

Investigative Effect Of Stone Crushing Dust On The Health Of Workers Of Quarry Industry At Umuoghara Community Of Ezza-North Local Government In Ebonyi State

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Abstract: The study was carried out to ascertain and investigate on the effect of stone crushing dust on the health of workers of quarry industry at Umuoghara Community, Ezza North Local Government Area of Ebonyi State. This project is primarily aimed at investigating the effect of stone crushing dust on workers of quarry industry in the area and provides necessary preventive measures. To achieve the aims and objectives, the researcher used descriptive study design, sample size were selected using simple random sampling method and some research questions were formulated, 144 questionnaire were used and 135 were returned which served as basic instrument for data collection. However, responses from questionnaires were presented and analyzed using simple percentage formula. Finding reveals that stone crushing dust contains silica and other harmful chemicals and inhalation of this dust resorts to infections like silicosis, visual irritation, skin disease and intestinal discomfort. In order to prevent these diseases, recommendations were made in chapter five which includes provision of personal protective devices, proper training of competent personnel, use of substance that does not cause harm to human, health education of the workers on the effect of dust and the measures to prevent the inhalation of dust in the quarry industry.

KEYWORDS: Stone-crush, Effect, Quarry, Dust and Stone.

Date of Submission: 13-11-2018

Date of acceptance: 28-11-2018

I. Introduction

In many industrial processes mineralogical materials are introduced into the environment as dust, fumes, ashes or other industrial waste results in some of the health risks in humans and animals alike (Banez et al, 2010). In Nigeria, the greatest pollution effects come from exploration of petroleum, limestone and rocks used in construction works (Unuraye, 2005). Large volumes of dusts from cement factories that operate in Nigeria are discharged daily into the air. A lot of air borne particulate matter is generated by the numerous stone crushing industries. In general, greater damage are witnessed in localities where tribute workers work manually (Ferris et al, 1979).

Dust particulates are small dry particles ranging in size from 1 to 100 diameters. They may be airborne depending on their origin, physical characteristics and ambient condition. Whenever dust particle are deposited either on the head or in lungs they have the potential to cause harm either locally or subsequently elsewhere in the body (Banez et al, 2010).

Most of the processes in the quarry industries can be associated with activities of rock drilling, blasting, stone cutting, rock crushing and aggregate manufacturing that generate dust, which can cause dangerous levels of airborne contaminations in the workplace. The same applies to site formation caisson and tunneling activity and handling of rock production in the construction industries. Local rock has high silicon content, which makes silicosis the major health hazard of exposed person who inhale the dust (Baird, 1992).

Workers of quarry industries are often exposed to dust, though they may not be aware of its danger (Ugbogu et al, 2009). Most studies, especially from developed countries have focused on the health effects of airborne particulate matters and in some countries, many studies relates to hospital admission and respiratory cardiovascular disease (Baird, 1992). In a country where poverty and unemployment are major problems coupled with the unavailability of efficient welfare service, airborne particulate matters have been showed to have an adverse effect on health as particles remain in the body for a long time (Ugbogu et al, 2009). All these condition lured the researcher to investigating into the topic and recommending measures of managing and controlling of dust particles to a level that can no longer be detrimental to the health of man and to the environment at large.

1.1 BACKGROUND OF THE STUDY

Umuoghara is one of the autonomous communities in Ezza North Local Government, situated at the northern zone in Ebonyi state along Enugu expressway. They are made up of male and female dwellers and the topography of the location is subdivided according to the natures of hills, valleys, upland and swampy areas. It was discovered that the inhabitants of the community are mainly farmers while few are petty traders and Civil Servants. The people of Umuoghara do not know the effect and the hazard they are exposed to in their place of work.

1.2 STATEMENT OF PROBLEM

In quarry industries, the majority of quarry workers are comprised of people who are employed for manual labour. They are usually under-educated people who may not be well grounded in the knowledge of the measures required for safety and protection of chipping; gravel etc. Stone crushing dust are discharged in large quantities to the atmosphere of the work environment. This dust particle have very harmful effect on the health of workers of quarry industries, that is why a decision to carry out a research on the effect of stone crushing dust on the health of workers of quarry industry at Umuoghara, Ezza North Local Government Area of Ebonyi State is inevitable.

Dust which are obnoxious to health are consumed directly or indirectly through inhalation, absorption and ingestion which affect the health of workers by introducing different type of disease condition in their body. These situation ranges from respiratory tract infection (RTI), silicosis, visual irritation (eye defect), skin diseases (dermatitis) and intestinal discomfort. These disease conditions are as a result of the alteration in the air and water constituents (Clark and Mc Mahon, 1967).

