



Sociological factors influencing occupational hazards among road construction workers in Rivers state

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Abstract

The Study examines sociological factors influencing occupational hazards among road construction workers in Rivers State. The survey was cross-sectional in design. The Ministry of Commerce states that the target population consists of 1,125 employees from the eleven legally registered road construction companies. A multistage selection process was employed to choose 795 samples. A systematic and verified tool was used for data collection, comparison, and interpretation. Reliability coefficients of 0.76 is obtained using Kuder Richardson 21. The cluster percent shows that workers with secondary (69.2%) and tertiary education (81.1%) had more adequate knowledge of occupational hazards among road construction workers in Rivers State. Also, the more job experience workers within 11-15 years had more knowledge. The finding shows that except for level of education, job experience shows a significant difference in the knowledge on occupational hazards among road construction workers in Rivers State. It is recommended that, the effort of the ministry of work and public health professionals at preventing occupational diseases among workers should include education and training for both informal and formal workers on construction sites.

Keywords: Knowledge, level of education, years of experience and road construction workers

Introduction

One of the most crucial facets of human endeavor is occupational hazard and safety (Tadesse & Admassu, 2016)^[14]. To promote and uphold a high level of physical, mental, and social well-being within the workforce, it strives to help workers—both employees and end employers—adapt to the workplace. A safe and healthy workplace is generally of importance to both employees and their employers. Unfortunately, despite the fact that workplace illnesses and injuries are continuously reported, the majority of which have catastrophic outcomes, deaths, and other severe repercussions, this idea has not attained meaningful global acceptance (Tadesse & Admassu, 2016)^[14]. Occupational hazard and safety, according to the World Health Organization (WHO, 2005), is a multidisciplinary activity that aims to: - protect and promote the health of workers by eliminating factors and conditions that can be harmful to health and safety in the workplace; - improve the physical, social, and mental well-being of workers in the workplace and support the development and maintenance of their working capacity.

Alli (2008)^[3] described occupational safety and health as a science that deals with the anticipation, recognition, evaluation, and control of dangers that could develop in or from the workplace and that are potentially harmful to employees' health and well-being. It typically covers a worker's social, physical, and mental health. It also refers to the results of providing a worker with proper protection against illness, injury, and disease brought on by their employment (ILO, 2003). According to the World Health Organization (WHO, 1995), occupational health is a multidisciplinary activity with the goal of promoting and protecting employees' health by removing workplace hazards. Occupational hazard, according to Adeniyi (2012)^[1], is a health science field that focuses on promoting and protecting the health, safety, and welfare of workers of all

categories at the workplace. It can also be defined as the research of the elements or circumstances that have an impact on a worker's overall health and wellbeing, both at work and at home. It implies identifying, assessing, and managing safety risks in the workplace and at home.

Agwa (2012)^[2] argued that despite the fact that certain hazards and the measures for them are clearly outlined in legislation, other hazards are not. The responsibility of "taking all possible precautions, under the particular circumstances, to prevent injuries or accidents in the workplace" falls squarely on the shoulders of the employer in every scenario, and the employer is obligated to exercise the obligation of due diligence. If there is not a clear way to control a hazard, or if legislation does not impose a limit or guideline, one should seek guidance from occupational health professionals such as an occupational hygienist or safety professional about what is the "best practice" or "standard practice" when working in that situation. These professionals can provide information on what constitutes the "best practice" or "standard practice" when working in that circumstance. It is never appropriate to consider a legal restriction or guideline (such as an exposure limit) as the dividing line between "safe" and "unsafe." The most effective strategy is to always take measures to limit exposures or the risk of a hazard to the greatest extent practicable. The following strategies, collectively referred to as the hierarchy of control, could be utilized in the process of controlling occupational hazards.

