

JOURNAL 17



ABDULLATEEF SHITTU <funsho@futminna.edu.ng>

Nigerian Journal of Technological Research - Decision on Manuscript ID NJTR-2019-0075.R1

2 messages

Omotunde Fasanya <onbehalf@manuscriptcentral.com>
Reply-To: njtrfutminna@gmail.com
To: aishatabdulahi2007@yahoo.com, funsho@futminna.edu.ng
Cc: njtrsec@yahoo.com

Wed, Nov 11, 2020 at 3:08 AM

10-Nov-2020

Dear Dr. Shittu:

It is a pleasure to accept your manuscript entitled "EFFECT OF SITE SANITATION ON THE SAFETY PERFORMANCE OF WORKERS ON CONSTRUCTION SITES IN MINNA, NIGERIA" in its current form for publication in the Nigerian Journal of Technological Research.

Please prepare final version using Microsoft word and submit as attachment using the journal email account.

Thank you for your fine contribution. On behalf of the Editors of the Nigerian Journal of Technological Research, we look forward to your continued contributions to the Journal.

Sincerely,

Editor-in-Chief,
Nigerian Journal of Technological Research
njtrfutminna@gmail.com

ABDULLATEEF SHITTU <funsho@futminna.edu.ng>
To: alhassanisah1970@gmail.com, mmndagi94@gmail.com, Hawwaahmad07@gmail.com

Wed, Nov 11, 2020 at 4:48 PM

[Quoted text hidden]

**EFFECT OF SITE SANITATION ON THE SAFETY PERFORMANCE OF WORKERS
ON CONSTRUCTION SITES IN MINNA, NIGERIA**

*Abdullateef Adewale Shittu^a, Hawwa Ibrahim Ahmad^b, Alhassan Mohammed Isah^c &
Mohammed Ndagi Mohammed^d

^{a,b,c,d}(Department of Quantity Surveying, School of Environmental Technology, Federal
University of Technology, Minna, Niger State, Nigeria)

*Corresponding Author: aishatabdulahi2007@yahoo.com (+2348034767554)

^bCo-Author: Hawwaahmad07@gmail.com

^cCo-Author: alhassanisah1970@gmail.com

^dCo-Author: mmndagi94@gmail.com

'Declarations of interest: none'.

EFFECT OF SITE SANITATION ON THE SAFETY PERFORMANCE OF WORKERS ON CONSTRUCTION SITES IN MINNA, NIGERIA

ABSTRACT:

Studies have shown that site sanitation practices are capable of improving the health and safety (H&S) performance of construction companies. In spite of this, evidence has shown that the level of compliance to these practices by construction firms is still poor. This study evaluated the effect of site sanitation on safety performance of workers on construction sites. Data were obtained through a well-structured questionnaire. Analysis of data was done using Relative Importance Index (RII), Mean Item Score (MIS) and Spearman's Rank Correlation. It was found that provision of first aid facilities is the measure most complied with on sites is (RII = 0.96); relationship between level of compliance to good sanitation measures and accident rate is not significant; and provision of Personal Protective Equipment is the most effective strategy for minimising rate of accidents (MIS = 4.95). It was concluded that the effect of site sanitation on safety performance of workers on construction sites in Minna is not significant. It was thus recommended that construction firms should always comply with the measures for enhancing good sanitation on sites, especially "Provision of drinking water", in order to improve safety performance on site.

Keywords: Construction, Safety, Sanitation, Performance, Workers.

1.0 INTRODUCTION

The construction industry generally contributes between 3% and 10% of the Gross Domestic Product (GDP) of most countries (Olanrewaju and Anahwe, 2015). For instance, in 2012, the construction industry contributed N2, 188,718.59 million, 3.05% to the Nigerian GDP and employed 6,913,536 persons (National Bureau of Statistics (NBS), 2015). Therefore, it is a stimulator of national economy (Okeola, 2009). In spite of the attractiveness of the construction industry in nation building, it is still seen as the most risky and hazardous of all industries in terms of health and safety (H&S). This is because its activities pose serious H&S risks to workers, users of construction facilities and the public (Kheni and Braimah, 2014). The risks that construction sites hazards pose are often unacceptably high on construction sites. Measures taken to eliminate these hazards where possible, or reduce their risks to an acceptable level on construction sites are unsatisfactory in developing countries including Nigeria (Kheni and Braimah, 2014; Shittu *et al.*, 2016; Eze *et al.*, 2018).

