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Effect of Environmental Pollution among Arable Farmers in Cement Production Area of Yewa North Local Government, Ogun State, Nigeria

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Abstract

*Pollution is a major risk to crop and animal production as well as human health. The air pollution from cement dust has been a major concern to sustainability of rural livelihoods. This study investigated effect of pollution among arable farmers in communities around Dangote cement plant in the study area. Primary data were obtained from 150 respondents through purposive and snowball sampling using structured questionnaire. Data were analysed using descriptive statistics and Cobb-Douglas production model. The results show that 70.7% derived their main income from farming and average farm size was 1.26 ha. Dust pollution was prevalent (78.0%) and the serious problems included low soil fertility (11.3%), abandonment of farmland (3.3%), low farm output/ failure (4.7%), stunting plant growth (10.7%), dust accumulation on crop/ vegetation (18.0%) and water pollution (7.3%). The most persistent infliction was cough/catarrh affecting 48.7% whereby 29.3% attended hospital, 8.7% used herbal drug while 10.7% received no treatment. Inferential analysis shows that arable crop production was si***24 | P a g e *gnificantly affected by dust pollution ($p<0.10$) among other variables including age ($p<0.05$), formal education ($p<0.01$), farm size ($p<0.01$), seed planted ($p<0.10$), fertiliser ($p<0.01$) and agrochemical ($p<0.01$). The coping strategies against pollution included use of nose masks (15.3%) while 40.0% farmers diversified to non-farm jobs. Therefore, social responsibility from the cement factory should include effective distribution of fertilizer and healthcare services to the farmers at affordable rate while Government should monitor pollution and air quality control in order to reduce environmental hazard.*

Key words: Pollution, Cement dust, Arable farming, Soil fertility, Perceived health

Introduction

Nigeria offers the highest growth opportunity in cement production in Africa. The country possesses the largest cement industry within West Africa, with a minimum of 12 registered companies amounting to a total production capacity of 58.9 metric tonnes per annum while Dangote Cement factory is the largest producer in the region. It is producing more than 28.5 metric tonnes per year (Ojo and Guntimehin, 2017). Hence, the Nigerian cement industry is now export-thriving within Africa. Annual cement production increased significantly by more than 1300% from about 2 million tonnes in 1990 to more than 28 million tonnes in 2013 (Etim, Babaremu, Lazarus and Omole, 2021). Though, it was projected by the World Bank (2021) that the demand for cement is expected to increase with a population of over 211 million Nigerians and a growth rate of approximately 2.5% per annum. The federal government of Nigeria consumes the largest (50%) of cement in the country. In spite of the fact that industrialization and cement demand is an essential feature of economic growth, the pollution from cement factory has adverse effects on the environment with consequences of air and water pollutants and the disposal of hazardous wastes in open areas. It contributes to a regular and high number of health challenges faced by the host communities. The production affects existing land for agricultural practices; water body and emission of carbon monoxide destroy plants which result to stunt growth of farm produce (Ojo and Guntimehin, 2017).

Limestone and marble are the main minerals of cement production which releases carbon dioxide as a waste product during conversion into cement by heat. Thus, cement factory releases massive atmospheric pollution, soot molecules and dusty residues during cement production thereby triggering respiratory ailments and diverse diseases in humans as it also affects the surrounding vegetation, crop and animals. The soil, ambient air and surface water within the vicinity of a cement factory are seriously degraded with incidence of elevated concentrations of heavy metals in soils and plants (Warrah, Senchi, Fakai, and Daboh, 2021). According to Zivin and Neidell (2018), industrial air pollution alone reduces the labour's productivity and that by inference can be detrimental to crop production. Voicu, Ciobanu, Istrate and Tudor, (2020) stressed that cement production releases solid waste substances and gaseous pollutants into the environment and the dust particles are blown by prevailing winds to the neighbouring villages where they could initiate many health problems. The negative effects of mineral extraction on the environment including air, water and soil pollution, poor human and animal health, poor crop yields, and damage to buildings (Oyegbile, Olawoye, Oladeji and Oyesola, 2017). The extraction activities cause soil erosion and river silting, which eventually damage arable lands leading to loss of farm land, threaten underground and surface water and directly impair the environmental quality and ecosystems (Ming'ate and Mohamed, 2016). Air pollution caused approximately 38.3% crop losses annually due to significant decrease in crop yield. The crops that are susceptible to damage by air pollution include cucumber, cocoyam, yams, maize, okra, plantain, cassava, pumpkins and pawpaw and the situation may aggravate in the future (Ekiyor, Horsfall, Kalagbor and Egbara-Dedua, 2019).

