

Impacts of Limestone Exploitation on the Socio-economic Development of Okpella, Nigeria

Olotu Y., Bada A.O., Elamah D., Akharia O.O., Erayanmen I.R.



Abstract: Limestone and other solid minerals exploitation have been a major activity at Okpella and its environs. This has tremendously contributed to the economic development of the host community, and on the other side poses a great danger to the health and the well-being of Okpella due to the continuous release of carbon emission, suspended particulate matter, and defying noise pollution from the mining and hauling equipment. However, long extraction of limestone has been attributed to land degradation as responded by 43.6% of the sampled population, whereas 19.2%, 14.6%, and 12.7% agreed to the use of heavy-duty equipment, land clearing, tailing dams, and application of toxic materials as responsible for land degradation and devaluation. Conversely, 39.4% of the respondents indicated that the exploration of limestone and other solid minerals could be attributed to cough, 22.5% to catarrh, and 13.2% to malaria. In conclusion, it is obvious that limestone exploration is beneficial to the socio-economic development of the host community but detrimental to their human and environmental health.

Keywords: Solid Mineral, Limestone, Okpella, Socio-Economic Development, Human and Environmental Health.

I. INTRODUCTION

Mineral exploitation is significant to the socio-economic integration and development of most of the endowed developing nations and by extension; Nigeria. Nigeria as a nation is blessed and endowed with unlimited natural such as favorable ecology and mineral resources both on the surface and beneath the earth surface across the belt of Nigeria. However, the exploitation of these resources has seriously contributed to the Gross Domestic Product of the country.

For instance, the country is a mono-economic operator, it depends solely on crude oil for foreign exchange, which the exploitation of solid minerals is largely consumed locally by the emerging cement factories, ceramic, road construction. The nation's wealth can be measured by the deposit of mineral resources, and these minerals need to be technically harnessed to prevent environmental pollution through standardized exploration, mining, and processing stages [1]. Nigeria's environment (at urban and rural levels) has suffered an accelerated decline in the quality of air, soils, and biodiversity, and water resources. It is clear that sound natural resources management and planning are essential to tackling the aforementioned problems and promoting sustainable development [2;3]. The process of disturbing and interfering with the earth and natural system by cutting, scarring, and drilling can be described as mining and exploitation activities. Specifically, the effect of mineral exploitation poses a great danger to the environment by increasing the carbon emission from the mining plants and equipment and increases in the suspended particulate matter. Again, toxification and pollution due to chemical wastes or weathering of mining spoil, cause changes in micro-climate, and several others [4]. The excavation process of natural resources beneath the earth's surface such as rock could be described as a mining and exploitation operation. It generates a lot of particulate matter (dust) with a diameter of 1-75 μm (micron) [5]. The aerodynamic and particle diameter of about 10 μm and 50 μm can be transported for long-distance and suspended in air and hence enter the respiratory of human and animal systems [6]. These processes have been reported by many researchers to have responsibility for a number of health problems. It is imperative to conduct a detailed investigation on the possible effects of limestone excavation and exploitation on the prevailing environment. However, the projected outcomes of such investigation could form a robust baseline database useful to develop integrated mining operations in terms of equipment. In this regard, the aim of this study was to have a preliminary assessment of the possible effects of mining activities on the environment that might be used as a possible indicator in assessing the effect of mining activities on public health. Based on this, the work investigates the impacts of limestone exploration in Okpella and its environs with the view of using the expected results for strategic environmental policy formations and implementations.

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II. METHODOLOGY

A. Study area

Edo State is situated in South-South Nigeria and the study area is located within the Edo North district. Okpella is located along Benin-Abuja Way. According to the 2006 census, Okpella has a population of 20,562 and is one of the towns that made up Etsako East Local Government Area. Also, the town has two functional cement factories namely: the Edo Cement Company and BUA cement factory. Okpella is located between latitude N07014' and N07022' and longitude E006015' and E006023' in the northeastern part of Edo State, Nigeria (see Figure 1).

The calc-silicate gneiss and marble are abundantly found at Okpella and the cement factories located in this region exploited these mineral resources for their production.

B. Instruments of data collection

A reconnaissance survey was carried out in the area under study. The essence of this step is to have a brief history or knowledge of the impact. Based on the first-hand information, a structured multiple-choice questionnaire was designed to elicit information from the respondent, documentary analysis from the study area, the trade union, and independent marketers in the area.