In view of the above, researches in Nigeria (Shittu *et al.*, 2016; Eze *et al.*, 2018) have found that 58 certain practices can lead to improved H&S performance and therefore constitute good H&S practices. These studies identified eleven (11) most important practices out of the whole 58. These are provision of adequate work space and neat environment on sites, provision of cloak and toilets on sites, provision of drinking water on sites, provision of canteen services on sites, availability of mobile clinic, provision of emergency response plan, ensuring adequate welfare provision on sites, conducting job site inspection, organizing H&S training for operatives – first aid and manual lifting, organizing alcohol and substance abuse programme, and employing an environmental sanitation officer on sites with mean score ranging from 4.21 – 4.19 on a five-point scale. These important practices are categorised by Eze *et al.* (2018) as Site Sanitation Practices that are capable of improving the H&S performance of construction companies.

In spite of the fact that the site sanitation practices have been adjudged to be capable of improving the H&S performance of construction workers, evidence has shown that the level of compliance to the practices by construction firms is still poor. This forms the basis for evaluating the effect of site sanitation on the safety performance of workers on construction sites in Minna with a view to minimizing the rate of accidents on sites. In order to achieve the aim of the study, the following objectives were formulated:

- i. To identify and examine the level of compliance with the measures for enhancing good sanitation on sites.
- ii. To identify and assess the barriers to compliance with measures for good sanitation on sites.
- iii. To determine the effect of the identified measures on the rate of accidents on sites.
- iv. To identify and examine strategies for improving compliance to site sanitation for improved H&S performance on Sites.

In order to achieve the objectives of the study, literature has been reviewed on the following issues.

1.1 Measures for Enhancing Good Sanitation on Sites

Sanitation can be referred to as public health conditions related to clean drinking water and adequate treatment and disposal of human excreta and sewage. Sanitation systems aim to protect human health by providing a clean environment that will stop the transmission of disease, especially through the facial-oral route. Sanitation is also described as one of the most important aspects of community well-being because it protects human health, extends life spans, creates a safe working atmosphere and is documented to provide benefits to the economy of a nation (Health Facilities Wash Manual, 2020). Unfortunately, it was discovered that low ability and willingness to pay are among the main reasons why access to adequate sanitation infrastructure remains low in both rural and urban areas of low and middle-income countries (Urich *et al.*, 2016). It is therefore important to carry out studies to enable construction stakeholders to be aware of the benefit of complying with the provision of good site sanitation and the disadvantage of not doing so.

In view of the above, it can be seen that site sanitation is key to the effective health and safety of workmen on construction sites. According to Oladiran *et al.* (2009), the important characteristics of every construction project are the cost, duration, quality and safety of such project; it was further argued that there has been a greater emphasis on the first three aspects, at the expense of safety. A lot of people have been exposed to risk situation on building sites, resulting in a high chance of accidents as a result of lack of good sanitation or inadequate provision of safety requirements (Oladiran *et al.*, 2009). This implies that, a lot of contractors in the building industry are much more concerned about the cost, time and quality of the project delivery but are less concerned about the safety of the workers among which good sanitation on sites is key. In view of this, Oladiran *et al.* (2009) enumerated four measures for enhancing good sanitation on sites and/or preventive approaches for accidents. These are Safety Plans; Safety Training and Meeting; First Aid and Medical Arrangement; and Management Policy.

In addition to the above, the studies of Shittu (2016); Shittu *et al.* (2016); David *et al.* (2018); Eze *et al.* (2018) and Doko *et al.* (2018) also identified several measures for ensuring good sanitation practices on construction project sites. Based on the findings of these studies, the measures for enhancing good sanitation on sites are summarised in Table 1.

Table 1: Measures for Enhancing Good Sanitation on Site

S/No	Measures for enhancing good sanitation on site	S/No	Measures for enhancing good sanitation on site
1	Effective safety committee	15	Health and safety responsibility <i>known</i>
2	Control of subcontractors	16	Encouragement of supervisor involvement
3	Top management involvement	17	Use of external assistance with respect to health and safety issues
4	Adequate work space and neat environment	18	Use of ISO 26000
5	Safety person or personnel	19	Provision of first aid facilities on site
6	Safety policies and procedures	20	Mobile clinic
7	Expended large percentage of revenue on safety performance	21	Fencing of sites
8	Provision of drinking water	22	Provision of toilet
9	Provision of cafeteria	23	Job hazard analysis
10	Provision of changing/rest room	24	Effective identification and hazard elimination/control
11	Use of posters and other signs to give safety education	25	Post-accident investigation
12	Safety inductions	26	Compliance with customer or regular certification schemes
13	Safety training and orientations	27	29 Hazard management plan in use of plant and equipment
14	Formal safety inspection per month	28	30 Workers' involvement
	Safety reward		

