

# OCCUPATIONAL HEALTH HAZARDS AMONG QUARRY EMPLOYEES IN EBONYI STATE, NIGERIA: SOURCES AND HEALTH IMPLICATIONS

**Oginyi, Ronald C.N.**

Department of General & Applied Psychology,  
Faculty of Social Sciences,  
Ebonyi State University, Abakaliki.  
P.O.Box 1056, Abakaliki.

**E-mail: [ronald.oginyi@yahoo.com](mailto:ronald.oginyi@yahoo.com).**

## **Abstract**

The study examined the quarry industrial environment, and studied specifically its unwholesome practices such as pollution and unprotective behaviour and how these problems affect the conditions of employees in such industries in Ebonyi State. The research also concentrated on the identification of those diseases, their sources and other psychological ailments and how they impacted negatively on employees and other residents around the quarry sites. The study aimed at determining the level of compliance of safety and protective devices among employees. The study also probed to ascertain the gender distribution and the level of proneness to the hazards. The study adopted survey design and used cluster sampling technique in the selection of participants in small and medium scale quarries in Abakaliki capital territory. Statistical summarization technique (Pearson correlation co-efficient) was used in the data analysis. The study made use of self constructed and validated questionnaire in the gathering of primary data among selected participants. Also, the study made use of hospital dispensary file records as secondary data gathering technique to augment information for data analysis. The results of the study showed wide scale negative impact on environment, the physical and psychological health of the employees, the productivity and efficiency of the quarry employees.

**Key Words:** Occupational health hazards, Industrial pollution, Quarry industry, Sources of hazards, Preventive practices, Awareness of knowledge of hazards.

## **Introduction**

In the past, Ebonyi people were mainly agrarian being predominantly peasant farmers. Thus, the main stay of their economy was agriculture. However, in the past twenty years, quarrying started as a major type of industry in the state. The bulk of the quarry employees are mainly illiterate men and women who have little or no knowledge of consequences of environment as a result of lack or inadequate information on safety practices. The type of quarrying industry present in Ebonyi State ranges from manual stone crushing industry to small and medium scale quarrying industries that use heavy machinery for crushing stones. Quarry and quarrying refer to open excavation from which any useful stone is extracted for building, engineering and construction purposes. As a matter of fact, crushing stone generates wide range occupational hazards. Achalu (2000), posits that

occupational hazard is any condition or substance that has the potential of causing injury or damage to human health and well-being. A large number of workers are exposed to moving parts and to dangerous chemicals like ammonium triphosphate and dust that contains sodium silicate. Ajayi and Osibanjo (1999) agree that stone crushing involves a mechanical process which causes vibration and noise.

In the quarry industry, employees make use of explosives, chemical compounds or mixtures that undergo rapid burning or decomposition with the generation of large amount of gas and heat that give rise to production of sudden pressure effects. The chief use of explosive in peace time is for blasting and quarrying, but explosives are also used in fireworks and signaling apparatus and for setting blind rivets and forming metals (Hussein, 2006).

Also, Hussein (2006), affirm that work-related accidents accounted for 103,000 deaths in USA, 122,000 in European Union, 90,500 in China and 40,000 in India in 2005. In the case of the developing countries where the rate of such deaths is higher, the relevant information are either unavailable or unreliable. Also, millions of the employees in developing countries including females and children are poor and illiterate.

Cronon (1996) has called these hazardous activities unnatural natures. This study therefore, focuses attention on interactions and impacts of occupational hazards on the physical and psychological health of quarry employees.

### **The Problem of Occupational Health Hazard among Quarry Employees**

Crushing stone has done more harm than good because of some occupational and environment hazards it exposes employees of such industries and residents living around such sites to. This is because of indiscriminate location of such sites without consideration to residential areas (Ashley, 2004). Consequently, the prices being paid by employees and residents have been unbridled exposure to such negative effects as: pollution, various degrees of occupational accidents and other physical accidents posed by blast stones flying in the air, physiological risks and psychological trauma (Ajayi & Osibanjo, 1995). In the same vein, ergonomic hazards can cause physiological and psychological stress and anxiety. Precisely, chemical hazards can arise from the presence of poisonous or irritating gas or dust in the work place. Biological hazards could include ambient heat, burns, loud vibration, sudden pressure changes and electric (Younger, 1999; Younger, 2002).

