil fungus [22]. Construction artisans are exposed to malaria or yellow fever when working in humid areas where harmful organisms are prevalent. These hazards can also affect human health in a variety of ways, ranging from mild allergic reactions to serious medical conditions and even death. Unfortunately, most incidents from biological hazards are not reported or documented, especially with small and medium-scale construction firms. As social creatures, certain situations require us to live at work camps where situations like shouting at coworkers, bullying, poor work management, altitude, and limited support from team members constituting social hazards [23] are uncommon.

Hatami et al. [24] classified workplace hazards into safety hazards and health hazards. He explained that safety hazards lead to accidents that physically injure workers, while health hazards contribute to the development of a disease or illness.

Hazards can also be classified based on the causes of unsafe conditions [19]. This classification consists of management action or inaction, unsafe acts of workers or co-workers, non-human-related events, and unsafe conditions that are part of site conditions.

Mihić [12] on the other hand, categorized hazards into self-induced hazards, peer-induced hazards, and global hazards. He referred to self-induced hazards as hazards that originate from the activity performed by the workers. Examples of self-induced hazards include falls from heights and into depths; injuries from inappropriate tool handling; burns from touching hot objects; and lacerations from cutting wooden elements. Peer-induced hazards, according to Mihić [12] are also produced not by the construction workers themselves but by their coworkers. Examples of peer-induced hazards include the fall of objects from a height, the collapse of formwork, cutting or impaling on protruding rebar, tripping over tools, material, or waste, and getting hit by flying material or objects. He further indicated that global hazards are a special type of peer-induced hazards, in whose case the area of influence is so large that it is not practical to assign a particular area of the hazard's influence. These hazards affect all construction workers and other personnel who are present on the construction site at the time of the hazard. Examples of global construction hazards include scaffold collapse, crane failure and collapse, fall of objects carried by a crane, fire, and explosion [12].

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Although these classifications had positive responses, a holistic view of hazards shows that some hazardous situations that result in accidents have not been considered. This includes limitations in workplace congestion, confined workspace, and working unilaterally, among others.

III. Methodology

A cross-sectional survey approach was adopted in this study. This method seeks to answer questions about real-life situations by collecting a large amount of data from the participants at a specific point in time [27]. This approach allows the measurement of certain variables in some research participants at the same time based on the inclusion and exclusion criteria set for the study [28].

Participants in this study comprised mainly one hundred and twenty (120) skilled workers on construction projects being executed by small and medium-sized construction firms in Axim, Sekondi-Takoradi, Cape Coast, Accra, and Tema metropolises.

Random and purposive sampling techniques were employed in identifying the participants, who were mainly construction artisans. The questionnaires were administered to participants who were engaged in site activities for the selected class of building contractors. This was to ensure the gathering of real-life and reliable data as opposed to conjectures from artisans, who might rely on what they think or what others perceive about construction-related hazards.

The questionnaire was pretested to ensure clarity and eliminate ambiguity before being administered to participants. Closed and open-ended questions were formulated in line with the aim of the study. The initial set of questions covered the demographic information of the participants. The other categories of questions were mainly in Likert scale format, where participants were to express their opinions on site conditions, construction-related hazards, and measures employed to eliminate hazards on construction sites. Participants were to respond by ticking their preference on a five-point Likert-type scale. The Likert-scale format was preferred, as it enabled respondents to have variability in their responses and reduced limitations [44]. Participants who could not answer the questionnaires on their own were aided by having them translated into their native language, taking into account the guidelines given by the World Health Organization for assessing instruments [29]. The administration of the questionnaires took four (4) weeks.

Ethical approval was also obtained from the various contractors before participants were considered for participation. The collected data was analyzed using JASP 0.16.4.0 software.

IV. Results and Discussions

Out of the total of 120 questionnaires administered to participants, 113 were successfully retrieved and used in the analysis, indicating a response rate of 94.2%.

A. Reliability and Validity of the Data collection tool

Participants responded to the hazard variables based on a five-point Likert scale in the questionnaire. The reliability test confirmed the instrument was reliable for all the variables. Participants' familiarity with hazards had a Cronbach's alpha score of 0.984, whiles the measures taken to eliminate hazards had a Cronbach's alpha of 0.965. Since all the scores were above 0.70, the instrument was considered reliable.