Source: Researchers' Review of Literature (2019)

1.2 Barriers to Compliance with Measures for Good Sanitation on Sites

Peter *et al.* (2016) described compliance as applying measures designed to comply with legal requirements with the regulator being primarily more concerned with improved outcomes than prosecution results. According to Peter *et al.* (2016), lack of strict enforcement of Occupational Safety and Health (OSH) regulations is a major contributor to the poor state of OSH in Nigeria. Hence compliance with OSH legislations can increase productivity in industries by reducing accidents, because accidents result in decreasing productivity and damage to equipment or property (Peter *et al.*, 2016). On the other hand, OSH measures are said not to be effective in improving safety and health conditions in workplace if not well adhered to. Thus the prevalence of health and safety abuses on construction site among construction stakeholders calls for an intensive investigation into the level of health and safety knowledge and compliance of construction workers.

In a related study by Priyadarshani (2013), a variety of factors militating against good health and safety performance on site were identified as follows: Employment of full-time safety officers, Lack of budgetary constraints, Presence of owner in coordination meetings, Maintaining safe work conditions, Establishing safety training, Educating workers and supervisors in developing good safety habits, Effective control of the numerous subcontractors by the main contractor, Time devoted to safety issues by the company safety coordinator, Promoting safe practices by safety award, Management talks on safety, Provision of safety booklets, Provision of safety equipment, Providing a safe environment, Appointing a trained safety representative at site.

Based on the literature reviewed, the barriers to compliance with measures for good sanitation on sites are summarised in Table 2.

Table 2: Barriers to Compliance with Measures for Good Sanitation on Sites

S/No	Barriers to compliance with measures for good sanitation on sites	S/No	Barriers to compliance with measures for good sanitation on sites
1	Low wages	16	Inadequate staff training
2	Unregulated practices by regulatory bodies	17	Industry norm/Organizational safety culture
3	Licensing and certification of plant operators	18	Ineffective Supervision and equipment management
4	Corruption and bribery	19	Non-provision of safety booklets
5	Weak legal structure and National OHS standards	12	Non-Provision a safe environment
6	Non enforcement of legal sanctions	21	Non-possession of basic Safety training and education
7	Low literacy level	22	Ineffective control of the numerous subcontractors by the main contractor
8	Ineffective OHS administration	23	Non-provision of toilet
9	Human relations/Communication problem		
10	Non-adherence to traditional methods of working		
11	Non availability of construction equipment		
12	Lack of Organisational OHS policies		
13	Lack of Experience		
14	Habit/Attitude		
15	OHS violation		

Source: Researcher's Compilation (2019)

The barriers to compliance with measures for good sanitation on sites which were summarised in Table 2 have been adjudged by previous authors (Shittu *et al.*, 2015; Shittu *et al.*, 2016; David *et al.*, 2018; Doko *et al.*, 2018) to constitute problems requiring urgent attention in order to improve site sanitation practices. The next section discusses the strategies for improving compliance to site sanitation for improved H&S performance on sites in order to address this problem.

1.3 Strategies for Improving Compliance to Site Sanitation for Improved H&S Performance on Sites

Having identified the measures for enhancing good site sanitation and the barriers to the compliance with good site sanitation on sites, it is imperative to identify strategies for improving the level of compliance with good site sanitation on sites for reduced rate of accidents and improved health and safety performance of construction firms. In view of this, Peter *et al.* (2016) reported that workplace H&S is a global challenge to the sustainable development and civilization of a nation. The H&S performance of the construction industry remains a staring challenge in its effort to tackle the developmental initiative of many nations including Nigeria (Peter *et al.*, 2016). The study further reveals that the neglect of safety on sites may have considerable impact of worker productivity and performance and capable of undermining the reputation of construction companies thereby increasing expenses. Therefore, improvement of safety performance can only be effective if construction firms is structured and positioned to make changes when it is deemed appropriate. It was then suggested that it is necessary for a shift in thinking where the focus is on those actions that can lead to good safety performance, for a better approach is to focus on proactive efforts dealing with the factors responsible for such accidents and injuries and how to control them.

