Effect of Safety Education Intervention on Knowledge among construction workers in Port-Harcourt

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Abstract

This study evaluated the impact of safety education intervention on knowledge towards accident prevention among building construction workers in Port Harcourt metropolis. It adopted a pre-test and post-test quasi experimental design research to determine the impact of safety education intervention on knowledge. Purposive sampling method was adopted for selecting the building construction site locations. The sample used were the respondents present at the construction sites which was a total of 219. The research instrument used for the study was a structured questionnaire and a Safety Education Intervention (SEI) module. Questionnaires were administered and retrieved before the safety training was conducted, post-test was conducted 4 weeks after the pre-test. Data collection was subjected to mean and t-test. Safety education had a significant impact on the knowledge of respondents with pre mean score of 14.33±2.68 and post mean score of 16.27±2.19. Using the t-test statistical analysis, it shows that at a significant level of 0.05 there was a significant difference between the pre-test and the post-test analysis. The study recommends that periodic training should be organized by contractors throughout the life span of a building project and defaulters should not be issued contracts for a stipulated number of years.

Key words: Building construction, knowledge, safety education, accident prevention

1. Introduction

It's been known for some time that certain occupations are more dangerous than others due to the exposed variety of occupational health hazards and risk (Oluwafemi et al., 2017). Among these

occupations, construction industry workforce suffers a substantial number of serious injuries and its one of the most dangerous industries. The International Labour Organization (ILO) estimates that approximately 6000 workers die each day world wide and 337 million people are victims of work-related accidents or illnesses arising from occupational injuries (Marras et al., 2000). In Nigeria, the construction industry looses at least 5% of its workforce annually to injuries and fatalities, while the influx of new blood has reduced by 17% compared to that of 1970s (Oh and Sol, 2008). Construction workers of developed countries are 3 to 4 times more likely to die from accidents at work than other workers. The risks among construction workers are 3 to 6 times greater than other workers for developing countries. A large number of workers suffer and die from occupational diseases as a result of past exposure to dangerous substances and hazards (Gibb et al., 1999; Hamalainen et al., 2009; Dong et al., 2010). Nigeria also falls within the categories of countries where few cases of occupational casualties and health problems have been documented.

It has been reported that there is little and unreliable data on accidents and injuries at construction sites due to poor reporting and recording system as well as poor health and safety performance by organization and contractors (Diugwu et al., 2012; Ede, 2013; Ajayi et al., 2015). It is however reported that at least 5% of the construction workforce are lost annually to injuries and fatalities (Ajayi et al., 2015). The case is more of occurrence in Lagos state recording the highest in accident cases, when Ede (2013) conducted research on the number of casualties in the building construction sector of Lagos, Abuja and Port Harcourt between the year 2000-2010, it was revealed that Lagos state led in the casualty figures with 178 casualties within the period, followed by Abuja with 65 casualties while Port Harcourt recorded 30 casualties (Ede, 2013). It is of public health importance to assess the knowledge of construction workers on accident prevention and promote their protection against work related hazards such as falls, slips and trips; manual handling/lifting

of materials; working at height; hazardous substances; noise, heat, etc and varying work-related diseases through a safety education intervention programme.

Intervention means changing external conditions of a system in order to make safe behaviour more likely than at risk behaviour (Geller, 2001). A safety intervention can be defined simply as an attempt to change how things are done in order to improve safety. It could be any new program, practice, or initiative intended to improve safety (e.g., engineering intervention, training program, administrative procedure). A safety intervention may consist of one or more components, running for a shorter or longer period, or involve a permanent change. In the workplace, it attempts to improve safety and prevent accidents at work and can be initiated at by the employer or the employees, or public authorities, social partners or other stakeholders. (Dyreborg, 2015).Safety interventions have been recognised as effective ways of improving safety performance and hazard reduction in the workplace (Dyreborg et al., 2005).

Research studies are still being conducted to know which interventions and programs are the most efficient in reducing accidents in the workplace (Dyreborg et al., 2005). Intervention may be initiated by management or the government on long or short-term period but most importantly, it must be aimed at improving safety at work, therefore this study aims at assessing the impact of safety education intervention on knowledge towards accident prevention among construction workers in Port Harcourt.

