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Socioeconomic Impact of Artisanal and Small Scale Mining on the Mambilla Plateau of Taraba State, Nigeria

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Abstract

Artisanal and Small Scale Mining (ASM) is an important livelihood activity to most rural dwellers living in communities endowed with mineral resources. Mining in Taraba state is dominated by informal mining activities undertaken by individuals or groups who rely heavily on manual labour, using simple implements and methods. This artisanal and small scale miners' indiscriminately carryout extensive mining activities without any consideration to the environment and other users. Despite serious dangers posed by this activity, artisanal gemstone mining operations continue to spread due to; rise in the demand for gemstone and unattractive nature of other means of livelihoods such as farming in the rural areas where the mineral is substantially available. This study therefore examines the socio-economic impact of artisanal and small scale mining on the Mambilla plateau area of the state. The research design involved the use of field observation and structured questionnaires to collect data required for the study. The findings of this study revealed that ASMs operation in the study area were informal and classified as "Rush" ASM. The involvement of people of different sex, age and other social groups in ASM operations in the study area to generate income was largely poverty driven. The noncompliance of ASM operations to mining rules, regulations and environmental laws accounted for the socioeconomic impacts observed in the study area.

Keywords

artisanal, Gemstone Mambilla, Rush, small scale

1. Introduction

Mining is the process of extracting minerals from the earth surface in an environmentally friendly manner (Davou, 2013). Mining can also be regarded as the extraction of minerals occurring naturally such as coal, ores, crude petroleum and natural gas. Mining is one of the oldest economic activities in Nigeria dating back to prehistoric times when man crudely exploited iron and clay, and perhaps other metals, for the production of his cosmetics, crude implements and utensils. Mining industries have been viewed as key drivers of economic growth and the development process (Bradshaw, 2005), and as lead sectors that drive economic expansion which can lead to higher levels of social and economic wellbeing (Bridge, 2008).

Artisanal and Small-Scale Mining is a means of livelihood adopted primarily in rural areas (Veiga, 2003). This is sometimes called informal sector, which is outside the legal and regulatory framework (Azubike, 2011). When not formalized, organized, planned and controlled, Artisanal and Small-Scale Mining can be viewed negatively by governments and environmentalists, because of its potential for environmental damage, social disruption and conflicts (Opafunso, 2010). Most artisanal miners work in difficult and often very hazardous conditions in the absence of the required safe mining regulations to safeguard the operations (Veiga, 2003). Despite serious dangers posed by this activity, artisanal gemstone mining operations continue to spread due to; rise in the demand for gemstone and unattractive nature of other means of livelihoods such as farming in the rural areas where the mineral is substantially available (Ako et al., 2014).

Mining operations oftentimes leave the affected environment severely degraded, physically and socially. Degradation commonly occurs at all stages of mining activities from exploration to mine closure, resulting from both large and small scale artisanal mining operations (Walde, 1992). Mining in Taraba state is dominated by informal mining activities undertaken by individuals or groups who rely heavily on manual labour, using simple implements and methods. The small scale artisanal miners' indiscriminately carryout extensive mining activities without any consideration to the environment and other users. The activities of this artisanal miners litter the state with abandoned pits, "lottos", trenches, ponds and mining dumps that pose serious danger to grazing livestock and human being. It has been reported that the activities of the artisanal small scale miners results in conflicts between livestock rearers, farmers and foresters on one hand and miners on the other side (Ahmed, 2013). This study therefore examines the socio-economic impact of artisanal and small scale mining in the state.

2. Description of the Study Area

The Mambilla plateau is located between latitude 5^o 30' to 7^o 18' N and longitude 10^o 18' to 11^o 37'E with a total land mass of 3,765.2 km^2 forming the southernmost tip of the north eastern part of Nigeria (Tukur et al., 2005). The entire area of the plateau falls under the Sardauna local government area in Taraba State Nigeria. The plateau is "Cameroon-locked" in its southern, eastern and almost half of its western part. The plateau is the highest elevation in West Africa (Frantz, 1981). Geologically, more than two-third of the Mambilla plateau is underlain by the Basement Complex rocks which dates back to the Pre-cambrian to early Paleozoic era (Mubi & Tukur, 2005). The remaining part of the plateau is made up of volcanic rocks of the upper Cenozoic to Tertiary and Quarternary ages (Jeje, 1983). The rocks of the Mambilla plateau are of volcanic origin (of basalt flows), extruded from fissures of tectonic lines. The volcanic rocks of the plateau are of the basalt suite, olivine basalt and trachyte basalt, found to be containing a mixture of pyroxenes, amphiboles with some free quartz minerals (Moulds, 1960). Mubi and Tukur (2005) observed that the rocks of the volcano cover an area of about one-third of the plateau which include Kakara, Nguroje, Maisamari, Ngel Nyaki and Dawa areas. The most common artisanal mining sites are located at Maisamari, Gurgu, Yelwa, Mayo Ndaga, Lekitaba and

