Assessment of Knowledge on Occupational Safety among Workers in Umuoghara Stone Quarry, Ezza North, Ebonyi State, Nigeria.

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ABSTRACT

Background*:* Occupational safety is important for protecting workers from hazards that cause injuries, illnesses or fatalities. In Nigeria, industries like quarry and mines expose workers to significant risk including dust inhalation, physical injuries and noise pollution. Despite the high prevalence of occupational hazards in industries, especially the quarry and mine industries, evidence suggests that misconceptions and inadequate safety practices are still being carried out. Increasing the level of knowledge of workers still stands out as one of the strategies that will improve occupational safety practices among workers.

Objective: To determine the level of knowledge among workers regarding occupational safety in selected industries in Ebonyi State.

Materials and Methods: Descriptive cross-sectional study was used. Workers were sampled from Umuoghara quarry site, Ezza North, Ebonyi State, Nigeria. A semi-structured questionnaire was used to obtain data from workers. Data collected were analyzed using International Business Machine Statistical Package for Social Science (IBM SPSS) program version 26.0.

Results: Mean age of workers is 34.92 ± 6.180, age group 36 – 42 had the highest number of participants 116 (39.8%), females formed the majority of the participants 165 (56.7%), majority of the participants were married 163 (56.0%), had no formal education 191 (65.6%) and a good number of the participants were Christians 241 (82.8%). Majority of the respondents' level of knowledge regarding occupational safety measures was poor 273(93.1%). There was association between gender and level of education with level of knowledge which is statistically significant, $p< 0.05$ and there was a relationship between level of education and knowledge level of occupational health and safety among workers which is statistically significant with $P<0.001$.(AOR) Adjusted odd ratio 65.022 (8.859 – 477.229 at 95% (C.I.))

Conclusion: Respondents had low level of knowledge regarding occupational safety measures.

Keywords: Occupational safety, knowledge and selected industries.

INTRODUCTION

Occupational safety is one of the most important determinants of well-being of workers and economic productivity, yet it still remains a challenge in developing countries like Nigeria. Presently, global workforce stands at about 2.8 billion [1]. Workers spend about one third of their lifetime at workplace. Workers expect safe working environment as their fundamental human right. However there are still poor working conditions especially in developing countries. Workers all over the world, face dual occupational hazards, the traditional as well as novel in the complex work settings due to rapid industrialization, technological advancement and globalization, over the last few years. This is resulting into injuries, accidents, illnesses, disabilities and death. Occupational health issues affect individuals, families and communities, as well as the citizens of the world,

hence the need for occupational health. [1] Occupational health and safety (OHS), is concerned with the safety, health, and welfare of the workers, family members, employers, customers, and other stakeholders. It studies all factors influencing the health of workers at their workplaces as well as at home, thereby anticipating, recognizing, evaluation and control of hazards. The standard of Occupational health and safety available at any work place is the main determinant of workers' health [2]

The International Labour Organization (ILO) reports that 2.78 million work-related deaths occur annually, with developing nations showing a disproportionate burden due to weak regulatory frameworks [3]. The functions of Occupational Health Services are oriented toward prevention, focusing on the guidance of employers and employees in the creation and sustenance of a secure and healthy working environment, which in turn fosters optimal physical and mental well-being. These functions have been outlined by Obionu [4]. One of the crucial functions as described by Obionu involves providing an initial orientation to the organization for new staff members within the occupational service department. This orientation serves to familiarize newly employed workers with the specific occupational safety and health dynamics of the organization, facilitating a seamless integration into their roles. Another imperative function pertains to placing individuals in suitable job positions. This is imperative to ensure that an individual's skill set aligns with the requirements of the position, considering factors such as mental and physical capabilities. It is crucial to conduct suitable job placements following pre-employment and pre-placement medical examinations. Periodic medical assessments are also administered to determine if the work has had any adverse effects on the workers.

