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Environmental and Socio-Economic Impact of Mining on Immediate Communities in Kogi State Central Nigeria

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Abstract
The socio-economic and environmental impacts of mining on immediate communities around Borini Porono quarry in Kogi State, central Nigeria were examined. A total of 100 respondents were contacted for relevant information through questionnaire administration and interviews. Quantitative methods such as Chi-square, Pair-wise ranking, and ANOVA TABLE were used to interpret the data collected. Physicochemical analysis of the water bodies close to the quarry were carried out using Atomic Absorption Spectroscopy (AAS), Sherwood Flame Emission Spectrometry and Titration. The research revealed that the mining activities have resulted in cracking of buildings, there are also incidences of pollution of various kinds (air, noise and land) to the environment. The result of the water analysis shows some trace elements such as $NO^{-}_{3,}$ Fe and total coliform bacteria were present to certain level making the water not suitable for drinking. The results show that the hypothesis that residents' appreciation of mining effects on the environments is affected by their years of stay in the communities was also validated. It was concluded that, there is need for the government to make it mandatory for mining companies at both large and small-scale, to submit environmental impact assessment report before a license to mine or explore can be granted and proper monitoring.
Keywords: Environmental, Social-Economic and Mining

1.0 Introduction

Historically, most Nigerian mining operations have assigned a lower priority to the management of community impacts than to workplace health and safety, and environmental performance. Issues associated with community impacts have mainly been addressed at the project approval stage, when environmental and social impact assessments are being prepared. Nevertheless, mining has an essential foundation for human development through creation of wealth (Acheampong, 2004).

Recently corporate social responsibility and sustainable development have gathered strength within the minerals industry. At the global and national level, leading mining companies have now formally embraced the paradigms of sustainable development, corporate social responsibility and 'triple bottom line' reporting. Each of these paradigms defines the community obligations of companies quite broadly and stresses the need to improve social, as well as environmental performance. For example, the International Council of Mines and Metals (ICMM) sustainable development framework includes an undertaking by signatories to 'contribute to the social, economic and institutional development of the communities in which they operate' (ICMM 2003).

Several researches have been conducted on mining and its effects as well as contributions to economic development of countries endowed with mineral resources. Whereas some researches highlight the benefits of mining to economic development, others focus on the negative impacts of mining on the overall development of such economies.

The negative impact of mining may include unemployment and dislocation of families. It creates unemployment because people lose their farmlands to the mining companies. In effect their source of livelihood is taken over by the mines. In spite of these adverse effects, mining companies provide good drinking water; build clinics and schools and other infrastructure for the communities. Mining companies also provide capacity building workshops for some workers in the operational area as well as provide extension services to the farmer.

The study area has witnessed massive migration of all kinds of people to the area. The population growth rate has increased according to the district statistics office. Farmlands have been taken over by estate developers as well as mining support companies who have also acquired vast lands for construction and other purposes. The mining activities have brought an increase in social problems in the area. Such problems according to (Fusseini, 1996) include drug abuse, high cost of living, prostitution and other environmental problems such as air pollution, ground and surface water pollution and physical assaults.

O'neill (1993) noted that, while the mining companies and to a lesser extent the government, reap the benefit, the communities enjoy few benefits and bear the greater part of the negative impact. It is this imbalance within these groups that result in the persistent social conflicts in the site of extractive industries.

This consequently result in the whole process of mining-led development being characterized with conflicts between corporate mining objectives, recipient community needs and governmental policy goals for regional development (Oyejide and Adewuyi, 2011; Bice, 2013). Given the wide range of environmental and social

discontents that are associated with the activities of the mining industry, as discussed in past literature (Moody and Panos, 1997; Warhurst, 2001; Dale, 2002),most mining communities are therefore perceived to experience 'poverty in the mist of plenty' (Oyejide and Adewuyi, 2011). Although authors like Hilson (2011) and Cheney et al. (2002) have made exciting observations in recent times that companies in the mining industry are making conscious efforts to regulate their impacts on host communities, such interventions are still in its infant stage. Host communities are considered to suffer the consequences of mining operations most especially in developing countries where the power held by local communities in such process is highly marginal(Erdiaw-Kwasie *et al*;2014).

