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Safety Practices among Quarry Workers in Izzi Local Government Area, Ebonyi State, Nigeria

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Abstract

Quarry industries have been recognized as one of the workplaces with the highest rates of work-related illnesses and injuries among all the occupational categories globally. Workers are exposed to potential hazards like inhaling of dust and they are prone to accidents such as burns, finger cuts, fractures, nose bleeds, fainting, shocks, scalds, gassing, and suffocation.The study assessed safety practices among quarry workers in Izzi Local Government Area (LGA), Ebonyi State. Three research questions and two null hypotheses guided the study. A cross-sectional survey research design was adopted. The population of this study comprised all the 274 quarry workers in Izzi LGA and all participated in the study. A self- developed Safety Practices Questionnaire (SPQ) was used for data collection.Mean and standard deviation were used to answer the research questions, while t-test and One-way Analysis of Variance (ANOVA) statistics were used to test the hypotheses at 0.05 alpha level.Results revealed that quarry workers in Izzi LGA had poor safety practices (2.11± 0.24). Male (2.08± 0.23) and female (2.15±0.25) quarry workers had poor safety practices. Quarry workers with noformal education (2.04± 0.24), Primary Education (2.11±0.28), Secondary Education (2.19±0.18) and Tertiary Education (2.16±0.19) in Izzi Local Government Area had low safety practices in Ebonyi State. Furthermore, when demographic variables were compared, there were significant differences in the level of safety practices among quarry workers in Izzi LGA, Ebonyi State based on gender (p=0.027) and education level (p= 0.002). The study concludes that safety practices among quarry workers were poor, necessitating improved occupational safety measures. Poor safety practices might lead to higher health issues. However, the Ministry of Commerce and Industry in collaboration with Health Educators should organize seminar/workshops for quarry workers to create awareness on occupational safety practices in quarry industries.

Keywords: Safety, Practices, Safety practices, Quarry, Workers, Ebonyi State

Introduction

Quarry industries have been recognized as one of the workplaces with the highest rates of work-related illnesses and injuries among all the occupational categories globally. International Labor Organization (ILO, 2023) reported that worldwide, there are around 340 million occupational accidents and 160 million victims of work-related illnesses annually in quarry industries. Zermane et al. (2023) reported that quarry industries have the highest rates of work- related illnesses and injuries among all the occupational categories globally. In Nigeria, over 3,036 workers in the quarry industry suffered significant injuries (Health and Safety Executive [HSE], 2017) and spent up to 87.89 million every year in treating health problems related to working in quarry industries (Omiyale et al., 2018).

A quarry is a place where sand, gravels or stones are extracted, processed and sold (HSE, 2020). This involves the making of small rocks and aggregates from big rocks used for extracting building materials, such as dimension stone, construction aggregate, riprap, sand, and gravel. The majority of the practices in quarrying and the related activities of rock drilling, blasting, stone cutting, rock crushing, and aggregate manufacture, generate dust, which can cause dangerous airborne contamination in the workplace. This occurs as a result of related activities carried out by quarry workers. Quarry workers are workers who erect supports in underground workings, set and detonate explosives to loosen rocks and set up and operate drilling equipment to extract minerals from the ground and operate stones and ores. The activities generate a lot of health hazards, such as cuts and injuries, falls from heights, vibration, effects and complications of noise, inhalation of dusts and fumes and bites from animals (e.g snakes) (World Health Organization [WHO], 2020). Air-borne particulates pose a potential health risk to quarry employees in the form of respiratory, dermal, ocular irritation, and damage. A particular concern in some quarries is the inhalation of dust containing silica which can lead to silicosis, an irreversible lung disease resulting in inflammation of the lungs and breathing difficulties which progresses even when exposure stops. Because of the inherent dangers and risks associated with quarrying, there is need for safety practices among the quarry workers.

