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Analysis of Safety Behaviour of Workers Under Small-Scale

Construction Sites: A Case Study of Anambra State

Emmanuel Ifeanyi Ogunjiofor^{1*}, Judith Ngozi Okoye¹, Ifeamnyi Ezeonyi¹

Article Information

ABSTRACT

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Keywords

Safety Compliance, Small-Scale Construction Site, Workers, SPSS, Safety Behaviour

Small-scale construction companies are predominant in developing countries and it is the most hazardous places in construction sites. Accidents mostly occur on construction sites due to a high level of safety ignorance and the nonchalant attitude of workers and management. The research aimed to investigate the actual behavior of workers at the selected sites regarding safety compliance, nutrition, alcohol use and smoking. This is highly necessary due to the high level of reported accidents and fatalities of the workers. And also recommend measures for improving how safety practices are implemented at a construction site. The interview and questionnaire approach was adopted to study the 150 participants. The data were analysed through SPSS. Research shows that 85% of construction workers are non-compliant with safety regulations because of their ignorance, poor safety training and lack of inspectors It was discovered that the majority of the small-scale contractors had no written health and safety policy within their companies and that made the level of understanding of the workers on safety and health policies very low. This has made the workers not care about wearing safety devices. The study was also extended to include behaviors related to food, alcohol and smoking. It was discovered that most of the workers don't observe simple hygiene and eat junk meals at the site. They smoke and share cigarettes on the site, not knowing that it was a means of sharing communicable diseases.

INTRODUCTION

The issues of safety analysis in construction sites have increased due to the incessant accidents associated with construction practices, the need to protect the site workers, the environment, and public health has brought about an increase in safety analysis in construction sites and to ascertain its challenges (Bryde et al, 2013; Armah et al, 2016). The developmental role of the construction industry in the world cannot be overemphasized, it ranges from the provision of shelter for human development to the provision of amenities, employment, and ease of doing business etc yet it is regarded as a dangerous industry (Ramli et al, 2013). The social, mental, and physical health of employees make up occupational health and safety (OHS), which Armah et al, (2016) refer to as the welfare of the "whole person." more fatalities occur at work than in battles in the entire planet (ILO, 2005). The building and development industry typically receives poor safety ratings (Othman, 2012). All over the world, Construction workers frequently suffer injury rates compared with other industries. The accident and fatality records call for serious concern (Amed et al 2000; Hinze, 2008). According to (ILO, 2009) reports, death rates are three times higher than the population of the work force in industries, it was estimated to be more than 50% when compared with others as reported by Australia Royal Commission into the Building and Construction Industry and Cole, (2003). Workers in other industries have a 2.4 times lower risk of dying than those in the construction industry. Australian Bureau of Statistics, (2005a) reported that Ineffective OHS was responsible for 6.3% of

Australia's GDP in 2002–2003. Most construction workers are at risk from things like using heavy electrical equipment, working around moving objects, using faulty scaffolding, and electrical failures. Three Zones ofrisk zoneseated based on these characteristics (Howell *et al*, 2001).

However, Mitropoulos et al. (2003) suggested a new approach designed to improve a worker's capacity to work safely close to the edge of a construction site by identifying the hazard and appropriate countermeasures. Mohamed, (2002) studied the connection between a safe atmosphere and the productive work output of construction workers. Cognitive systems engineering (CSE) principles were examined by Saurin et al. (2008) in high-risk and highly automated complex systems on a construction site, where the emphasis was laid on the five safety management practices. Huang and Hinze (2006), however, stressed the significance of determining the Owner's role in building safety. Where the correlation between the owner's experience and the project safety performance was looked at. In order to prevent accidents from happening in the first place, (Hare et al. 2006; Saifullah & Ismail, 2012) recommended including health and safety into pre-construction planning.

Due to their dynamic and unique nature in comparison to other industries, some of these strategies don't function well with construction sites. Unlike other manufacturing industries, it experiences topographic changes, and as a result, it necessitates the capacity to anticipate changing safety concerns related to the workforce's dynamic operations. (Rozenfeld *et al.* 2010) created a construction

¹ Department of Civil Engineering, Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria

^{*} Corresponding author's e-mail: <u>ogunjioforemmanuel@gmail.com</u>



job safety analysis that took into account the unique aspects of construction site safety analysis, particularly with regard to the element of loss of control and activities relating to exteriors at height.

