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Full Length Research Article

AN APPRAISAL OF SOCIAL AND HEALTH IMPACT OF CEMENT PRODUCTION AT OBAJANA COMMUNITIES IN LOKOJA LOCAL GOVERNMENT AREA OF KOGI STATE

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ABSTRACT
Mining is a major economic activity in many developing countries including Nigeria. This paper examines the social and health challenges of Cement production on Obajana communities. This was necessitated to providing a sustainable safe environment to the people and communities where industrial activities take place. The study involved empirical observation and interview of residents of the study area. A total of four hundred respondents were randomly selected from four communities, to appraise the social and health impacts of cement production on human populations in the study area. Descriptive statistics and one sample T- Test were used to analyze the data. The result of the test statistic of P-value 0.00 shows that there is significant relationship between cement production and its associated social and health impact on the people in obajana communities. Obajana community recorded the highest socio and health impact of cement production (43.3%). A significant proportion of the sampled population and clinic records revealed increasing cases of malaria within the study area. Malaria alone account for 37.4% of the incidence of disease in the study area. Additionally, there are health related problems at the host communities that were not properly documented, let alone attempting a resolution process.

Keywords: Social and Health Impact, Cement Production, Social Assessment, Obajana cement, Socio-economic Development.

INTRODUCTION

The cement industry plays a crucial role in improving standard of living of people all over the world by creating direct employment and providing multiple economic benefits to associated industries (Potgieter, 2012). Cement demand is directly associated to economic growth and many growing economies are striving for rapid infrastructure development which underlines the tremendous growth in cement production (World Business Council for Sustainable Development, 2006). Cement is the most common and extensively used adhesive in the construction industry (Adeniran, Yusuf, Fakinle & Sonibare, 2019). It is employed on highways, houses, embankments, bridges, commercial establishments, and flyovers. Hence, the cement manufacturing industry has played a fundamental role in global economic development, with construction, steel, crude oil, iron, and telecommunications, constituting major infrastructural aspects worldwide. Swift commercialization, urban civilization, and the necessity to boost domestic goods production have been the lead cause for the surge in cement production (Adenran et al, 2019).

The Obajana Cement Project (OCP) involves the construction and operation of a greenfield cement plant at Obajana, Kogi State, 220 km southwest of Abuja, the Nigerian capital. The Project will have a combined production capacity of 4.4 million metric tonnes per annum (mtpa) and includes a 135 MW captive gas power plant; a 94 km gas pipeline; a limestone quarry with associated 7.5 km conveyor belt; a 13m high dam impounding a reservoir with a total storage capacity of 5.1 million and a 351 unit housing complex for all staff within a particular grade level (both foreign and local staff). With the increasing presence of cement manufacturing, the industry poses as one of the most significant CO_2 emitters. Evaluating the risk factors of its spillover impact on public health is inevitable.

In 2018, data from World Health Organization (WHO) indicated that 9 in 10 persons breathe air containing excessive concentrations of toxins beyond the approved threshold stated by WHO. Africa and Asia amass the worst hit with 90% deaths from environmental air contaminants (WHO, 2018). Cement production entails severe health constraints; nearly every production phase adversely affects man and its environment. When dismantling rocks, particulate matter is dispersed into the atmosphere, making it harmful to man. Moreover, this disintegration process causes noise pollution (Adeyanju & Okeke, 2019).

Simukanga et al (2003) and Akande and Idris (2005) maintained that if properly co-ordinated, mineral exploitation for cement manufacturing can transform development in surrounding communities. This can be achieved through employment creation and infrastructural development such as roads, schools, hospitals and housing as the case in Obajana district of Nigeria (Busuyi et al 2008). A wide range of business activities also sprouted in the same district; hence increasing disposable income for the local people. The aforementioned studies revealed that the socio-economic impacts of cement manufacturing varied from place to place which compelled the researchers to look at the Obajana, not only the socio-economic impact but also the health impact of the cement production on the host communities. Similarly, this work aimed at appraising the Social and health impacts of cement production on Obajana communities in Lokoja Local government area of Kogi State