Safety practices involve the use and adoption of safety devices, such as protective device that can either be worn or applied to reduce the chances of accident or injury (Kitoye & Etor, 2023). Safety practices are the precaution people take to prevent accident, harm, disease, or death in the workplace (Shaukat et al., 2020) Safety practices are a set of procedures, rules, and processes designed to ensure the health and safety of people in the workplace (Verma & Chaudhari, 2017). Contextually, safety practices are a set of established measures to follow by the quarry workers in quarry industries to ensure well- being and physical safety in the environment.

The safety practices include combination of many practices starting from proper arrangement of equipment before use, cleaning of the workplace, keeping of work equipment in safe condition by eliminating or removing damaged ones, and substituting them with good ones and properly log faulty equipment in the maintenance log book (WHO, 2020). Other safety practices include the use of personal protective equipment (PPE), such as respirators, ear plugs, heavy duty gloves, helmet, goggles, safety belts, safety boots, overalls, and face shield (Fabián et al., 2017). According to La Torre et al., (2020), providing and receiving first aid in emergency situation in

quarry industries is another form of safety practice. According to the International Labour Organization (ILO), the main aim of all these practices is to prevent hazards, protection from exposure, and maintaining the highest level of health and safety among workers in any workplace.

Safety practices among the workers may differ significantly based on some demographic variables, such as gender and education status. Verma and Chaudhari (2017) found poor low safety practices among male and female workers in Indian mines. Ripamonti and Scaratti (2015) revealed that both male and female quarry workers had poor safety practices. A study carried out by Langwana et al. (2024) found a significant difference in the occupational safety practices among mine workers in Lesotho based on gender. Ilo et al. (2018) reported a significant difference in the workers' compliance with measures for safe environment based on level of education in quarry industries in Abakaliki capital development territory of Ebonyi State.

Several studies across the globe indicated different level of safety practices. For example, in Malaysia, Rav et al. (2020) found poor occupational safety practices among Quarry Plant Workers. In Zimbabwean Mining, workers in the industries demonstrated poor safety practices(Mabika, 2018). In Nigeria, Etabee and Okon (2021) reported poor practice of safety measures among Cross Rivers Quarry workers.

Moreover, it is possible that the poor safety practices had made quarry workers to suffer from many health hazards. For instance, Nigerian Institute of Safety Professionals (2000) reported that in quarry industry alone, a total of 11,000 individuals were hurt due to workplace accidents each year. Olusegun et al. (2009) established that 26 per cent of the workers suffered predominantly from cough, 20 per cent from catarrh and 15 per cent from sinusitis. Zermane et al. (2023) noted that quarry industries have one of the highest rates of work-related illnesses and injuries among all the occupational categories globally, and has a reputation for being extremely unhealthy for workers. It is possible that those in Ebonyi State are inclusive.

In Ebonyi State, Nwiboet al. (2012) determined the prevalence of respiratory problems and lung function impairment among quarry workers; the respiratory problems found were chest pain (47.6%), occasional cough (40.7%), occasional shortness of breath (6.5%), and wheezing (5.2%). However, the study did not explore orinvestigate the safety practices among quarry workers in Izzi Local Government Area, Ebonyi State. A related study in Ebonyi State focused on Abakaliki capital tertiary. Hence, the need to determine safety practices among quarry workers in Izzi Local Government Area of Ebonyi State.

Despite existing occupational health and safety regulations, studies shows that poor adherence to safety practices among quarry workers remains a major concern in many developing countries. As a result, quarry workers face increased risks of musculoskeletal injuries, respiratory diseases, hearing loss and even death. These incidents not only affect the health and livelihood of workers and their families but also lead to productivity losses, compensation costs, and legal liabilities for quarry operators. In Izzi Local Government Area, the researchers observed in many occasion that most of the workers in the quarry areas are full of dust covering their faces, most times one cannot recognize them. These situations might result to ill health to the workers as many have been seen coughing seriously in the area, some fainted and lost their lives while working and

many were hospitalized. However, most of the few related studies in quarry industries did not explore quarry workers in Izzi LGA. The main purpose of this study was to determine safety practices among quarry workers in Izzi Local Government Area of Ebonyi State. Specifically, the study determined level of: occupational safety practices among quarry workers in Izzi Local Government Area of Ebonyi State; occupational safety practices among quarry workers based on gender; occupational safety practices among quarry workers based on education status. Therefore, this study would provide data on the level of safety practices that may serve as evidence for better training and polices by quarry management and Government Agencies to develop evidence-based training programs and safety policies targeting solution instead of using general safety rules that do not work. Hence, the main purpose of this study was to determine safety practices among quarry workers in Izzi Local Government Area of Ebonyi State. Specifically, the study determined level of occupational safety practices among quarry workers based on gender and educational status.