1.3 STATEMENT OF THE PURPOSE

The purpose of this study is to assess the effects of quarry dust among workers of quarry industry, their level of awareness and knowledge of the kinds of the health hazards or injuries they are exposed to on the job and to proffer recommendations on how to increase their awareness and compliance with the use of safety protective devices. (Okecha 1992).

1.4 SCOPE OF STUDY

This study was carried out mainly on the workers of quarry industry at Umuoghara Community in Ezza North L.G.A Ebonyi State. The sitting of the industry attracted so many people to Umuoghara community, which led to the development of the area. So many people are involved in petty business around and inside the industry to earn a living. The people within the area are exposed to dangers of stone crushing and quarrying has been known as a highly hazardous work, whereby workers are affected by many occupational health hazards and diseases. Some studies also indicate association with lung cancer. It has no cure but it is 100% preventable if employers of workers and health professionals work together to reduce exposure (Emeharole, 1996).

1.5 SIGNIFICANCE OF THE STUDY

The atmospheric air plays an important role in the existence of man in his environment. The work is significantly carried out to have a control on the indiscriminate discharge of stone crushing dust in the air to ensure a state of free health of the workers and of the surrounding communities in other to prevent disease associated with these particulate matters. It is therefore a setback on the existence of the health of the workers of quarry industry at Umuoghara on the realization of effect of dust. The study will provide the people with the knowledge of the air pollution of the work environment caused by the uncontrolled discharge of stone crushing dust into the atmosphere; it has to recommend a suitable method in solving the problem.

More so, it will inform the government or organizations responsible for environment friendliness the opportunity to make or suggest a legislative policy to regulate discharge in the air. To the general public, it will unfold the knowledge of people who work in areas where dust particles are discharged in an uncontrolled manner such as mining industries; quarry and cement industry on the health hazards associated with dust and will also help educate them to be health conscious. (Lund, 1971).

1.6 JUSTIFICATION OF THE STUDY

Knowledge is one of the factors that shape attitudes and influence behavior. When quarry workers and their employers have an increased awareness of the health hazards to which quarry workers are exposed, this is likely to increase the acquisition of safety protective devices for their use on the job. If these devices are available, the health hazards or injuries will only be reduced when the use of these devices is complied with at all times and in proper way to control most of the deadly health hazards (Train, 1976).

1.7 BROAD OBJECTIVE

The objective of this research work is to investigate the effects of stone crushing dust on the health of workers of quarry industry at Umuoghara Community in Ezza North Local Government Area of Ebonyi State and to ascertain the necessary preventive measures against it.

1.8 SPECIFIC OBJECTIVE:

1. To assess among workers of quarry industry their level of awareness and knowledge of safety protective devices against health hazards and injuries on the job.
2. To assess among quarry workers their level of health hazards and injuries they are exposed to on the job.
3. To know the level of compliance with the use of safety protective devices on the job by quarry workers when they are available.
4. To study the patterns of injuries and health hazards among quarry workers.
5. To proffer recommendation on how to increase their awareness and compliance with the use of safety protective devices where there are found to be deficient.

1.9 RESEARCHER QUESTIONS

1. Does stone crushing dust have negative effects on the health of workers of quarry industry?
2. Does stone crushing dust affect the source of water supply?
3. What measure does the management take towards solving this problem of the effects of stone crushing dust?

1.10 RESEARCH HYPOTHESIS

1. Stone crushing dust have negative effect on the health of workers of quarry industry.
2. Stone crushing dust may affect source of water supply.
3. The management has not provided protective devices to the workers.

1.11 OPERATIONAL DEFINITION

1. **Pollution:** - This is the presence or introduction of substance in the concentration than normal such as producing measurable effect within and around the environment.
2. **By-products:** - These are substances obtained at the end process of other products or substance
3. **Particulate matter:** - These are pollution agents consisting of dust particles that pollute the air.
4. **Acid Rain:** - this is the rain containing acid from atmosphere pollution.
5. **Engineering:** - this is an act of arranging skill-fully.
6. **Dust:** - this is fine particulate matter introduced into the atmosphere.
7. **Infection:** - this is the entry and multiplication pathogenic microorganism in the body, which is capable of causing diseases.
8. **Stone Crushing:** - this is the act of breaking stone into pieces to get the actual size that is wanted OR the act of breaking large stone into smaller pieces.
9. **Quarry:** - this is a place where large amount of stone, sand etc. are dug out of the ground.