Elimination control is a technique for hazard control that is centered on totally removing an item or process that is causing a hazard. This can be accomplished by eliminating the hazard. It is the most effective way to safeguard employees out of the five methods that make up the hierarchy of hazard control, and it should be applied before any other approach whenever it is possible to do so. It is especially useful in the beginning stages of the design

process. When implementing for an established process, it is more difficult to do so because significant changes in equipment and method may be required. In the event that the hazardous procedure or material is reintroduced at a later stage in the design or building phase, the strategy of elimination runs the risk of failing. The concept of preventing accidents by careful planning and design is known as the "prevention through design" (PdD) approach, and one of its primary tenets is the elimination of all potential dangers as early in the planning process as possible. The term "substitution control" is used to describe the practice of exchanging a hazardous material or procedure for one that poses a lower risk. One could think of it as reducing the risk posed by a potentially dangerous substance by first reducing the risk posed by the potentially dangerous process. It should always be the first engineering hazard management measure that is considered because substitution is typically the approach of managing hazards that is both the least expensive and the most effective (Anupama & Pratibha, 2007) ^[4]. Hazard substitution is a strategy for hazard control in which a material or process is replaced with another that is less dangerous. This can be done in order to reduce the overall level of risk. After hazard removal, it is the second most successful of the five members of the hierarchy of hazard control in terms of safeguarding workers. Similar to removal, substitution is best effective in the early stages of the design process when it is possible for these changes to be implemented with little expense or difficulty.

Hazard substitution can involve not just swapping one material for another but also employing the same substance in a less dangerous form. This can be done by either changing the shape of the material or changing the material itself. When implementing a change, it is important to take into account and keep an eye on the potential risks posed by the new component. Engineering Controls are any designs, alterations, or additions to plants, equipment, ventilation systems, or processes that lessen the likelihood of an individual being exposed to a hazardous substance. Anupama and Pratibha (2007) ^[4] state that control can be defined as the installation of equipment or physical facilities, which may or may not include the selection and layout of experimental equipment. The risk is eliminated through the use of engineering controls, which can take the form of initial design specifications or the implementation of strategies such as substitution, minimization, isolation, or ventilation.

Engineering controls are the most effective technique of hazard control, particularly when included at the conceptual stage of planning when control measure can be integrated into the design. further reading Because they remove the source of the hazard or diminish the hazard itself rather than lessening the damage that may occur from the hazard, they tend to be more effective than other forms of hazard control, such as administrative controls and personal protective equipment. They are also less dependent on the chemical user, who, sadly, is subject to all of the frailties that afflict people. They have less of a dependency on the chemical user (eg forgetfulness preoccupation, insufficient knowledge). Administrative Controls, according to Anupama and Pratibha (2007) ^[4], administrative controls are controls that modify the manner in which the job is performed. This includes the time of the work, policies and other rules, and work practices such as standards and

operating procedures (including training, housekeeping, and equipment maintenance, and personal hygiene practices). It consists of management efforts to reduce hazards through planning, information and training (for example, hazard communication), written policies and procedures (for example, the chemical hygiene plan), safe work practices and environmental and medical surveillance (for example, workplace inspections, equipment preventive maintenance, and exposure monitoring). It includes things like training, procedures, policies, and even the design of shifts that are intended to make an individual's exposure to hazards less dangerous. Rather than reducing the physical hazard or supplying workers with personal protective equipment, this type of occupational hazard control often involves changing the behavior of people (such as those who work in the building construction industry) (PPE).

According to data from the Bureau of Labor Statistics (2017) ^[5], the construction industry recorded four cases of workplace injuries and illnesses per 100 full-time workers in 2015 (BLS, 2017a). This figure has been consistent for the construction industry for several years. Furthermore, the number of workers projected to be employed by the construction industry is expected to rise to 6.9 million by 2024 (Bureau of Labor Statistics, 2017) ^[5]. Approximately a quarter million construction workers will likely experience injuries while working on construction sites. Also, 985 fatalities cases were recorded from the construction industry in 2015 and this figure has also been increasing.

Road constructions likely contributed at least somewhat to the injury and fatality rate, given that it has many similar hazards to industrialize institution including exposure to chemicals and gases, and electrical, noise, and slip, trip, and fall hazards (Van Fleet *et al.*, 2013 ^[15]; Ramaswamy & Mosher, 2017) ^[10]. Although there is a growing awareness of the importance of worker safety on construction sites, fatalities and incident rates in the construction industry remain higher than those in most other industries (Man, Chan, & Wong, 2017) ^[9]. This may be the result of multiple reasons: one being the high-risk and complex characteristics of construction work and the lower education level of most construction workers (Fung, *et al.*, 2010; Sousa, Almeida, and Dias, 2014) ^[13].