Methods

Study design and setting

This study adopted descriptive cross-sectional survey research design. This is one in which data are collected from many different individuals at a single time {Lauren, 2020).This study was conducted in Izzi Local Government Area of Ebonyi State using all the quarry industries. Izzi Local Government Area is one of the thirteen Local Government in Ebonyi State. Izzi LGA covers a total of land area of 2,264 kilometers. It is bordered in the east by Cross River State and in the north by Benue State, in the South by Abakaliki LGA. The LGA has five Development Centre namely: Igbeagu DC, Ibyia DC, Nnodo DC, Izzi DC and Ominyi DC. The people are Igbos and mainly Christians. The indigenes are mainly farmers with few traders and civil servants. The soil is rich and good for agriculture particularly for growing rice, yam, and cassava and vegetable. Furthermore, the LGA has three quarry industries namely Mkpuma Ekwaoku quarry industry, Ndieborishiagu quarry industry and Mkpuma Akpatakpa quarry industry. In this quarry industries, workers are involved in the activities of rock drilling, blasting, stone cutting, rock crushing which can exposed them to dust and they may be also prone to accidents, hence, there is need for safety practices.

Study population

The population of this study comprised all the 274 quarry workers in Izzi Local Government Area, Ebonyi State. The use of the entire population was based on the fact that the population is small and manageable and this help to eliminates sampling error and ensures no important cases are missed.

Sample size determination and sampling technique

The sample size of this study comprised all the 274 quarry workers in Izzi Local Government Area, Ebonyi State.

Data collection instrument

The instrument for data collection was a self- developed Safety Practices Questionnaire (SPQ). The instrument consisted of 20 items with two sections. Section A contained 2 items which elicited information on the demographic variables of the respondents. Section B contained 18 items which elicited information on the safety practices from 1-18. The respondents were required to indicate on a 4-point scale using Always (AL) = 4, Often (OF) = 3, Sometimes (ST) = 2 and Never (NE) = 1. The instrument was validated by three experts in Health education unit, Ebonyi State University. In order to determine the reliability of the instrument, Safety Practices Questionnaire (SPQ) was administered on 30 quarry workers in Ikwo Local Government Area. Cronbach's alpha procedure was used to test the reliability of the instrument. The overall reliability co-efficient of the instrument was r = 0.95. Since the reliability coefficient of above 0.60 was obtained, the instrument was considered reliable. This was based on Ogbazi and Okpala's (2014) who suggestion that if the correlation coefficient obtained in an instrument is up to 0.60 and above, the instrument should be considered good enough to be used for a study.

Data collection procedure

In order to gain access to the respondents by the researchers and their research assistants, introductory letter was presented to each manager of the quarry used in the study. Subsequently, the manager introduced the researchers and their research assistants to the respondents and thereafter, the researchers and their research assistants administered the questionnaire to the respondents in their respective quarry industries. Four research assistants assisted the researchers in the distribution and collection of the data. The research assistants were instructed by the researchers on the procedure for administration of the questionnaire. In order to gain access to the respondents by the researchers and their research assistants, introductory letter was presented to each manager of the quarry used in the study. Subsequently, the manager introduced the researchers and their research assistants to the respondents and thereafter, the researchers and their research assistants administered the questionnaire to the respondents in their respective quarry industries. Out of 274 copies of the questionnaire administered, 264 representing 96.3% were retrieved and used for data analysis.