AduYeboah *et al* (2008) explained that one of the major negative impacts of mining activities is the high cost of living within and around the communities. Most basic needs such as food, accommodation, water and other necessities are expensive to purchase by ordinary people. He further stated that there are two main reasons for this situation vis-à-vis;that the mining companies employ most of the strong and able-bodied young men into the mining industry, preventing them from their farms and most of the farmlands in those communities are taken over by the mining companies. The resultant effect of this is the reduction in food production in those areas and the need for food to be brought from distant areas at exorbitant prices.

The most important environmental problems as recognized by Da Rosa and Lyon,(1997) and Mason, (1997) are: mercury pollution, cyanide pollution, direct dumping of tailings and effluents into rivers, improperly constructed tailings dams, acid rock drainage, river damage in alluvial areas and river siltation. Others are erosion damage and deforestation, landscape destruction, garbage and solid waste, tropical diseases. In addition, mining activities has always led to de-vegetation and soil erosion.

Dust being generated from mining operation causes some environmentally related respiratory diseases such as tuberculosis, silicosis and other pulmonary diseases. It comes from activities like moving rocks and soils, bulldozing, blasting, and vehicles travelling on dusty roads. Most dust particles' from mining site are large dust particles, also called coarse particles or particulate matter. These particles are generated when soils are disturbed when wind blows over bare ground and stockpiles. Noise and cracks are environmental problems which occur as result of blasting. Agbeno (2001) explained blasting as the loading of explosives into drilled holes using detonating technique to achieve the desired fragmentation of the rock. The noise can interfere with human wellbeing such as hearing, sleep and speech, and can cause stress-related diseases such as hypertension. The vibration of the rock mass has always caused cracks on building. This was very visible in the study area.

In the case of panning and alluvial mining methods, their actions impacts directly on the river and water system. Some of the tailings are dumped directly into the river system thereby polluting it and making the river course to be diverted. Where minerals like galena, sphalerite and barites are mined, their tailings produce acid rock drainage, the leachates from their tailings are potential pollutants if they are discharged into river systems.

Akabzaa (1997) also revealed the advent of large-scale open-pit mining with its attendant destruction of large land surface and displacement of settlement as a major source of conflicts between the local people and the mining companies. The study area witnessed resettlements of lands which were mostly used for farming. The affected farmers have had confrontations with the mining companies but Government has mostly intervened and resolved partially some of the conflicts. These include:

- Disagreement over value of compensation for affected farm crops and other structures.
- Employment opportunities for the affected people in the mines.
- Continuing relationship between the people and the companies.
- Alternative farm sites to be allocated to the people affected.

According to Zo (1997), the coming of surface mining in an area does not only abuse the human rights of the indigenous people but also brings different problems about land use. The mining companies have large tracts of land for their operations and farming is not allowed in their concession areas unless authorized by the companies. Even if permission is granted, the farmers are allowed to grow seasonal crops such as cassava, maize, vegetables and plantain, Cash crops or perennial crops such as cocoa, coffee and oil palm are not allowed. These are the main crops that fetch the people in the area a lot of money. Allowing the people to grow perennial crops means when the company's activities reach such areas, they may have to pay more in compensations when it is time to mine on the lands. It is noted that mining activities (both large and small) share space with agriculture, timber and other activities.

In Nigeria, most discussion about environmental impacts have been on the oil producing region of Niger-Delta where agricultural surface and underground water resources have been badly affected. However, mining (artisanal mining inclusive) of solid minerals have pervaded the entire country leaving behind their effects on the environment. Mining activities include mining of minerals like columbite, tantalite, and cassiterite e.t.c. these array of activities led to uncoordinated and unregulated mining which usually results in haphazard extraction of the minerals and eventual destruction of the environment. Evidence of such destruction is observed in the form of soil erosion, and change in topography and water pollution and dumps of overburden material. The resultant effects of abandoned pits and other mining sites that becomes flooded during the rainy season pose health

dangers to the citizens. All these impacts respectively degrade the environment.