Despite the undeniable importance of occupational safety in preserving the well-being and lives of workers, the industries within Ebonyi State, Nigeria continue to grapple with significant challenges in this crucial realm. While this industry serves as one of the backbones of the state's economy, providing livelihoods and opportunities, it also exposes workers to a multitude of occupational hazards and risks. Stone quarry workers in low-and-middle-income countries are exposed to different forms of hazards, which have negative consequences on their wellbeing and performance at work, whereas in high income countries, various interventions and screening programs targeting stone quarry workers help improve their occupational health [5]. The stone quarry workers at Umuoghara, Ezza North are exposed to hazards which include little to no protective equipment provide; they are therefore, exposed to dust, noise and vibrations. They are also exposed to body pains, falls, trips and machinery injury.

One thing is to have the knowledge or consciousness of protective measures, while another is to make use of them. Scanty knowledge of safety practices has been observed as one of the reasons for low levels of safety practices; while little or no efforts have been made towards provision of protective equipment and improving knowledge of safety at the stone quarry in Ebonyi State. By identifying the strengths and weaknesses of current practices, the gaps that hinder the establishment of a proactive safety culture can be uncovered. Furthermore, exploring innovative and tailored preventive strategies will enable the development of effective interventions that address the unique challenges faced by each industry, ultimately fostering a safer working environment for all.

This study sought to evaluate the extent of knowledge as well as the preventive actions taken by employees working in various industries and sectors. It is considered that the information to be obtained regarding the employees' current knowledge level will further help to improve their health status

METHODS AND MATERIALS

Study Area

Study area was located in Ebonyi State, Nigeria, which is one of the states in South-eastern Nigeria. Ebonyi State lies approximately within latitudes 5º 40' and 6º45' North of the Equator and longitudes 7º30' and 8º30' East of the Greenwich meridian. The prevailing climatic condition in the area is characterized primarily by two regimes which are the rainy and dry season. About 60-70% of the dwellers of southeast zone are found to engage in agriculture, mainly crop farming [6]. The State has 13 Local Government Areas which include Abakaliki, Afikpo North, Afikpo South, Izzi, Ivo, Ohaozara, Onicha, Ohaukuwu, Ebonyi, Ikwo, Ishielu, Ezza North and Ezza South.

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The State has a population of about 2,176,947 million people as at the last census conducted by the National Population Commission in 2006; with a population projection of 3,242,500 in 2022 [7]. Agriculture is a very significant sector of the economy for the zone and the sources of raw materials used in the processing industries which serve as another area of employment and income generation for the people. It is home to some higher institutions which include Alex Ekwueme Federal University, Ndufu-Alike, Ikwo, Ebonyi State University, King David University of Medical Science, Uburu, AkanuIbiam Federal Polytechnic, Unwanna, Federal College of Agriculture, Ishiagu, Federal College of Education, Isu, College of Health Sciences, Ezzamgbo, School of Nursing and Midwifery Mater Misericordiae Hospital, Afikpo, School of Nursing and Midwifery, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, and Ebonyi State College of Health and Midwifery, Uburu. Ebonyi has one tertiary hospital which is Alex-Ekwueme Federal Teaching Hospital (AE-FETHA), a general hospital for each Local Government Area, primary health centres and other privately owned hospitals and clinics.

Most people in the state are civil servants, traders, some farmers and some artisans. Christianity is the predominant religion while a few are Muslims and some traditionalists. The official language in Ebonyi State is Igbo although not central Igbo; they also speak English. The type of marriage practiced in Ebonyi State is basically monogamy while some are polygamists. In childbirth, some give birth to many children mostly when the sexes are not properly mixed.

Study Design

The research design for this study was descriptive cross-sectional study conducted in Ezza North, Ebonyi State, Nigeria between September 2024 and December 2024.

Study Population

Study population was 1,040 male and female workers from the stone quarry site.

Inclusion criteria: All workers (both male and female) who gave their consent for the study, including those from 18 years and above.

Exclusion criteria: All workers who did not give their consent to participate in the study.

