



ASSESSMENT OF ACCIDENT PREVENTION AND SAFETY PROTOCOLS IN THE NIGERIAN HOUSING CONSTRUCTION SITES

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Abstract

The housing industry is one of the most rapidly developing sectors of the economy globally. However, accidents occur continually on housing construction sites in Nigeria due to risky and hazardous nature of construction activities. This study assesses the prevalence of construction accidents using a mixed method of data analysis. Findings revealed that accident rates can be controlled, and older workers knew their rights as on-site workers. While the use of faulty and wrong tools, unavailability of safety officers on site, inadequate provision of all safety gadgets and facilities including lack of government enforcement, increases the rate of accidents. The primary reason for accidents among workers was the absence of safety training, leading to predominantly minor injuries being sustained. Unskilled workers were most often involved in accidents at work sites. Accidents have occurred mostly among workers under the age of age of 20. This study suggests that safety officers be present on every construction site, workers must be formally trained, safety laws upgraded, public enlightenment about safety, and government enforcement of safety laws. In conclusion, to avoid accidents, workers must be aware of risks and safety procedures. In order to effectively safeguard these workers, it is essential for government agencies to enhance their enforcement initiatives, revise current safety regulations, and, if feasible, establish a new regulation.

Keywords: Construction Accidents; Construction Safety; Housing Industry; Nigeria.

1. Introduction

The construction industry is responsible for the delivery of building structures, such as housing of all types, and civil engineering works. The housing industry contributes about 11% of Gross Domestic Product (GDP), despite the significant importance of the industry it is faced with divers risk, occupational hazard, accident and injuries which are predominant occurrence to work on the construction sites. The dynamic nature of the sector and the variety of dangerous activities carried out on construction sites pose a major health and safety challenge for the workers involved in the construction sector (Asan & Akasah, 2015). Compared to other sectors, accidents and injuries at construction sites are very common in all countries, including the US and the UK. Although the true incidence rate in Nigeria cannot be determined due to the lack of reliable data, this scenario includes Nigeria, as well as other developing countries. According to Hosseinian & Torghabah (2012), accidents at construction sites (BSS) cause delays in project completion, cost increases and damage to the reputation of the company. Construction accidents also have psychological effects on workers (depression, depression, boredom), physical (severe disability, pain) and financially.

In addition, the causes of accidents, the state of the working environment, the attitude of workers and the availability of health and safety training are all subject to a number of studies on building safety rules, procedures and implementation and enforcement (Ismail, Doostdar & Harun, 2012; Aniekwu, 2007; Umeokafor., Isaac, & Umeadi,. 2014; Olutuase, 2014; Dodo, 2014). Studies on safety practices and the operational performance of workers are scarce, and little is known about the impact of safety practices on the productivity of workers, especially in developing countries such as Nigeria. Therefore, this research specifically assesses the accident prevention and safety protocols in Nigerian housing construction sites, with the objectives of determining the (1) factors that causes accident in the study area, (2) effect of accidents on housing construction sites, (3) compliance to safety measures on housing construction sites and (4) the impact of the statutory body in the study area.

This study is focused only on housing construction sites in Nigeria. The study holistically assesses the practices of all workers and professionals involved in the housing sector and the efforts of the local authority in ensuring accident prevention and safety protocols in Nigerian residential construction sites are maintained.

2.0 Literature Review

2.1 Experts' Contribution to Safety on Housing Construction Sites.

Ensuring a safe environment for the effective performance of construction tasks is the responsibility of all the experts present at the site. Examples of professionals are suppliers, contractors, as well as engineers and architects. Research indicates that a significant number of construction-related accidents can be minimized or entirely avoided through prudent decision-making in the design and planning stages of a project.

2.1.1 The contractor's Responsibility for Site Safety.

The level of planning and decisions taken at the site determine the success of any housing project. According to Toole (2002), almost all accidents in the construction sector are caused by inadequate training, insufficient enforcement of safety rules, dangerous equipment, unsafe conditions on the site and a lax safety approach. As suppliers often delegate their tasks to others, their role is usually unclear. The overall security of the site shall be the responsibility of the main contractor. In their roles of supervision, management, and coordination of subcontractors' activities, they exert a significant influence on the safety of the operations. Given that subcontractors typically supply labor directly at the site, it is imperative that they ensure the protection of their workers in situations where risks may arise.