While mineral development can create new communities and bring wealth to those in existence, it can cause considerable disruption. Mining activities can bring jobs, business activities, roads, schools, and health clinics to remote and previously impoverished areas. However, the adverse impacts need to be addressed if proper development, starting from minerals exploitation is to bring long-term benefits. Unless the environment and social impacts of mining are properly managed, the considerable disruption to livelihoods and to the social fabric of communities' adjacent mines can negate its positive contribution. The objective of this study therefore is to assess the environmental and socio-economic impacts of mining activities on the immediate communities and proffer solution to the negative impacts in the area.

2.0 Location of the Study Area.

The study area, Borini Prono Quarry is located North West of Itakpe Hill along Okene-Lokoja express way in Kogi State, North central Nigeria as shown in Figure 1 It lies between Latitude 7°37'22"N and7°13'17"N and Longitude 6°15'55"E and 6°17'15"E . It is located at the central region of the state in Ebira land and specifically in Adavi Local Government. The area is a Guinea savannah belt with rich deciduous and occasional stunted trees including palms, iroko, mahogany etc. During the dry season, the land is open showing charred trees and the remains of burnt grasses. The vegetation of the area is not however in their natural state owing to the careless human use of the forest.

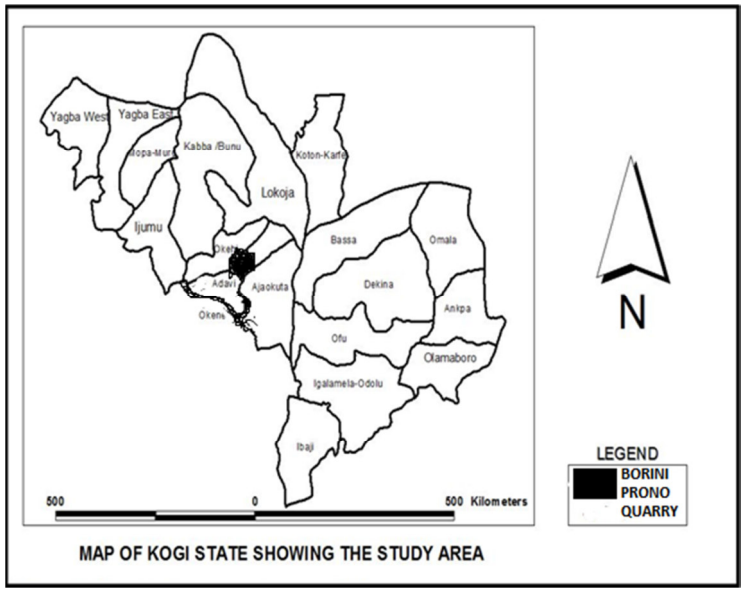

Fig. 1: Map of Kogi State showing the Studied Area

3.0 Methodology

Qualitative and quantitative methods were both used in the designing of the questionnaire in order to acquire primary and secondary data for accurate analyses. The research was carried out by administering designed questionnaires to people residing at the immediate community of the study areas. In administering the questionnaires, rapport was first established between the researcher and the respondents. For instance where the respondents can not express themselves in English, an interpreter was used to assist during the interview. The questionnaire was designed to collect and provide information on:

- Socio-economic profile of respondents.
- Socio-economic and environmental impact of surface mining on immediate community.
- Identifying ways of alleviating the negative impact of the surface mining on the immediate community.
- Developing an alternative means to solve land degradation in the area;
- Finding alternative means of livelihood in the communities;
- Finding ways of peaceful co-existence between the mining companies and the residents in the immediate community.

One hundred (100) respondents were selected from the community. The selection was based on purposive sampling technique. The interview was successful because of the help from the community chairman and the youth leader. A total of one hundred (100) respondents were Interviewed from the study area.

Data collected were summarized and stored in statistical tables and graphs. These include frequency distribution tables and histogram. Other relevant mathematical and statistical techniques such as chi square were used when appropriate for the analysis. In this research, the responses received from the respondents were

grouped into items and each item responses were tallied. The data are summarized and expressed as frequencies and percentages.