The environmental impacts of cement production on surface water quality and vegetation around the vicinity of the industry revealed high concentrations of Ca and Fe which caused significant reduction in the chlorophyll contents of vegetations and a high incidence of upper respiratory tract infections, cardiovascular diseases, arthritis, and dermatitis among the cement factory workers (Agbede, Adeofun, Adetunji, Taiwo and Arowolo, 2022). The effects of the cement dust are also felt indirectly by man as it settles on dried foodstuffs, like rice, groundnut, maize, yam, flour, and dried cassava. The dust get absorbed by foodstuff when the moisture content is high thereby leading to contamination and various health problems including kidney damage and cardiac arrest, if consumed over time (Kabiru, Rufai, Lukman and Fatima, 2015). Bada, Olatunde and Olu-wajana, (2013) observed that air emissions in cement manufacturing are generated from the handling and storage of intermediate and final materials, and by the operation of kiln systems, clinker coolers, and mills and these processes release various pollutants into the environment, which give rise to ambient air pollution. These pollutants may alter the biodiversity of plants by directly covering the leaf surface and also have negative effects on human health (Oran and Zahra, 2014).

Therefore, there is urgent need to examine the effect of environmental pollution and associated risks among farming communities. This study aimed at investigating the effect of cement dust pollution on arable crop production and health of the farmers within the neighbouring communities of Dangote cement factory in Yewa Division of Ogun State. The specific objectives of this study are to: Describe the socioeconomic characteristics of the farmers and their farming system,; Assess the problems caused by dust pollution to farming and perceived health of the farmers; Estimate the effect of pollution on arable crop production among other farm inputs; and Identify the coping strategies adopted by the farmers against pollution in the cement production area.

Materials and Methods: The study was carried out in Yewa North Local Government Area (LGA) of Ogun State in the Southwestern Geo-political zone of Nigeria. The focus of the research was on the farming communities around Dangote Cement plant in Ibese town which was commissioned with 6.0Mta capacity in 2012 while the production was expanded to 12.0Mta in 2014 to serve the Southwest market in Nigeria and neighbouring countries in West Africa. The Yewa North LGA is located on 200,213.5 hectares which is the largest expanse of land with an estimated population of 312,700 among 20 LGAs in Ogun State (National Population Commission, 2022). The geographical coordinates of Ibese town are 6° 58' 0''North, 3° 2' 0'' East. Its geology and environs consist of thick limestone unit in several meters. The climate of the area falls under the hot and dry harmattan season, starting from November - March and the warm and wet season between April and October. Precipitation ranges from 1270 -1524mm, and annual mean temperature is 26.6°C. The vegetation of the area consists of the Guinea savannah with the climatic conditions that favour arable crop production while the inhabitants are mainly farmers, produce merchants/ traders and artisans.

Primary data were obtained from arable crop farmers using structured questionnaire. A two-stage sampling technique was used in selecting the respondents for interview. The first stage involved purposive sampling of fifteen (15) farming communities within Yewa North Local Government Area (LGA) based on proximity to the Dangote Cement factory namely: Ibese, Imashayi, Joga-Orile, Igan-Okoto, Ibooro, Sawonjo, Igbogila, Omilende, Abule-Oke, Aga-Olowo, Afami, Abule-Maria, Orimoloye, Ijako-Orile and Saala-Orile. In the second stage, a minimum of ten (10) arable farmers were selected from each community through a snowball sampling, depending on the size of the community. Subsequently, data analyses were based on complete questionnaires from one hundred and fifty (150) respondents.

Methods of Data Analysis : The statistical tools such as frequency, mean and percentage were used in describing socioeconomic characteristics of the farmers while the linear and Double-log production functions of the Cobb-Douglas model were adapted to capture the effects of pollution and other factors affecting arable crop farming in the area. The farm output was measured in maize equivalence which was estimated by dividing the total revenue by the unit price of maize output. The ordinary least square regression (OLS) model is specified as;

$Y = \beta_0 + \beta_i X_i$

$+ \mu_i$

The linear equation is given as;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + ... + \beta_9 X_9 + \mu$

When log-linearised, the double-log function becomes;

$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + ... + \beta_9 \ln X_9 + \mu$