In Anambra State, there are more unskilled laborers and small-scale contractors working on construction sites who don't care about the safety, security, or well-being of their employees. Some of the reasons for non-safety compliance are

i. Lack of inspection by safety officials

ii. Lack of safety training for construction workers

iii. Ignorance of construction workers

iv. Lack of rules and regulations about safety measures v. Lack of provision of appropriate personal protection equipment(PPE)

vi. Low level of worker knowledge and skills

vii. Harsh work environment

viii. Workers believe that the use of PPE are unnecessary

ix. Lack of use of standardized safety device

x. Insufficient provision of PPE

Most of these noncompliances are common with nonregistered contractors. These contractors typically operate in rural areas of Anambra State, they are mainly concerned with their financial gains. The majority of these shady contractors are illiterate, but they also use retired experienced workers who are rehired in the civil carrier building firms and their apprentices. According to Hansen *et al*, 1997 financial concepts are involved in health and safety. He continues by stating that the best approach to implementing health and safety is by employing financial concepts.

This study investigated the safety compliance of workers and the management of small-scale construction sites in Anambra state. It also studied the behaviour concerning feeding, drinking and smoking habits of the workers and possibly considers the health implications.

MATERIALS AND METHODS

This investigation consists of a safety analysis and a detailed study of the health and safety measures practised by construction workers on the site. The research design, the sampling technique, the order of the records, and the document analysis technique are all covered in this study. The methodology selected for this research comprises a questionnaire design, a questionnaire survey and interviews, and surveyed data analyzed by SPSS software Method (statistical package for social sciences).

Data collection techniques

Two methods, a literature review and questionnaires, were chosen from the many data collection options available. To find key themes from the literature, the first phase entails gathering broad information, including both firsthand and second-hand data. Important safety criteria were found in the second step using a literature study and unstructured interviews. With the help of these elements, a survey was created and carried out. Information for the study was gathered via questionnaires.

SPSS Software

SPSS software was utilized to evaluate the results. The software contains all of the replies collected from the questionnaires. The variables or questions are entered first in the data view, followed by the responses in the software. From the various data entered in the software, the frequency can be found, which is used to calculate the importance factor.

Analysis of Data

To ensure accuracy, uniformity, and readability, the completed questionnaires were examined. The information was then set up in a way that made analysis simple. Quantitative information from the questionnaires was entered into the program for analysis. Because it is regarded as user-friendly, the Statistical Package for Social Sciences (SPSS 16.0) was chosen. After that, the information gathered from the survey was examined using the following statistical methods.

Multiple Linear Regression Model

The multiple linear regression model, which includes more than one independent variable, was used for the investigation. For this work, we will only analyze the situation of two independent variables with the model as shown in equations 1 through 5.

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + e_t \tag{1}$$

Where Y_{i} = time-dependent variable

 X_1 and X_2 = the explanatory variables (or repressors) et = The error term given as

$$e_t = y_t - \hat{y}_t = y_t - \hat{\beta}_1 x_{1t} + \hat{\beta}_2 x_{2t}$$
(2)

$$\hat{\beta}_{1} = \frac{\sum x_{1}y \sum x_{2}^{2} - \sum x_{1}x_{2} \sum x_{2}y}{\sum x_{1}^{2} \sum x_{2}^{2} - (\sum x_{1}x_{2})^{2}}$$
(3)

$$\hat{\beta}_{2} = \frac{\sum x_{1}^{2} \sum x_{2} y - \sum x_{1} \sum x_{2}}{\sum x_{1}^{2} \sum x_{2}^{2} - (\sum x_{1} \sum x_{2})^{2}}$$
(4)
$$\hat{\beta}_{3} = \overline{Y} - \hat{\beta}_{1} \overline{X}_{1} - \hat{\beta}_{2} \overline{X}_{2}$$
(5)