2. Research Methodology

2.1 Research Design

This study adopted a pre-test and post-test quasi-experimental research design to determine the impact of safety education intervention on knowledge towards accident prevention among construction workers in Port Harcourt. A quasi-experimental design often described as non-

randomized control group pretest-posttest intervention studies with the attribute of both experimental and non-experimental was used for this study.

2.2 Study Area

Port Harcourt is one of Nigeria's leading industrial centres, 66 km upstream from the Gulf of Guinea and an estimated population of 1,865,000 inhabitants. Port Harcourt is located within latitudes 6º58´N to 7º6´N and Longitude 4º40´E to 4º55´E. Port Harcourt, the capital of Rivers State with a population of about 1,356,000 (Federal Office of Statistics, 2003) is a major industrial city in the Niger Delta region (FEPA/ World Bank, 1998) and 3,020,232 in 2020 (United Nations, 2017). Port Harcourt is a fast-growing city having several construction companies both multinational and indigenous located at different areas of the city. This is the reason for several building construction activities of residential buildings, roads and fly-overs to cater for the growing population in the nearest future.

2.3 Participants of the Study

Participants of the study comprised construction workers of privately owned building construction sites within the metropolis. Privately owned building construction sites were used because the multinational and medium scale construction companies have safety management system in place to ensure that their workers are safe and to prevent hazards and accidents.

2.4 Sample and Sampling Techniques

The choice for selecting the eight construction sites owned by private individuals that consented to using their facilities for this research was purposively selected. A purposive sampling technique was employed where the number of workers existing already in the construction sites participated in the study.

2.5 Data Collection and Quality Control

Questionnaires were administered and retrieved before the safety training was conducted (Pre-test), the same questionnaires were administered four weeks after the training (Post-test). A total number of two hundred and nineteen (219) workers were used for this study to determine the level of knowledge before and after safety training. These questionnaires were administered to only workers in privately owned building construction sites. Confidentiality was maintained and informed consent was obtained. The workers were told that the collected data was just for the purpose of conducting a scientific study and they could discontinue participation in the study whenever they wished. The duration for completing a cycle of experiment is 4weeks per site. The duration for the safety education intervention model for all the sites visited is thirty-two (32) weeks.

The pre-test questionnaires were administered to the respondents after the purpose of the study has been explained to the respondents and retrieved immediately with the assistance of two safety officers trained for this task. The safety education intervention was conducted after the pre-test, while the same questionnaire was re-administered four weeks after (Post-test).

A hundred percent (100 %) retrieval rate was achieved because all the workers on the construction site was used; this was due to the fact that it was during the COVID 19 period, so contractors confined workers on site to avoid government interference. Pre and post-test data were retrieved for analysis.

2.6 Data Analysis

Data analysis was performed using SPSS software version 22. Data gathered were presented via tables and charts and analyzed with descriptive and inferential statistics. Descriptive statistics

comprised: frequencies, mean, percentages, standard deviation. Inferential statistics included the analysis of variance (ANOVA).

3. Results

3.1 Demographic Distribution of Participants

Figure 1 shows the demographic distribution of participants. The gender proportions of building construction workers surveyed comprises of 167 males (76.30%) and 52 females (23.70%). Majority of the respondents are aged 31-40 years (44.70%) and 51-60 years (35.60%) with age 21-30 years (14.20%) and 18-20 years (5.50%) making the minority. Also, from Figure 1, 81.70% of the respondents are married with only 18.30% single. A larger proportion of the respondents have secondary education (65.80%) while 21% and 10% have primary and tertiary education respectively with the least proportion of respondents having non-formal education (3.20%).