Data analysis

Data were analyzed using mean, standard deviation, t-test and Analysis of Variance. Mean and standard deviation were used to answer all the research questions. A criterion mean of 2.50 was set for this study. The criterion mean was derived by adding up the scale values and dividing the sum by the number of scale options thus: 4 + 3 + 2 + 1 = 10/4=2.50. A criterion mean of 2.50 and above was adjudged good safety practices while below 2.50 were considered poor. The t-test statistic was used to test hypothesison gender while ANOVA statistic was used to test hypotheses on age. The entire hypotheses were tested at 0.05 alpha level of significance.

Results

Table 1: **Responses on Safety Practices among Quarry Workers in Izzi Local Government Area of Ebonyi State (n=264)**

S/N	Items	$\bar{x}$	SD	Decision
1	Proper arrangement of equipment before use	2.66	1.10	Good
2	Clean the workplace after work	2.50	1.08	Good
3	Use of eye goggles to reduce light and protect eyes	1.92	0.92	Poor
4	Wear hand gloves while working	1.91	0.86	Poor
5	Wear apron	1.74	0.76	Poor
6	Wear nose mask while working	2.85	1.10	Good
7	Wear ear muffs due to sounds from the Industry	2.12	1.04	Poor
8	Wear face mask	2.50	1.12	Good
9	Ensure that fire extinguisher is available and functional before daily work	2.17	0.92	Poor
10	Wear boots	1.91	0.86	Poor
11	Received first AIDs treatment in emergency situation	1.74	0.73	Poor
12	Adopt dust suppression such as use of bag filters and scrubbers	2.03	0.81	Poor
13	Wear helmets before starting a work	1.96	0.87	Poor
14	Keep work equipment in safe condition	1.21	0.68	Poor
15	Log faults equipment in the maintenance log book	1.73	0.79	Poor
16	Report faulty equipment to the supervisor	1.78	0.74	Poor
17	Urinate in the toilet within the quarry area	1.94	1.01	Poor
18	Wash hand with soap and water after daily work	2.90	1.20	Good
	Overall	**2.11**	**0.24**	**Poor**

Results in Table 1 show that proper arrangement of equipment before use (2.66±1.10), clean the workplace after work(2.50±1.80), wear nose mask while working(2.85±1.10), wear face mask (2.50±1.12) and wash hand with soap and water after daily work (2.90±1.20) score a criterion mean of 2.50 and above set for this study while all other items were below the criteria mean of 2.50. Moreso, overall 2.11± 0.24 is also below a criterion mean of 2.50 set for this study. This suggest that quarry workers in Izzi Local Government Area of Ebonyi State had poor safety practices (2.11± 0.24)

Table 2: **Mean and Summary of t-test Analysis of Safety Practices among Quarry Workers in Izzi Local Government Area of Ebonyi State based on Gender**

Variables	N	$\bar{x}$	SD	t-val	P-val	Decision
Male	126	2.08	0.23	2.228	0.027	Significant
Female	138	2.15	2.15			

NS = Nost significant; S = Significant at $p \leq 0.05$

Data in Table 2 indicate that male quarry worker score (2.08± 0.23) and female (2.15±0.25) were below 2.50 criteria set for this study. This means that both (2.08± 0.23) and female (2.15±0.25) quarry workers in Izzi Local Government Area had poor safety practices. Results of the hypothesis (t-val=2.228, p-val=0.027) indicate that there is a significant difference in the safety practices based on gender. This suggests that gender influences adoption of safety practices among quarry workers in Izzi Local Government Area of Ebonyi State.