II. Literature Review

2.1 OVERVIEW OF WORK ENVIRONMENT

The environment in which man find himself has a great influence on his health, behavioral response to situations and his general wellbeing (Ugbogu et al, 2009). The work condition of the environment has much effect on the health of workers. The environment has lost its original state due to the activities of man in the environment. This activity has led to the discharge of harmful chemical substances and particulate matters in atmosphere which impacts are felt by man, animals, plants and materials.

According to Longman (2001), quarrying is one of the most dangerous industries. To work in quarry, workers are twice as likely to be killed in an accident at work as construction worker and 13 times more likely to die at work as those in manufacturing industries. In the first century, a roman scholar linked health risk to those working with zinc and sulfur. He advised a facemask made from animal bladder to protect workers from exposure to dust and Lead fumes. In the second century, Greek physician, Garland, accurately described the pathology of Lead poisoning and also reveals hazardous exposures of copper mine to acid mists. According to Olesgun et al, (1992), the impact of Granite quarrying on health of workers is quite enormous to residents of Abeokuta, Ogun State, Nigeria. Ethiopian Journal of environmental studies in the middle ages, provided guidelines to workers at assisting sick workers families. The suggestion of mine variation and workers protection discussed mining accidents and diseases associated with mining occupation such as silicosis.

Emeharole (1996), in his study, stated that the introduction of these pollutants into the atmosphere through industrial, domestic and agricultural activities have resulted in an effect on the existence of man, plants and animals.

According to Okecha, (1992), these particulate matters which are dust fumes eventually return to the earth as acid rain in the environment to interact with the plants and animals of the areas causing alteration and destruction of its terrestrial and aquatic ecosystem.

2.2 DUSTS IN THE WORK ENVIRONMENT

Emeharole (1996) defined dust as “solid” particles (Pneumoconiosis) 0.5mm – 10mm in sizes dispersed in air. It is an aerosol produced mainly by mechanical action”. Lund (1971) in his own version defined dust as solid particles projected into the air by natural forces such as wind, volcanic eruption or earthquake by the mechanical or man-made processes or activities such as crushing, grinding, screening, bagging and sweeping.

According to Train (1976), dusts are formed by pulverization of solid matter in small particles. These may be results of such processes such as grinding, crushing, blasting and drilling.

According to Alexander (1964), dust particles are usually irregular in shape, example include fly-ash, rock and flour, and they are heterogeneous in size and structure.

TYPE OF DUST

According to Emeharole (1996), dust may be classified according to their toxic effect

- 1) Dust causing systemic poisoning: If the solid is soluble or the particle is small enough it may be absorbed and thus cause system toxicity. Example is the dust of heavy metals and insecticide.
- 2) Dust causing reaction; example include the several metal fumes, fever or the reaction of cotton dust.
- 3) Dust causing extensive pulmonary fibrosis. This is due to the inhalation of dust that remained in the lung (called pneumoconiosis), a given pneumoconiosis may be malignant or symptomatic. Example is silicosis.

2.3 DISEASES ASSOCIATED WITH DUST

Dusts have been known as one of the major causes of respiratory and skin diseases. These diseases include silicosis, dermatitis, asbestosis, and bysinosis.

According to Clark and Mehon (1967), the term pneumoconiosis frequently applies to the groups with the different diseases particularly when the condition is attributed to mining or the handling of mining products. He went further to say that these diseases are classified either by the pathological change produced or by the physical or chemical nature of the inhaled dust or irritant.

2.4 EFFECTS OF DUST ON THE ENVIRONMENT

Graw-Hill (1973) asserts that dust storm is experienced when high wind pick up dust from dry loose soil. Recently a dust storm indirectly caused massive pile up of 80 vehicles on a California highway killing 80 person and injuring 96 persons. Sudden reduction of visibility to particularly zero by a similar dust storm causes indirect damage to such an extent.

According to Unuraya (2005), dust *devils* commonly observed on a dry hot sand surface, often become violent, pushing over, overturning objects similar to a large tornado. Large dust whirl often consist of a number of small but intense dust *devils* circling around the major one. Decreased visibility caused by dust interferes with safe operation of aircraft, automobiles, disrupt transportation schedule and the particle suspended in the air scatter and absorb light reducing the content and altering the coloration between objects and their background.

Mc Graw – Hill (1974) went further to state that small dust particles increase scatter light in short (blue) wavelength. The sun often appear a deep orange or red when seen through a dust cloud, however, optical effects are variable large particle effect reflectors and an observer in an aircraft above a dust storm may see a solid sheet with an apparent dust horizons.

According to WHO (1972) and Royal College of Physicians (1970), environmental pollution has hazardous effects on the health of man, animals and plants. It also affect physical structures and other properties.

Roland and Molina (1994) stated that the destruction of the Ozone layer in the upper atmosphere has led to an increase of skin cancer due to ozone depletion caused by the chlorine from the chlorofluorocarbon (CFCS) destroying the Ozone layer.