STUDY AREA

Lokoja local government is one of the twenty-one (21) local government areas in Kogi state. Lokoja is one of the ancient towns in Nigeria (Harley, 2007). The town assumed metropolitan status from pre-independence days, harbouring many Nigeria ethnic

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groups. It is both the administrative and commercial capitals of Kogi state, the most centrally located town in the country. Lokoja is located between latitude 7^0 46'N and 7^o 52'N and longitudes of 6^0 38'E and 6^0 46' E. Lokoja is also a Local Government Area of Kogi State with an area of 3180km^2. However, Obajana is a very small but very important community in Lokoja local government also in Kogi State, north central Nigeria which is the focus of this study. It is part of Lokoja Local Government Area and is a home to the famous Dangote cement factory, rated as the largest in Afric (Ameh E.G; Kolawole, M.S & Imeokparia, E.G, 2011). Obajana cement factory can be assessed both by road an air as it has two functional roads and a landing strip. The mining site is located at Ooyo-Iwa while the factory is located at Obajana which is bounded by Oshokoshoko and Apata to the west and east respectively. The soils are generally very productive and farmers do not need to add fertilizers to obtain 'good' crop yields (Harley, 2007). The study area is underlain by basement complex rocks, predominantly composed of folded gneisses and metal sediments. The rock type found in the area includes: schist, pegmatite, quartzite, limestone, granite and granulites. An overburden of 2m and 8m thickness of soil overlies the limestone. The area is characterized by two types of Landforms, domed shaped residual hills and river valleys (Afeni et al, 2008). The Obajana area is defined by hills in form of ridges tending in a North-South direction. The terrain is very rugged and comprise of quartzite ridges rising as high as 100 meters above the lowlands. The area is mainly by River Mimi and River Oinyi. River Mimi and its tributaries discharge into the River Niger. It's a semi-seasonal river flowing during the rainy season and some parts of the dry season but ceases to flow at the peak of the dry season. Obajana like has an average maximum temperature of 330 C and average minimum temperature of 22.80 C. it is generally hot throughout the year. The area experiences both wet and dry season. The mean annual rainfall for the study area ranges from 1,100 to 1,320mm. Rainfall lasts from May to October with dry season occurring in between November to April. A careful analysis of the soils of Obajana, shows that the soils found in the area are friable and slightly acidic to slightly alkaline with mean PH of 5.82. The soils are generally very productive and farmers do not need to add fertilizers to obtain good crop yields. The soil types in the area ranges from sand to loam with the sand fraction varying from 68.3-95%. The percentage sand content generally decreased with depth at any particular point while the percentage silt content varied from 2.3 – 20.7% and clay content varied from 2.3- 20.0% (OCP, 2005).

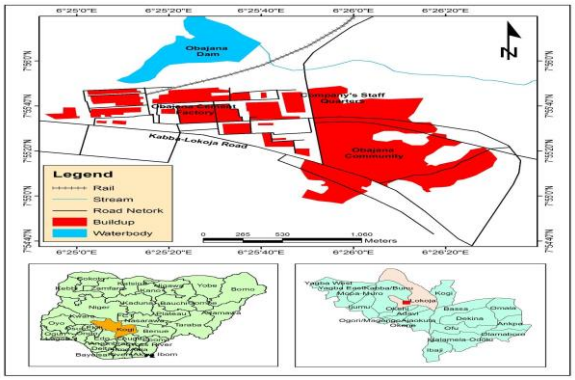

Figure: Map of the Study Area Showing Obajana Community and Factor Location
Source: GIS Lab, Geography Department, University of Abuja.

MATERIALS AND METHODS

Qualitative and quantitative data gathering techniques were used as both methods are required where time, funds and accessibility are issues to contend with. The social and health based impact appraisal is carried out to extract information from key informants within study areas.

Data Sources

Primary and secondary sources of data were used in this study. The major sources of primary data used were questionnaire administration and In-depth Interview. On the other hand while the secondary data used were obtained from textbooks, magazines, published and unpublished articles from authors whose works are relevant to this study. Medical records were also obtained from the local clinics, primary health care centres and private hospitals within the area of interest.