Nguroje. The minerals mined include gemstones, mainly blue sapphire, topaz and occasionally, amethyst and garnet. The minerals occur as placer deposits in ancient river beds (Ahmed, 2013). The minerals were initially weathered from the host rocks, eroded, transported, sorted and then deposited in the present environment. They were later covered by very thick overburden.

In the mining sites, the ASM operation include clearances of vegetation to create footpath in the mining area, manual digging and excavation, transportation, washing and sorting of minerals. Three mining methods identified in the area are; traditional "loto" (vertical) underground mining, (horizontal) ground sluicing and panning methods.

2.1 Materials and Methods

The research design involved the use of field observation and structured questionnaires to collect data required for the study. The research questionnaire was structured to determine the socio economic background of the respondents. This was used to determine to some extent the level of socio economic and cultural impacts of the artisanal and small scale mining operations in the study area. During the fieldwork, people were interviewed and only those who are directly or indirectly involved were selected and administered with questionnaires. This was done to eliminate people who might not have knowledge of mining activities in the area as their response might have negative influence on the result. Stratified and availability sampling methods was adopted in the administration of the questionnaire. The questionnaire was administered by the researchers. The estimated population of the artisanal miners were over 5000. However, only 175 operators were randomly sampled and administered with the questionnaires at Maisamari mining sites.

At Nguroje mining sites, information was generated through interview with identified key informants. Some of the information solicited from the respondents includes duration of involvement in mining, engagement status, quantity of minerals mined, income generation from mining, mode of payment and reasons for going into mining. Other information include types of minerals mined and duration of mining at the site. The Information obtained from the individual interviews and questionnaire administration was content-analyzed and subjected to descriptive analysis.