Road construction workers are exposed to constant changes of work environment and stochastic elements such as weather conditions and soil characteristics. During the execution of a project, multiple activities performed by multiple teams and trades simultaneously and in a close proximity also contribute to the higher risk of safety incidents occurring on a construction site. These factors can significantly contribute to an increase in fatalities rates while working on road project. Work culture, age, level of education and years of experience among the construction workers also plays substantial role in explaining the disproportionate injury and fatality rates within the construction industry. Hallowell (2008) ^[7] explained that machismo, substance abuse, and language barriers are among the cultural factors contributing to the negative safety culture on construction sites thus increasing the likelihood of incidents. The same situations may also be true for road construction workers. In addition to the different work elements and types of facilities they are constructing, road construction workers may have also experienced similar negative safety culture on their project sites.

The high fatalities and injury rates in the construction industry are also motivated by the economic and financial issues concerning the implementation of safety interventions. The economic situation is frequently characterized by limited financial resources for safety improvements, often hindering the implementation of safety interventions. Construction workers are exposed to high-risk tasks and are three times most likely to die and two times more likely to suffer work-related injuries than other workers (Sousa, Almeida, & Dias, 2014) ^[13], yet limited funds and unfavorable economic situations do not help in implementing safety interventions for construction workers across all areas of construction, agribusiness construction workers included.

The study reviewed theoretical framework such as risk hazard model, this model applies to the work environment where workers are vulnerable to several (hazardous events) conditions ranging from physical, biological, ergonomical and psychological hazards. From the empirical reviewed, studies have shown that construction workers knowledge of occupational hazards was associated with their attitude and practice of safety measures. Rotifa and Eguvbe (2017) ^[11] averred that age and duration of employment was not found to statistically, significantly influence knowledge in this study. However, educational level and hours of work per week greater than 48 hours were both found to influence respondents' knowledge of road construction site hazards positively. This is in concordance with Vahid *et al* (2016) which showed significant correlation between education level (P=0.001), exercise (P=0.014), accident experience (P=0.001) and occupational safety attitude. Age (P=0.108), marital status (P=0.554), and job related to last education (P=0.307) did not have any significant correlation with safety attitude (P>0.05). Also, Sanaei, *et al* (2009) ^[12] the mean of knowledge grade shows a significant relationship with education level. An overview of these studies indicates an unresolved issue, moreso there is scanty literatures concerning this study in the area of study. Therefore, it is pertinent to find out the sociological factors influencing occupational hazards among road construction workers in Rivers State.

The following research questions were used to guide the study.

1. What is the knowledge of occupational hazards among road construction workers in Rivers State based on level of education?
2. What is the knowledge of occupational hazards among road construction workers in Rivers State based on years of experience?

The following null-hypotheses are postulated and were tested at 0.05 level of significance.

1. There is no significant difference in the knowledge of occupational hazards among road construction workers in Rivers State based on level of education.
2. There is no significant difference in the knowledge of occupational hazards among road construction workers in Rivers State based on years of experience

Methodology

For this study, a cross-sectional survey design was adopted. The study's target population consisted of all the road construction companies operating in Rivers State. According to the Ministry of Commerce, the researcher determined that 1,125 road construction employees were employed by the eleven (11) registered construction businesses in Rivers State. Using a multi-stage sampling technique, eight (8) registered road construction companies' workers made up the sample size of 795 that was chosen for the study. Information was gathered from the respondents using a self-structured questionnaire called the Knowledge on Occupational Hazards and Safety among Road Construction Workers Scale (KOHSRCWS). There were two sections on the questionnaire: Section A and Section B. Section A will gather data on the respondents' demographics, while Section B will gather data on knowledge on construction sites, issues related to construction workers, and safety precautions implemented to reduce occupational hazards for road construction workers. The knowledge reliability was assessed using Kuder-Richardson 21. For knowledge workplace risks and safety measures, reliability coefficients of 0.76 was achieved.