Sample Frame Determination

The study drew a sample size from the 2006 population figures of Lokoja Local Government (since community's population figures are not available) but projected to 2022. The 2006 population of Lokoja Local Government was 195,261 (National Population Commission, 2006).The projected 2021 population was derived at 338,580people. Population Projection formula is $Pt = P_0 (1 + \frac{r}{100})^t$

Where Pt = Population projection
P_0 = Population at present
r = Growth rate (3.5%)
t = time interval in years

$$Pt = 195{,}261 \left(1 + \frac{r}{100}\right)^{16} = 338{,}580 \text{people}$$

The sample size was also derived using Yamane (1961) sample size Formula

$$n = \frac{N}{1 + N(e)^2}$$

Where n = Corrected sample size
N = the population size,
e = margin of error (0.05%)

Similarly, $n = \frac{534{,}475}{1 + 53475\ (0.05)^2}$

n= 400persons.

Similarly, the figure was divided equally among the four communities, making it 50persons per community. The random sampling technique was adopted to identify household heads within the communities for questionnaire administration.

Questionnaire Administration

Questionnaires were designed to capture information on the socio-demographic characteristics as well as the perception of the respondents on the assessment of cement production on socio-economic impacts on the people in the study area. The copies of questionnaire were distributed to the respondents in each selected communities based on their sample proportion. The questionnaires were administered to the respondents across the various communities on random basis. The questionnaires were administered to men, women and young adults at their place of residence on random basis. The whole questionnaires were

collected altogether from which analysis were carried out. The questionnaire was divided in to two sections; while section A delved with bio-data of the respondents such as age, sex, marital status, and educational qualification. Section B on the other hand captures data related to the social and health impact of cement production on Obajana communities.

Data Analysis

This study employed descriptive and inferential statistics methods such as tables showing: percentage, frequency distribution. Descriptive statistics were used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtual every quantitative analysis of data. One sampled T-Test was used to test the significant of the impact of social and health impact of cement production in the study area.

RESULTS AND DISCUSSION

Demographic and Socio-economic Composition of Respondents

In all, the study population consisted of more males (72%) while the remaining 28%were generally female across the selected communities as shown in table 1. This is because some cultures do not permit their female to speak to strangers. Hence in such society the males engage more in socio-economic activities than their female counter part. Women are only known with petty trading. The study Shows gender differences which is one of the increasing talked about issues in the developing world. In the developing countries, gender gap is still a big issue that has a direct impact on the social life of people. Nagees (201) opined that women are not allowed to entertain visitor when their husbands are not around. Rahman (2008) also revealed that most males are involved in farming whereas most women are in to taking care of their households, which simply means that distinction reflects societal differences in gender roles and cultural definition of work. Similarly, this study agrees with the aforementioned study that female views on issues in the society are hampered by customs and believe of people thereby affecting the social life of female population.

Table I: Sex Distribution of the Population

Sex	**Obajana**	**Oshoko shoko**	**Iyo-Iwa**	**Apata Oworo**	**Total**
Male Female	69 (69%) 31 (31%)	67 (67%) 33(33%)	71 (71%) 29 (29%)	81 (81%) 19 (19%)	288 (72%) 112(28%)
Total	100		***100***	***100***	***400***

The population of the study area is made up of active population and more socio-economic activities are expected in the study area as shown in table 2. The active population is referred to as the working population. The major socio-economic activities of a nation depend on the working population. It is expected that the higher the active population, the more the social life of the people. However, this mean that active population also are prune to health issues due to environmental pollution.

Table II: Age Structure of the Population

Age	Obajana	Oshokoshoko	Iyo-Iwa	ApataOworo	Total (percentage %)
20-24	10 13	14 11	14 13	12 12	**50** (12.5%) **49** (12.3%)
25-29	12 14	13 12	12 10	13 10	**50** (12.5%) **46** (11.5%)
30-34	12 12	10 13	12 10	11 12	**45** (11.3%) **47** (11.8%)
35-39	8 9	6 7	9 6	9 6	**32** (8%) **28** (7%)
40-44	4 6	6 8	8 6	9 6	**27**(6.8%) **26**(6.5%)
45-49					
50-54					
55-59					
60-64					
65+					
Total	**100**	**100**	**100**	**100**	**400**

The educational status of respondents as shown in table. 3 revealed that about 24.5% of the respondents does not have any formal educational, while primary and secondary educational attainment among the respondents is about 34.5% and 22.8%, respectively. For tertiary education, the attainment level is 18.3%. Literacy level is one of the factors considered when measuring the well-being of any particular population. The population of the study can be said to be rated average in terms of literacy level. However, the result is not far-fetched as the study is communities are located in rural areas with little and low educational facilities. This study is in opposite with the work of Ujah et al (2009) whose study shows there were more number of secondary schools and tertiary schools in his research, reason being that the study was located close to Gboko town in Benue State.

