

Occupational Safety and Health Practice in Building Construction Sites in Minna

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Abstract

This study was carried out to identify the occupational safety and health practice in building construction sites in Minna. Specifically, this study determined: the level of occupational safety and health knowledge of construction workers in building construction sites in Minna; the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna and the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna. Three research questions were answered and three null hypotheses were formulated and tested at 0.05 level of significance to guide the study. The descriptive survey approach was used and the target population for this study was made up of Architects, Builders and Engineers within Minna metropolis. Twenty-eight (28) item questionnaires were used as instruments for data collection which were analyzed according to research questions. The questionnaire was validated by three experts in building technology. The reliability of the instrument was found to be 0.87 using Cronbach alpha statistics. The data collected from the respondents were analyzed using mean and analysis of variance (ANOVA). The findings among others include: the use of personal protective equipment by workers is paramount in the construction site, scaffoldings should be properly inspected and fix before mounting and ladders fixed and secured in position before ascending them and occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna revealed that it reduces construction site accidents and increase productivity. It was recommended among others that during the training of the site workers by the building engineers or the project managers with regards to the knowledge of the causes of injuries on the building construction sites, emphasis should be given to the hazards from excavations and other sub-structural works, roof works, manual handling of block walls and the assembling of other parts of superstructures, and the use of plants and pieces of machinery since hazards from them were significantly rated high.

Keywords: Building construction sites, health practice and occupational safety

Introduction

A construction site is any workplace where construction activities are carried out. The activities include among others; erection of buildings, fittings and installation work, assembly and disassembly of prefabricated elements, demolition, alteration and repairs, redevelopment and maintenance and other general construction activities. However, construction sites are very dangerous with potential hazards from falling materials, collapsing foundations, scaffolds, movement of people inside the construction site. According to Alfred and Pao-Chi (2019) construction sites is a very hazardous place, therefore each year a lot of workers both skilled and unskilled lost their lives, injured and even lost their bodily parts on sites in building construction. Building construction is the technique involved in the assembly and erection of structures which is primarily to provide shelter. It is an ancient human activity that began with the functional need for a controlled environment to moderate the effects of climate. However, construction remains

the most dangerous land-based work sector in the world (Alcumus Group, 2014). The construction industry has continued to occupy an important position in the nation's economy. According to the National Bureau of Statistics (NBS) (2015a), the sector contributed about ₦121,900.86 million to the Gross Fixed Capital Formation and employed 6,913,536 personnel excluding the casual workers in 2012 and in 2014, its share the total GDP was 3.82%. However, the range of professions in the construction industry includes not only the workers and managers on the site but also the architects, designers, engineers and other specialist professions. Conversely, these workers are killed, injured or suffer ill health than in any other industry (NBS, 2015b; Peter, *et.al.*, 2016). It is, however, disheartening that despite several efforts towards improving the health and safety status of these workers in the construction industry, continuous increases in the number of accidents both reported and unreported on construction sites still go unabated.

Furthermore, the rate of accidents recorded in Minna metropolis was attributed to lack of effective monitoring, reporting and control practices. Added to this problem is the incessant collapse of building in the country. Although there has been a dramatic improvement in recent decades, the construction industry safety record has continued to be one of the poorest (Olotuase, 2014). Adeogun and Okafor (2020) believe that improving occupational safety and health practices in the construction industry. Thus, occupational safety and health practice in the construction industry starts from the designing phase and continue throughout the construction phases until the safety and health of end-users is ensured due to the complexity of the industry and the hazards it contains (Udo, *et al.*, 2020).

Minna, the state capital of Niger State is a state on the transition that is witnessing tremendous infrastructural development, especially to building projects. Almost all these projects are being handled by the local contractors and construction workers (Baba, 2017). In recent times, there has been an increased case of construction sites accidents in the state. Thus, the issue of whether these workers have adequate knowledge on health and safety issues and whether they comply with health and safety rules and guidelines on site come to the forefront. According to the Federal Republic of Nigeria (FRN) (2015), safety and health have become an integral component in the workplace as employers, labour unions and others engage in training and procedures to ensure compliance with safety standards and also to keep a healthy workforce. Vitharana *et.al.*, (2015) assert that the increasing rate of construction accidents has increased the level of awareness of construction health and safety, thereby involving its inclusion as part of project performance criteria. It is against this background that this work investigates the occupational safety and health practice in building construction sites in Minna to determine the:

1. Level of occupational safety and health knowledge of construction workers in building construction sites in Minna
2. Level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna
3. Impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna.