C. Questionnaire instrument

This is a device for obtaining answers to relevant research questions from respondents with or without the assistance of the researcher. However, the researcher adopted a closed structured type of questionnaires that contained questions relating to the respondents and the study area would be distributed among the respondents who participated in the process. Questionnaires were also designed to collect data from workers in the quarry industry and the dwellers in the study area (Okpella). According to Anderson (1989), good workers delineate goals or objectives or intended outcomes; they select or develop skills that were linked directly with those goals or intended outcomes and they were able to deliver the identified skills.

D. Observatory instrument

The verbal communication between the researcher and the respondent was established and applied. In the process of the interaction, the researcher could record relevant information. This would be very useful and reliable for generating relevant information by watching, counting, and measuring events and objects in such a manner that the data can be properly analyzed and interpreted. These techniques were adopted in assessing recreation facilities.

E. Observatory instrument

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F. Data analysis

Basically, the obtained from field investigation were analyzed. For the purpose of this study both the descriptive statistics explorative were used for the analysis of data collected from the field. The descriptive statistics include the use of figures, tables, charts, maps, graphs, percentage and photographs to enhance visual impression.

III. RESULT AND DISCUSSION

A. Demography

The result in Table 1 shows the sex distribution of the total respondent, 67.1% of the respondent is male, while 32.9% of the total respondent is as well female. This means that majority of the respondent is male, it could be that most of the dwellers are male due to the nature of job available in the study area. As observed from the output in Fig 2, the majority of the respondent falls within the age of 31-40years representing 34.3% of the total respondent, 28.6% of the total respondent range from age 41-50years, 18.8% of the total population are age 19-30years, 14.1% of the total population fall within the age range of 50years and above. However, 4.2% of the total population are 50years and above. This indicates that a good majority of the respondent falls within the age of 31-40 years.

Table 2 shows the distribution of the total sample of respondents, 41.8% of the total respondent had no formal education, 25.4% of the total sample had primary education, 18.8% of total respondents had secondary education, while 14.0% of the total respondent represent respondent had tertiary education. Thus, a good majority of the respondent fall under people who were not formally educated. As shown in Fig.3, the distribution of occupation of the total sample, 37.5% of the total respondent were observed to be farmers, 23.5% of the population are traders, 9.9% of the total respondent were observed to be artisan, 9.4% of the total respondent works in an organized private organization, 8.9% of the total respondent are civil servant, 6.6% of the total respondent were student, while 4.2% of the respondent are unemployed. This means that most of the respondent is farmers.

Table 1 Sex of respondent

Sex of respondent	Freq	Cum(%)
Male	143	67.1
Female	70	100
Total	213	

Source: Field survey, 2019

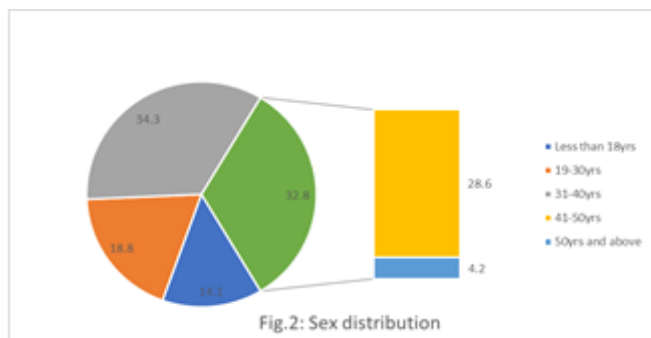


Fig.2: Sex distribution

Table 2: Educational background of respondent

Background of respondent	Freq	Cumu (%)
No formal education	89	41.8
Primary education	54	67.2
Secondary education	40	86
Tertiary education	30	100
Total	213	

Source: Field Survey, 2019

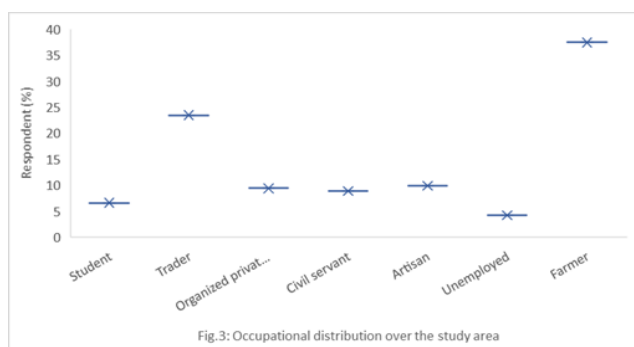


Fig.3: Occupational distribution over the study area

B. Environmental Effects of Mineral Exploration

The observation from the technically-based investigation as revealed in Table 3 indicated that out of a total distributed samples, 85.9% of the total respondent indicted YES which implies that the mining techniques really affect the natural environment, whereas 14.1% indicated NO and by this implication showed that the adopted techniques are safe and cause no harm to the prevailing environmental condition of the mining community.