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Table III Educational Qualification of the Respondents

Educational Qualification	Obajana	Oshokoshoko	Iyo-Iwa	Apata-Oworo	Total (Percentage%)
Non Formal Education	13	19	25	41	98(24.5%)
Primary Education	37	29	33	39	138(34.5%)
Secondary Education	31	23	27	10	91 (22.8%)
Tertiary Education	19	29	15	10	73 (18.25%)
Total	**100**	**100**	**100**	**100**	**400**

Health Care Centres In the Study Area

Accessibility to health care services or facility is one of the key social variables of any given place. Similarly, this study took in to consideration the major health care facilities in the study area and the accessibilities to the services. Table 4 revealed the distribution of health care facilities in the study. Five health care facilities are found in the Obajana community which comprises of primary health units and clinics. Three (3) health care facilities are found in Oshokoshoko community while one health care facility is found in Iyo-iwa and Apata Oworo respectively. Since industrial activities have negative effects on the health of the people, it is expected that the Obajana cement company should provide adequate health care facilities for the workers and the communities. The study also shows that there are no tertiary health care facilities in the study area. Critical medical cases were taken to federal medical centre Lokoja (which is about 20kilometre away from the study area) for treatment.

Figure 1 examines accessibility of the health care facilities in the study area. Majority of the respondents (95.2%) reported that the health care facilities in the study area are not accessible.

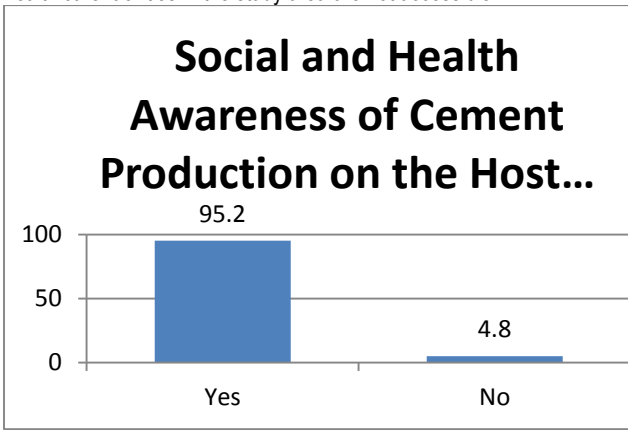

Figure I

However, from the data derived from the in-depth interview it was reviewed that there is inadequate health care facilities in the study area. Due to poor medical facilities at the primary health centres, most of the illnesses could not be clearly diagnosed. The medical staff informed that their classification of these illnesses was based on the symptoms observed from patients. In some cases, community members with severe health cases were referred to more equipped hospitals away from these. Therefore, it is possible that number of cases for complicated illnesses could have been more than what was recorded by the clinics.

Table IV: Health Care Centres in the Study Area

Health Care Unit	Obajana	Oshokoshoko	Iyo-Iwa	Apata-Oworo	Total
Primary Health care	3	1	1	0	5
Secondary Health care	1	0	0	0	1
Tertiary Health care	0	0	0	0	0
Clinics & Dispensaries	5	2	2	1	10
Total	8	3	3	1	15

Social and Health Assessment

Cement production at various stages is accompanied by the release of dust and chemical substances to the environment (Abdul-Wahab, 2006). These chemical substances play negative effects on the health of workers and population of most communities. The study identifies key parameters on the likely impacts of cement production on Obajana communities. Table 6 shows the Likert-format of inquiry. Obajana, Oshokoshoko, Iyo-Iwa and Apata –Oworo community responded to the likelihood of these listed impacts. The communities affirmed to severe impacts of cement production to their health. According to respondent the cement impact is mostly felt in Obajana community (43.3%) which is the host community to the cement factory. The least felt community is Apata Oworo (16.5%) which is about 2km away from the production site.