Sample size determination:

The sample size was determined using the formula [8]

$$\mathbf{N= Z^2PQ/ D^2}$$

Where N= required sample or minimum sample size

Z= constant (1.96) [standard normal deviation]

P= proportion with the desired characteristics

Q= 1-P

D= degree of accuracy (0.05)

$n = [(1.96)^2 \times (50/100) \times (0.5)/ (0.05)^2] = 0.9604/0.0025 = 265.$

Therefore, the minimum sample size will be 265

Adjustment for non-response 10% non-response rate

NS = n/response rate

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Assumed non-response rate = 10/100 X 264 = 26.5

Total = 265 + 26.5 = 291.

Sampling and sampling technique: Systematic sampling

Data Collection Method: Data was collected using pre-tested semi-structured self -administered questionnaires.

Data Analysis: Data obtained was analyzed using Statistical Package for Social Science [SPSS] Version 26.0. Variables were summarized in frequency distribution tables and numerical variables by mean and standard deviation. Binary logistic regression analyses were performed to identify variables having association with students' knowledge.

Ethical Consideration

Approval of this work was obtained from the Ethics and Research Committee, Abia State University Teaching Hospital, Aba. Informed consent was also obtained from the workers.

RESULTS

Out of 291, only 204 workers consented to take part in the study.

Table 1: Descriptive statistics of Umuoghara Quarry industry in Ebonyi state

Variables		Values
Descriptive statistics of Umuoghara quarry industry in Ezza North LGA, Ebonyistate.	Mean	35
	Median	36
	Mode	36
	Std. Deviation	6.952

Table 1 points out the descriptive statistics of Umuoghara Quarry. It shows the mean of age distribution which is 35 ± 6.952.

Table 2: Socio-demographic variables of the respondents of Umuoghara Quarry industry in Ebonyi state.

Variables		Frequency	Percentage (%)
Age group of the respondents	Less than 18	6	2.9
	18 – 23	8	3.9
	24 – 29	18	8.9
	30 – 35	59	28.9
	36 – 41	87	42.6
	42 – 47	19	9.4
	48 – 53	6	2.9
	54 – 59	1	0.5
Total		204	100.0
Gender of the respondent	Male	44	21.6
	Female	160	78.4

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Total		204	100.0
Marital status of the respondents	Single	75	36.8
	Married	110	53.9
	Divorced	15	7.5
	Widowed	4	2.0
Total		204	100.0
Level of education of the respondents	No formal education	145	71.1
	Completed primary	33	16.2
	Completed secondary	35	12.2
	Completed tertiary education	1	0.5
Total		204	100.0
Religion of the respondents	Christians	181	88.7
	Muslim	4	2.0
	Traditional religion	19	9.3
Total		204	100.0

Table 2 displays the socio-demographic variables of the respondents of Umuoghara Quarry. Findings from table 2 show that the age group 36 – 41 had more participants 87 (42.6%), females formed the majority of the participants of 160 (78.4%), married participants formed the majority of 110 (53.9%), majority of the participants 145 (71.1%) had no formal education and majority of the participants were Christians 181 (88.7%).

Table 3: Level of knowledge among workers regarding occupational safety in Umuoghara Quarry

Variables		Frequency	Percentage (%)
Level of knowledge among workers regarding occupational safety in Umuoghara Quarry, Ezza North, Ebonyi state	Good knowledge	18	8.8
	Poor knowledge	186	91.2
Total		204	100.0

Table 4 shows that the participants' level of knowledge regarding occupational safety measure is poor 186 (91.2%).

Table 4: Association between socio-demographic variables and the level of knowledge

Variables	Knowledge level				Total (N=291)	Asymptotic Sign (2-sided)
	Poor knowledge		Good knowledge			
	Frequency	Percent	Frequency	Percent		X^2=7.596
Age group						df=7
<18	6	100	0	0.0	6	p-Value=0.370
18 – 23	8	100.0	0	0.0	8	
24 – 29	30	96.8	1	3.2	31	
30 – 35	92	89.3	11	10.7	103	