Oladiran *et al.* (2009) outlined some strategies for minimising rate of accidents on sites leading to improved level of compliance with site sanitation as: wearing clothes that are appropriate to the work and weather condition on site; wearing of hand gloves; wearing of work traction boots at all times on site; wearing of hardhats or helmet at anywhere on site; provision of eyewear or goggle

for welding purposes; constant inspection and assessment of equipments, plants, tools and other site materials before use; organizing effective safety training for all site workers and personnel whether on site or off site; provision of effective first aid facility and personnel on site and provision of barriers, signs or reflector around dangerous areas on site (e.g. barrier around trench and so on).

In addition, Arya (2018) reported that construction site safety is one of the most overlooked things during a construction project. In most workplaces, accidents are a nuisance for the worker and a headache for Human Resource Managers. Thus, construction industry leaders must strive to safeguard their employees if not for ethical reasons, then for the economic ones. In the light of this, Arya (2018) suggested some strategies for minimizing the rate of workplace accidents and promote level of compliance with site sanitation construction and site safety. These are: Awareness; Training; Communication; Documentation; Proper Equipment; Supervision; Innovation; and Transparency. These review of related works brought about the strategies for minimising rate of accidents on sites summarised in Table 3.

Table 3: Strategies for Minimising Rate of Accidents on Construction Sites

S/No	Strategies for minimising rate of accidents on sites	S/No	Strategies for minimising rate of accidents on sites
1	Accident and nearmiss investigation	18	Training and retraining of employees on safe work procedure
2	Safety record keeping and follow-ups	19	Safety pre-task planning
3	Fire protection programme	20	Accountability/responsibility and safety budget
4	Detailed safety programmes	21	Regulatory enforcement activity
5	Use of more directly employed labour	22	Emergency response plan
6	Minimization of cost of ill-health and injury	23	Employer-paid group insurance plan
7	Desire to improve staff morale and productivity	24	Jobsite inspection
8	Minimization of workers' turnover	25	Holding management accountable for health and safety
9	Implementing employee drug testing	26	Safety incentives
10	Increase in safety auditing	27	Higher average wage of workers
11	Recognizing unique needs of members of the organization	28	Longer average length of employment
12	Provision of Personal Protective Equipments (PPE)	29	Higher percentage of married workers
13	Provision of transport for workers	30	Transparency
14	Safety meetings	31	Communication
15	Alcohol- and substance-abuse programme	32	Innovation
16	Supervision	33	Documentation
17	Proper Equipment	34	

Source: Researcher's Compilation (2019)

2.0 RESEARCH METHODOLOGY

This study adopted the quantitative research approach. The use of structured questionnaire was employed to collect data. Selected construction sites were visited in order to observe and record the level of provision and of compliance with the procedures for site sanitation on construction projects. Data collected was analyzed using descriptive and inferential statistical techniques.

The population for this study is comprised of construction firms registered with the Niger State Ministry of Works and Infrastructural Development, Minna, Niger State with a size of 225. The sample size for the study is 55 purposively selected construction firms which is the number representing the total population size of 225. The criteria for selection are age or years of existence (15 years and above) of construction firms, possession of current active construction project sites and having a designated safety officer on site. These criteria were based upon the fact that Shittu (2016) discovered that age, years of experience and having a designated safety personnel on sites by construction firms have significant influence on the health and safety practices of the firms. In view of this, only 55 construction firms met the criteria and questionnaire was administered to

them accordingly. Therefore, the current active site of each of the 55 firms were used for data collection; giving a total of 55 construction sites.

The data for the study was collected with the aid of questionnaire. Questionnaire was employed to collect data on the research objectives based on a five-point Likert's Scale format. The questionnaire comprised of five sections. The first section addressed issues relating to the profile of respondents. The second section addressed issues relating to Objective 1. Issues relating to Objective 2 were addressed in the third section of the questionnaire. The fourth section of the questionnaire addressed issues relating to Objective 3. The fifth section of the questionnaire address issues concerning Objective 4.

Analysis of data were carried out using descriptive methods of analysis such as Relative Importance Index (RII), Mean Item Score (MIS) and Spearman's Rank Correlation analysis. RII was employed to examine the level of compliance with the measures for enhancing good sanitation on sites. MIS was adopted to assess the barriers to compliance with measures for good sanitation on sites. Spearman's Rank Correlation analysis was used to determine the effect of the identified measures on the rate of accidents on sites. The use of MIS was also employed to examine the strategies for improving compliance to site sanitation for improved H&S performance on sites. The decision rule adopted for the RII and MIS are summarised in Table 4.