It was also understood that high incidence of airborne diseases are recorded within the study area. Although the trend of occurrence of medical cases appears rather fluctuating, these ailments recorded are largely airborne and have been linked to pollutants possibly arising from activities around plants as proven in other studies by Ikoy et al. 2007, Meo 2003 and Akeem 2008.

Table 5 revealed the medical records cases of the primary health care centres, clinics and dispensaries in the study area for one year (2021). Table 5 shows the numbers of people with different kinds of ailment recorded in the study area. It was reported that within one year of data collection about 37.4% of residents in the four communities had malaria,23.3% had severe headache, 1.5% skin diseases, 0.6% Stomach colon, 20.5% Respiratory disease while 12.1% and 6.2% cases of typhoid and other different types of ailment that was not recorded in the study.

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Table V: Incidence of Disease in the study area

Diseases	Frequency	Percentage
Incident of Malaria	315	37.4
Severe Headache	112	13.3
Skin disease	13	1.5
Stomach and colon	5	0.6
Respiratory disease	173	20.5
Infection	71	8.4
Typhoid	102	12.1
Others	52	6.2
Total	843	100

Statistical Analysis of Social and Health Impacts

Table 6 presents the summary of the raw data collected from the field survey. The raw data is further subjected to One sample T-test. Table 7 shows one sample statistics of table 6. The tables shows the mean value (50.00), standard deviation (25.63) and standard error of mean (9.06). The result of the one sample test shows the degree of freedom at 7 and t-calculated value at -38.617 while the p-value is 0.000. Similarly, our p-value (0.00) from the test statistics is less than 0.05 which shows that the data is statistically significant. Hence, there is significant relationship between cement production and social and health impact of the people in obajana communities.

Table VI. Socio and Health Impact of Obajana Cement

Social And Health * Obajana Communities

Count

		Obajana Communities				
		Obajana	Oshokoshoko	Iyo-Iwa	Apata-Oworo	Total
Social And Health	Provision of Health care centre	9	5	2	0	16
	Subsidy on drugs	36	21	10	3	70
	Free medical operation services	39	27	8	6	80
	Health Awareness	17	12	8	5	42
	Creation of Schools and materials	23	18	15	14	70
	Good road network	5	3	1	1	10
	Provision of Electricity	18	15	12	9	54
	Provision of Employment Opportunity	26	18	10	4	58
Total		173 (43.3%)	119(29.8%)	66(16.5%)	42(10.5%)	400

Table VII: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Health	8	50.0000	25.63480	9.06327

Table VIII: One-Sample Test

	Test Value = 400					
					90% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Health	-38.617	7	.000	-350.00000	-367.1711	-332.8289

Conclusion

The result of the test statistic (P-value 0.00) shows that there is significant relationship between cement production and its associated social and health impact on the people in obajana communities. Obajana community recorded the highest socio and health impact of cement production (43.3%). A significant proportion of the sampled population and clinic records revealed increasing cases of malaria within the study area. Malaria alone account for 37.4% of the incidence of disease in the study area. Additionally, there are health related problems at the host

communities that were not properly documented, let alone attempting a resolution process. From the result of the study, table four shows that only one public health centre is found in one of the communities in the study area and hence the conclusion that health of the people in that area are adversely affected by the cement production. A total of eight hundred and forty three (843) cases of incidences of sickness and diseases were recorded in the study area for a period of one year as shown in table five. Hence, the prevailing environmental and socio-economic conditions at the study area would, as a matter of practicality, require the attention and willed intervention of the Federal and State tiers of government, with the LGA championing the process. This could require reformation backed by legislation, a process that could likely be delayed beyond a short term timeframe. In the meantime, short term measures could be instituted to relocate communities away from the immediate vicinity of the factory. Above all in the surrounding communities, there is a need for proper establishment and equipment of health care centres in the study area in other to facility and maintain a stable health status of the people in the study area.

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