Unuraye (2005) reported that the effect of environmental pollution is the result of diseases such as bronchitis, pneumonia, and asthma. Lung cancers have their mortality and morbidity rates increased by industrial pollution. Heart and irritation of the eyes are aggravated by atmospheric pollution. Elderly people, infants, pregnant women, and people with heart disease, asthma, or other respiratory diseases are especially vulnerable to air pollution. Awake (1994) opined that one other effect of pollution is the release of carbon

dioxide resulting in global warming which evidently has complicated the already difficult task of weather forecasting. Exposure to high level of carbon monoxide causes suffocation and even death.

2.5 EFFECT OF DUST ON WATER

Awake (1994) gave a detailed report that dust particles cause turbidity when they are carried into the body of water. Accumulation of dust particle in the atmosphere can lead to acidic particle in the atmosphere which in turn can lead to acidic rain. This is because as rain drops, it carries along the dust particulate which makes it acidic by undergoing through chemical reactions. In Unuraye's (2005) report, some effects of dust on humans are obviously undesirable over the past century; it has been recognized that many diseases are water borne and their frequency can be checked dramatically through purification of municipal and individual water supplies. However, the drinking water of most of the world's population is considerably less safe than that of the developed nations because of inadequacies in public health programs.

2.6 EFFECT OF DUST ON ANIMAL

Anonymous report stated that episodes of air pollution in some parts of the developed countries are associated with increased mortality in animals. Animals that graze on grasses and plants in which industrial particulate matters are deposited are exposed to serious health hazards. One of the diseases that can be associated to grazing dust in animals is fluorosis.

2.7 EFFECT OF DUST ON PLANTS

According to Unuraye (2005), excessive quantities of air borne particles cover leaves and block stomata, thereby reducing the passage of carbon dioxide from the atmosphere into the leaf and exit of oxygen from the leaf during photosynthesis. Sunlight reaching the interior of the leaf is also reduced. The result is that there is reduction in plant growth and crop yield. According Awake (1994), photosynthesis in plants is adversely affected by atmospheric pollution, earth's tree, which absorbs carbon dioxide and release oxygen are among the victims of toxic air.

2.8 EFFECTS OF DUST ON PROPERTIES/MATERIAL

Mc Graw – Hill (1974), said that because of friction with air on ground, dust particles acquire appreciable electrostatic charges, and on striking, random alteration may cause severe static visible electrical discharge which sometime occurs within the dust cloud.

2.9 PREVENTIVE MEASURES OF DUST

According to Clark and Mc Mahon (1967), in their own view came up with the following as measures to prevent dust.

1. Replacement or substitution of a substance known to be harmful. This applies particularly to silica.
2. Dust and fumes suppression wet scrubber.
3. Ventilation of generator and local ventilation reduce the hazard of dust.
4. General housekeeping such as vacuum cleaning or wet sweeping will reduce the amount of dust in the room.
5. Personal protective device where dust cannot be controlled by use of ventilation mask or airtight breathing apparatus may be worn for short period.
6. Careful pre-employment checks and regular medical examination depend mainly upon chest-radiographs. Applicant with pre-existing disease should be screened out and miners who develop radiological silicosis or early pneumoconiosis should be carefully treated or withdrawn from site.
7. Constant health education of workers at quarry industry.
8. According to Mc Graw Hill (1975) encyclopedia of science and technology, method of dust control includes:
 - a. **Scrubber:** A scrubber uses a liquid usually water to assist in the particulate collection process.
 - b. **Air filter:** This is a unit which separate very small quantities of dust from large quantity of dust, form large quantity of air as in air conditioning application.
 - c. **The use of cyclones:** This is a mechanical dust collector or a device, which separate solid particles from a dry gas or a liquid by employing initial and or gravitational forces.
 - d. **Cloth collector or bag filter:** In such a collector the dust lading gas is passed through a woven or filter fabric upon which the gradual deposition of dust forms a pre-coat when they serve as filter for the subsequent dust.
 - e. **Respiratory protective equipment:** For many years ago, only a few industrial occupations consider a hazard of respiratory system. In such cause, gas masks were the basic protection devices and were used

only in emergencies today. Respiratory protective equipment should be worn regularly under such condition to prevent lung damage.