Table 4: Decision Rule for Data Analysis

SCALE	Cut-Off Point		Interpretation				
	RII	MIS	Frequency of Occurrence	Level of Importance	Level of Significance	Level of Compliance	of
5	0.81 - 1.00	4.51 - 5.00	Very Often	Very Important	Very Significant	Very High Compliance	
4	0.61 - 0.80	3.51 - 4.50	Often	Important	Significant	High Compliance	
3	0.41 - 0.60	2.51 - 3.50	Fairly Often	Fairly Important	Fairly Significant	Average Compliance	
2	0.21 - 0.40	1.51 - 2.50	Less Often	Less Important	Less Significant	Partial Compliance	
1	0.00 - 0.20	1.00 - 1.50	Rarely	Least Important	Least Significant	No Compliance	

Source: Adapted and Modified from Shittu et al. (2015)

3.0 DATA ANALYSIS AND DISCUSSION OF RESULTS

3.1 Response Rate

The total number of questionnaires distributed was fifty-five (55) and a total of forty-one (41) were retrieved at the end of the survey showing an effective response rate of 74.55% as shown in Table 5.

Table 5: Response Rate of Questionnaires

Questionnaires Sent	Questionnaires Received	Response Percentage
55	41	74.55%

Source: Researcher's Field Survey (2019)

3.2 Measures for Enhancing Good Sanitation on Sites

Twenty one (21) basic measures for enhancing good sanitation on sites were identified through literature review and were ranked according to their importance using RII. The rate of response and the RII score are shown in Table 6.

Table 6: Measures for Enhancing Good Sanitation on Sites

S/No	Measures for Enhancing Good Sanitation on Sites	RII	Rank	Decision
1	Provision of first aid facilities on site	0.96	1st	Very High Compliance
2	Fencing of sites	0.74	2nd	High Compliance
3	Safety policies and procedures	0.71	3rd	High Compliance
4	Health and safety responsibility known	0.70	4th	High Compliance
5	Safety person or personnel	0.70	4th	High Compliance
6	Expended large percentage of revenue on safety performance	0.69	6th	High Compliance
7	Provision of changing/rest room	0.69	6th	High Compliance
8	Encouragement of supervisor involvement	0.69	6th	High Compliance
9	Provision of toilet	0.68	9th	High Compliance
10	Provision of cafeteria	0.67	10th	High Compliance
11	Use of posters and other signs to give safety education	0.67	10th	High Compliance
12	Use of external assistance with respect to health and safety issues	0.66	12th	High Compliance
13	Effective safety committee	0.65	13th	High Compliance
14	Mobile clinic	0.65	13th	High Compliance
15	Adequate work space and neat environment	0.65	13th	High Compliance
16	Safety inductions	0.63	16th	High Compliance
17	Use of ISO 26000	0.63	16th	High Compliance
18	Safety training and orientations	0.62	18th	High Compliance
19	Control of subcontractors	0.62	18th	High Compliance
20	Top management involvement	0.61	20th	High Compliance
21	Provision of drinking water	0.60	21st	Average Compliance
Average		0.68		High Compliance

Source: Researcher's Data Analysis (2019)

The result in Table 6 indicates that "Provision of first aid facilities on site" is the measure for enhancing good sanitation on construction sites which is most complied with (RII = 0.96). Other measures ranging from "Fencing of sites" to "Top management involvement" also have level of compliance (RII 0.74 - 0.61), while "Provision of drinking water" is averagely complied with (RII = 0.60). On the average, the measure for enhancing good sanitation on construction sites have high level of compliance (average RII = 0.68).

3.3 Barriers to Compliance with Measures for Good Sanitation on Sites

In order to determine the barriers to compliance with measures for good sanitation on sites, twenty-two (22) factors were identified and ranked with the aid of (MIS) as shown in Table 7.