36 – 41	109	94.0	7	6.0	116	
42 – 47	20	100.0	0	0.0	20	
48 – 53	6	100.0	0	0.0	6	
54 – 59	1	100.0	0	0.0	1	
Gender						
Male	107	86.3	17	13.7	127	X^2=23.754 df=2
Female	164	100.0	0	0.0	164	p=0.000
Marital status						
Single	93	95.9	4	4.1	97	X^2=4.456 df=4
Married	144	90.6	15	9.4	159	p=0.348
Divorced	13	100.0	0	0.0	13	
Widowed	7	100.0	0	0.0	7	
Others	15	100.0	0	0.0	15	
Level of education						
No formal education	191	100.0	0	0.0	191	X^2=237.490 df=3
Completed primary	52	98.1	1	1.9	53	p=0.000
Completed secondary	29	100.0	0	0.0	18	
Completed Tertiary	2	11.1	16	88.9	18	
Religion						
Christianity	223	92.5	18	7.5	241	X^2=2.258 df=2
Muslim	18	94.7	1	5.3	19	p=0.323
Traditional religion	31	100.0	0	0.0	31	

Findings from table 4 show that there is no association between age group, marital status and religion with level of knowledge of the participants as it is not statistically significant, P> 0.05 while there is an association between gender and level of education with the level of knowledge which is statistically significant, P<0.05. Please see table 4 for more details.

Table 5: Relationship between socio-demographic characteristics and level of knowledge

	s			95% C.I for EXP (B)	
Variables	df.	Sig	OR	Lower	Upper
Gender	1	0.994	0.000	0.000	
Education	1	0.000	65.022	8.859	477.229
Constant	1	0.999	20.057		

Table 5 shows that there is relationship between level of education and knowledge level of the participants which is statistically significant P<0.001 AOR (Adjusted Odd Ratio) of 65 at 95% confidence Interval (8.859 – 477.229) while there is no relationship between gender and level of knowledge which was not statistically significant, P>0.001. Please table 5 for more details.

DISCUSSION

Findings from this study indicate that a greater number of the respondents in Umuoghara stone quarry's (36-41) age bracket accounted for 42.6%. This suggests that middle-aged workers were more prevalent in the workforce within the stone quarry industry. Younger workers (aged 18–29) were significantly underrepresented, comprising only about 15.7% of the workforce. This may indicate a potential gap in recruitment or interest among younger demographics in this sector. This is in line with study of Innocent [9] on common occupational health hazards among health workers in a university health centre Southeastern Nigeria which showed a similar age bracket of (31-40) years. Another study carried out [10] observed that workers within the age of 16 to 30 were more prevalent in a construction industry. Findings from their study revealed that performance at work begins to decline at age 15 years, the industry recruited younger persons. While a study by Afolayan [10] showed that artisanal barite miners were more than 25 years old. In another study by Agwu [11] on occupational safety in Nigerian manufacturing industries, it was found that the median age of workers often falls between 30 and 40 years, similar to the findings at Dolph Metals. Agwu's study emphasized the importance of continuous safety training and the incorporation of age-specific safety strategies to enhance compliance and reduce accidents.

The gender distribution showed that majority of the workers in Umuoghara stone quarry were females which accounted for 93.1%. A study conducted among Nigerian sawmill workers [12] to assess their knowledge of health and occupational safety issues showed a direct link with high male population which is consistent of this study's findings of Faremi [13]. This does not come as a surprise because males are considered more daring and lean towards professions that requires the lifting of heavy loads and exposure to hazards such as excessive heat. The finding from Umuoghara quarry is an interesting contrast to the traditionally male-dominated nature of many industrial sectors. The predominance of females might indicate that the specific industries selected in Ebonyi state could be sectors where women are more represented, possibly due to the nature of work that is seen as more appropriate or acceptable for women in the local cultural context. However, this imbalance could also suggest that the industry's work environment and safety policies may not be fully inclusive, as male-dominated safety concerns might be prioritized. The findings could also be as a result of cultural practices from the people of that region. The findings from this study were in line with the study of Aloh [14] where females dominated the workforce (6:1). The study was carried out among quarry workers in Ebonyi State, Nigeria. Findings from this study were also in line with the study of Afolayan [10] where males had more than 92% represented in the barite artisan mining in Nigeria. While traditionally male-dominated industries show different patterns, the high female representation in this study might indicate a sector-specific trend that warrants further investigation, particularly in relation to safety measures that cater specifically to female workers.