2.1.2 The Importance of Design Experts in Ensuring Site Safety

The design experts encompass structural engineers and architects responsible for creating development plans intended for on-site implementation. Frequently, the responsibility for the safety of workers is relegated entirely to the contractors; however, design experts possess the capacity to impact safety on construction sites through judicious decision-making during the design phase. In 1985, the International Labor Office advised that designers ought to take into account the safety of workers who will be involved in the construction of the structures they create. It is recommended that designers identify specific sections within their designs that may pose risks of accidents during the implementation phase, providing comprehensive guidelines and instructions to ensure their safe execution.

2.2 A Historical Overview of Safety Regulations

The enactment of the "Health and Morals Act" by the British Parliament in 1802 signified the inception of such legislative measures. The purpose of this act was to curtail the working hours of children and to necessitate the inspection of factories for the assessment of working conditions. It insisted on proper protection for workers against injuries. Several trades were amalgamated under the British Factories Act, which was expanded in 1864 to encompass numerous industries and establishments employing over 50 individuals. The act prohibited workers from consuming food in hazardous or unsanitary environments, thereby necessitating the installation of artificial ventilation in these factories. Factory inspections commenced in 1897, paving the way for the implementation of workers' compensation. Klein (2009) noted in the United States that individuals must recognize the dangers present in their surroundings, as exemplified by his gunpowder factory in 1802, which represents one of the earliest recorded individual safety initiatives. This act was merely a declaration rather than a formal regulation. Up until 1916, all labor was governed by "common law," which placed the onus of safety on the workers themselves, leaving employers without liability. The American government established the workers' compensation law post-1916, which mandated that employers be held accountable for workplace safety concerns. Employers were required to provide medical care and compensate for lost wages during workers' absences. This obligation was regarded as a moral duty rather than merely a legal requirement (Reese, 2018). These enforced payments heightened employers' awareness of safety, resulting in decreased accident rates and a decline in fatalities (Petersen, 2003). The Occupational Safety and Health Act (OSHAct) was enacted

in April of 1971 in the United States, affecting over 5 million businesses and approximately 60 million workforce (Hammer et al., 2016).

2.3 Unsafe Practices and Unsafe Environments

Any action taken by an individual without proper regard for their own safety or the safety of those nearby is classified as an unsafe act (Akintobi, 1999). Approximately 80% of accidents occurring on construction sites stem from unsafe practices and hazardous conditions (Okoye, 2018). Akintobi (1999) identified several unsafe practices and hazardous conditions, including: improper tool usage, utilizing equipment and tools for tasks they were not intended for, and operating electrical equipment without turning it off, among others. De Reamer (1980) characterized unsafe practices as a "Deviation from an established standard procedure, practice, or unwarranted exposure to risks." He further noted that these construction hazards can accumulate unknowingly at construction sites. If these hazards are not addressed and corrected, they may result in the following: I. Fire hazards. II. Insufficient lighting (Poor illumination). III. Problems with the construction site itself, such as uneven floors or slippery surfaces, etc. Not every unsafe action or procedure on construction sites leads to accidents; however, it is the supervisor's responsibility to correct such unsafe actions before they lead to an accident. Anderson (1992) posited that proactive safety measures are realized by providing equipment and facilities that are suitable for mitigating risks associated with identified hazards, as well as employing individuals who are competent in managing equipment and activities. Additional safety measures involve the creation of a thorough safety policy statement, analysis of project constructability, pre-construction meetings, transparent contractor evaluation, inspections, and proper housekeeping.

2.4 The Importance of Safety Protocols in Construction Environments

Accidents leading to disabilities or significant fatalities adversely impact site operations. Such incidents incur financial costs and diminish worker morale. The construction industry is fraught with numerous hazards due to the nature of the tasks performed, rendering safety a shared concern for both the general public and workers. All stakeholders recognize the critical need of ensuring safety and safeguarding lives. The reasons for implementing safety measures on construction sites include the following aspects: 1. Humanitarian issues. 2. Economic implications and advantages. 3. Legal and regulatory factors. Litigations frequently arise from accidents occurring on sites, and over the years, the judiciary in cases of death and injury, has established the principle of employer liability. The courts have assigned certain responsibilities to employers, which include a. Providing a safe and reasonable workplace. b. Ensuring the

availability of reasonably safe tools, appliances, and equipment. c. Exercising reasonable care in the selection of employees/workers. d. Implementing reasonable safety regulations. e. Informing workers about the hazards associated with their work.