There are two classifications of respiratory protective devices:

1. Air purifiers which can be subdivided into three stages:
 - a. Mechanical filter respirator which filter out contaminants especially particles.
 - b. Chemical cartridge respirator, which remove pollution through chemical absorption.
 - c. Combination respirators, which removes contaminant both chemically and mechanically.
2. Air supplier, which provides the user with clean air from an outside (or oxygen from a tank train)

Summarily, the control measure of dust includes:

1. Engineering control
2. Process change
3. Personal protective device
4. Construction of chimneys
5. Workers should not be exposed to contaminant arising from industries example quarry industries.
6. Establishment of compliance policies with regulations on acceptable standards.

2.10 PROBLEMS OF DUST CONTROL

The following are problems of dust control in various industries, they include.

1. **Lack of proper maintenance of machines:** Lack of proper maintenance of machine used in industrial process is one of the problems facing control of dust exercise. If the machines are faulty, it will be difficult to have efficient operation of those machines thereby creating problems in the control of dust.
2. **Inadequate trained personnel:** This is another problem of dust control in the sense that competent hands that will give expert direction on how to use the machines for effective control of dust are not adequately provided instead untrained persons are employed to do the work.
3. **Lack of fund:** The amount of money involved in the control of dust and provision of protective devices is so much for the industries to provide which makes the managerial relaxation and expose workers to dangers of dust.
4. **Ignorance:** It is on both the administration and workers. On the administrative part, if they are not knowledgeable on the implication of dust on health, environment, and materials they cannot work towards the control of dust. On the side of workers, if they are aware of the danger posed by dust on their health, they would have been adhering to the safety precautions.
5. **Workers nonchalant attitudes:** The workers do not like the use of personal protective device that are provided for them to use during work process, thereby exposing themselves to hazard of dust.
6. **Low level of technology:** Low levels of technological knowhow in developing countries have been a problem of dust control. When the technology is low, the application of dust control measure that requires high level of technology advancement cannot be achieved.

2.11 REPORT ON THE INTERVIEW CONDUCTED

The interview conducted on the workers at Umuoghara quarry industrial site indicated that they experience so many problems.

They proved to me that the dust, which enters their nostril, cause constipations, intestinal obstruction, respiratory problem and the dust which accumulate on their skin cause peeling. They also told me that the protective device provided for them is not good and they find it difficult to wear it when working which also lead to the problem they experienced in the work environment.

III. Methodology

This chapter focuses on the method used by the researcher for the collection and analysis of data. The basic issues discussed here includes study design, description of study or study setting, sampling size and sampling techniques, instrument design, method in validation of instrument, method of data collection, methods of data analysis and limitation of the study.

3.1 RESEARCH DESIGN

This research work used descriptive research method for the collection of information. Oral interview and questionnaire as well as personal observation formed the primary data collection method. Secondary data collection method comprises of review of published and unpublished materials.

3.2 DESCRIPTION OF STUDY AREA

The study area of quarry industry is a stone crushing industry located at Umuoghara in Ezza North Local Government Area, Ebonyi State. The quarry industry is made up of over 250 staff/workers in different departments and sections. The industry is located at the Northern part of Ebonyi State for the purpose of stone crushing used for road construction and building. Quarry industry is a source of revenue to the state government and it constitutes most of the pollution source like air pollution and environmental pollution that lead to some of the harmful diseases in the environment today if not properly managed. Quarry industry consists of many departments, which includes: electrical department, administrative department, stone crushing department, mechanical department, account department, safety and liaison department. There is health center by the side of the quarry industry which helps to rescue the workers in case of injury and emergencies.

3.3 STUDY SETTING (POPULATION)

The population of this study area has currently 250 staff/workers spread across the under listed various departments.

1. Administrative department.
2. Mechanical department.
3. Electrical department.
4. Stone crushing department.
5. Account department.
6. Safety and liaison department.

3.4 SAMPLE SIZE AND SAMPLING TECHNIQUES

The method adopted for the selection of sample is random sampling techniques for identifying the respondent from various departments in the study area. Due to the large number of workers, it was not possible to use work population; so the total number of 144 people were served with questionnaire.

3.5 INSTRUMENT DESIGN

The instrument used for collection of data is questionnaire. A total of 144 questionnaires were distributed among the departments used for the study. Twenty four (24) questionnaires were distributed to each department. Out of 144 questionnaires served, nine (9) were not returned, showing retrieval rate of 47%; therefore 135 questionnaires were properly filled, returned and used for analysis.

3.6 PRE TEST/PILOT STUDY

To show its reliability and validity, a pre-test of the questionnaire was distributed. Some important modifications and amendments were made before the final copies were distributed at the six departments of the study area. The research work was presented during the completion of the questionnaire for guidance and clarification, which increased the reliability of the information gathered.