A good number of the respondents in Umuoghara quarry were married (53.9%). The high percentage of married workers might suggest that the workforce was composed of people with dependents, which can impact their approach to occupational safety. Often, workers with families might prioritize job security over safety concerns due to the need to provide for their families. This was in contrast to findings in a descriptive cross-sectional study carried out in Ikpeshi community, Akoko-Edo Local Government Area in Edo State [15]. The study revealed that 61% of the respondents were single. This was as a result of the workers mostly falling within the age range of 20-29 years as compared to workers in Umuoghara which is assumed to be the age bracket for most married persons in Nigeria. Similar studies have found that younger workforces tend to exhibit different safety behavior compared to older workers. For instance, a study in Ghana [16] observed that younger workers (under 40) were more prone to occupational accidents due to overconfidence and a tendency to underestimate risks.

This study revealed that 71.1% of respondents in Umuoghara quarry had no formal education. This raises concerns about the overall level of occupational safety awareness among the workforce. The low level of education may suggest that a large proportion of the workforce may lack the basic literacy required to understand and follow safety protocols effectively. According to a study in Ghana [17] education plays a crucial role in ensuring that workers are aware of and can adhere to occupational safety guidelines. In a study carried out on

barite artisanal miners that more than 50% had no formal education [10]. This finding was in contrast to the study carried out in Edo State, Nigeria [15]. The findings align with other studies conducted in Ghana [18]. The study revealed that most small-scale mining industries often employ a workforce with limited educational backgrounds, which impacts their ability to comprehend and implement safety measures effectively. This study showed that Christianity is the predominant religion among respondents in Umuoghara stone quarry which accounted for (88.7%). The high level of Christianity may reflect the broader religious demographics of the region; while religion itself may not directly influence occupational safety, cultural practices tied to religious beliefs might affect attitudes towards safety measures, compliance, and even the management of hazards.

This study revealed that the workers in this industry have low levels of knowledge as regards occupational safety; 91% in Umuoghara quarry. The findings were still in line with a study in Ogun [19] which found that over 85% of construction workers in Ogun State, Nigeria, had limited knowledge about occupational hazards and the necessary safety precautions. This lack of awareness was linked to the high rate of occupational accidents reported in the region. Similarly, in a study conducted in Southeastern Nigeria [11], it was found that a majority of quarry workers had minimal understanding of safety procedures, which correlated with frequent workplace injuries and fatalities. Agwu's research suggested that targeted safety training and education programs were essential to improving safety outcomes in these high-risk environments. Also, the findings from this study were also in line with a study carried out in Ghana [17] which revealed that quarry workers generally had poor knowledge of occupational safety, which was attributed to insufficient training and a lack of ongoing safety education initiatives. Education level appears to be a significant determinant of safety knowledge. Study carried out on occupational hazards among stone quarry workers in Northern Nigeria [20], which shares similarities with Umuoghara found that workers with tertiary education were more likely to have good knowledge of occupational safety. In Umuoghara where literacy levels among workers are low, this educational gap likely contributes to poor safety awareness [21]. This finding is in contrasts with a study in Uttar India who found out that majority of survey participants had a moderate degree of knowledge and practice regarding workplace safety [22]. The majority of survey participants (72%) were aware of health risks and the impact of dust on health (58%). Wearing gloves is crucial when working with chemicals, according to the majority of participants (58%) who claimed that exposure to chemicals (inhaled sprays, spilled on the body) throughout the course of their jobs creates health problems (74%). Only 34% of workers knew about the safe working procedure in their place of employment. The majority of managers and front-line employees, however, had insufficient knowledge of health and safety risks, according to another survey that looked at awareness and attitudes regarding personal protection [23]. Findings from this study showed there was association between gender and level of education with level of knowledge which is statistically significant, $p< 0.05$ and there was a relationship between level of education and knowledge level of occupational health and safety among workers which is statistically significant with $P<0.001$.(AOR) Adjusted odd ratio 65.022 (8.859 – 477.229 at 95% (C.I.)Confidence Interval) This finding was similar to a study in Uttar India which found a link between education and knowledge of occupational health and safety of workers in the industries [21]. In their case, they found that workers had an average of 68.1percent understanding of occupational risk which was adequate knowledge in contrasts to this study where workers had inadequate knowledge. The reason may be that workers in Uttar India were educationally better and very well aware of the risks in their work places. The study in Maiduguri, Borno State [24] showed that there is good level of knowledge of occupational health and safety of the participants with diploma which is in line with the study among workers of Kaduna Refinery [20] and petrochemical company ltd (krpc), Kaduna, Nigeria that reported 95% of those that attended tertiary health institutions had higher level of knowledge of occupational health and safety practice. The finding of this study was in contrast with this study. Similarly, there was a reported significant relationship between educational status and safety practices among their respondents' other studies [25,26]. The good knowledge among the participants in their study might not be unrelated to the fact that majority of the participants had post primary school education. There was no significant association in level of knowledge of occupational health safety among workers of different appointment, although, a much higher number of permanent workers reported good knowledge (70.1%) than the casual workers (63.2%). This is consistent with the study [27] which reported highest knowledge about occupational hazards among those who had worked for 10 years or more and lowest was found among the newly employed workers. This is also consistent to a study on small and medium scale industrial workers that reported no significant differences in knowledge of occupational health and safety practice between the skilled and unskilled workers [28].