Table 7: Barriers to Compliance with Measures for Good Sanitation on Sites

S/No.	Barriers to Compliance with Measures for Good Sanitation on Sites	MIS	Rank	Decision
1	Non-availability of health and safety plan before commencement of construction project	4.83	1st	Very Important
2	Ineffective control of the numerous subcontractors by the main contractor Provision of toilet	4.29	2nd	Important
3	Inadequate staff training	3.90	3rd	Important
4	Lack of Experience	3.78	4th	Important
5	Habit/Attitude	3.76	5th	Important
6	Low literacy level	3.76	5th	Important
7	Non availability of construction equipment	3.76	5th	Important
8	Weak legal structure and National OHS standards	3.73	8th	Important
9	Corruption and bribery	3.71	9th	Important
10	Industry norm/Organizational safety culture	3.68	10th	Important
11	Lack of Organisational OHS policies	3.68	10th	Important
12	Licensing and certification of plant operators	3.68	10th	Important
13	Ineffective Supervision and equipment management	3.66	13th	Important
14	Non-possession of basic Safety training and education	3.66	13th	Important
15	Non-enforcement of legal sanctions	3.63	15th	Important
16	OHS violation	3.49	16th	Fairly Important
17	Unregulated practices by regulatory bodies	3.49	16th	Fairly Important
18	Adherence to traditional methods of working	3.46	18th	Fairly Important
19	Low wages	3.46	18th	Fairly Important
20	Inadequate provision of a safe environment	3.46	18th	Fairly Important
21	Ineffective OHS administration	3.34	21st	Fairly Important
22	Human relations/Communication problem	2.95	22nd	Fairly Important
Average		3.69		Important

Source: Researcher's Data Analysis (2019)

As shown in Table 7, "Non-availability of health and safety plan before commencement of construction project" is the most important barrier to compliance with good site sanitation (MIS = 4.83). Fourteen (14) other barriers, ranging from "Ineffective control of the numerous subcontractors by the main contractor" (MIS = 4.29) to "Legal sanctions" (MIS = 3.63) are important barriers too, while the last seven (7) barriers ranging between "OHS violation" and "Human relations/Communication problem" (MIS = 3.49 – 2.95) are of less importance. On the average, the barriers to compliance with good site sanitation are important and severe with average MIS of 3.69. This finding agrees with the finding of Peter *et al.* (2016) where it was discovered that Non-availability of health and safety plan before commencement of construction project was the major barriers to compliance with measures for good sanitation on sites.

3.4 Effect of the Identified Measures on the Rate of Accidents on Sites

The result of the Spearman's Rank Correlation Analysis carried out in order to determine the effect between the level of compliance to measures for enhancing good sanitation on sites and rate of accident on sites is summarised in Table 8.

Table 8: Results of Spearman's Rank Correlation Analysis

Analysis No.	Variables		Observations		Inferences	
	X ₁	X ₂	R (%)	P-value	Strength of Relationship	Remark
1	Compliance to sanitation measures	Rate of accidents	10.40	0.518	Weak	NS

Source: Researcher's Analysis of Data (2019)

KEY:

NS = Not Significant

It was observed from Table 8 that there exists a weak, positive and non-significant relationship between the level of compliance to measures for enhancing good sanitation on sites and rate of accident on sites. The correlation coefficient (R value) observed was 10.40% (0.104) indicating weak degree of association between the variables. This is an indication that the measures for enhancing good sanitation on sites are not been complied with by construction firms. The probability (P) value of 0.518 observed was greater than 0.05. This implies a non-significant relationship between the variables.

3.5 Strategies for Improving Compliance to Site Sanitation for Reduced Accident Rates and Improved H&S Performance on Sites

Strategies for improving compliance to site sanitation for reduced accident rates and improved H&S performance on sites were identified and in a quest to analyze them the Mean Item Score was employed to rank the thirty-three (33) factors identified as shown in Table 9.

Table 9: Strategies for Improving Compliance to Site Sanitation for Improved H&S Performance on Sites