Table 3: **Mean and Summary of One-way ANOVA of Safety Practices among Quarry Workers in Izzi Local Government Area, Ebonyi State based on Educational Level**

Variables	N	$\bar{x}$	SD	t-val	P-val	Decision
No formal education	76	2.04	0.21	5.299	0.002	Significant
Primary Education	91	2.11	0.28			
Secondary Education	64	2.19	0.18			
Tertiary Education	33	2.16	0.19			

Table 3 shows that those quarry workers with no formal education score (2.04± 0.24), primary education (2.11±0.28), secondary education (2.19±0.18) and tertiary education (2.16±0.19) score which is below mean 2.50 criteria set for this study. This suggest that quarry workers with no formal education (2.04± 0.24),primary education (2.11±0.28),secondary education (2.19±0.18) and tertiary education (2.16±0.19) in Izzi Local Government Area had low safety practices in Ebonyi State. Furthermore, (F-val =5.229, p-val= 0.002) indicate that there is a significant difference in the level of safety practices among quarry workers in Izzi Local Government Area of Ebonyi State based on education level. This means that education level had influence on adoption of safety practices among quarry workers in Izzi Local Government Area of Ebonyi State.

Discussion

The findings in Table 1 showed that quarry workers in Izzi Local Government Area, Ebonyi State had poor safety practices. This result is not surprise and it attest to the observation of the

researchers that quarry workers in Izzi Local Government Area in many occasions has been seen working in the industry and dust covering their faces, most at times one cannot recognize them. This situation might result to constant ill health to the workers as many has been seen coughing seriously in the area and some fainted while working and hospitalized. This finding led credence to a study conducted by Rav et al. (2020) in Malaysia which found poor occupational safety practices among Quarry Plant Workers. The finding is in line with Mabika (2018) whose study reported poor safety practices among Mining workers in the industries in Zimbabwean. Finding further agrees with Etabee and Okon (2021) which found low practice of safety measure among Cross Rivers Quarry workers.

Findings in Table 2 indicated that male and female quarry workers in Izzi Local Government Area had poor safety practices. The reason for this result could be attributed to the production pressure and risk-taking behaviour for male as so many of them rush work and skip safety steps like wearing PPE or following procedures while female ones usually have a mix ill-fitting resource, most often too big, heavy or uncomfortable, so they avoid wearing them. This finding is in agreement with other studies such as Verma and Chaudhari (2017) who found poor safety practices among male and female workers in Indian mines and Ripamonti and Scaratti (2015) who revealed that both male and female quarry workers had poor safety practices. Result in Table 2 indicated that there was a significant difference in the level of safety practices among quarry workers in Izzi Local Government Area, Ebonyi State based on gender ($p<0.05$). However, the findingsdid not disagree with Ilo et al. (2018) whose study reported no significant difference between male and female workers in the level of compliance with measures for safe environment in quarry industries in Abakaliki capital development territory of Ebonyi State

Findings in Table 3 showed that quarry workers with no formal education, secondary education and tertiary education and in Izzi Local Government Area had poor safety practices in Ebonyi State. In the corresponding hypothesis, there was a significant difference in the level of occupational safety practices among quarry workers in Izzi Local Government Area of Ebonyi State based on education level($p<0.05$). This finding is expected based on the fact that education affects hazard awareness, ability to understand training and willingness to comply with safety rules. For example, those with low education may have poor understanding and low awareness, mid education may have peer pressure and production targets while higher education are faced with complacency and weak enforcement. This finding agrees with Ilo et al. (2018) whose study reporteda significant difference in workers' compliance with measures for safe environment based on level of education in quarry industries in Abakaliki capital development territory of Ebonyi State.Also, this finding agrees with Okorie et al. (2023) who found a statistically significant association between level of education and usage of personal protective equipment in both States.

Conclusion

The study concluded that quarry workers in Izzi Local Government Area of Ebonyi State had poor safety practices. When the demographic variables were computed, both male, female, those with No formal education, primary education, secondary education and tertiary education had poor level of safety practice.

Recommendations

The following recommendations are made based on the findings

1. Quarry and managers should supervise and monitor the use of Personal Protective Equipment (PPE) and sanction any worker who failed to make use of the equipment
2. Ministry of Commerce and Industry in collaboration with Health Educators should organize seminar/workshops to quarry workers to strengthen their knowledge regarding safety practices and proper use of personal protective equipment to male and female workers
3. 3. Intensive health education campaigns on safety practices in quarry industries need to be advocated by health educators which will go a long way in creating awareness for the workers with different educational level

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