Coefficient of Determination: The multiple coefficients of determination is given by equation (6)

$$R^{2} = \frac{\hat{\beta}_{1} \sum x_{1} y + \hat{\beta}_{2} \sum x_{2} y}{\sum y^{2}} \quad (6)$$

Where x_1, x_2 , and y are said to be in deviation form. The adjusted R^2 written as \overline{R}^2 written is defined by equation (7).

$$\bar{R}^2 = 1 - (1 - R^2) \frac{n-1}{n-k}$$
(7)

Test of hypothesis: Our model simplified in equation (8) involves two explanatory variables

$$Y = \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + U \qquad (8)$$

Thus, we may conclude that there is a potential of conducting two types of tests regarding the model's parameters: individual tests and joint tests.

Individual Test: In an individual test, it is determined



whether one explanatory factor has any bearing on the dependent factor while the other explanatory factor is kept constant. Equation (9) contains the alternative and null hypotheses.

$$H_0:\beta_i=0\qquad(9)$$

i = 1 or 2 (i.e. with the other x held constant, there is no linear relationship between x and y).

The decision rule is to reject H_0 at the α level of significance if $t_{cal} > t_{tab}$ (thus supporting the conclusion

Table	1:	ANOVA	Table
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Source of Variation	DF	SS
Regression	2	Σý
Error	n – 3	$\sum Y_{i}$
Total	n – 1	$\sum Y$

$$F_{cal} = \frac{\frac{\sum \hat{y}_i^2}{2}}{\frac{\sum Y_1^2 - \sum \hat{y}_i^2}{n-3}} = \frac{RMS}{EMS}$$
(11)

The decision rule in equation (11) is to reject H_0 if $F_{cal} \ge F_{2n} - 3$, α otherwise accept H_1

RESULTS AND DISCUSSION

Following the completion of the questionnaire survey, the responses were statistically analyzed using the social

Table 2: Respondent profile

that y and xi are related) and to accept H0 in all other circumstances.

Joint Test: This involves the testing of x_1 and x_2 if they are jointly related to y. this is the same as testing whether $\beta_1 = \beta_2 = 0$. Thus, the null and alternative hypotheses are stated in equation (10);

$$H_0: \beta_1 = \beta_2 = 0 \quad (10)$$

(i.e. x_1 and x_2 are jointly related to y). The summary of sources of variance of the ANOVA was summarized in Table 1.

SS	MS
$\sum \hat{y}_{i}^{2}$	$\frac{\Sigma \hat{y}_i^2}{2}$
$\sum Y_1^2 - \sum \hat{y}_i^2$	$\sum Y_1^2 - \frac{\sum \hat{y}_t^2}{n-3}$
$\sum Y_1^2$	

sciences statistical package outlined in the research process. Table 2 showed the Profile of the respondents.

From Table 2, it is abundantly visible that construction site is one of the world's industries where men predominate the most. Out of the 150 workers surveyed, men made up 74.67% and women 25.33%. With regards to age distribution, the majority of the workers are within the age of 20-29 years (48%), followed by 30 - 39 years (30.67%). the sites surveyed in the construction sector have an average experience level of between 5 and 10

Male 112 74.6 Female 38 25.3 Total 150 100 Age 12 12 Below 19 years 18 12 20-29 years 72 48 30-39 years 46 30.6	57 33 57
Female 38 25.3 Total 150 100 Age 12 Below 19 years 18 12 20-29 years 72 48 30-39 years 46 30.6	33 57
Total 150 100 Age 12 12 Below 19 years 18 12 20-29 years 72 48 30-39 years 46 30.6	57
Age 12 Below 19 years 18 12 20-29 years 72 48 30-39 years 46 30.6	57
Below 19 years 18 12 20-29 years 72 48 30-39 years 46 30.6	67
20-29 years 72 48 30-39 years 46 30.6	57
30-39 years 46 30.6	57
40 and above 14 9.33	3
Total 150 100	
Educational Background	
O level 65 43.3	33
Technician certificate 22 14.6	57
Diploma 15 10	
Graduate 40 26.6	57
PHD	
Masters 8 5.33	3
Total 150 100	
Years of Experience	
0-5 years 38 25.3	33
5-10 years 76 50.6	57
10-15 years 21 14	
Over 15 years 15 10	
Total 150 100	

years (50.67%). The educational background of workers comprises of Technician certificate 14.67%, Diploma 10%, O level 43.33%, Masters 5.33%, Graduates 26.67% and no PhD.