The validity, generalization and reliability can only be limited to the study, it is a simple random technique approach of one hundred (100) respondents, which may reflect the general trends of mining impacts of other regions.

4.0 Results and Discussions

As noted earlier, mining activities, such as any other large-scale economic ventures worldwide, have both positive and negative impacts on the human lives as well as the physical environments, particularly areas where they are sited. The positive effects are seen in terms of creating employment opportunities; development of infrastructure for other economic and social activities to take place; improvement in revenue generation for the state and country; and technological advancement amongst others. The social and economic effects that are commonly critical are severe human health problems due to pollution, displacement of local people, alteration of socio-cultural life of the local communities, and land-use changes. The physical environment suffers severely in terms of the destruction of vegetation, soil and water pollution, displacement of wildlife from their natural habitat. The more recent environmental issues associated with mining include the use of toxic chemicals, disposal of hazardous waste, accidents, and release of ozone depleting substances and greenhouse gasses.

4.1. Socio-Economic Characteristics of Respondents

The effects of surface mining on the physical environment also have socio-economic implications. Over the years the communities within Borini Prono have faced problems concerning socio-economic development as a result of mining effects on the lives of people living within the environment. There has been a great impact on the health, income, education, livelihood and the overall existence of the people of Okene especially those that are close to the mining site. In order to ascertain the level of impacts of mining on the socio-economic environment, the following indicators were considered; income, health, education, unemployment and incidence of cracking of buildings. Table 1 shows the details of the proportion of males and females interviewed during the survey. 38% of the respondents were females while 62% were males. Within the surveyed area, respondents reported to be involved in diverse economic activities, include civil servants, mining, subsistence business activities, livestock rearing and subsistence farming. Table 2 shows the Chi-Square profiling the sex of respondent in the survey while Figures 2 and 3 show the sex and age distribution of the respondents respectively. Table 3 shows the socio-economic activities of respondents and table 4 shows the pair-wise ranking of the economic activities of the respondents. The histogram in Figure 4 depicts the socio-economic activities of the respondents.

Table 1 Sex Distribution of the Respondents

Sex	Total number	Percentage (%)
Male	62	62
Female	38	38
Total	100	100

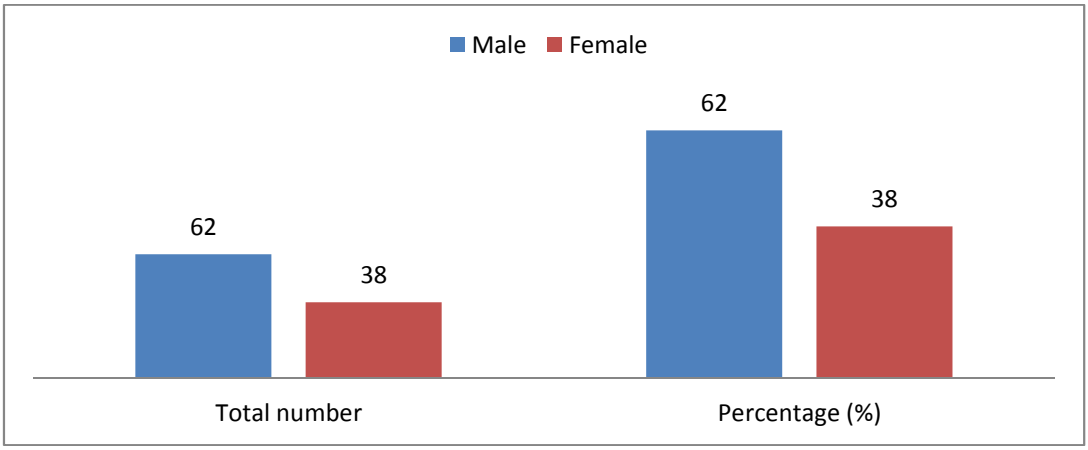

Figure 2: Sex Distributions of Respondents

Table 2. Chi-Square Table Profiling the Sex of Respondents in the Survey

Variables/ Gender	Community status		Total (n=100)	$x^2 - value$
	Niomco camp (n=50)	Nearby household (n=50		
Male	38	24	62	
Female	12	26	38	