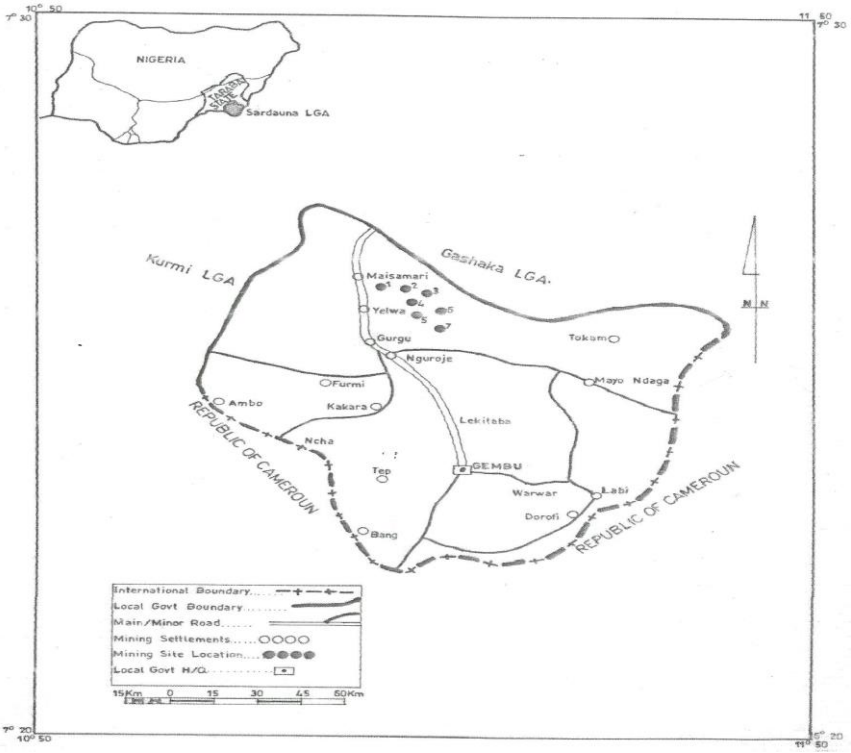

Figure 1. Map of Sardauna LGA Showing the Study Area

3. Result of the Findings

The demographic data shows that 94.3% of the respondents are male and 5.7% are female as shown in Table 1. The high percentage of male (94.3%) as ASM operators in the study area is because of the "loto" underground mining which women cannot do. Also, access to female labour in the area is very difficult because of the Islamic religion and cultural restriction. The result also shows that most of the ASM (76.6%) were mainly youths and adults generally within the age range of 15-59 years. The table also shows that there was little involvement of under aged and over aged miners. The result also shows that all the respondents were Nigerians. This pattern of ethnic composition was typical of ASM operations in "rush" mining sites. In this type of mining site, once a speculative boom is triggered, people from different parts of the country and foreigners rush to the mining site. However, at expiration or slowdown of mining operations, virtually all migrants would gradually move to other areas of speculative boom leaving behind only people from the surrounding areas. It is in this sense that one would understand why all the current ASM were from Taraba State. The study findings show that 89% were Moslem and 10.1% were Christians, 89.1% were married and 10.9% were singles. The findings also show that ASM operations were largely a part-time activity for nearly 95% of the respondents, while less than 6% regard mining as their main occupation. Farming was the main occupation of almost 75% of the respondents while about 6% each were drivers and students. The rest, which constituted less than 6% were traders and technicians. The Table revealed that the sampled ASMs in the study area have a high level of literacy. This is because nearly 80% had either quranic or primary education while about

20% had secondary education and 2% had no education at all.

Table 1. Demographic Characteristics of Respondents

Gender	**Frequency**	**Percentage (%)**
Male	165	94.3
Female	10	5.7
Total	175	100
Age		
15-29yrs	56	32.0
30-44yrs	78	44.6
45-59yrs	39	22.3
60-74yrs	2	1.1
Total	175	100
Marital Status		
Married	156	89.14
Single	19	10.86
Total	175	100
State of Origin/Nationality		
Taraba	170	97
Other Nigerian State	5	3
Total	175	100
Education		
Q'uranic education	73	41.7
Primary education	64	36.6
Secondary education	34	19.4
No education	4	2.3
Total	175	100
Main Occupation of ASM in the Study Area		
Farming	130	74.3
Mining	10	5.7
Driving	10	5.7
Schooling	10	5.7
Technician	5	2.9
Trading	5	2.9
Total	175	100
Religion of ASM		

Islam	156	89
Christian	19	10.1
Total	175	100

Source: Fieldwork.

3.1 Artisanal and Small Scale Mining on the Mambilla Plateau

Mining in Maisamari town on the Mambilla plateau started in 1993, with old mining sites at Mayo Ndaga and Lekitaba. Mayo Ndaga is close to the Nigerian boundary with the Republic of Cameroon. The "speculative boom" especially of blue sapphire stimulated influx of large number of people of different nationals into the area. The mines in both Mayo Ndaga and Lekitaba stopped flourishing as a result of decline in blue gemstone and the people abandoned the site. At Maisamari, the activities of the ASM operation virtually stopped in 2007-2008 as all the miners were forced out of the area as a result of the conflict that ensued between the miners and cattle rearers, farmers and foresters. The new Mambilla blue sapphire mineral was said to have been discovered in Santiye (Maayo) area in Nguroje community between December 2012 and January 2013. From February 2013 till date it has been a beehive of economic activity in the area.

Findings from the study show that about 17 out of every 20 respondents had spent less than 6 years in mining while the rest had spent more than 10years as shown in Table 2. Thus, most of the ASMs were relatively new in the study area.

Table 2. Years Spent in Mining in the Study Area

No. of Years	**Frequency**	**Percentage (%)**
1-5	34	19.4
6-10	112	64.0
11-15	24	13.7
16-20	15	2.9
Total	175	100

Source: Fieldwork.

The study findings show that 98% of ASMs sampled in the study area were self-employed in the mining operations. The remaining 2% are those who were engaged by others to assist them in buying the mineral commodity. The result on the quantity of mineral mined in the study area revealed that most ASMs in the study area produced less than 40g of gemstones in a month. However, field investigation revealed that this production figure varied with season.