Results

Table 1: Frequency and percentage of the knowledge of occupational hazards among road construction workers in Rivers State based on level of education

S/N	Knowledge of occupational hazards and safety measures in construction	No formal education (35)		Primary education (65)		Secondary education (340)		Tertiary education (355)	
		T	F	T	F	T	F	T	F
1.	Workers are exposed to Physical hazards such as Noise, Heat, Humidity, Solar Radiation	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
2.	Wearing of personal protective equipment protects workers from occupational hazards	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
3.	Strict compliance with occupational safety rules and regulation protects workers from occupational injuries	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
4.	Prolonged work under sunlight is hazardous	71.4%	28.6%	69.2%	30.8%	82.4%	17.6%	88.7%	11.3%
5.	Excessive noise on work site is an occupational hazard	100.0%	0.0%	92.3%	7.7%	97.1%	2.9%	77.5%	22.5%
6.	Removal of a hazard or placing a barrier between the worker and the hazard serve as a safety measure	71.4%	28.6%	15.4%	84.6%	29.4%	70.6%	84.5%	15.5%
7.	Unavailability of PPE makes workers not to wear PPE	71.4%	28.6%	7.7%	92.3%	79.4%	20.6%	31.0%	69.0%
8.	Awareness on the usage of PPE is high among workers	57.1%	42.9%	69.2%	30.8%	82.4%	17.6%	54.9%	45.1%
9.	Absence of project managers/supervisor is the reason PPE are not been used	42.9%	57.1%	84.6%	15.4%	35.3%	64.7%	66.2%	33.8%
10.	Workers lack of awareness about site safety and	85.7%	14.3%	92.3%	7.7%	55.9%	44.1%	76.1%	23.9%

	regulation predispose workers to hazard								
11	Workers are exposed to Ionizing radiation e.g welding	0.0%	100.0%	7.7%	92.3%	51.5%	48.5%	88.7%	11.3%
12	Workers are exposed to Corrosive materials (Concrete, brick acid)	0.0%	100.0%	7.7%	92.3%	44.1%	55.9%	88.7%	11.3%
13	Workers are exposed to Skin sanitizers, irritants (bitumen, acids, alkalis, cement)	42.9%	57.1%	46.2%	53.8%	42.6%	57.4%	98.6%	1.4%
	Overall %	64.8%	35.2%	60.9%	39.1%	69.2%	30.8%	81.1%	18.9%

Table 1 revealed that majority (100% and 92.3%) workers with no formal and primary education are not exposed to Ionizing radiation e.g welding and corrosive materials (Concrete, brick acid). Moreso, the cluster percent shows

that workers with secondary (69.2%) and tertiary education (81.1%) had more adequate knowledge of occupational hazards among road construction workers in Rivers State.

Table 2: Frequency and percentage of the knowledge of occupational hazards among road construction workers in Rivers State based on years of experience

S/N	Knowledge of occupational hazards and safety measures in construction	1-5 years (265)		6-10 years (240)		11-15 years (150)		16 years & above (140)	
		T	F	T	F	T	F	T	F
1.	Workers are exposed to Physical hazards such as Noise, Heat, Humidity, Solar Radiation	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
2.	Wearing of personal protective equipment protects workers from occupational hazards	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
3.	Strict compliance with occupational safety rules and regulation protects workers from occupational injuries	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
4.	Prolonged work under sunlight is hazardous	73.6%	26.4%	75.0%	25.0%	100.0%	0.0%	100.0%	0.0%
5.	Excessive noise on work site is an occupational hazard	96.2%	3.8%	81.3%	18.8%	76.7%	23.3%	96.4%	3.6%
6.	Removal of a hazard or placing a barrier between the worker and the hazard serve as a safety measure	56.6%	43.4%	52.1%	47.9%	46.7%	53.3%	64.3%	35.7%
7.	Unavailability of PPE makes workers not to wear PPE	52.8%	47.2%	39.6%	60.4%	43.3%	56.7%	78.6%	21.4%
8.	Awareness on the usage of PPE is high among workers	71.7%	28.3%	68.8%	31.3%	73.3%	26.7%	53.6%	46.4%
9.	Absence of project managers/supervisor is the reason PPE are not been used	18.9%	81.1%	68.8%	31.3%	100.0%	0.0%	42.9%	57.1%
10.	Workers lack of awareness about site safety and regulation predispose workers to hazard	39.6%	60.4%	81.3%	18.8%	96.7%	3.3%	75.0%	25.0%
11	Workers are exposed to Ionizing radiation e.g welding	66.0%	34.0%	70.8%	29.2%	46.7%	53.3%	57.1%	42.9%
12	Workers are exposed to Corrosive materials (Concrete, brick acid)	66.0%	34.0%	60.4%	39.6%	46.7%	53.3%	57.1%	42.9%
13	Workers are exposed to Skin sanitizers, irritants (bitumen, acids, alkalis, cement)	58.5%	41.5%	87.5%	12.5%	76.7%	23.3%	42.9%	57.1%
	Overall %	69.2%	30.8%	75.8%	24.2%	77.4%	22.6%	74.5%	25.5%