2.5 Prevention of Accident on Building Construction Sites

The prevention of accidents on construction sites entails forecasting the likelihood of future incidents and recognizing the perceived characteristics of these accidents, considering the immediate context of the site and its surrounding environment (Kennedy, 2014). The occurrence of construction accidents on housing development sites can be effectively controlled if the following measures are properly enforced: 1. Safety Measures on Site: The primary contractor is tasked with providing a sufficiently safe site environment. In 1958, amendments to building regulations were made, which applied to all construction industry activities. It is crucial to implement safety training courses at construction sites. These courses will help decrease the number of accidents by educating workers on the appropriate practices and the best methods for executing their tasks. 2. Discipline on Site: Upholding respect and compliance on site can greatly reduce the incidence of accidents. It is important to avoid rushing when operating mechanical equipment. Additionally, break periods should be strictly adhered to, allowing operators to refresh themselves before resuming work. The absence of such breaks can lead to operators working under conditions of fatigue.

3. Training and Educating Site Workers: The modern landscape of job training has transformed, with employees learning to perform their roles in the safest manner possible. They are trained to identify potential hazards and methods to circumvent them. Research indicates that for safety training to be effective, employees must be instructed on both acceptable and unacceptable behaviors on site. Construction workers should be trained in the following key areas: 1. Awareness and consciousness regarding safety. 2. Proper procedures for operation and timing of activities. 3. Acquisition of skills. 4. Appropriate methods of operation. It is typically unwise to expose untrained workers to hazardous conditions on site, as this can result in disastrous consequences; even those who are well-trained need the oversight of a supervisor to ensure safety standards are upheld.

3.0 Methodology and Research Protocol

3.1 Data Collection

Data was collected from professionals and workers in the study area, using questionnaires.

3.1.1 Questionnaire Design

The questionnaire designed for this research was structured to include personal data of the respondents and the degree to which variables lead to errors and omissions respondent were asked to indicate their perception on the variable indicated, using YES or NO and ticking. The questionnaires were divided into secession A and B. Secession A for the respondent data while secession B is the actual research questions. 4,000 questionnaires were administered to professionals and workers by the researcher. Out of 4,000 questionnaires distributed 3,200 were returned which is 80% response rate.

3.2 Sampling Techniques

The research utilized simple random sampling for the survey. Simple random sampling is a method of probability where each sample unit within the population has an equal opportunity of being chosen and it is bias free.

3.3 Data Analysis Design

Data used for analysis were extracted from the completed and returned questionnaire and were analyzed with percentage which is part/ whole or % /100. The data analysis was conducted utilizing both qualitative and quantitative analytical methods. Quantitative techniques involved the use of tables, percentages, and textual summaries of the collected data, whereas qualitative analysis relied on descriptive narratives during the presentation of data. Furthermore, a cross-case analysis was performed. These methodologies were implemented to enhance and clarify the data, enabling readers to extract valuable insights without the need to sift through all the information independently.

4.0 Result Presentation and Analysis of Data

Data collected were organized and analyzed in consonance with the research objectives. Frequency and percentage tables are utilized for presentation purposes. Each table provides details regarding the responses to the research objectives. Table 1 to 4 below shows the summary of the background information on the respondents.

4.1 PERSONAL DATA

Table 1: PROFESSION/ POSITION OF RESPONDENTS

S/no	Profession/position	No of respondent	Percentage %
1	Builder	700	21.8
2	Civil engineer	400	12.5
3	Town planner	300	9.3
4	Architect	400	12.5
5	Quantity surveyor	400	12.5
6	Workers	1000	31.2
	Total	3,200	100

From the Table 1 above, the respondents were spread among the professionals and workers in the housing industry with the workers having 31.2% followed by builders 21.8%, Architects 12.5%, quantity surveyors 12.5%, civil engineers 12.5% and the town planners 9.3%. All the professionals and workers were highly represented in the survey.

Table 2: Qualification Obtained by Respondents

S/no	Qualification	No of respondent	Percentage %
1.	M.Sc	500	15.6
2.	B.Sc / B.Eng /B. Tech	800	25
3.	HND	700	21.8
4.	Technician	200	6.2
5.	Worker	1,000	31.2
	Total	3,200	100

The Table 2 above indicates that most of the respondents are workers representing 31.2%, BSc/B.Eng/B.tech 25%, HND holders 21.8%, Msc 15.6%, technician 6.2%. Most site users were represented in the survey.