The percentage of men to women is comparatively low because mining is gender-oriented, difference in gender within the surveyed NIOMCO and nearby households has probabilities of (0.05)

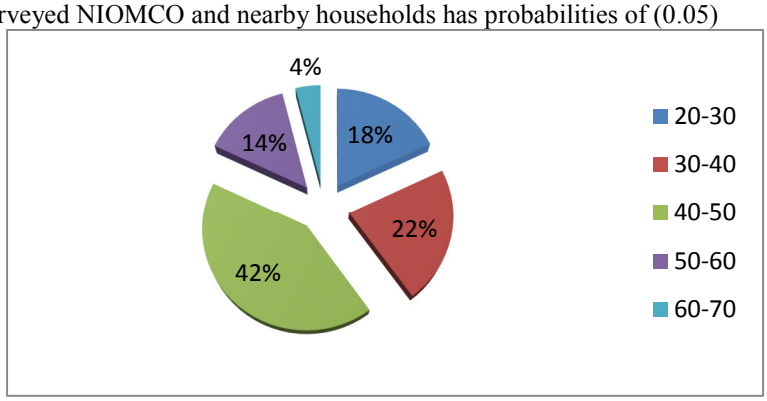

Figure 3: Age distribution of respondents

4.2. Economic Activities of Respondents

There are several economic activities in the study area, the dominant ones are mining, civil servant, farming, industrial and commercial activities. Tables 3 and 4 show details of the socio economic profile of the immediate communities to the mine.

Table 3: Socio-Economic Activities of the Respondents

Main occupation	Total (n = 100)
Civil servant	36
Subsistence farming	8
Livestock rearing	4
Mining	16
petty business	16
Student	20

Large proportion of the respondents are civil servants. Traditionally, the local people made their living from agriculture. Critical observation and analysis of response from stakeholders in the communities show that mining was not the major economic activity of these immediate communities but rather a complimentary source of income.

Table 4. Pair-Wise Ranking of Economic Activities of Respondents

Main occupation	1	2	3	4	5	6	rank
1.Civil servant	x						1st
2 Student	1	x					2nd
3 Subsistence Farming	1	2	x				5th
4 Livestock rearing	1	2	3	x			6th
5 Mining	1	2	5	5	x		4th
6 Petty business	1	2	6	6	6	x	3rd
Frequency	5	4	1	0	3		

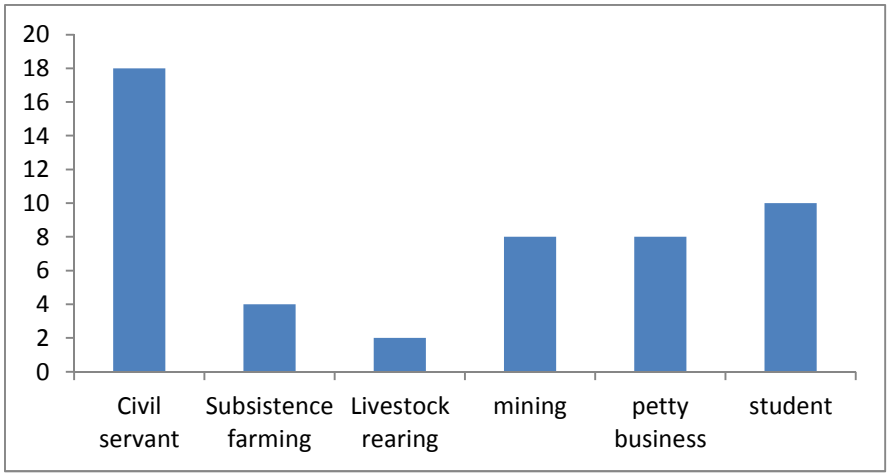

Figure 4: Histogram of the socio-economic activities of the respondents

4.2.1. Income Disparity

Income is a very important necessity to make life worth a living. Income generation from mine activities within the study area is insignificant. This is clearly shown in the analysis of variance and ANOVA TABLE presented in Table 5. The income generated comes from other economic activities apart from mining.