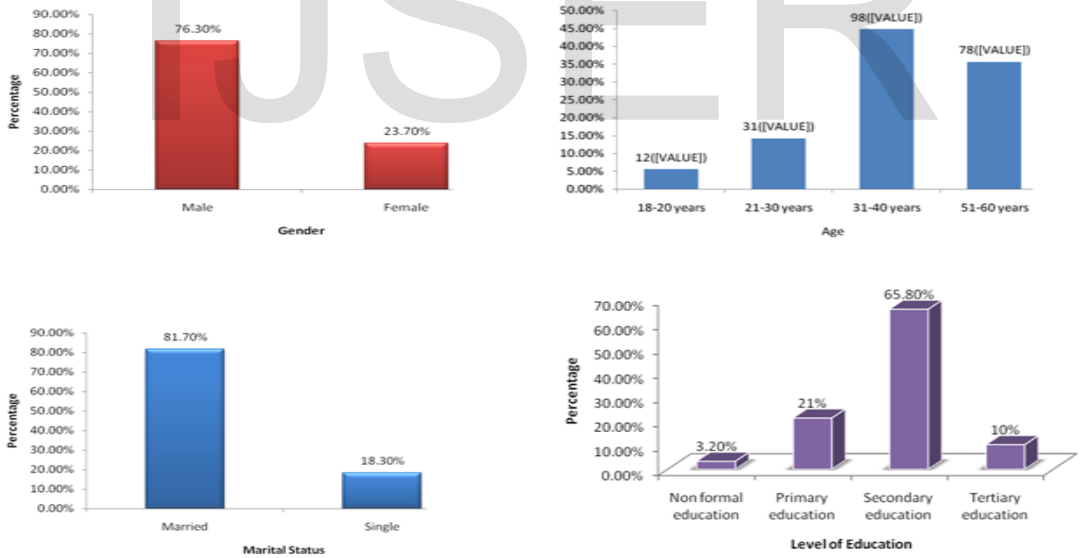

Figure 1: Demographic distribution of respondents

3.2 Work Records of Building Construction Workers

Building construction workers surveyed have mostly 6-10 years (29.2%) and 1-5 years (23.7%) of experience, often time spend 5-8 hours (51.6%) working per day and 88(40.2%) of them reported to have been involved in a workplace accident. Most of the workers have experienced accidents

once (43.2%) or twice (29.5%) and eighty three percent (83.6%) did not undergo pre-employment examination. Table 1 presents work records of the building construction workers.

Table 1: Work records of building construction workers

Variable	Categories	Frequency	Percentage
Years of Experience	1-5 years	52	23.7
	6-10 years	64	29.2
	11 years and above	30	13.7
	No response	73	33.3
	Total	219	100.0
Average time spent at work per day	2-5 hours	18	8.2
	5-8 hours	113	51.6
	9 hours and above	43	19.6
	No response	45	20.5
	Total	219	100.0
Have you been involved in an accident?	No	131	59.8
	Yes	88	40.2
	Total	219	100.0
If yes, how many time?	Once	38	43.2
	Twice	26	29.5
	Thrice	7	8.0
	Many times	17	19.3
	Total	88	100.0
Was there pre-employment medical examination?	No	183	83.6
	Yes	36	16.4
	Total	219	100.0

3.3 Impact of Safety Education Intervention on Knowledge of Accident Prevention among Workers in Building Construction Sites

Table 2 shows the effect of safety education on level of knowledge of respondents. Generally, level of knowledge of building construction workers for each question answered increased after the intervention of safety education compared to the levels before the intervention.

Table 2: Effect of safety education on level of knowledge of respondents

S/N	Question	Correct response	Frequency (%) of correct response	
			Pre	Post
1	Hazard is anything that has the potential to cause harm, injury or damage to property	True	212(96.80)	219(100.00)
2	Workers unsafe behavior contributes more to accidents than unsafe conditions	True	196(89.50)	208(94.78)
3	Accidents do not just happen they are caused	True	155(70.78)	194(88.58)
4	Any event that has the potential to cause injury/damage/loss, but was avoided by circumstances is known as a near miss	True	168(76.71)	207(94.52)
5	The employer's responsibility is to provide PPEs for employees free of charge	True	143(65.30)	179(81.74)
6	Consequences of accidents are injury, damage to property and death	True	169(77.17)	192(87.67)
7	It is more important to report accidents than to report near misses	False	103(47.03)	134(61.19)
8	An increased accident rate is a good safety culture indicator	False	135(61.64)	167(76.26)