S/No.	Strategies for Minimizing Rate of Accidents on Sites	MIS	Rank	Decision
1	Provision of Personal Protective Equipments (PPE)	4.95	1st	Very Effective
2	Increase in safety auditing	3.83	2nd	Effective
3	Supervision	3.83	2nd	Effective
4	Safety incentives	3.78	4th	Effective
5	Higher average wage of workers	3.76	5th	Effective
6	Jobsite inspection	3.71	6th	Effective
7	Innovation	3.68	7th	Effective
8	Use of more directly employed labour	3.66	8th	Effective
9	Desire to improve staff morale and productivity	3.66	8th	Effective
10	Implementing employee drug testing	3.66	8th	Effective
11	Minimization of workers' turnover	3.63	11th	Effective
12	Holding management accountable for health and safety	3.61	12th	Effective
13	Safety record keeping and follow-ups	3.59	13th	Effective
14	Fire protection programme	3.56	14th	Effective
15	Minimization of cost of ill-health and injury	3.56	14th	Effective
16	Regulatory enforcement activity	3.54	16th	Effective
17	Safety pre-task planning	3.51	17th	Effective
18	Accountability, responsibility and safety budget	3.51	17th	Effective
19	Emergency response plan	3.51	17th	Effective
20	Proper Equipment	3.51	17th	Effective
21	Employer-paid group insurance plan	3.51	17th	Effective
22	Safety meetings	3.49	22nd	Fairly Effective
23	Alcohol- and substance-abuse programme	3.49	22nd	Fairly Effective
24	Training and retraining of employees on safe work procedure	3.46	24th	Fairly Effective
25	Regulatory enforcement activity	3.46	24th	Fairly Effective
26	Longer average length of employment	3.41	26th	Fairly Effective
27	Accident and nearmiss investigation	3.37	27th	Fairly Effective
28	Higher percentage of married workers	3.29	28th	Fairly Effective
29	Detailed safety programmes	3.27	29th	Fairly Effective
30	Documentation	3.20	30th	Fairly Effective
31	Provision of transport for workers	3.15	31st	Fairly Effective
32	Safety pre-task planning	3.15	31st	Fairly Effective
33	Recognizing unique needs of members of the organization	3.02	33rd	Fairly Effective
Average		3.56		Effective

Source: *Researcher's Data Analysis (2019)*

Table 9 revealed that the most effective strategy for improving level of compliance to site sanitation for improved H&S performance on sites is "Provision of PPE" (MIS = 4.95). Twenty (20) other strategies are also effective. These range from "Increase in safety auditing" to "Employer-paid group insurance plan" (MIS = 3.83 - 3.51). The other twelve (12) strategies are fairly effective. The range from "Safety meetings" (MIS = 3.49) to "Recognizing unique needs of members of the organization" (MIS = 3.02). Averagely, the strategies for minimizing rate of accidents on sites are effective (average MIS = 3.56). This finding agrees with research finding of

Oladiran *et al.* (2009) which also identified Provision of PPE as the most effective strategy for improving level of compliance to site sanitation for improved H&S performance on sites.

4.0 CONCLUSION AND RECOMMENDATIONS

This study has brought into focus the effect of site sanitation on the safety performance of workers on construction sites. After a series of extensive literature review and findings, it is concluded that provision of first aid facilities on site is the measures for enhancing good sanitation on sites which is most complied with; non-availability of health and safety plan before commencement of construction project is the most important barrier to compliance with measures for good sanitation on sites; level of compliance to measures for enhancing good sanitation on sites and rate of accident on sites was weak, positive and non-significant; and provision of PPE is the most effective strategy for improving level of compliance to site sanitation for improved H&S performance on sites. Hence; the effect of site sanitation on the safety performance of workers on construction sites in Minna is not significant.

The following recommendations were made based on the findings of this study:

- i. Construction firms should always comply with the measures for enhancing good sanitation on sites, especially "Provision of drinking water", in order to improve safety performance.
- ii. Contractors' should provide PPE to enhance site sanitation and ensuring safety of the construction workers.
- iii. Contractors' should provide effective first aid facilities on site which will go a long way in ensuring safety of the construction workers.

ACKNOWLEDGEMENT

The authors wish to thank the management and staff of Niger State Ministry of Works and Infrastructural Development, Minna, Niger State for assisting during the field work by providing the data required and providing response to the questionnaire administered.

ROLE OF THE FUNDING SOURCE

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

- Arya, H. (2018). Best Practices to Improve Construction Site Safety. Posted in Best Practices and tagged Construction Tips, Jobsite Safety. December 12, 2018.
- David, B. R., Idiake J. E. and Shittu A. A. (2018). Effect of Health and Safety Management Practices on Safety Performance of Construction Contractors. In A. M. Junaid, O. F. Adedayo, R. A. Jimoh & L. O. Oyewobi (Eds.); *School of Environmental Technology International Conference (SETIC) 2018: Contemporary Issues and Sustainable Practices in the Built Environment*; 10 -12 April, 2018. School of Environmental Technology, Federal University of Technology, Minna, Nigeria. Vol. 1: 384 – 395.
- Doko, A. U., Shittu, A. A. and Oke, A. A. (2018). Influence of Hazard Recognition Measures on Safety Performance of Building Workers in Abuja, Nigeria. *Proc: 6th National Economic*,

Management and Technology Conference: Development Issues & Challenges that Affects Infrastructure, Employment, Property Reduction & Food Security in Nigeria. Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria. 5th – 6th December, 2018. 107 – 115.