Table 5. Anova Table of Income Generated from other Economic Activities

Summary	single count	Sum	Average	Variance
Column 1	50	4756.183108	95.1233662	217164.2665
Column 2	50	5233.6046	104.6720946	26,2781.9.9937

Source SS variation		DF	MS	F	p-value	F-crit
Between groups	844.1	1	844.1	0.0236320	0.792539	3.906393
Within groups	3,525,597.298	99	35,612.48263			
Total	3,526,6441.398	100				

Where;
DF= Degree of freedom
SS= Sum of square
M.S=Mean of Square
P-value= probability value
Since F-cal <F-crit then the treatment is equal, therefore the hypotheses is hereby accepted.
It is quite obvious that mining has contributed less to the income of people living within the study area.

4.3 Borini Prono Contribution to Community Development

The Borini Prono mine has performed below expectation in terms of community development services such as the provision of health services, bursary/scholarship, environmental quality programmes for the people in the area. In an interview with management of the company during the field survey, it was gathered that the inability of the company to extend development to the communities is mainly due to financial difficulties facing the company. And, that it is just operating to sustain itself.

It was gathered that the environmental problems caused by the mine was the only assistance they've received from the mine. The most important areas that the people expect company to assist in terms of development contribution are health service, bursary/scholarship, and control of their blasting to reduce cracking and collapse of engineering structure and possibly provide alternative means of getting drinking water.

4.4. Adverse Effect of Borini Prono Operations on the Health of Immediate Communities

The health of the people has been affected adversely as a result of mining activities. Many people have suffered several ailments and diseases especially malaria due to the fact that guinea savannah region area breeds a lot of mosquito. Abandoned pits has a result of stoppage in operation in the quarry given room for breeding of mosquitoes larvae. Also typhoid fever is also rampant in this community. Typhoid is caused by bacteria called *Salmonella typhi* which is sometimes associated with and may be found with mine dust. Typhoid is spread in this community when mine dust from blasting operation settles on the roof of household close to the mine. The subsequent consumption of rain water that falls on these roofs will definitely result to typhoid fever. Table 6 shows prevalent diseases identified among the 100 respondents and Table 7 indicates the pair-wise ranking as well.

Table 6. Common Diseases in the Studied Area

Diseases	Frequency	Percentage
Malaria	25	50
Respiratory tract disease	8	16
Skin disease	2	4
Typhoid fever	15	30

Table 7 Pair Wise Ranking of Common Diseases in the Community

Mine problems	1	2	3	4	rank
1. Malaria	x				1st
2. Respiratory tract diseases	1	x			3rd
3. Skin diseases	1	2	x		4th
4. Typhoid fever	1	4	4	x	2nd
Frequency	3	1	0	2	

In summary, pair wise ranking of diseases in this community indicates that mining operations has increased the rate of occurrence of these diseases, most especially malaria, typhoid and some respiratory diseases.

4.5 Impact of Mining Activities on the Environment

Mining has often a negative impact on the environment by the pollution it causes. The impact of mining on the environment affects different aspects. The deforestation and generally the environmental degradation have indeed important implications for the environment concerned, particularly on agriculture, which is often the main economic activity. Pollution becomes an additional cause of poverty. Crack in buildings, air pollution, noise pollution and land degradations in Otite and its surroundings is a major environmental problem that needs to be addressed. It has contributed to human health problems, destruction of vegetation and eventual failure of some engineering structures. The long term effects of the pollution on human health and manpower productivity can be detrimental and costly, as similar cases have happened in the United Kingdom, America, Namibia, China and some parts of Central and Eastern Europe (UNEP 1991). People living in household close to the quarry share their opinion on environmental effect caused by the existence of Borini Prono. Their views are presented in the Table 8