9	PPEs can be taken off when one is uncomfortable	False	121(55.25)	148(67.58)
10	Accident prevention is the responsibility of the employers alone	False	144(65.75)	176(80.37)
11	There is not much one can do about exposure to hazards in the workplace	False	154(70.32)	168(76.71)
12	Safety training increases accidents and injuries in the workplace	False	161(73.52)	191(87.21)
13	All accidents are incidents but not all incidents are accidents	True	162(73.97)	181(82.65)
14	An untidy working condition or environment may lead to slips, trips and falls	True	210(95.89)	217(99.09)
15	Ill health are diseases or medical conditions are attributable to work	True	113(51.60)	116(52.97)
16	Causes of accident does not include poor communication	False	129(58.90)	157(71.69)
17	It is my responsibility to mind my business and not care about other people's safety	False	162(73.97)	170(77.63)
18	Safety trainings and toolbox meetings are not important for construction workers	False	161(73.52)	184(84.02)
19	Stress can lead to accidents in the workplace	True	159(72.60)	163(74.43)
20	Near misses that are not controlled may lead to accidents, injury, damage or death	True	181(82.65)	193(88.13)

Table 3: Mean comparison of building construction workers' knowledge based on selected demographic characteristics

	Pre	z-score/Fcal.	Sig	Remark	Post	z-score/Fcal.	Sig	Remark
Gender								
Male	14.37±2.64	0.408	0.342	NS	16.42±2.20a	1.792	0.037	S
Female	14.19±2.80				15.81±2.13b			
Age								
18-20years	13.75±2.30a	8.664	0.000	S	15.00±2.73	2.146	0.095	NS
21-30years	16.45±1.73b				16.64±2.24			
31-40years	14.14±2.77a				16.47±1.94			
51-50years	13.81±2.54a				16.08±2.33			
Marital Status								
Single	15.40±2.66a	2.825	0.002	S	16.50±2.33	0.687	0.246	NS
Married	14.09±2.63b				16.22±2.17			
Level of Education								
Non formal	15.14±2.34a	18.571	0.000	S	16.29±1.11abc	8.576	0.000	S
Primary	14.17±2.65a				15.24±2.47a			
Secondary	13.80±2.36a				16.35±2.04c			
Tertiary	17.86±2.14b				17.95±1.73b			

Table 4: Mean comparison of building construction workers' pre and post knowledge

	Mean±SD	Paired t-test		Remark
		t – value	Sig	
Pre	14.33±2.68	-10.517	0.000	S
Post	16.27±2.19			

Significant at 0.05 level

4. Discussion

Generally, level of knowledge of building construction workers increased after the intervention of safety education compared to the levels before the intervention. Safety education had a significant impact on the knowledge of respondents with pre mean score of 14.33±2.68 and post mean score of 16.27±2.19. This finding is in line with the study conducted by Johnson (2011) where safety education had a positive effect on the knowledge and compliance to road safety signs among motorcyclists. This rejects the null hypothesis that there is no significant difference in the level of knowledge and safety practices before and after safety education intervention.

Table 3 presents the mean comparison of building construction workers' knowledge based on selected demographic characteristics. Gender had no significant difference during the pre-test but was significant after the post-test with males (16.42±2.20) having a higher level of education than the females (15.81±2.13). Prior to the safety education, age groups had significant different level of knowledge with 21-30 years (16.45±1.73) having the highest mean score but this difference was nullified after the post test. Similarly, single (15.40±2.66) workers had a significant higher score than those married (14.09±2.6) but was not significant after the post test. Difference in level of knowledge remained significantly different before and after safety education with respondents who attained tertiary education (17.86±2.14; 17.95±1.73) having the best mean score in the pre and

post-test respectively. This finding necessitates regular safety education for construction workers and employers.

5. Conclusion

The study concluded that safety education intervention can positively influence the knowledge of the building construction workers and there was a notable high improvement from the result of the pre-test to the results of the post-test for knowledge. Furthermore, the resultant effect of safety education on knowledge will eventually control/ eradicate hazards and accidents on building construction sites.

Conflict of Interest

The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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