3.7 METHOD OF DATA COLLECTION

The method adopted for data collection for this project was based on both primary and secondary sources. The primary source includes questionnaire, interview and observational method while the secondary source includes textbooks, journals, magazines, unpublished materials and the internet. However, total number of one hundred and forty four (144) questionnaires were produced and randomly distributed or served to the respondents of the different departments of the study area. This was done by the researcher personally to ensure that the questionnaire were actually received by the respondents and at the time of collection, a total number of one hundred and thirty five (135) questionnaires were retrieved from the respondents while nine (9) were not retrieved because of the time of the collection, most of the respondents were not available.

Below shows the number and percentage of questionnaire distributed and collected:

Table 1. Data collection table

S/N	Department of the study	No. of Questionnaire Distributed	No. collected
1	Administrative	24	24
2	Mechanical	24	24
3	Electrical	24	21
4	Stone crushing	24	24
5	Account	24	18
6	Safety	24	24
	Total	144	135

3.8 METHOD OF DATA ANALYSIS

The methods used in this research were gotten from the respondents. Tabulation and analysis were done using simple percentage techniques for data analysis for the purpose of effective interpretation of findings and quick decision-making.

3.9 LIMITATION OF THE STUDY

The research work encountered some difficulties, which are poor funding and lack of proximity from the researcher’s residence to the area of the study. More so, some effort to ascertain information from the respondents proved abortive during the research work especially in the interview.

IV. Chapter Four

4.1 DATA PRESENTATION OF FREQUENCY DISTRIBUTION:

The data was presented and analyzed using simple percentage technique. A total number of one hundred and forty-four copies of the questionnaire were distributed among the randomly selected population of 144 respondents, both males and females of various ages.

Out of this number of questionnaire distributed 93.75% rate of return was achieved showing that only 135 copies of the questionnaire were properly filled and used for the analysis.

RESEARCH QUESTION 1

Does stone crushing dust have negative effects on the health of workers of quarry industry?

4.2 Do you think that stone crushing dust can cause respiratory disease?

Response	No of Respondent	Percentage
Yes	135	100%
No	0	0%
Total	135	100

The response in the above indicates that stone crushing dust can cause respiratory disease because the number of response is 100% indicating that the workers are fully aware of the health implication of the job with regards to the particular disease.

4.3 Do you think that stone crushing dust can cause eye defect?

Response	No of Respondent	Percentage
Yes	135	100%
No	0	0%
Total	135	100

The table analyzed that the number of respondents that answered yes to this question dominated.

4.4 Do you agree that stone crushing dust can cause skin disease?

Response	No of Respondent	Percentage
Yes	135	100%
No	0	0%
Total	135	100

The table shows that the highest number of respondent (100%) agrees to the fact that stone crushing dust can cause skin disease.

4.5 Do you agree that unintentional ingestion of stone crushing dust can lead to intestinal discomfort?

Response	No of Respondent	Percentage
Yes	95	70.4%
No	40	29.6%
Total	135	100

Table 4.5 above shows that 95 (70.4%) of the respondents considered the effect of unintentional ingestion has been harmful to the health of workers while 29.6% respondent did not see that way.

4.6 Does excessive inhalation of stone crushing dust cause nasal obstruction?

Response	No of Respondent	Percentage
Yes	125	92.6%
No	20	7.4%
Total	135	100

This table above shows that the number of people who said YES 125(92.6%) to the question is more than the people who said NO 20(7.4%); showing that there is a good knowledge that excessive inhalation of stone crushing dust can cause nasal obstruction.

RESEARCH QUESTION II

Does stone crushing dust affect the source of water supply?

4.7 Is it appropriate to have a source of water closer to stone crushing factory?

Response	No of Respondent	Percentage
Yes	95	70.4%
No	40	29.6%
Total	135	100

This table shows that the number of respondent that say YES 95(70.4%) to the question is higher in percentage than the number of people that say NO 40(29.6%) to the effect of the question. This is an indication that the level of awareness on the danger posed by stone crushing dust in water source is quite minimal.

4.8 Do you agree that dust particles from quarry can contaminate any source of water around it?

Response	No of Respondent	Percentage
Yes	115	85%
No	20	14.8%
Total	135	100

The table shows that the total number of people who identified suspended particles in the water has a high percentage rate of 85.2% (115) and the number of respondents who did not is 14.8% (20). This shows a clear evidence of some level of awareness on greater number of the workforce.

4.9 If there is a source of water at the industry, does the water have any taste?

Response	No of Respondent	Percentage
Yes	105	77.8%
No	30	22.2%
Total	135	100

The above data indicates that 105(77.8%) of the people prove that the water have taste while 30(22.2%) of the people did not approve that.