Table 8.Opinion of Respondents on Effects of Mining on the Environment

Years of staying in the community	Does the mining activity affect the environment?			Total	**Chi square value calculate**	**Degree of freedom (df):**	**Probability value**
	Yes	No	No idea				
1-4 years	10	--	2	12			
5-8 years	12	4	--	16			
9-12 years	14	--	--	14			
13-16 years	12	--	4	16			
17-20 years	38	4	--	42			
Total	86	8	6	100	**10.94**	**8**	**0.005**

It is evident that those who have stayed relatively longer period within the mining area gave a 100% attestation that mining activities affect the environment compared to those who have stayed for relatively shorter period. The chi-square analysis confirms this as it indicates that years of staying in the community affects respondents' knowledge on mining effects of mining on the environment. Therefore, the first hypothesis that residents' appreciation of effects of mining on the environments is affected by their years of stay in the communities is valid.

4.6 Indigenous Perceptions of the Environmental Impacts of Mining

A pair-wise ranking of problems shown in Table 9 indicates the local peoples' perceptions on the problems experienced in the community, which reveals that the most pressing problems are dust, cracking and the collapse of buildings . Some respondents gave additional information that some abandoned pits formed from excavation are not seen as a serious problem, although they have caused disturbances to livestock keepers and farmers in the study area.

Also during the blasting operation, some dust particles emitted, will settle on the roof and wall of buildings. During rainfall, the reaction of the dust particle with the atmosphere causes oxidation to take place and subsequent rainfall on the roof of the buildings get contaminated and making the residents to be more susceptible to contracting typhoid fever (by drinking the rain water.

Table 9: Problem Ranking in the Study Area

Mine problems	1	2	3	4	rank
1. Cracks in buildings	x				1st
2. Air pollution	1	x			2nd
3. Land degradation	1	2	x		4th
4. Noise pollution	1	2	4	x	3rd
Frequency	3	2	0	1	

4.7 Adverse Effect of Borini Prono Operation on Quality of Air in the Community

Quality of air in this community was found to be very poor, with elevation dust levels and humidity levels of 70% especially during harmattan season, the available air in the communities is polluted by silica and other harmful chemicals due to the blasting of granitic rocks in the mine. This has denied the people of the community hygienic air to breath. From field survey, it was observed that there were a number of respiratory diseases such as tuberculosis, cold, headache and catarrh whose source has been traced to the presence of the surface mining activities within the area.

One of the greatest impacts of mining operations is the hazard posed by air pollution to the health of the local population. The common respiratory treat related diseases found in the area are cough, catarrh, flu, and tuberculosis. There are to a large extent caused by silica dust and other dusts from the quarry. The chief medical officer of nearby clinic close to the mine disclosed that the common communicable diseases treated by them in the community are cough, chest pain, flu, catarrh, tuberculosis and asthma. The statistics of the occurrence of these diseases is presented in Table 10

Table 10: Common Communicable Diseases within the Study Area

Disease	Frequency	Percentage
Tuberculosis	10	9.26
Chest pain	15	13.89
Cough	25	23.14
Asthma	3	2.78
Catarrh	35	32.41
Flu	20	18.52
Total	108	

Table 11: Pair-Wise Ranking of Communicable Diseases

Mine problems	1	2	3	4	5	6	rank
1. catarrh	x						1st
2. chest pain	1	x					4th
3. cough	1	3	x				2nd
4. asthma	1	2	3	x			6th
5. flu	1	5	3	5	x		3rd
6. tuberculosis	1	2	3	6	5	x	5th
Frequency	5	2	4	0	3	1	

From Table 11, it shows clearly that the most prominent communicable diseases are catarrh, cough and flu which are mainly caused by inhaling quarry dust which has a high percentage of silica content.

4.8: Adverse Effect Of Borini Prono Operation on Quality of Water in the Community.

A comparative physio-chemical analysis of well water close to the quarry is carried out to assess its quality and suitability for drinking by the people living in the community. The result of the test is shown in Table 12.