B. Demographic characteristics

The demographic data from the participants has been presented in Table 2 below. The characteristics considered were their age, gender, educational background, years of experience, classification, and roles they play on the site.

Data obtained showed that among the 113 participants, most of them (97.3%) were within the age range of 20–40 years, indicating the youthful nature of construction workers. This was confirmed in the 2021 Census in Ghana and other studies that the highest proportion of workers in the construction industry were aged between 20 and 49 years [3], [30].

More than 90% of the participants were male, depicting how construction in Ghana is a male-dominated industry. Participants had acquired some training in their respective trades and had gained reasonable years of work experience as workers for contractors (78.8%) and subcontractors (21.2%).

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Table 1. Demographic Characteristics of Participants

Variables		Frequency	Per cent (%)
Gender	Male	102	90.3
	Female	11	9.7
Age	Below 20 years	3	2.7
	20 - 30 years	95	84.0
	31 - 40 years	15	13.3
Educational level	Bachelor's Degree	5	4.4
	Higher National Diploma	12	10.6
	Diploma	41	36.3
	Construction Technician Certificate (CTC)	55	48.7
Organisation	Contractors	89	78.8
	Subcontractors	24	21.2
Years of experience	Less than 5 years	85	75.2
	6 - 10 years	19	16.8
	11 - 15 years	8	7.1
	Over 20 years	1	0.9
Classification	D1/K1	0	0
	D2/K2	0	0
	D3/K3	47	41.6
	D4/K4	66	58.4
Artisans	Carpenter	16	14.2
	Electrician	8	7.1
	Mason/Plasterer	23	20.4
	Painter	7	6.2
	Plumber	4	3.5
	Decorators	12	10.6
	Steel bender	6	5.3
	Steel/Scaffold erector	3	2.7
	Glazer	5	4.4
	Tiler	6	5.3
	Foreman	11	9.7
	Operators	9	7.9
	Welder	3	2.7

Analysis of the responses showed that most construction sites were moderately hazardous, with a mean of 3.02 on a scale of 5.00, while the likelihood of encountering a hazard on a particular site had a mean of 2.18 on a scale of 3.00. Comparing the above findings to previous studies [32], [33], this study noticed a reduction in the hazards that exist on construction sites. Although this reduction speaks positively about current health and safety practices, it can also be associated with the employment of trained artisans and safety managers by these small and medium-sized contractors.

A chi-square test of independence (shown in Tables 2 and 3) was performed to examine the relationship between the number of years and the likelihood of encountering hazards on construction sites. There was a significant relationship between the variables: $X^2 (6, N = 113) = 16.116, p = 0.013$. Deducing from Table 2, participants with higher years of work experience were more likely to identify hazardous situations on construction sites than those with fewer years of work experience. It was clear that the artisan's work experience was influential in identifying potential hazards on construction sites. This position was similarly reiterated by Hussain et al. [34], who noted that project safety performance is significantly improved when a highly experienced and skilled workforce is employed.

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Table 2. Contingency Table Showing a Relationship Between Work Experience and The Likelihood Of Encountering Hazards

Years of experience		Likelihood of encountering hazards on the construction site			
		Very likely	Somewhat likely	Not Likely	Total
Less than 5 years	Count	18.000	23.000	44.000	85.000
	Expected count	22.566	24.823	37.611	85.000
6 - 10 years	Count	10.000	4.000	5.000	19.000
	Expected count	5.044	5.549	8.407	19.000
11 -15 years	Count	2.000	5.000	1.000	8.000
	Expected count	2.124	2.336	3.540	8.000
Over 20 years	Count	0.000	1.000	0.000	1.000
	Expected count	0.265	0.292	0.442	1.000
Total	Count	30.000	33.000	50.000	113.000
	Expected count	30.000	33.000	50.000	113.000

Table 3. Chi-Squared Test Results

	Value	df	P
X^2	16.116	6	0.013
N	113		

C. Hazards on Construction sites

Participants shared their opinions on construction-related hazards. The mean rankings of the various hazards enabled the identification of the most dominant hazards artisans encounter on construction sites during project delivery. Whenever two or more hazards have the same mean in the analysis, the one with a lower standard deviation is given the higher rank [35]. The analysed results shown in Table 4 present the mean, standard deviation, rank, and category of hazards.