Findings on the income generated by individual ASMs in the study area are presented in Table 3.

Table 3. Years Spent in Mining in the Study Area

Income (₦)	Frequency	Percentage (%)
1000-20,000	85	48.6
21,000-40,000	53	30.3
41,000-60,000	22	12.6
61,000-80,000	10	5.7
81,000-100,000	5	2.9
Total	175	100

Source: Fieldwork.

Close look at Table 3 shows that there seems to be a correlation between the quantity of the gemstones produced and income generated by the ASMs in the study area. The unit price of gemstone in the field was ₦1,000/g at the Maisamari. The Table revealed that nearly 80% of the ASMs operators in Maisamari generated less than ₦40,000 per month.

At Nguroje mine site, findings show that the cost of the mineral is dependent on both the quality and quantity. A whole size of quality blue sapphire (highest quality) per gram could cost up to one million naira (US $5,920). But if you have same quality that is a whole (not splitted) which weighs higher, then that attract more money as shown below: a) 1 gram = 1million naira (US $5,900). b) 2 whole gram = 4-5 million naira (US $23,700-US $29,600). c) 3 whole gram = 10-12 million naira (US $59,000-US $71,000). This varies depending on the flourishing and scarcity seasons. **Low quality sapphire:** a) 1 gram = N150,000-N200,000 (US $880-US $1,180). b) 2 gram = N300,000-N400,000 (US $1,700-US $2,300). **Poor quality Sapphire:** 1 gram = N10,000 (US $60).

The Mambilla blue sapphire comes in different grades and colours: red, orange, opaque and blue. The blue stones are the most sought after and very expensive. The Blue Sapphire from the Mambilla plateau are sold as unprocessed precious stones and exported to mainly Thailand where the 'Blues' is used in making jewelry. Other uses of the sapphire include the manufacture of electronic chips and highly valued in India for its mystical potency. There are dealers at Gembu town mostly Nigerians and Senegalese buyers who hang around the pits to buy whatever is extracted. The marketing of the blue sapphire passes through many hands along the transaction chain. Payment of all gemstones purchased from the ASMs in the study area is 100% by cash.

3.2 Reasons for Involvement of ASMs in Mining in the Study Area

Reasons presented for involvement of individuals into ASMs operation in the study area are presented in Table 4.

Table 4. Reasons for Involvement of ASMs in Mining in the Study Area

Reasons for Involvement	Frequency	Percentage (%)
Income generation	131	75
Unemployment	39	22
Poverty	5	3
Total	75	100

Source: Fieldwork.

The result in Table 4 revealed that 75% of ASMs engaged in mining to generate income while 22% of the ASMs were forced into mining due to unemployment and the remaining 3% were due to poverty.

3.3 Social Impact

ASMs operation in the study area has created significant impact on the infrastructures and socio-cultural environment. Some of the socials impact of the ASMs operation in the study areas includes:

a) Large influx of population.

b) Change in level and nature of community resources.

c) Potential effects on health, safety and welfare.

d) Creation of employment.

e) Conflict generation.

f) Child and women labour.

3.3.1 Large Influx of Population

During the period of speculative boom in the study area, over 5000 miners were seen on site. Despite this large number of population, there was no ancillary facility constructed to accommodate the miners in the field. The ASMs operation therefore had secondary effects like over stressing of available social infrastructures, increase in demand for accommodation and food and subsequent inflation. Housing rent in the study area increase from ₦100 to ₦500, while a plate of food (*tuwo in local parlance*) increase from ₦50 to ₦100 as a result of this influx of population. The daily period of human activities in the study area also extended from about 9:00 pm to 1:00 am. The negative impact of these unholy hours was also felt in the study area as crime rate and other social vices was said to be on the increase alongside other negative impact of population increase.