Statement of the Problem

Building construction activities and accidents on construction sites are significantly rated high in Nigeria (Peter, John and Fidelis, 2016). Because of the rapid rate of construction in Nigeria, it became obvious that more workers are needed and for this to be achieved, people must be in good

health and must also engage in construction activities and jobs which do earn them as much as to be comfortable with and also leave them with little or no health hazards. Excessive exposures to certain substances/agents during building construction may result in acute injury, chronic illness, permanent disability or even death (Abrar, Cheema, Saif and Mahmood, 2017; Occupational Safety and Health Council, 2004). In addition to this problem, loss of concentration at construction work and fatigue arising from poor health conditions may increase the risk of accidents as well (Okeola, 2019). Thus, to reduce this problem, this study is therefore aimed at determining the occupational safety and health practice in building construction sites in Minna metropolis are being affected by the construction activities by taking into consideration, the sources of responsible hazards, to generate guidelines to reduce hazards in construction sites in Nigeria.

Research Questions

The study provides answers to the following research question:

1. What is the level of occupational safety and health knowledge of construction workers in building construction sites in Minna?
2. What is level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna?
3. What is the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance

- HO₁ There is no significance difference between the mean response of the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna
- HO₂ There is no significance difference between the mean responses of the respondents on level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna
- HO₃ There is no significance difference between the mean response of the respondents on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

Methodology

In carrying out this study, the descriptive survey approach was used, where questionnaires are used to determine the opinion of the respondents on the issue under investigation. Uzoagulu (2011) defined survey research as the gathering of information about a large number of people or objects by studying a representative sample of the entire group through the use of questionnaires. In support of this, Kumar (2011) stated that research design is a plan or blueprint which specifies how data relating to a given problem should be collected and analyze. Therefore, the survey research was considered suitable since the study seeks information from a sample that was drawn from a population using a questionnaire. The study will be conducted in Minna Metropolis. The target population for this study was made up of 33 architects, 42 engineers and 47 builders in Minna. This population was chosen because they are the range of professions in the construction industry. Since the population is manageable, no sampling will be adopted in the study.

The instrument used for data collection was a structured questionnaire developed by the researcher. It consisted of two (2) parts in which the first indicate the introductory part of the respondents and the second part is divided into three (3) sections A, B and C respectively. All items are to be responded to by indicating the appropriate respondent's best perception using four-point rating scales. The instrument was validated by 3 experts from the Department of Industrial and Technology Education, Federal University of Technology, Minna.

Cronbach alpha statistics was used to determine the internal consistency of the instrument. This was chosen to determine the reliability of the instrument for this study because the items are non-dichotomous scored and the result was found to be 0.87. The analysis of data for the research questions and hypotheses was accomplished using mean and Analysis of Variance (ANOVA). The mean was used to determine the degree of acceptance or rejection in research questions, while ANOVA was used to test the hypotheses of the groups of respondents at 0.05 level of significance. Real limits of values of number was used to determine the occupational safety and health practice in building construction sites in Minna with numerical values of:

3.50 – 4.00 as SA- Strongly Agree	VHL- Very High Level	HC- Highly Complied
2.50 – 3.49 as A- Agree	HL- High Level	C- Complied
1.50 – 2.49 as D- Disagree	LL- Low Level	LC= Low Complied
0.50 – 1.49 as SD- Strongly Disagree	VLL- Very Low Level	NC= Not Complied.

Therefore, if the P-value is less than α -value ($P < \alpha$) the null hypothesis will be rejected; this implies that there is a significant difference. However, if the P-value is greater than the α -value ($P > \alpha$), the null hypothesis will be accepted; this implies that there is no significant difference.

Results

Research Question 1: What is the level of occupational safety and health knowledge of construction workers in building construction sites in Minna?

Table 1: Mean response of the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna

		N ₁ =33, N ₂ =42, N ₃ =47				
S/N	Items	X ₁	X ₂	X ₃	X _a	Remarks
1	Construction safety laws and regulations	3.48	3.25	2.73	3.15	HL
2	First aid	2.96	2.96	3.87	3.26	HL
3	Positive safety attitudes	3.84	3.87	2.77	3.49	HL
4	Proper housekeeping	2.48	2.55	2.98	2.67	HL
5	Proper use of ladders	2.55	2.56	2.73	2.61	HL
6	Proper use of scaffoldings	2.45	2.50	3.87	2.94	HL
7	Safety equipment acquisition	3.62	3.60	3.28	3.50	VHL
8	Safety equipment maintenance	2.71	2.70	2.92	2.78	HL
9	Safety records	3.86	3.82	3.87	3.85	VHL
10	Safety training	2.71	2.74	2.53	2.66	HL
11	The use of personal protective equipment	2.92	2.96	2.92	2.93	HL
12	Welfare facilities	2.52	2.57	2.55	2.55	HL
X_g					3.03	HL

Keys: X_1 = Mean response of architects; X_2 = Mean response of builders; X_3 = Mean response of engineers; X_a = Average of Mean response of the respondents; X_g = Grand Average of Mean response of the respondents; N_1 = Number of architects; N_2 = Number of builders; N_3 = Number of engineers; VHL- Very High Level; HL= High Level; LL= Low Level and VLL= Vey Low Level.