Table 4. Descriptive Statistics for Hazards on Construction Sites

Variables	Mean	Std. Deviation	Rank	Category
Working at heights/raised floors	3.053	1.432	1	Task-induced
Tiredness	2.956	1.332	2	Human-induced
Constant loud noise	2.903	1.329	3	Site-induced
Confined work spaces	2.814	1.347	4	Site-induced
Unadjusted supports	2.770	1.476	5	Task-induced
Externally induced pressure	2.752	1.418	6	Human-induced
Manual handling/lifting	2.717	1.398	7	Task-induced
Operating heavy machinery	2.619	1.365	8	Task-induced
Poor/Unhygienic working conditions	2.611	1.339	9	Site-induced
Fatigue	2.575	1.294	10	Human-induced
Intensive work	2.558	1.336	11	Task-induced
Vibration	2.549	1.232	12	Task-induced
Hand-held power tools	2.540	1.232	13	Task-induced
Indiscriminate waste disposal	2.496	1.337	14	Site-induced

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Falling objects	2.496	1.409	15	Task-induced
Ill-fitted PPE	2.487	1.344	16	Human-induced
Fragile work surfaces	2.469	1.134	17	Task-induced
Malfunctioning tools	2.398	1.386	18	Task-induced
Stressful shifts	2.372	1.371	19	Task-induced
Spillage	2.363	1.337	20	Task-induced
Unsecured formworks	2.327	1.305	21	Task-induced
Poor communication	2.327	1.372	22	Human-induced
Poor posture	2.310	1.261	23	Human-induced
Exposed sharp objects	2.301	1.375	24	Task-induced
Moving objects	2.301	1.382	25	Task-induced
Strong winds	2.248	1.299	26	Site-induced
Unhelpful relationships	2.230	1.275	27	Human-induced
Unsafe design of work activities	2.230	1.282	28	Human-induced
Unsupported excavations	2.230	1.323	29	Task-induced
Exposure to harmful materials /chemicals	2.212	1.299	30	Task-induced
High temperatures	2.204	1.344	31	Site-induced
Repetitive Movement	2.195	1.216	32	Task-induced
Working unilaterally	2.168	1.239	33	Human-induced
Occupational violence	2.168	1.302	34	Human-induced
Entanglement	2.150	1.241	35	Task-induced
Biological agents	2.124	1.226	36	Site-induced
Restriction or trapped	2.080	1.181	37	Task-induced
Hot objects	2.053	1.231	38	Task-induced
Poor lighting	2.071	1.230	39	Site-induced
Exposed electrical wires	2.018	1.203	40	Task-induced
Bullying	1.973	1.206	41	Human-induced
Uncontrolled fire	1.788	1.130	42	Task-induced

Working at heights was the most prevalent hazard on construction sites, with a mean of 3.053. This situation most often leads to incidents of falls and trips among construction workers. As new high-rise buildings spring up in most communities in Ghana, working at heights has become a major hazard artisans often encounter, since most of these small and medium-sized contractors rely on orthodox construction techniques with minimal supervision.

With a mean of 1.788, “uncontrolled fire” was the least observable hazard on sites, as the utilization of fire or other combustible materials is limited on most sites during construction operations in Ghana. Activities like bush burning, which use fire, have been substituted with other advanced technologies due to their devastating environmental impacts.

Most of the hazards identified in the survey occurred when artisans were performing tasks on construction sites or were engaged in work activities. These hazards can therefore be classified as task-induced hazards. Task-induced hazards can be eliminated by training workers regularly, ensuring the appropriate selection and usage of tools and equipment, and changing the work process [45]. As can be deduced from Table 4, twenty-three (23) task-related hazards were identified from the survey.