Table 3: Years Of Experience in their Profession.

s/no	No of years	No of respondent	Percentage%
1	0-5 years	8,00	25
2.	6-10 years	1,000	31.2
3.	11- 15 years	700	21.8
4.	16- 20 years	400	12.5
5.	More than 20 years	300	9.3
	Total	3,200	100

Table 3 above shows that 43.8% of the respondents have been in the field either private or public for 10 years and above while 25% have been in the field for up to 0-5 years. The remaining 31.2% are made up of respondents that have been practicing for five years to ten years.

Table 4: Ownership of Company

s/no	Type of company	No	Percentage %
1.	Private	2,900	90.6
2.	Public	300	9.3
	Total	3,200	100

Professionals and workers in the private sector represent 90.6% of the survey while 9.3% respondents are from the public sector.

Table 5: Accident and Its Causes

s/n	Item	Strongly Agreed %	Agreed %	Undecided %	Disagreed %	Strongly Disagreed %	Total % agreed	Total % disagreed
1.	Accidents are common on site	20%	80%	-	-	-	100%	-
2.	The use of faulty tools leads to accidents on site.	12.5%	40.6%	9.3%	25%	12.6%	53.1%	38%
3.	Not using the right tools leads to accidents.	25%	50%	-	18.8%	6.2%	75%	25%

4.	Workers that are not trained mostly have accident	18.7%	43.8%	-	30%	10%	62.5%	37.5%
5.	Unavailability of safety officers on site leads to accidents	37.5%	42.5%	-	6.2%	13.8%	80%	20%
6	Accident can be controlled on site	62.5%	21.8%	3.1%	6.3%	6.3%	84.3%	12.6%
7	Which profession records high accident rate							
I	Laborers	42.5%	37.5%	-	9.4%	10.6%	80%	20%
li	Steel benders	21.8%	28.1%	6.3%	21.8%	21.8%	44.9%	48.8%
lii	Bricklayers	25%	31.3%	-	31.3%	12.5%	56.3%	43.8%
lv	Welders	37.5%	31.3%	-	18.8%	12.5%	68.7%	31.3%
V	Carpenters	25%	25%		25%	25%	50%	50%

Item 1 in Table 5 shows that all the respondents agree that accidents are common on site. Item 2 shows that 53.1% of the respondents agree that the use of faulty tools leads to accidents on site while 38% disagreed. Item 3 shows that 75% of the respondents agree that not using the right tools leads to accidents while 25% disagreed. Item 4 shows that 62.5% of respondents agree that untrained workers mostly have accidents while 37.5 disagreed. Item 5 shows that 80% of respondents agree that unavailability of safety officers leads to accidents on site while 20% disagreed. Item 6 shows that 84.3% of respondents agree that accidents can be controlled on site while 12.6% disagreed. Items I - V shows that laborers had the highest rate of accident with 80%, welder 68.7%, bricklayer 56.3%, carpenter 50%, steel bender 44.9%.

Table 6: Effect of Accident

s/n	Item	Strongly Agreed %	Agreed %	Undecided %	Disagreed %	Strongly Disagreed %	Total agreed %	Total disagreed %
1.	Accident increases the cost of a project.	37.5%	31.3%	-	12.5%	15.6%	68.8%	28.1%
2.	Accident leads to delays or extensions of project.	45.6%	34.4%		12.5%	12.5%	75%	25%
3.	Most accidents on site lead to loss of life	18.8%	18.7%		25%	37.5%	36.7%	63.5%

Item 1 of Table 6 shows that 68.8% respondents agree that accidents increase the cost of a project while 28.1% disagreed, item 2 shows that 75% respondents agree that accidents lead to delay or extension of project while 25% disagreed. Also, item 3 shows that 63.5% disagreed that most accidents on site lead to loss of life while 36.7% agreed.

Table 7: Availability of safety officers, safety gadgets, and facilities/tools on site before work starts on site.

s/n	Item	Strongly Agreed %	Agreed %	Undecided %	Disagreed %	Strongly Disagreed %	Total % agreed	Total % disagreed
1.	Safety officer	15.6%	15.6%	6.3%	25%	34.4%	31.2%	59.4%
2.	Helmets	31.3%	37.5	-	15.6%	12.5%	68.8%	28.1%
3.	First aid box	25%	25%		25%	25%	50%	50%