However, the overall investigation showed that more dwellers are of the opinion that exploration methods affect the environmental quality. The breakdown of associated environmental pollution and degradation as revealed by the sampled respondents is shown in Fig.3. The majority of the respondent accounting for 43.7% agreed to dust pollution has an effect of the quarry operation, 27.7% indicate noise pollution, 19.2% indicated that vibration is the major effect, while 9.4% reported that land degradation. Conclusively, air pollution from the particulate matter generated from the limestone exploration and carbon emission from the mining equipment has seriously affected the air quality as revealed by the large portion of the respondents.

Since land devaluation and degradation is the primary cause of poor crop yield and production which thus cause hunger, famine, inflation, and food insecurity. The result in Fig.4 shows that 43.6% of the respondents indicated that

long extraction limestone could lead to land degradation, 19.2% signifies the use of heavy machines as a cause of land degradation, 14.6% also agree to clear of vegetation, 12.7% of the total respondent agreed to the presence of tailing dams, while 9.9% agreed to use of toxic material as a cause of land degradation.

However, the long extraction of limestone and other solid minerals is strongly responsible for land devaluation and degradation. Again, a stream of factors has been considered to be responsible for noise pollution. Table 4 showed that 41.8% of the respondents agreed that blasting operation is the major source of noise operation, while truck haulages, rock processes, and excavating machines accounted for 24.9%, 23.0%, and 10.3% of respondents' feedbacks. Based on this, it is clear that rock blasting is rated as the major source of noise pollution among other operations.

Table 3: Exploitation operation and Envir. Effects

Method of quarry operation effect the natural environment	Freq	Cumulative Percent
Yes	183	85.9
No	30	100
Total	213	

Source: Field Survey 2019

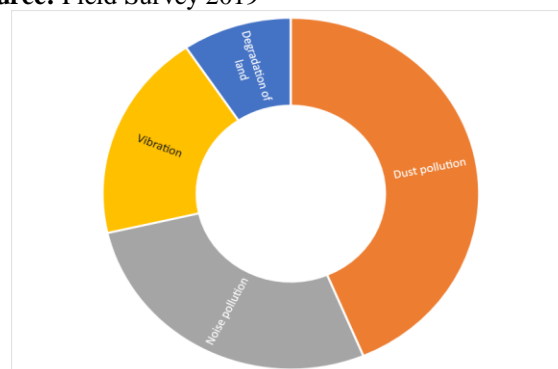


Fig.3: Effects of exploitation techniques on environment

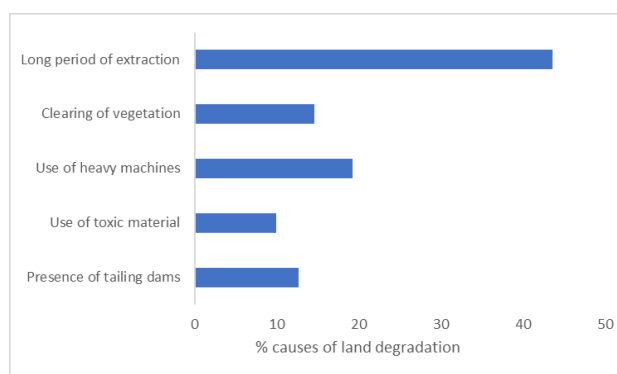


Fig.4: Causes land degradation from mineral exploitation

Table 4: Source of noise in the community

Source of noise in the community	Freq.	Cumulative Percent
Blasting of rocks	89	41.8
Processing of rocks	49	64.8
Excavation machinery	22	75.1

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Haulage trucks	53	100
Total	213	

Source: Field Survey, 2019

C. Exploration related sickness

Several studies have linked limestone and solid mineral exploration to the outbreak and causes of a number of diseases and sicknesses due to air, water, and land pollution (Ogundele et al., 2019). The results in Fig.5 showed that 39.4% agreed that cough is prevalent in Okpella, 24.9% of the total respondent indicated eye infection, 22.5% signifies catarrh as a major ailment, while 13.2% of indicated that malaria could be caused due to quarrying and exploring activities.