The result in table 1 shows that two (2) out of the twelve (12) items dealing with the level of occupational safety and health knowledge of construction workers in building construction sites in Minna are very high level. Conversely, ten (10) items are rated high level and none of the items is rated as low level and very low level. Based on the grand average mean value (3.03) which is between the mean range of 2.50 – 3.49, this gives the impetus to conclude that the level of occupational safety and health knowledge of construction workers in building construction sites in Minna is high.

Research Question 2: What is level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna?

Table 2: Mean response of the respondents on the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna

$N_1=33, N_2=42, N_3=47,$

S/N	Items	X_1	X_2	X_3	X_a	Remarks
1	Adequate communication of safety issues to all concerned	3.84	3.75	3.80	3.79	HC
2	Availability of first aid	3.55	3.68	3.62	3.61	HC
3	Availability of welfare facilities	3.42	3.7	3.56	3.56	HC
4	Compulsory use of personal protective equipment	2.66	2.77	2.72	2.71	C
5	Construction equipment handled with utmost care	3.76	3.57	3.65	3.66	HC
6	Ladders fixed and secured in position before ascending them	3.73	3.86	3.81	3.80	HC
7	Possession of basic safety training	2.11	2.04	2.08	2.07	C
8	Scaffoldings properly inspected and fix before mounting	2.56	2.66	2.59	2.60	C
9	Strict monitoring of safety policy	3.74	3.61	3.74	3.69	HC
10	Strict monitoring of safety records	3.55	3.59	3.53	3.55	HC
11	Working environment always free from all objects that can cause injury	3.71	3.82	3.79	3.77	HC
X_g					3.45	C

Keys: X_1 = Mean response of architects; X_2 = Mean response of builders; X_3 = Mean response of engineers; X_a = Average of Mean response of the respondents; X_g = Grand Average of Mean response of the respondents; N_1 = Number of architects; N_2 = Number of builders; N_3 = Number of engineers; HC- Highly Complied; C= Complied; LC= Low Complied and NC= Not Complied. The result in table 2 shows that eight (8) out of the eleven (11) items dealing with the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna highly complied. Conversely, two (2) items are rated complied and

none of the items is rated as low complied and not complied. Based on the grand average mean value (3.45) which is between the mean range of 2.50 – 3.49, this gives the impetus to conclude that the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna is complied.

Research Question 3: What is the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna?

Table 3: Mean response of the respondents on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

S/N	Items	X ₁	X ₂	X ₃	X _a	Remarks
1	Increase productivity	2.54	3.01	2.99	2.85	A
2	Increase efficiency	3.01	3.79	3.73	3.51	SA
3	Improve industry's reputation	2.86	3.67	3.62	3.38	A
4	Reduce project cost	3.17	3.58	3.62	3.46	A
5	Reduce construction site accidents	3.65	2.55	2.57	2.92	A
X_g					3.22	A

Keys: X₁ = Mean response of architects; X₂ = Mean response of builders; X₃ = Mean response of engineers; X_a = Average of Mean response of the respondents; X_g = Grand Average of Mean response of the respondents; N₁ = Number of architects; N₂ = Number of builders; N₃ = Number of engineers; SA- Strongly Agreed; A= Agreed; D= Disagreed and SD= Strongly Disagreed.

The result in table 3 shows that one (8) out of the five (5) items dealing with the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna is strongly agreed. Conversely, four (2) items are rated agreed and none of the items is rated as disagreed and strongly disagreed. Based on the grand average mean value (3.22) which is between the mean range of 2.50 – 3.49, this gives the impetus to conclude that the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna is agreed.