4.	Hoisting equipment	12.5%	12.5%	6.3%	31.3%	31.3%	25%	62.6%
5.	Safety signs	18.8%	25%	6.3%	28.1%	18.7%	43.8	46.6%
6	Head pan	37.5%	31.3%		18.8%	12.5%	68.8%	31.3%
8	Shovel	62.5%	31.3%	-	-	6.3%	93.8%	6.3%
7	Hand gloves	46.8%	31.3%	3.1%	9.4%	9.4%	78.1%	18.8%
8	Eyes glasses	15.6%	21.8%	12.5%	28.1%	15.6%	37.4%	31.2%
9	Scaffold/ladder	25%	25%	-	25%	25%	50%	50%
10	Safety boots	37.5%	31.3%	6.3%	12.5%	12.5%	68.8%	25%

In Table 7, the availability of safety officer, safety gadget and facility/tools on site before work starts is arranged in a descending order from the survey conducted, shovel 93.8%, hand gloves 78.1%, safety boots, helmet, hand pan all have 68.8%, first aid box and scaffold has 50%, safety signs 43.8%, eyes glasses 37.4%, safety officers 31.2%, hoisting equipment 25%. None of the facilities/ gadget/ safety officer is up to 80%. This simply shows they were provided but not fully. Not providing sufficient/all safety gadget is equivalent to not providing any gadget. As accident is unplanned, half-done is undone.

Table 8: Safety Regulation

s/n	Item	Strongly Agreed %	Agreed %	Undecided %	Disagreed %	Strongly Disagreed %	Total agreed %	Total Disagreed %
1.	It is necessary for government to enforce health and safety procedures on site.	62.5%	21.9%		9.4%	6.3%	84.4%	15.7%
2.	Government or non-governmental agencies visit sites for safety inspection	12.5%	21.9%	3.1%	31.3%	31.3%	34.4%	65.7%
3.	There are known governmental establishments that deal with construction workers safety	9.4%	3.1%	9.4%	59.4%	18.7%	12.5%	78.1%
4.	Agencies inspect company safety not workers safety.	46.8%	31.3%	3.1%	9.4%	6.3%	78.1%	15.7%

Item 1 of Table 8 shows that 84.4% of the respondents agree that it is necessary for government to enforce safety procedures on site while 15.7% disagreed. Item 2 indicates that 78.1% agreed that there are not known government establishments that deal with construction safety while 12.5% indicate there are. Item 3 indicates that 65.7% disagreed that governmental or non-governmental agencies visit sites for safety inspection while 34.4% agreed. Item 4 shows that 78.1% of respondents agreed that agencies inspect company safety not workers safety while 15.7% disagrees.

5.0 Discussion and Summary of Findings

It is imperative to re-establish that accidents are common on housing construction sites, thus the need to provide procedures for safety can never be overemphasized. Based on the analysis of data collected through questionnaires, the result revealed that

1. Accident can be controlled on site though accident is common site.
2. The use of wrong and faulty tools leads to accidents on site.
3. On the job training leads to accidents, not having formal or informal training before starting work.
4. This study identifies the unavailability of safety officers on site, which leads to accidents.
5. The accident rate based on selected samples follows in this descending order, laborers, welders, bricklayers, carpenter and steel bender.
6. An accident increases the cost of the project and alters its time frame.
7. Some accidents lead to loss of life.
8. There is no full provision of safety gadgets and facilities on site.
9. There are few well-known governmental and non-governmental safety agencies, and they don't enforce safety procedures on site.
10. The few agencies are more concern about company safety than workers safety.

5.1 Conclusion

This research has established that accidents on housing construction sites can be minimized by enrooting safety procedure measures from the design stage which includes engaging a safety officer on site, providing all safety gadget and facilities and a proper enlightenment inform of formal training, off the job training and regular orientation in housing construction site. Also, government should establish construction safety agencies, enact an updated safety regulation law and stand up to the task of enforcing not only company safety but also workers safety.

5.2 Recommendation

1. Employers of construction workers should mandate the presence of safety officers and provision of full safety kits and facilities, as the research reveals that construction workers hardly provide all the safety kits and facilities on a housing construction site.
2. Workers must be formally trained or off the site training before getting engaged on site because the construction industry floods so many unlearned workers, this category of unlearned workers are more prone to accident the research reveals.
3. Government should establish agencies that will oversee safety enforcement. It was deduced from the survey that most companies are owned by individual which aim is to make profit, paying little or no attention to safety procedures.
4. Government and other bodies should educate the public about safety and encourage proper documentation of accident rates in the study area. It was difficult trying to be analytical about accident rates as there was no track record of accident rates.

5. Nigeria down to the state need to update law as regards safety regulation. Gathering the secondary data indicated that Nigeria law is outdated.

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Conflict of Interest

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