Where,

Y= Quantity of arable crop harvested (kg)
X_1 = Age of farmers (year)
X_2 = Level of formal education (year)
X_3 = Experience in arable farming (year)
X_4 = Farm size cultivated (hectare)
X_5 = Quantity of seed planted (kg)
X_6 = Farm labour used (man-day)
X_7 = Quantity of fertilizer used (kg)
X_8 = Quantity of agrochemical used (liter)
X_9 = Dust pollution on farm (1, if serious; 0, otherwise)
μ = Error term

Results and Discussion: Socioeconomic characteristics of the respondents and their farming system: The descriptive statistics of the farmers and their farming system are presented in Table 1. The result shows that the age of an average farmer was about 52 years old. This implies that the farmers were agile to cope with traditional method of farming which was prevalent in the area. Majority of the farmers were male (88.7%), 11.3% were female, about 78.7% were married while 21.3% of them were single or once married. Marital status indicates possibility of access to family labour which is less expensive.

A vast majority (70.7%) of the respondents derived their main income from farming while 29.3% were primarily engaged in non-farm activities. About 38.7% had a maximum of primary education while 61.3% had, at least, secondary education. This result shows a higher literacy level among the respondents with an average of 24.5 years of farming experience. However, a long year of farming experience could enhance better coping strategies against pollution effect in order to achieve increased farm output. Majority (71.3%) cultivated less than 1.0 ha, 28.7% cultivated a minimum of 2.0 ha while the average farm size was 1.26 ha. This implies that the respondents were small-scale farmers, 78.0% of them confirmed the prevalence of dusty air pollution while 22.0% were not affected possibly due to long distance from the cement factory. Half (50.0%) of the farmers cultivated by seeds possibly for vegetables and cereals, 28.7% used stem cuttings usually for tuber crops while 21.3% used sets as major method of propagation maybe for yam/ cocoyam.

In addition, about 44.7% of them did not apply fertilizer either due to scarcity, unaffordable price or lack of skill while 55.3% used an average of 33.05 kg of fertilizer, which could be considered insufficient with respect to the average farm size (1.26 ha). Likewise, 46.0% did not apply agrochemical probably due to low literacy or inadequate finance. However, 54.0% of them applied an average of 2.14 liters of agrochemicals on their farms. The respondents (66.7%) acquired their farmland either by inheritance, borrowing or rent while only 33.3% owned the land through outright purchase. This is an indication of high level of land fragmentation, which could restrict commercial farming and full adoption of innovation in the area. The results also show that 26.0% did not belong to any group or association, 33.3% were members of cooperatives while 40.7% participated as members of informal finance group in order to access interest-free loan among the members in rotation.

Table 1: Characteristics of the farmers and their farming System (n = 150)

Characteristics	Class interval	Frequency	%	Mean
Age of farmer (year)	Below 40	29	19.3	
	40 - < 50	38	25.3	
	50 - < 60	71	47.4	51.69
	≥ 60	12	8.00	
Sex	Male	133	88.7	
	Female	17	11.3	
Marital status	Single	11	7.3	
	Married	118	78.7	
	Divorced	15	10.0	
	Widowed	6	4.0	
Major occupation	Farming	106	70.7	
	No-farm activities	44	29.3	
Education (years)	None	7	4.7	
	Primary	51	34.0	
	Secondary	71	47.3	
	Tertiary	21	14.0	
Farming experience (years)	≤ 10	46	30.7	
	11 - 20	85	56.7	24.51
	Above 20	19	12.6	
Farm size (ha)	< 1.0	107	71.3	
	1.0 - < 2.0	24	16.0	1.26
	≥ 2.0	19	12.7	
Prevalence of pollution	Yes	117	78.0	
	No	33	22.0	
Major source of planting	Seed/ seedling	75	50.0	
	Stem cutting	43	28.7	
	Set/ curb	32	21.3	
Fertiliser (kg)	No application	67	44.7	
	< 50	54	36.0	33.05
	50 - < 100	20	13.3	
	≥ 100	9	6.0	
Agrochemical application (litre)	No application	69	46.0	
	< 5	28	18.7	2.14
	5 - < 10	41	27.3	
Mode of land acquisition	Inherited	61	40.7	

	Rented	26	17.3
	Purchased	53	33.3
	Borrowed	10	6.7
Membership of association	Non-member	39	26.0
	Cooperative society	50	33.3
	Informal contribution group	61	40.7

Source: Field survey, 2023.