Apart from task-induced hazards, workers are also exposed to hazardous situations when they enter the construction zone, even

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though they might not be performing any tasks. These hazards can be classified as site-induced hazards. They are generally eliminated when the site space is kept safe, clean, and hoarded. One notable thing about the site-induced hazards is that they constantly change depending on the environment, site conditions, and weather patterns.

From the analysed data in Table 4, eight (8) site-induced hazards were determined. Constant loud noise emanating from construction activities and vehicular movement was the most prevailing hazard in this category. Continual exposure to loud noise can lead to hearing loss, stress, anxiety, depression, high blood pressure, heart disease, and other health problems [36]. The least considered hazard under this category of hazards was poor lighting, which has been linked to eye strain, fatigue, headaches, stress, and even accidents. They can contribute to mistakes, poor work quality, and a decline in productivity among construction workers [14]. Poor lighting might have attained the lowest rank among respondents because most construction projects executed by small and medium-sized contractors are done during the day when adequate daylight is readily available.

Artisans can also make the site a hazardous place through their actions or inactions. These actions or inactions can cause harm to themselves as well as their coworkers. While some are self-induced, others occur as a result of interaction between coworkers. These hazards affect the physical and psychological well-being of workers or coworkers [14] and can be classified as human-induced hazards. From Table 4, the human-induced hazards identified from the survey were eleven (11). Tired workers and bullying were the top and least-ranked hazards, respectively, in this category. It is therefore not surprising that the National Safety Council [46] reported that 69% of workers across the construction, manufacturing, transportation, and utilities industries said their tiredness at work increases the risk of injuries and incidents on the job, a situation that is not different from that of the construction worker in Ghana. Participants opined that tired members of a gang tend to lose focus and are non-cooperative, which exposes them to potential instances of near-misses and accidents, especially when transporting materials or operating a machine. They further indicated that the dynamics in the selection of workers for most small and medium-sized contractors make it difficult for bullying to occur on construction sites.

Approximately one-third (1/3rd) of all apprentices in the construction sector have experienced bullying in the form of intimidation, abuse (verbal, physical, and mental), and/or harassment, damage to a person's personal property, teasing, and name-calling [38]. This hazard can have significant impacts on the physical and emotional well-being of workers.

A review of Table 4 showed high variability in the analysed responses, as studies [36], [39] on hazards explained such variability was attributed to differences in people's experiences, health and emotional states.

The Mann-Whitney U test (shown in Table 6) was conducted to compare the means of male and female responses to the identified hazards.

Table 5. Independent Samples T-Test Mann-Whitney

	Group	N	Mean	SD	W	p	Hodges-Lehmann Estimate	Rank-Biserial Correlation	SE Rank-Biserial Correlation
Hazards	Male	102	2.487	1.019	944.50	<0.001	0.794	0.684	0.182
	Female	11	1.488	0.203					

Note. For the Mann-Whitney test, the effect size is given by the rank biserial correlation.

Note. Mann-Whitney U test.

The Mann-Whitney U test showed that male construction workers were significantly conversant with construction-related hazards compared to their female counterparts on sites: $W = 944.50$, $p < 0.001$. The Hodges–Lehmann estimate of 0.794 and the Rank–Biserial correlation of 0.684 suggest a significant difference between male and female workers. This difference can be attributed to the experience and exposure male workers gain compared to their female counterparts, who are often made to handle less strenuous tasks on construction sites.

There was no correlation between construction-related hazards and tasks performed by artisans on sites (shown in Table 6). This indicates that construction artisans may not be exposed to hazards arising from their tasks. Literally, artisans' presence at the construction site makes them vulnerable, as they are also exposed to hazards emanating from their coworkers or even site-induced hazards.

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Table 6. Correlation Between Tasks Played and Hazards

Variable		Tasks performed
Tasks performed	Spearman's rho	-
	p-value	-
Hazards	Spearman's rho	-0.153
	p-value	0.105

p-value = 0.05

D. Measures employed to address the hazard

Although hazards are difficult to predict before construction activities commence on sites, contractors can institute measures to address them before they lead to injuries or even accidents. Respondents expressed their views on some measures taken by contractors to eliminate hazards construction workers were exposed to on sites. The analysed results are presented in Table 7.