3.3.2 Change in Level and Nature of Community Resource

Mining is one of those human activities that draw people from different area without any restriction. In this regard, possible significant change in the level or nature of community resources, such as cultural character, distribution of jobs and income and community identity were observed in the study area. Some of the communities that were predominantly Muslim community were influenced by a population much more than the existing population, some of which were Christian or do not practice

any religion. This corroborated earlier findings of Ogezi (2005) in parts of Zurak in Plateau state, Nigeria. As shown earlier by the distribution of the main occupation of miners in the study area, most of the people involved in the operation of the ASMs were farmers. There is now shift in labour from farming to mining and commercial motor bike operation. The acquisition of electronics and electronic equipment, erection of new houses, purchasing of motor cycles and cars and the presence of different people changed the identity of local communities.

3.3.3 Potential Effects on Health, Safety and Welfare

The influx of large population into the local communities as a result of ASMs operation will certainly have effects on individuals and community through traffic congestion, odour, noise and dust, as well as dislocation and relocation of people. In view of the increasing number of motor cycles using the narrow footpath, it was ascertained that accidents do occur from time to time but no fatality was reported. The process of mining gemstone is very difficult and involves high risk and occupational hazards which could result in death and injuries following collapse of minepit and other accidents as the case may be. There were reported cases of trapped miners being rescued by combined effort of others. Depletion of oxygen by burning candles that were used for illumination in confined underground works, dust pollution from digging and blasting, and air pollution from oil and gas combustion from water pump were the major health hazards that the miners were exposed to in the mining sites.

3.3.4 Creation of Employment and Income Generation

The employment opportunities generated by the operation of ASMs in the study area have both positive and negative impacts. The positive impact includes dual employment opportunity either as miners or as commercial motorcyclist. With over 5,000 ASMs miners reported in this study, commercial motorcycle operation was boosted in the area (Figure 2). Although it was difficult to ascertain the number of commercial motorcyclist plying the road between the mining site and the towns, it was obvious that they are in excess of 200. The income earned by individuals and the community has increased the social and infrastructural development of the study areas. The negative impact include abandonment of farming activities thereby worsening food crises in the area. Other factors include the emergence of get-rich-quick syndrome and increase in risky behavior which brings about social hazards that erode the social capital of the communities around the mining site.

Figure 2. Beehive of Activities at the Mining Site

Figure 3. Sorting out of Sapphire from Gravels

3.3.5 Conflict Generation

Pitting and "lottoing" carried out by ASMs in the study area left behind several unreclaim pits and mining dumps. These have made the area unproductive for agricultural purposes and also endangering both human beings and animal lives. This has resulted in serious conflict between the miners the other users of the land such as farmers and cattle rearers. The operations of the ASMs also led to the destruction of government owned forest reserve in the area which has generated much concern. The series of conflict generated led to the near closure of ASM operations in the area.

3.3.6 Child Abuse and Women Labour

The findings from the study have shown that there was little involvement of children in ASM operations in the study area. Field observation at Nguroje mining sites shows that there is increasing dropout of schooling pupils/students in search of money. The girls took to hawking and petty trading

while the boys search for paid jobs at the site such as digging holes, washing the excavated gemstones and gravels, sorting out of the precious stones among others. The involvement of these children in mining operation has been described by social crusaders and children right fighters as child abuse. During the fieldwork, women too were seen involved in various stages of mining operation such as transporting and washing and sifting of the gemstones from the gravel (Figure 3). Some of the women with their babies or children were seen carrying out this activities but were paid differently from the men. When men are paid ₦1500 for instance, the women are paid between ₦500-₦1000 a day. This differential payment for the same amount of work done on the basis of sex is considered as abuse of women labour.

4. Conclusion

This study has examined the socio-economic impact of artisanal and small scale miners in parts of Taraba State, Nigeria. The findings of this study revealed that ASMs operation in the study area were informal and classified as "Rush" ASM. The involvement of people of different sex, age and other social groups in ASM operations in the study area to generate income was largely poverty driven. The noncompliance of ASM operations to mining rules, regulations and environmental laws accounted for the socioeconomic impacts observed in the study area.

The lack of adequate information on ASM operations in the study area by the government contributes to the lack of enforcement of the mining regulations. Also the differential payment of women and child labour was due to local traditional mentality that the woman should always earn less than the man. This study recommend the need for further ground work to be conducted on the Mambilla plateau to fully explore the unreclaimed and partially reclaimed mine site as many of these ponds are located in places people would not really suspect. Effort should be put in place to recover and reclaim the abandoned mine sites to reduce the danger it posed to the communities.

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