The result in table 4.6 shows the level of knowledge of occupational hazards among road construction workers in Rivers State based on years of experience. It revealed that workers with 16 years and above experience had 74.5% level of knowledge, 11-15 years had 77.4% of knowledge and the least were workers with 1-5 years had 69.2%. this implies the more job experience workers within 11-15 years had more knowledge.

Table 3: Summary of χ^2 analysis on difference in knowledge of occupational hazards among road construction workers in Rivers State based on level of education.

VARIABLE	N	Df	χ^2_{cal}	p-value	Level of Sig.	Decision
Level of education	795	3	6.734	0.081	0.05	Significant

Table 2 revealed that the χ^2_{cal} is 6.734 with $df = 3$ and $p < 0.05$. The obtained p -value of 0.081 is greater than 0.05, therefore the null hypothesis that there is no significant difference in knowledge of occupational hazards among road construction workers in Rivers State based on level of education is accepted. This indicates that there is no significant difference in the level of education of road

construction workers on knowledge of occupational hazards in Rivers State.

Table 4: Summary of χ^2 analysis on difference in knowledge of occupational hazards among road construction workers in Rivers State based on job experience.

VARIABLE	N	Df	χ^2_{cal}	p-value	Level of Sig.	Decision
Job experience	795	3	23.541	0.000	0.05	Significant

Table 4 revealed that the χ^2_{cal} is 23.541 with $df = 3$ and $p < 0.05$. The obtained p -value of 0.000 is less than 0.05, therefore the null hypothesis that there is no significant difference in knowledge of occupational hazards among road construction workers in Rivers State based on job experience is rejected. This indicates that there is a significant difference in the job experience of road construction workers on knowledge of occupational hazards in Rivers State.

Discussion of Findings

The finding shows that except for level of education, and job experience shows a significant difference in the knowledge on occupational hazards among road

construction workers in Rivers State. This is in disagreement with Rotifa and Eguvbe (2017) ^[11], that duration of employment was not found to statistically, significantly influence knowledge in this study. However, educational level and hours of work per week greater than 48 hours were both found to influence respondents' knowledge of road construction site hazards positively. The study revealed that age, level of education and job experience had significant difference in the occupational safety practice among road construction workers in Rivers State. This result is in affirmative with Rotifa and Eguvbe (2017) ^[11], which concluded that occupational hazard control practice of building construction workers was associated with their years of work experience, training, educational status and age.

The finding showed that age, level of education and job experience had significant difference in the attitude towards occupational hazard among road construction workers in Rivers State. This is in concordance with Vahid *et al* (2016) which showed significant correlation between education level (P=0.001), exercise (P=0.014), accident experience (P=0.001) and occupational safety attitude. Age (P=0.108), marital status (P=0.554), and job related to last education (P=0.307) did not have any significant correlation with safety attitude (P>0.05). Accident experience, as well as education level, could affect positively on changing workers' safety attitude. Also, Sanaei, *et al* (2009) ^[12] the mean of knowledge grade shows a significant relationship with education level. A same relationship was reported for the mean of attitudes and behavior with age.

Conclusion

The finding shows that except for level of education, job experience shows a significant difference in the knowledge on occupational hazards among road construction workers in Rivers State. It was concluded that occupational hazard control practice of road construction workers was associated with their years of work experience and educational status.

Recommendations

1. Policy makers in consultation with work safety practitioners should design policies that are sensitive to the perceptions of the users for effective improved use of PPE.
2. It is recommended that, the effort of the ministry of work and public health professionals at preventing occupational diseases among workers should include education and training for both informal and formal workers on construction sites.
3. Traffic management should be emphasized, with the provision of personal protective equipment, observation of hygiene and emphasis of safety at tendering stage.

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