Table 3 displays the respondents to the documented health

and safety policy of construction works. The respondents that choose NO were more with a percentage of 81.33% and YES has 18.67%. This shows that most construction companies do not have health and safety policies guiding the workers.

Table 3: Does yo	our company	have a written	health and	safety policy?
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	Frequency	Percentage
Yes	28	18.67
No	122	81.33
Total	150	100.0

Understanding of Health and Safety Policy



Figure 1: Rate of Understanding of Health and Safety Policy

Figure 1 shows the level of understanding of workers on safety and health policy. The result shows that the percentage of people who have a high understanding has much percentage (39.33%) when compared with others. From the result gotten, most of the workers understand the meaning of health and safety policy but yet they rarely apply it on construction sites.

The response from the workers at the site in Table 4,

 Table 4: Responses on the company that undertakes health and safety policy

Questions	Yes	No
Does your company have a written health and safety policy?	8	28
Does your company keep a record of the accident on-site?	4	17
Does your organization consult its employee on health and safety matters?	6	27
Does your company Undertake formal site health and safety inspections?	7	30
Does your company have formal health and safety Program for your employees?	5	18
Total	30	120

shows that most small-scale companies do not participate in health and safety measures in a construction site in Anambra State. This is mostly because no organization comes to inspect if they are applying the policy for health and safety on building sites. The number of companies that apply health and safety policies is very poor compared to the ones that do not apply them. Thus, the reason rate at which accidents/hazard occurs in the small-scale construction industries is higher.

Table 5 shows various safety practices on sites, of which safety hats (23.33%), safety boots (25.33%) and Hand gloves (26.67%) are the ones mostly used on the sites, Which sums up to 75.33%. In small-scale construction sites, the protective equipment that is readily available for workers is hard hats, safety boots and hand gloves which are mainly provided by the workers to protect themselves.

Table 5: Safety Practices Performed on Sites

Questions	Frequency	Percentage
Provision Ear muffs	7	4.67
Provision Hand gloves	40	26.67
Provision Hard hat	35	23.33
Provision safety boot	38	25.33
Provision safety goggles	10	6.67
Provision Safety overall	13	8.67
Respiratory protection	7	4.67
Total	150	100.0

Where;

Factor 1: Lack of site safety and health inspection Factor 2: Lack of personal protective equipment Factor 3: Lack of temporary keeping of accident record Factor 4: Absence of safety and health policy

Factor 5: Absence of safety and health programs for employees

Table 6: Factors Affecting Performance of Health andSafety Management

Questions	Frequency	Percentage
Factor 1	38	25.33
Factor 2	67	44.67
Factor 3	10	6.67
Factor 4	21	14.0
Factor 5	14	9.33
Total	150	100.0

Table 6 shows the various factors that affect performance in health and safety management. Factor 2 with a percentage of 44.67% affects it mostly more than other factors.

The greatest factor affecting the effectiveness of health and security management is the absence of personal protective equipment for workers, which is also a major contributor to accidents on building sites. This is due to the fact most of the substances used at the development sites are harmful if not handled with care. For instance, the reaction of cement when you put your bare foot or hand in concrete when mixing, placing and compacting it, causes sores and peeling of the skin, hence, the need for protective equipment for the workers.

Eating Habits

 Table 7: Do you wash your hands before and after eating?