Table 7. Measures To Eliminate Hazards on Construction Sites

Variables	Mean	Std. Deviation	Rank
Worksite inspections	3.956	1.129	1
Use of personal protective equipment (PPE)	3.956	1.228	2
Keeping the workspace clean	3.903	1.149	3
Keeping construction sites secure	3.814	1.177	4
Warning signs	3.788	1.346	5
Emergency procedures	3.761	1.190	6
Schedule regular safety meetings	3.752	1.243	7
Provision of modern tools and equipment	3.726	1.104	8
Regular waste disposal	3.681	1.212	9
Signage warning of hazards	3.673	1.326	10
Proper assignation of operatives	3.628	1.182	11
Zoning of activities	3.602	1.138	12
Staff and visitor training	3.478	1.247	13
Ties, chutes and nets to prevent falling debris	3.319	1.284	14

From Table 7, most of the top-ranked measures implemented were found to be geared towards eliminating site-induced hazards. This consisted of "worksite inspection" which was ranked 1^{st}, "keeping the workspace clean" which was ranked 3^{rd} while "keeping the construction site secured" and "providing warning signs" were ranked 4^{th} and 5^{th} respectively. The exception to this was the "use of personal protective equipment (PPE)" which ranked 2^{nd} with a mean of 3.956. A critical review of respondents' data showed that contractors prioritized worksite safety. However, "zoning of activities," "training of staff and visitors," and the "use of ties, chutes, and nets" (in descending order) were the least implemented measures.

Respondents indicated that most of the hazards prevailing on construction sites emerge during the performance of work, but the hazard mitigation measures adopted by contractors targeted site-induced or workplace hazards.

V. Conclusions and Recommendations

In conclusion, artisans consider construction sites to be a moderately hazardous workplace. Due to the nature of the work activities and practices of most small and medium-sized contractors, artisans are exposed to a variety of hazards, irrespective of the tasks they perform on site. Female construction artisans were less likely to identify hazards compared to their male counterparts. Furthermore, experienced artisans are more likely to identify hazardous situations on construction sites than their inexperienced counterparts. The top ten (10) ranked hazards existing on construction sites in the study area were working at heights, tiredness, constant loud noise, confined work spaces, unadjusted supports, externally induced pressure, manual handling and lifting, operating heavy machinery, poor or unhygienic working conditions, and fatigue.

The study classified the hazards into task-induced hazards, site-induced hazards and human-induced hazards. Task-induced hazards refer to situations that expose construction workers to harm, mainly when they are performing work activities. On the other hand, site-induced hazards refer to situations at the site that have the potential to cause harm, while human-induced hazards refer to situations caused by workers and their physical, mental, emotional, and social interactions with coworkers that have the potential to cause harm. Most of the construction-related hazards were categorized as task-induced hazards, indicating that in the absence of the task, workers would not be in such hazardous conditions. Classifying hazards by targeting the aforementioned types helps to address specific incidences that lead to injuries and fatalities among workers and ensure safety at the workplace.

Most of the measures implemented by contractors to eliminate hazards were associated with site-induced hazards, creating a gap between the situations that contribute to incidents at construction sites and what contractors do to prevent these incidents. In minimizing hazards that exist on construction sites, priority should also be given to tackling hazards that occur when executing tasks and those that are human-induced. The combination of task-induced hazards, site-induced hazards, and human-induced hazards can extensively mitigate hazards on construction sites.

Based on the study, the following recommendations were proposed:

i. Teamwork and collaboration from all workers are required to ensure a safe and hazard-free site during project execution;
ii. Artisans should be trained in hazard identification and control peculiar to their work to minimize hazards that occur during work activities;
iii. Contractors should allocate resources to tackle hazards that occur during the performance of work activities (task-induced) and those that affect the physical, and psychological well-being of their workers (human-induced hazards) to augment those existing measures;
iv. Site managers and safety officers should be trained to identify hazards since they serve as implementing agents for safety during project delivery; and
v. Contractors should endeavour to improve the emotional health of their workers through psychological training and counselling to promote safety management at the construction site.

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