4.10 Are there any observable colour or odour in the water?

Response	No of Respondent	Percentage
Yes	100	74.1%
No	35	25.9%
Total	135	100

The table above shows that 100(74.1%) of the respondents acknowledged the presence of a characteristic colour change and odour in the water while 35(25.9%) of the respondents affirmed to the absence of these characteristic parameter.

RESEARCH QUESTION III

What measure does the management take towards solving this problem of the effect of stone crushing dust?

4.11 Does the management provide personal protective equipment to the workers against stone crushing dust?

Response	No of Respondent	Percentage
Yes	125	92.6%
No	10	7.4%
Total	135	100

The table presented above shows the high rate of 125(92.6%) of people being provided with personal protective equipment while 10(7.4%) denied ever receiving such from the management.

4.12 Does workers in the stone crushing industry make use of the protective equipment provided for them?

Response	No of Respondent	Percentage
Yes	34	25.2%
No	101	74.8%
Total	135	100

The above data shows that 101(74.8%) of the respondents are not making use of the protective equipment provided for them; thus, endangering their health while a low rate of 34(25.2%) of the respondents affirmatively confirmed use of the protective devices.

4.13 Are there dust monitoring device/measure provided by the management?

Response	No of Respondent	Percentage
Yes	100	96.3%
No	35	3.7%
Total	135	100

The above data shows that 100(96.3%) of the respondents are aware of the monitoring devices by the management while 35(3.7%) are not aware of it.

4.14 Does the management often give health education on the effect of stone crushing dust?

Response	No of Respondent	Percentage
Yes	129	95.6%
No	6	4.4%
Total	135	100

Table 4.14 shows that 129(95.6%) of the respondents agreed that they do receive health education while 6(4.4%) of them negatively responded that they do not receive health education.

4.15 Does the management usually provide pre-employment and regular medical examination to the worker?

Response	No of Respondent	Percentage
Yes	34	25.2%
No	101	74.8%
Total	135	100

The above data shows that 101(74.8%) of the respondents said NO to their pre-employment and regular medical care while as low as 34(25.2%) of the respondents answered YES that they enjoy such provision.

4.16 SUMMARY OF DESCRIPTIVE STATISTICS

From the above presentation and analysis, it can be deduced that there are observable effects of stone crushing dust on the health of workers of quarry industry in Umuoghara Community, Ezza North Local Government Area. Equally, there is health effects in the area, exposure to dust during human activities in the industry that expose them to some diseases suffered by them thorough out the years even sometimes without their full knowledge.

From the observation also made it can be adduced that stone crushing dust could cause respiratory disease as the number of respondent that affirmed having the symptoms in the populace are largely many (100%). This may result in adverse health problem in the area.

To that effect, regular examination and treatment of the worker and also health education is of great importance, hence their affirmation of receiving same is actually a boost in their awareness as the distribution of the protective devices will help in boosting the overall safety level. Also, management of tools used in the industry should be properly observed.

However, from the above indication, quarry industry should not be sited near source of water for its effects on our water source cannot be over-emphasized. Contamination of our water bodies and the resultant effect of disease spread due to colour change and odour swap that automatically delists the water source from portability.

4.2 ANALYSIS HYPOTHESIS TESTING

H₀: Stone-crushing dust has caused many adverse health effects among the people of Umuoghara Community Ezza North Local Government Area.

H₁: Umuoghara Community Ezza North Local Government Area has not known that major diseases suffered by them can be directly associated to stone crushing dust.

V. Discussion

This chapter discussed the finding of the study against the background of the literature review. It also summarizes and draws conditioned recommendation and makes suggestion for further studies. However, the discussion were emphasized on the research questions earlier short listed to draw conclusion based on information collected for this research on the effect of stone crushing dust on the health of workers of quarry industry at Umuoghara, Ezza North Local Government Area of Ebonyi State.

5.1 DISCUSSION OF FINDINGS

RESEARCH QUESTION ONE

➤ Does stone crushing dust has effect on the health of the workers?

From the analyzed data in Tables 4.2 to 4.6, it shows that the number of workers that responded positively to the research question one is greater than the workers that respond negatively, therefore, a conclusion can be drawn that the workers who suffer from respiratory diseases and skin diseases as a result of stone crushing dust are numerous. This result agrees with the findings of Clark and Train Mc Mahon (1967), which pointed out that several forms of pulmonary diseases are known to arise in the course of employment particularly when the condition is attributed to the handling of mines products. This is because the dust particles that emanate from this process are being discharged into the atmosphere which can be gotten through inhalation, ingestion or contact with the eyes, which result into disease condition to man.

RESEARCH QUESTION TWO

➤ Does the stone crushing dust affect the source of water supply?