Yes	No
81	69

Food	Frequency	Percentage
Bread and soft drinks	55	36.67
Beans cake and soft drinks	14	9.33
Snacks and soft drinks	25	16.67
Cassava flour and soup	30	20.00
Rice and tomato stew	16	10.67
Others	10	6.67
Total	150	100

 Table 8: Type of food workers eat on the site

The environment and how a person eats affect his/her health. Most construction workers rarely wash their hands before eating as can be seen in Table 7. With how dirty their hands might be, they still use them to eat without properly washing them. This may cause some kind of illness in the long run which will affect their performance on the construction sites. The kind of food they eat also affects their health and performance. Most (40%) of the workers eat break and carbonated drinks for lunch while some (10%) eat bean cake and soft drink, about 20% eat cassava flour and soup, 15% eats snacks and soft drink and the remaining eats Rice and stew as illustrated in Table 8. This goes to show that construction workers rarely eat good food when working at the construction sites which affects their stamina and agility when performing their tasks at construction sites.

Smoking Habit

The response in Table 9 and Figure 2 show that most construction workers smoke during lunch breaks at the construction sites and 72% share a stick of cigarette with others workers. This means that by sharing the same stick

Table 9: Do you share cigarettes with another worker?

Yes	No
102	48

Frequency of Smoking of Workers



Figure 2: How regularly do you smoke?

of cigarette with a fellow worker you are both putting your mouth on the same stick and whatever mouth infection one has the other gets infected with it. Sharing of cigarettes by workers is one of the causes of illnesses among construction workers.

The response shows that 30% of the workers smoke frequently while the rest do so occasionally. Smoking affects the lungs which are why most workers who smoke are likely to have issues with their lungs in the nearest future.

Drinking alcohol on construction sites is a habit most construction workers like to do as illustrated in Table 10 which is very wrong. This happens due to peer pressure and ignorance of most of the workers on the impact of alcohol on their health. Most of the workers share a bottle of alcohol with their fellow workers thereby passing mouth infections from one worker to another. Taking alcohol during working hours can cause drunkenness which may lead to a fight. Alcoholic drinks also affect both the lungs and intestines when taken excessively. They also take unhygienic water as seen in Table 11. (CIAA 2002; NAFDAC 2004).

Table 12 shows the illnesses that mostly affect construction workers. From the response gotten, skin



Table 10: Drinking Habit

	Yes	No
Do you share alcohol/drink with other workers	22	17
Do you share containers for drinking with other workers	40	29
Do you drink alcohol on the construction sites	30	12
Total	92	58

 Table 11: Do you drink water from the tank at the construction sites?

Yes	No
99	51

allergies/irritation is more common in workers especially the ones in charge of casting and Mason. This mostly occurs because they were exposed to cement and other materials for a long without protective equipment. Other illnesses occur due to their misconduct.

 Table 12: Which of the following illness have you encountered among workers on the site?

Illnesses	Yes	No
Asthma	5	55
Skin allergies	54	25
Tuberculosis	15	30
STD	30	15
Urinary tract infection	26	8
Others	20	17
Total	150	150

CONCLUSION AND RECOMMENDATION Conclusion

This study successfully examined the safety behaviour and Safety management in small-scaled construction project sites, which are the most dominant construction companies in the study area. The researchers moved from site to site to understand the actual safety compliance of the artisans and unskilled labourers at the site. The interview and questionnaire method was used to examine the respondents. There were 150 people tested, with 112 men and 38 women. Most of the workers are between the ages of 20 and 29 and stopped their formal education at O'Level. Workers with Diplomas and Degree certificates are few and are there because of the lack of professional jobs at the moment.

It was discovered that the majority of the small-scale contractors had no written health and safety policy within their companies and that made the level of understanding of the workers on safety and health policies very low. This has made the workers not care about wearing hand gloves, Hard hats, safety belts, safety overall, respiratory protection devices, Ear muffs, safety goggles and safety boots. The study was also extended to eating, drinking and smoking behaviour. It was discovered that most of the workers don't observe simple hygiene such as washing hands, cups, and spoons and eating poor/ junk meals at the site. They smoke regularly at the site and believe it gives them more strength. Majority share cigarettes at the site, not knowing that it was a means of sharing communicable diseases.

RECOMMENDATION

1. Distribution of personal protective equipment to workers to be used during construction work

2. Setting up orientation and training for construction workers in safety

3. The establishment of safety awards to encourage workers in the construction industry

4. Assigning duties for safety to all levels of management and employees

5. Informing the factory inspectorate of the location new construction site.

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