This study showed that there was poor implementation of safety precautionary measures and use of personal

protective equipment (PPE) (82.2%) among the participants [13]. This is in contrast albeit higher than this finding [20]. The poor implementation of safety precautionary measures and use of PPE among workers in this study is similar with previous studies that reported poor acceptance of safety precautionary measures and use of PPE among their workers [13, 27, 29, 30, 31]. However, the present study found that more than 15% of the participants minimally make use of PPE and safety precautionary measures at the workplace. This should be of concern and an important area for occupational health and health intervention with regular monitoring and decisiveness with effective supervision by management of workers.

The study has some limitations even though the cross-sectional study design provided reliable and valid findings, interventional studies should be carried out in this area. There is also a need to target a larger population in bottling companies to be able to generalized findings. Despite the above limitations findings from this study has provided insight into the occupational risks and hazards exposure, knowledge of occupational health and safety practice, safety measures and their association with different socio-demographic characteristics among workers of the selected industry, Umuoghara Quarry in Ebonyi State, Nigeria.

CONCLUSION

Our findings conclude that workers in Umuoghara stone quarry have low level of knowledge as regards occupational safety measures, this may be caused by low levels of formal education, inadequate personal protective equipment and lack of formal trainings.

RECOMMENDATION

Recommendations include regular and mandatory safety training programs should be conducted for all workers, with a focus on increasing their knowledge and awareness of occupational hazards and safety practices. Training should be tailored to the literacy levels of the workers and should include practical demonstrations. Employers should ensure the consistent availability and proper use of appropriate PPE. Regular inspections should be conducted to verify that workers are using PPE correctly and that the equipment is in good condition.

Regulatory bodies should increase their monitoring and enforcement activities to ensure that mining and quarry companies comply with existing safety regulations. Penalties for non-compliance should be strictly imposed to deter unsafe practices. Investments in safety infrastructure, such as emergency response systems, adequate lighting, and signage, should be prioritized. This includes the installation of safety barriers, ventilation systems, and other engineering controls to minimize exposure to hazards. Management should work towards cultivating a safety culture within the workplace. This can be achieved by promoting open communication about safety concerns, involving workers in safety planning, and recognizing and rewarding safe behavior.

Targeted interventions should be implemented to address specific hazards identified in the study, such as dust exposure, noise, and chemical handling. This may include the introduction of dust suppression systems, noise reduction measures, and safer handling protocols for chemicals. Periodic health checks should be conducted for workers to detect early signs of occupational illnesses. This would help in timely intervention and prevent the progression of work-related health conditions. Collaboration between industry stakeholders, including government agencies, labor unions, and community organizations, should be strengthened to ensure a holistic approach to occupational safety. Stakeholders should work together to develop industry-wide safety standards and share best practices.

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