This study is set to unravel the hazards that frequently occur in the area of materials handling, where workers must lift or carry heavy stones. The working conditions and environment in most of the workplaces are sub-standard and there is no concrete preventive and control measures to safeguarding the physical and psychological health of employees. There is no record keeping and data of accidents and incidents that also go mostly unreported (Nwankiti, 1998). It appears that the work culture inhibits the labourers from taking safety precautions, like using protective clothing and it involves disseminating information about diseases they may acquire at workplace. The study therefore is aimed at critically investigating the variables raised in the subject matter of this research and to proffer solutions for healthier work environment and the need to have better informed employees on health hazards prevention.

**The objectives of this study are as follows:**

1. To ascertain the level of quarry employees' adherence to the use of safety and protective devices in their work places.
2. To find out the extent of training and awareness campaigns among employees concerning the occupational health hazards inherent in the quarry industries.
3. To find out the gender distribution and the quality of the work force in the quarry industries in Ebonyi State.
4. To ascertain the level of employees' proneness to occupational health hazards.
5. To identify the pollution related ailments prevalent among the quarry employees.
6. Finally, to make some recommendations on the way forward.

**Research Hypotheses**

1. There is no statistical significant relationship among employees on occupational health hazards and employee health in the quarry industries.
2. There is no statistical significant relationship between occupational health hazards and the psychological ailments among quarry employees and their efficiency at work.
3. There is no statistical significant difference in exposure to hazard between quarry employees who have undergone training and experienced awareness campaigns and employees who have neither undergone training nor acquired awareness information.

**Background of Quarry Industry in Ebonyi State**

The conceptualization of occupational health hazards is hinged on the assumption of category of environmental pollution, diseases, illnesses, risks, on-the-job accidents and psychological ailments from job-related exposures and work settings specifically tied to mining and quarry sites. The study focuses on the adverse environmental conditions orchestrated by hazards of quarrying activity on the employees. It is therefore not surprising that researchers have begun to empirically examine the impact of occupational health hazards among quarry employees (Ajayi & Osibanjo, 1995).

The type of quarry industry present in Ebonyi State ranges from manual (individual crushing) to small and medium scale quarry industries that use heavy machinery for stone crushing. The number of such industries in Ebonyi State is estimated at about one hundred and thirty (130). Most of these sites are located close to residential homes and public buildings all over Abakaliki Capital Territory and Ishiagu areas of Ebonyi State. However, they are scattered indiscriminately because of the absence of functional industrial layout in the state. These sites are located in clusters and they include sites at: Nkalagu, Isimkpuma Ezeillo, Ntezi, all in Ishielu Local Government Area. Others are: sites located in Ezzamgbo, Ohaukwu L.G.A, Umuoghara in Ezza-North L.G.A., Mile 50 and Azuiyiokwu areas in Abakaliki Capital Territory. Also, there are other sites at Inyimagu in Izzi L.G.A, Ameka in Ezza South L.G.A, Amoha in Afikpo South L.G.A. and Ishiagu in Ivo L.G.A. Other sites also abound.

The employees in those quarry sites are mainly untrained, illiterate and unskilled workers comprising men and women with women forming about 70 per cent of the work force in the quarry industries (Isah, 1999).

### **Quarry and Industrial Hazards: An Overview**

Crushing stone is any type of natural rock which in order to be mined, has to be first blasted or excavated from its natural state in the ground and then processed. This research work is borne out of the desire to increase awareness on pollution and occupational health hazards of the quarrying sector in Abakaliki.

The range and scope of occupational safety and health covers all the industrial, commercial, agricultural, manufacturing, mining/quarrying and construction sectors. Nonetheless, the high-risk areas are related to the manufacturing, mining/quarrying, construction and power generation sectors. These sectors generate significant environmental hazards, and resultantly cause illnesses and injuries not only to the employees but the general public (Isah, 1999). Nwankiti (1998) outlined that work related diseases range from tuberculosis in mine workers to carpal tunnel syndrome in computer users. Other common diseases as identified by Nwankiti (1998), include common diseases such as asthma, skin diseases, allergies and stress related illnesses, whereas muscle-skeletal disorders result due to manual lifting operations.

Again, disabilities related to machine operations are common. The use, handling of or exposure to asphalt chemical is injurious to health. Shockingly, hazardous materials are responsible for annual killing of several thousands of workers worldwide (ILO, 2006). In June, 2006, the International Labour Organisation adopted a convention on promotional framework for occupational safety and health placing occupational safety and health on the national agenda in order to lower the toll of work-related injuries and diseases.