- Eze, C. J., Ayuba, P. and Shittu, A. A. (2018). Assessment of Accidents Hazard Impact in Nigerian Building Industry. Centre for Human Settlement and Urban Development. *Journal (CHSUDJ)*. Centre for Human Settlement and Urban Development, Federal University of Technology, Minna; May, 2018. 7(1): 208 – 226. ISSN NO: 2141 – 7601.
- Health Facilities Wash Manual (2020). Design and Construction Manual for Water Supply and Sanitary Facilities in Health Institutions. Ministry of Health, and Water Energy in Collaboration with UNICEF. Ethiopia.
- Kheni, N. A. and Braimah, C. (2014). Institutional and Regulatory Frameworks for Health and Safety Administration: Study of the Construction Industry of Ghana. *International Refereed Journal of Engineering and Science (IRJES)*. 3(2): 24 – 34.
- National Bureau of Statistics (NBS), (2015). Nigerian Construction Sector: Summary Report; 2010-2012.
- Okeola, O. G. (2009). Occupational Health & Safety (OHS) Assessment in the Construction Industry. In: *1st Annual Civil Engineering Conference*. University of Ilorin, Nigeria. 26-28th August. 236-246.
- Oladiran, O.J., Ogunsanmi O.E. and Soyingbe A.A. (2009). Control Measures of Accidents: Nigerian Building Projects' Case. CIB W065/055 Commissions: Transformation through Construction.
- Olanrewaju, A. and Anahwe, P. J. (2015). Duties and Responsibilities of Quantity Surveyors in the Procurement of Building Services Engineering. *Creative Construction Conference*.
- Peter, U. O., John U. E. and Fidelis, O. E. (2016). Building Construction Workers' Health and Safety Knowledge and Compliance on Site. *Journal of Safety Engineering 2016*, 5(1): 17-26 DOI: 10.5923/j.safety.20160501.03
- Priyadarshani, K.K., Gayani and J. S. (2013). Construction safety assessment framework for developing countries: a case study of Sri Lanka, *Journal of construction in developing countries*, vol. 18, no. 1, pp. 33-51.
- Ulrich, L., Salian, P., Saul, C., Jüstrich, S. & Lüthi, C. (2016). Assessing the Costs of on-Site Sanitation Facilities: Study Report. Eawag: Swiss Federal Institute of Aquatic Science and Technology. Dübendorf, Switzerland.
- Shittu, A. A., Ibrahim, A. D., Ibrahim, Y. M. and Adogbo, K. J. (2015). Assessment of Level of Implementation of Health and Safety Requirement in Construction Projects Execution by Small Firms in Abuja. In D. R. Ogunsemi, O. A. Awodele and A. E. Oke (Eds). *Proceeding of the 2nd Nigerian Institute of Quantity Surveyors Research Conference (RECON2)*. Federal University of Technology, Akure. 1st – 3rd September. 467 – 482.

- Shittu, A. A., Ibrahim, A. D., Ibrahim, Y. M., Adogbo, K. J. and Mac-Barango, D. O. (2016). Impact of organisational characteristics on health and safety practices of construction contractors. *Nigerian Journal of Technological Research (NJTR)*. Federal University of Technology, Minna, Nigeria. 11(1): 60 – 67.
- Shittu, A. A. (2016). Influence of Organisational Characteristics on Health and Safety Practices of Small and Medium-sized Construction Companies in Abuja. Unpublished PhD Thesis. Department of Quantity Surveying, Faculty of Environmental Design, Ahmadu Bello University, Zaria, Nigeria.



Search mail

Compose

Inbox 297

Starred

Snoozed

Important

Chats

Meet

New meeting

My meetings

Hangouts



ABDULLATEEF

+

No recent chats
Start a new oneNigerian Journal of Technological Research
0075.R1 Inbox x**Omotunde Fasanya** <onbehalf@manuscriptcentral.com>

to aishatabdulahl2007, me, njtrsec

10-Nov-2020

Dear Dr. Shittu:

It is a pleasure to accept your manuscript entitled "EFFECT OF SITE S/
SITES IN MINNA, NIGERIA" in its current form for publication in the Nig

Please prepare final version using Microsoft word and submit as attachr

Thank you for your fine contribution. On behalf of the Editors of the Nigi
the Journal.

Sincerely,

Editor-in-Chief,
Nigerian Journal of Technological Research
njtrfulminna@gmail.com