Table 12: Results of the Water Test

Analysis	Result	Unit	Standard
Total coliform bacteria	20	Per 100ml	0 per 100ml
Fecal coliform bacteria	ND	Per 100ml	0 per 100ml
PH	7.2	PH units	6.5 to 8.5
Hardness	260	mg/L	<500mg/L
Iron	0.4	mg/L	<0.3mg/L
Nitrate	4.23	mg/L	<45mg/L
Total dissolved solid	260	mg/L	<500mg/L
Lead	11	µg/L	<15µg/L

(i) Hardness test: hardness in water is a general term used to refer to the calcium carbonate ($CaCO_3$) content in water. Hardness does not pose a health threat, but it does cause aesthetic. It can ruin hot water heater

elements, reduce soap lathering, and make laundry difficult to clean. The hardness unit of the well water is within acceptable range, thus making it suitable for laundry. A water hardness of about 90mg/L to 100mg/L provides excellent corrosion control and is usually acceptable aesthetically, but there are no drinking water standards for hardness.

(ii) Presence of Nitrate: The presence of Nitrate in this water is traced to the use of ANFO for blasting operation. Although the value of nitrate in this water is within acceptable one, but there is a danger of consuming water with high nitrate as it make one to be prone to "methemoglobinemia" (blue baby disease) especially in infants.

(iii) PH test: This is the measure of how acidity or basicity the water is. It is measured on pH scale (from 0 to 14) in pH units. If pH of water is less than 7.0, it is acidic, and if it is greater than 7.0, it is basic. If pH values are exactly 7.0, it considered neutral. If pH values deviate very far from neutral, other water quality problems may be indicated. These would include the presence of toxic metals such lead at low pH and high salt content at high pH. It is recommended that the pH of water be between 6.5 and 8.5 to minimize other potential water problems. The water close to Borini Prono has pH level of 7.5 which is within acceptable range.

(iv) Presence of coliform bacteria: These are large group of bacteria that occur throughout the environment. They are indicator organisms to show the potentiality of disease causing bacteria to be present in water. The absence of coliform bacteria leads to the assumption that water is micro-biologically safe to drink. Consuming water with coliform bacteria may cause "gastroinstestinal" illness, fever, and other flu-like symptoms.

(v) Presence of iron: The presence of iron in sampled water can be traced to presence of iron ore in the area being studied.

Consequently, the water sample does not meet safe drinking water standards. Total coliform bacteria are present. Iron concentration is above recommended level. Water should be disinfected to remove bacteria. Treatment of iron may be necessary if staining or taste is objectionable.

5.0 Conclusion

While the potential economic benefits of mining is acknowledged in Nigeria, there is need also to recognize the negative impacts that come with it in order to find ways of handling them. It is clear from the investigation of the study area that there are incidences of pollution of various kinds (that is, air, noise and land) to the environment, particularly on the immediate communities. Equally, the socio-economic and environmental impacts of mining on immediate communities revealed that mining does not provide primary economic occupation for the majority of the region's local people but does provide essential supplementary income, and land degredation, cracks and collapse of buildings near mine sites as a result of excessive vibration by repeated explosion respectively.

6.0 Recommendations

After a thorough and meticulous study and analysis of these impacts the following recommendations are put forward to address them:

1. Stringent, rigorous efforts and other measures aimed at restoring back degraded lands to its original state after mining activities should be intensified by the company. These will not only reduce the negative environmental impacts on the people but also land would be available particularly to farmers for agricultural purposes.
2. Similarly, the Government of Nigeria, who holds right to all minerals in trust for all Nigerians, in collaboration with the Ministry of Mines and Steel Development, should make conscious efforts to reduce the rate at which lands or concessions are granted to mining companies in the country. This is necessary because despite several efforts and measures put in place, the effects of mining activities has continued to remain a huge predicament, particularly to those living in the immediate communities, and to a greater extent, the country at large.
3. Improved regulations and independent Monitoring Teams (MT) should be commissioned to intervene before environmental and social problems spiral out of control.
4. Awareness should be created by Government and the company on the need for the people living close to the mine to frequently treat their water to make it suitable for drinking. Also there is need for Government and the company to provide alternative source of drinkable water (boreholes), so that people living close to mining site can have free access to clean and hygienic water.

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