In a study conducted by Isah (1999), on environmental impact assessment of cement manufacturing in Edo State of Nigeria, he reported that in 96.7 percent of all the industries sampled, no worker used protective devices. Also, Warrel (1995), carried out a related study where he used unselected group of 126 quarry sites in Kano State Nigeria. In his result, radio-active evidence showed traces of silicosis. In another study conducted in Mumbai India, Beckett, (1997) found that each of the quarry operations generated airborne total dust and respirable dust which contains very high percentage (75 percent) of free silica. In a separate study, Fulekar (1999), reported that exposure to dust causes temporary and permanent disabilities and deaths. He also opined that at this level, quarry employees have estimated average exposure to air-borne total dust of 2.36 mg/ms as against recommended level of permissible unit of exposure (PLE) of 1.08 mg/m<sup>3</sup> and 0.36 mg/3.

In another study, Victory and Shaw (1992), investigated the effect of temperature and task complexity on industrial employees' health, participants who worked as excavators in the mines and also doing a collection of other tasks. They reported that fatigue, stress and anxiety may contribute to human error and could predispose such employees to occupational hazards. Friedman and Rosenman (1994), reported that men who showed a particular pattern of behaviour, labeled type A behaviour were twice as likely to develop cardio-vascular disease prematurely than those who did not exhibit such a pattern of behavior (labeled type B).

Karasek (1979), introduced the job-demand control model. According to JDC Theory a psycho-social work environment can be characterized by a combination of demands and control. Karasek (1979) therefore hypothesized that employees working the high strain jobs will have an increased risk of developing high blood pressure and reduced job satisfaction and ill-health over time. The assumption that high strain or stressful jobs

result in health complaints overtime by workers is known as the strain hypothesis of the Job-Demand Control Model.

Domino (1986), introduced his multiple causation theory of occupational hazards. This suggests that industrial accident causes often have a variety of contributory factors that do not always fit neatly into a unique theory or explanation. The report implicated behavioural and environmental factors as major causative factors of occupational hazards.

For the purpose of this study, emphasis will be on multiple causative factors of hazards and the centers on hazards identification and the influence of these hazards on the general health of quarry employees including psychological ailments such as anxiety, depression, stress, fatigue and loss of efficiency. The theoretical aspect of this study lies on the humanistic approach which lay emphasis on the individual's free will. That is, the ability to use or adopt his or her own decision. 'Free will' as mentioned has to do with workers who freely choose such risk prone jobs, may be due to reasons of not being educated or skilled for other jobs which do not have wide scale risks and psychological strains.

Thus, the present method of quarrying in Ebonyi State poses a serious health risk to the employees, the public and the environment at large and therefore, requires suitable prevention and control mechanisms. It is on the above premises that the hypotheses of this study were generated and formulated.

### **Research Methodology**

This study was carried out in ten (10) different quarry sites scattered all over Abakaliki Capital Territory. The population of study comprised a total of sixty (60) participants who were quarry employees in the sites selected. The participants were selected through cluster sampling technique to represent each of the quarry sites selected for this study. The primary instrument used in the study was a self developed questionnaire containing a five-point Likert format structured scale (ranging from 1 to 5 points). The instrument was validated in a preliminary pilot study before being administered on the selected participants. The literate participants completed the questionnaire by themselves, while the non-literate ones answered orally and had their questionnaire simultaneously completed for them by the investigator as they responded.

Secondly, the study involved the use of data gathering carried out at the Ebonyi State University Teaching Hospital Abakaliki, in the Department of Community Medicine using the case files of sixty (60) participants who were identified in their bio-data as quarry employees. The case files were selected through simple random technique. The case files were made possible because the employees have it as a rule from government to visit the hospital for free periodic check-up. In the secondary data gathering exercise, the study adopted cross-sectional design in which the selected participants' files were grouped into three categories based on years of involvement/exposure on the job as follows: (A) Less than 5 years (B) 5 to 10 years (C) More than 10 years. The ages of the participants in the two data collection exercises ranged from 17 to 60 years for women and 20 to 50 years for men.

Lastly, data obtained were analyzed using statistical summarization technique (Pearson product co-efficient) for empirical testing of the three hypotheses formulated in the study.

## Results and Discussion

The research results presented here are predicated on the three hypothesis tested to guide the study.

### Hypothesis One:

There is no statistically significant relationship between occupational health hazards and quarry employees' health.