Hypothesis 1

HO₁ There is no significance difference between the mean response of the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna

Table 4: Analysis of Variance (ANOVA) between the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna

Source of Variation	SS	df	MS	F	P-value
Between Groups	0.048067	2	0.024033	0.088299	0.915702
Within Groups	8.981933	33	0.27218		
Total	9.03	35			

Keys: df= degree of freedom, F= F-calculated, P-value= Probability value, MS= Mean Square
 Table 4 shows F=0.088299, df (35). Since the P-value (0.915702) is greater than α (0.05) ($P > \alpha$), the null hypothesis is accepted, this implies that there is no significant difference between the mean responses of the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna

Hypothesis 2

HO₂ There is no significance difference between the mean responses of the respondents on level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna

Table 5: Analysis of Variance (ANOVA) between the respondents on the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna

Source of Variation	SS	df	MS	F	P-value
Between Groups	0.00817	2	0.004085	0.011442	0.988627
Within Groups	10.71002	30	0.357001		
Total	10.71819	32			

Table 5 shows F=0.011442, df (32). Since the P-value (0.988627) is greater than α (0.05) ($P > \alpha$), the null hypothesis is accepted, this implies that there is no significant difference between the mean responses of the respondents on the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna

Hypothesis 3

HO₃ There is no significance difference between the mean response of the respondents on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

Table 6: Analysis of Variance (ANOVA) between the respondents on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

Source of Variation	SS	df	MS	F	P-value
Between Groups	0.23812	2	0.11906	0.511969	0.611834
Within Groups	2.79064	12	0.232553		
Total	3.02876	14			

Table 6 shows F=0.511969, df (32). Since the P-value (0.611834) is greater than α (0.05) ($P > \alpha$), the null hypothesis is accepted, this implies that there is no significant difference between the mean responses of the respondents on the on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

Findings

The results of the findings indicated that:

5. The level of occupational safety and health knowledge of construction workers in building construction sites in Minna is high.
6. The level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna is high
7. The impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna is high.
8. There is no significance difference between the mean response of the respondents on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna
9. There is no significance difference between the mean responses of the respondents on the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna
10. There is no significant difference between the mean response of the respondents on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna

Discussion of Findings

The findings on the level of occupational safety and health knowledge of construction workers in building construction sites in Minna revealed that the use of personal protective equipment by workers is paramount in the construction site. This is in line with Abrar et.al., (2017) that building engineers or project managers that all workers should have protective clothing, to minimize injuries during construction activities on the building construction sites. The study also revealed that construction safety laws and regulations reduce occupational hazards in the building construction site. This concurs with Daniel (2015) that the enactment of laws by the government of Nigeria can reduce the injuries due to construction activities at building construction sites.

The findings on the level of compliance of occupational safety and health practices of construction workers in building construction sites in Minna revealed that scaffoldings were properly inspected and fix before mounting and ladders fixed and secured in position before ascending them. This finding coincides with Ellie (2017) that Inspecting all scaffold components before assembly to ensure that components used are of similar material and in good repair before becoming a part of the completed scaffold.

The findings on the impact of occupational safety and health knowledge and compliance among construction workers in building construction sites in Minna revealed that it reduces construction site accidents and increase productivity. This finding concurs with Ahmad et.al., (2016) that safety measures at construction sites helps to prevent unforeseen accidents and enhances workout and productivity.

Conclusion

Building construction was overviewed as an ancient human activity that began with the functional need for a controlled environment to moderate the effects of climate. However, it remains the most dangerous land-based work sector in the world. To this end, various building construction sites in Minna metropolis were studied and the aim was to determine the extent to which the health of

workers are being affected by the construction activities by taking into consideration, the sources of responsible hazards, to generate guidelines to reduce hazards in construction sites in Nigeria. This study further averred that health and safety knowledge and compliance alone cannot substantially improve project performance, this implies that knowledge and compliance alone are not enough to cause behavioural changes required for safety performance but certain aspects of safety culture are required. These other essential safety factors include enforceable regulatory framework, management commitment, workers involvement, which must also be considered for improved project performance.

Recommendations

Based on the findings of the study, the following recommendations were proffered:

1. Since almost all the construction works going on in Minna, Niger State are being handled by the local contractors and construction workers, this study has highlighted the need for effective and enforceable health and safety regulations in the State. Based on the result of this study, this would serve as a wakeup call to agencies responsible for ensuring strict implementation of safety rules on construction sites, if any in the State.
2. Provisions of National Building Code as regards to health and safety on construction site is very obvious, adherence to that provisions will maximize safety performance of our construction sites.
3. During the training of the site workers by the building engineers or the project managers with regards to the knowledge of the causes of injuries on the building construction sites, emphasis should be given to the hazards from excavations and other sub-structural works, roof works, manual handling of block walls and the assembling of other parts of superstructures, and the use of plants and pieces of machinery since hazards from them were significantly rated high.

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