This means that a good majority of the respondent revealed that cough is a major ailment. However, the result in Table 21 summarized the overview of some quarry-related ailments with 70.4 % of agreed (YES) that limestone exploitation could lead to the listed sicknesses, while 29.6% of the sampled population disagreed (NO) with this assertion. The finding agrees with the study of Ogundele et al. (2019) which investigated the effect of air pollution as a result of limestone exploration on the well-being of the Ikpesh's dwellers.

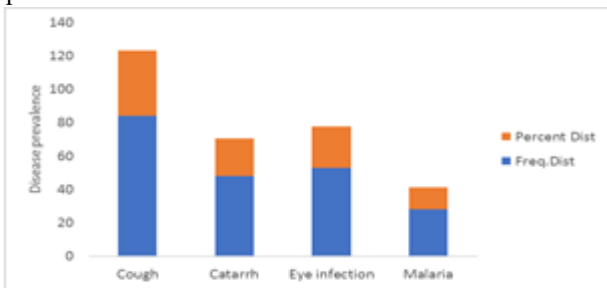


Fig.5: Distribution of diseases prevalence at Okpella

Table 5: Limestone exploitation related diseases activity

	Freq.	Cumulative Percent
Yes	150	70.4
No	63	100
Total	213	

Source: Field Survey, 2019

D. Limestone Exploitation and Socio-economic

Limestone exploration has tremendous impacts on the socio-economic integration and development of the host community and its environs. The result in Table 6 showed that 62.4% responded YES indicating that exploitation of solid minerals has brought development to Okpella and the surrounding communities, while 37.6% of the respondents are of opinion that limestone exploitation has no significant development at Okpella. Therefore, a good majority of the respondents established that quarry-related activities have really in one way or the other brought about maximum development. The developmental area on employment showed that Okpella has witnessed an increase in employment rate directly through solid mineral exploration and indirectly in BUA cement manufacturing factory, the sales of cement, and others. It is observed from Fig.6 that 41.3% of total respondents agreed that solid mineral

exploitation has brought an increase in employment rate, 18.8% signifies income generation as a medium of development, 18.8% also agreed to youth empowerment as an area of development, 11.3% of the total population are educational attainment, and 9.8% of the population agreed to infrastructural development.

Table 6: Development of Okpella based exploitation

Response	Freq	Cumu (%)
Yes	133	62.4
No	80	100
Total	213	

Source: Field Survey, 2019

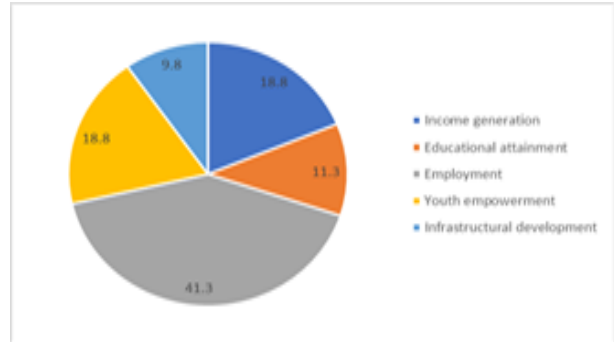


Fig.6: Area of development in Okpella

IV. CONCLUSION

Mineral exploration is basically a combination of processes such as extraction and processing of natural resources and this plays an essential role in Nigerian economic growth and development.

This process could cause lead to a number of environmental and health challenges. The environmental-related problems caused due to mineral exploration as biodiversity damage, pollution, and the use of hazardous chemicals are very injurious to mineworkers, the dwellers in the host community, and its environs.

Again, environmental degradation due to limestone exploitation has seriously affected crop yield in Okpella as a result of sealing up the plant leaf and reducing the photosynthesis rate. However, many dwellers at Okpella and its environs have successfully been engaged directly or indirectly in limestone mining and quarrying activities over the years. It has really boosted the economy of the host community in this direction.

Therefore, mineral exploration companies should strictly adhere to the standard and apply environmentally friendly techniques to reduce the rate of carbon emission, suspended particulate matter that pollutes and deteriorates the environment.

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