**TABLE 1:**

Variables	N	DF	P. Level	Calculated Value	Critical Value	Remarks
Occupational Hazards (X)	60	58	0.05	0.95	0.25	S
Employee Health (Y)	60	58	0.05	0.09	0.25	S

**Decision:** Since the computed  $r=0.95$  is greater than the critical value of 0.25 at 0.5, it means that the perception of stone crushing boosts the level of industrial health hazards experienced by workers. Therefore, we accept that there is strong relationship between stone crushing activity and impairment of employees' health. The null hypothesis is however rejected and the alternative hypothesis is therefore accepted. This result however confirms earlier findings by Isah (1999) and Nwankiti (1998) who reported that mining/quarrying activities increased susceptibility of employees to risks and impairment of health and in turn reduce employees' job satisfaction.

### Hypothesis Two:

There is no statistically significant relationship between occupational hazards and psychological well-being of quarry employees and their efficiency at work.

**TABLE 2**

Variables	N	DF	P. Level	Calculated Value	Critical Value	Remarks
Occupational Hazards (X)	60	58	0.05	0.32	0.25	Significant
Psychological Health & Efficiency	60	58	0.05	0.32	0.25	Significant

**Decision:** Since the computed  $r=0.32$  is greater than the critical value of 0.25 at the probability level of 0.05, the null hypothesis was therefore rejected. This means that the alternative hypothesis was therefore accepted indicating that there was a statistically significant relationship of occupational health risk on employees' psychological health and efficiency at work. This result is similar to the findings reported by Karasek and Theorell (1979), that employees working in the high strain jobs like that of quarry and mining activities have high risk in psychological ailments such as anxiety, depression, stress and fatigue which could in turn predispose employees to physical hazards on the job. This study reveals that more women than men were affected in the susceptibility level of occupational hazards. Also the result supports the findings of Fulekar (1999), who reported that exposure to dust causes temporary disabilities and deaths.

### Hypothesis Three:

There is no statistically significant relationship on exposure to hazards between trained / informed quarry employees and untrained and un-informed workers on the job.

**TABLE 3:**

Variables	N	DF	P. Level	Calculated Value	Critical Value	Remarks
Exposure to Risk	60	58	0.05	0.58	0.25	Significant
Employee Level of Awareness of Hazards	60	58	0.05	0.58	0.25	Significant

**Decision:** Since the computed  $r$  0.58 is greater than the critical value of 0.25, it means that the perception of training and creating awareness of health risks among quarry employees actually equips them with the know-how and knowledge to take protective and preventive care of them to minimize attendant occupational risks in the quarry job. Therefore, we reject the null hypothesis and accept the alternative hypothesis. This outcome is however buttressed by the findings of Friedman and Rosenman (1994) who reported that a particular pattern of behaviour like ignorance and unawareness of hazards could predispose employees prematurely to industrial risks and illnesses such as tuberculosis, asthma, cough, silicosis among other sicknesses. This is when employees who have awareness and knowledge of hazards and could engage in protective behaviour at work are compared with other employees without such advantage.

### Conclusion

The statistical analysis of the variables studied in this research indicates that the three null hypotheses formulated were rejected while the alternative hypotheses were accepted and upheld. Thus, it was found that quarrying activity predisposes the employees to multiples of occupational health hazards if not given job security, training and awareness information on attendant dangers. However, whether the workers perceive industrial hazards or not, employees still show total commitment and dedications to their duties and goal of organization (Beckler, 1998). Beckler (1998), also reports that workers love job security and constant training. The findings also indicate that there are evidences of decreased lung function and renal pathology and perhaps other diseases among quarry employees as indicated in the medical file records studied. Also, some traces of silicosis, lung cancer, TB were found among the participants. However, it is not easy to confirm the incidence levels of the ailments found because of the small number of workers with 10 or more years of exposure to silica dust in the study. Also a wide range of other industrial hazards recorded by employees include noise pollution, and even psychological problem such as phobia, anxiety, depression, fatigue and stress among others.

### Recommendations

Based on the strength of the above findings and conclusions the study offers the following recommendations for minimizing the attendant occupational health hazards among quarry employees:

- ◆ Adequate education, awareness campaigns, seminars, workshop and training should be stepped up to sensitized employees on occupational health hazards posed by the quarry activities.
- ◆ Adoption of supply and use of protective and preventive devices among quarry employees should be encouraged and passed as law.