Table 4:7 – 4.10 of the analysis shows that more of the workers yielded to the fact that their source of water supply are being affected by stone crushing dust than those who objected to that fact. It can be conclusively stated that the source of water supply around the work environment is being affected by stone crushing dust, thus affecting the portability and wholesomeness of the water source.

RESEARCH QUESTION THREE

➤ What measures does the management take in solving the problem of the effect of stone crushing dust?

Based on the outcome of the analyses, tables 4:11 – 4.15 agreed that the workers are not provided with personal protective devices. This conclusion harmonizes with Clark and Mc Mahon (1967) which in his own view came up with measures to use in preventing the dust. These measures are: -

- 1) Replacement or substitution for a substance to silica.
- 2) Dust and fumes suppression wets rubber.
- 3) Ventilation generator and local ventilation reduces the hazard of dust.
- 4) General housekeeping such as vacuums cleaning or wet sweeping will reduce the amount of dust in the room.
- 5) Personal protection where dust cannot be controlled by water or ventilation, mask or airline breathing apparatus may be worm for short period.
- 6) Careful pre-employment and regular medical examination depends mainly upon chest radiographs screened out, and miners who develop radiological silicosis or early pneumoconiosis should be reviewed.
- 7) Constant health education of workers in industry, occupation concerning the dangers and pulmonary hazard of their job.
- 8) Specific Federal or State legislation, which will, enforces certain standard of specific hazard operation.

5.2 IMPLICATION OF THE STUDY

The work being a survey study of the effect of stone crushing dust on the health of workers of quarry industry at Umuoghara in Ezza North Local Government Area enabled the researcher to agree that a lot of implication which centered on the fact that the attitude of the workers of quarry industry contribute to some of the ill-health and loss of lives among the people of Umuoghara Community.

Furthermore, from the information collected, people of Umuoghara in Ezza North Local Government Area are aware of the effect of stone crushing dust but have refused to obey the rules and regulation guiding the factory by not wearing the protective devices provided, which is an implication of the enlightenment campaign to notify the workers on the effect of stone crushing dust.

5.3 CONCLUSION

From the research the following conclusions are drawn: -

- i. Stone crushing dust is made up of particulate matters which are hazardous to health.
- ii. The ingestion, absorption or inhalation of dust particles caused a lot of discomfort to man, which includes respiratory infection, skin diseases, intestinal problem and eye defect.

- iii. Particulate matters are one of the major environmental pollutants.
- iv. The discharge of stone crushing dust into the environments without control has a lot of effect on source of water supply, plants, atmospheric air, soil and agricultural materials.
- v. Low visibility caused by dust has been proved to be the cause of plane crash in so many parts of the world, so if dust is not controlled it might cause more problems in other parts of the world.
- vi. Accumulation of dust particles in the atmosphere can lead to acid rain.
- vii. Health education and enforcement of legislation could effectively be used to ensure that effects are controlled in the work environment.

5.4 SUMMARY

The research is a survey to investigate the effect of stone crushing dust on the health of workers of quarry industry at Umuoghara Ezza North Local Government Area of Ebonyi State. The focus of the researcher was to determine the relationship between stone crushing dust and the workers of quarry industry as well as the measure taken by the management in solving the problems. Questionnaires were used to obtain the information for the study population. Three research questions were postulated for the studies; data collected were tabulated and analyzed using simple percentage techniques and a sample size of 144 workers was used out of 250 workforces.

The three research question used to find out the solution to the problem, majority were negatively answered which tends to agree with literature review on the topic and the researcher's observation. The general notion derived from stone crushing dust indicates great danger to the health of the workers and the environment.

Therefore, stone crushing dust should be properly treated before discharging it into the environment or the atmosphere.

5.5 RECOMMENDATION

Based on the findings and conclusions made, the following suggestions are submitted: -

1. Effort should be made to enhance the training of competent personnel whose expert advice will go a long way in the control of dust in the environment.
2. Health education should be given to the workers on the implication of non-usage of personal protective devices.
3. More scientific research should be made to discover the most appropriate method to which dust can be discharged into the environment without causing harm.
4. Substitutions should be made using substances that do not cause harm
5. Process change and engineering modification should be introduced.
6. Effective company or industry inspection should be embarked on by the environmental health technologists to ensure that health condition is maintained in the work environment.
7. The government should institute an enforcement committee whose duty is to ensure that those rules and regulations spelt out are been adhered to by the workers.

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Aja, Josiah Nwadibia . "Investigative Effect Of Stone Crushing Dust On The Health Of Workers Of Quarry Industry At Umuoghara Community Of Ezza-North Local Government In Ebonyi State. " IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.6 , 2018, pp. 80-91.