- ◆ Routine free medical examination of quarry workers to determine their health status at all times should be consistently implemented and enforced.
- ◆ There should be rehabilitation of workers who have been incapacitated as a result of occupational illness.
- ◆ Improved personal hygiene and reduction of duration of contact with dust in line with international standards must be encouraged and adopted by relevant government agencies.

It is also suggested that more studies using greater number of quarry employees and increasing the scope of the research study would yield a more reliable and valid results.



## References

- Achalu, E. (2002) *Occupational Health and Industrial Safety*, Lagos, Nigeria: Semorch Publishers Ltd.
- Ajayi, M.N. (2004) Dustiness, Silicosis and Tuberculosis in Small scale Pottery Workers, *Indian Journal of Community Medicine*, 102: 138 ó 142.
- Ajayi, M.N. & Osibanjo, C.N. (1999) *Research in Industrial Hazards among Employees*, Lagos: Macmillan Printing Press.
- Ashley, M.N. (2004) Dustiness, Silicosis and Tuberculosis in Small scale Pottery Workers, *Indian Journal of Community Medicine*, 102: 138-142.
- Beckler, B.C. (1998) An Epidemiological Survey of Respiratory Morbidity, among Quarry Workers in Singapore: Radiological Abnormality, *Annual Academy of Medicine*, Singapore, 21: 305-311.
- Beckett, W. (1997) Adverse Effects of Crystalline Silica Exposure, *Annual Journal of Respiratory Care Medicine* 155: 761-765.
- Cronon, W. (1996) *Uncommon Ground: Rethinking the Human Place in Nature*, New York, W.W. Norton.
- Domino, F.C. (1986) Research in Occupational Health Hazards and safety, *Industrial Psychology Review*, 16.
- Fulekar, M.H. (1999) Quartz Manufacturing Industry. *Annual Journal of Occupational Hygiene*, 43(4): 73-269.
- Friedman, A. & Rosenman, L.A (1994) Occupational Exposure to Dust in Quartz Manufacturing Industry. *Annual Occupational Hygiene*, 43 (4): 269-273.
- Goldsmith, D.F. (1997) Respiratory Cancer and other Chronic Diseases Mortality among Silicosis in California, *Annual Journal of Industrial Medicine*, 28 (4) 459-467.
- Goldsmith, D.F. & Warrel, F.G. (2000) Radiographic Abnormalities and the Risk of Lung Cancer among Workers Exposed to Silicosis Dust in Ontario, *Annual Journal of Occupational Hygiene*, 15 (1) 37-43.
- Hussein, S. (2006) Rehabilitation of Pits, Quarries and other Surface ó mined Lands, Geological Survey Miscellaneous, 76, Ontaria: Min of Natural Resources.
- Isah, E.C., Asuzu, M.C & Okojie, O.H. (1998) Occupational Health Hazards in Manufacturing Industries in Nigeria, *Journal of Community Medicine & Primary Health Care*, Vol. 9: 2-34.

Isah, E.C. (1999) *Environment on Trial: A guide to Environmental Law and Policy*, 3rd Edition, Toronto: Edmond Montgomery, 743-65.

International Labour Organisation,(ILO) (2006) Protecting Employees from Occupational Hazards, *Bulletin*, Vol. 9, 95-135.

Karasek, R. & Theorell, T. (1979) Job demand of decision latitude and mental strain implication for job design, *Administrative Science, Quarterly*, 24, 285-306.

Nwankiti, O.C. (1998) *Man and His Environment*, University of Nigeria, Nsukka, Division of General Studies.

Okeke, T.A., (1995) Low Back Pain among Coal Miners in Enugu, Nigeria, *Journal of Community Medicine and Primary Health Care*, Vol. 9: 42-46.

Victory, B.G. & Shaws H.C. (1992) Work-Related Factors and Ill-Health, *Journal of Applied Psychology*, 45, 265 ó 335.

Warrel, S.N. (1995) The Occupational Diseases that shouldn't Exist, *American Medical Association Bulletin*, Vol. 69: 6-12.

Younger, E.E (1999) Heavy Metal Contaminations in Holliston River Basin (Tennessee) *Archives of Environmental Contamination Toxicology*, Vol. 10:541-560.

Younger, E.E (2000) Heavy Metal Contaminations in Holliston River Basin (Tennessee) *Archives of Environmental Contamination Toxicology*, Vol. 11:250-310.