Effect of environmental pollution among the farmers : The responses on problems experienced in farming activities are presented in Table 2. The proportion of the responses revealed that the respondents were actually affected by dust pollution but the effect was not severe. About 11.3% was affected by serious low soil fertility. This result agrees with Lamare and Singh (2020) who found that soil fertility is affected by the deposits of cement dusts which reduced the water-holding capacity, moisture, organic carbon and nitrogen content of the soil thereby reducing its fertility. More so, 3.3% of the farmers abandoned their farmland probably due to pollution at a close proximity to the cement plant. This result is in line with Laniyan and Adewunmi (2020) who reported that deposits of dust particles on soil increase the heavy metal levels and pH which prevent water absorption resulting to poor drainage and soil erosion. About 4.7% of the respondents were seriously affected by low farm output or crop failure while 10.7% experienced stunting plant growth. Dust accumulation on crops/ vegetation was a serious problem among 18.0% of the farmers while 22.0% were also affected seriously by dusty air pollution. Meanwhile, 7.3% reported that there was serious water pollution. Thus, water is contaminated by dissolved minerals such as calcium, magnesium and other metals leading to hard water, which may be caused by erosion or dust pollution on water surface and it is toxic to man, animal and aquatic life.

Table 2: Distribution of farmers by problems associated with dust pollution (n=150)

Problems	Serious	Not serious	No occurrence
	F (%)	F (%)	F (%)
Low soil fertility associated with dust particles	17 (11.3)	86 (57.3)	47 (31.4)
Soil degradation	-	87 (58.0)	63(42,0)
Abandonment of farmland/ shifting cultivation	5 (3.3)	88 (58.7)	57 (38.0)
Low farm output/ crop failure	7 (4.7)	78 (52.0)	65 (43.3)
Stunting growth of Plants	16 (10.7)	80 (53.3)	54 (36)
Dust accumulation on vegetation	27 (18.0)	93 (62.0)	30 (20.0)
Dusty air pollution	33 (22.0)	92 (61.3)	25 (16.7)
Water pollution/ poor water quality	11 (7.3)	72 (48.0)	67 (44.7)

Source: Field survey, 2023

Perceived health conditions reported by the farmers: The responses of the farmers on their perceived health conditions associated with dust pollution is presented in Table 3. The proportion of responses shows that dust pollution affected the health condition of the farmers but the effect was not severe. Though, the most persistent ailment among the respondents was cough or catarrh among 48.7%. However, 29.3% of them claimed to seek medical care from hospital, 8.7% used herbal drug while 10.7% received no treatment possibly due to mild level of infection. This is followed by persistent fever/ high body temperature (30.0%) out of which 18.7% received hospital care while 11.3% adopted herbal treatment and sore throat (28.7%) for which 26.0% attended hospital while 2.7% sought herbal cure. The other categories of ailment reported by the farmers include respiratory allergies (22.7%), eye discomfort (14.0%) and diarrhea/ gastrointestinal infection, which may be cause by air pollution or consumption of polluted water. These results were corroborated by Gull *et al.*, (2013) who affirmed that the effects of industrial air pollution on physical environment are the same as any other pollution and harmful to the environment as well as human beings.

Table 3: Distribution of the respondents by their perceived health conditions (n=150)

Perceived health condition	Hospital care		Herbal care		No treatment		All affected	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Respiratory allergies	34	22.7	-	-	-	-	34	22.7
Cough/Catarrh	44	29.3	13	8.7	16	10.7	73	48.7
Sore throat	39	26.0	4	2.7	-	-	43	28.7
Persistent fever/ headache	28	18.7	17	11.3	-	-	45	30.0
Eye discomfort	21	14.0	-	-	-	-	21	14.0
Diarrhea/ gastrointestinal infection	14	9.3	-	-	-	-	14	9.3

Source: Field survey, 2023.

Effect of pollution on arable crop production in the area : The estimated effect of pollution and production factors on arable crop farming in the cement plant area is presented in Table 4. The Double-log was selected as the lead equation due the higher number of significant variables and adjusted R^2 (goodness of fit) which indicated that the explanatory variables in the model accounted for 66.5% of the factors affecting arable crop production in the area while exogenous variables (not specified in the model) were possibly responsible for the remaining 33.5%. The result revealed that age (-83.673) had a significant negative relationship with arable production at p<0.05 probably due to aging and drudgery of labour. Formal education (5.307) significantly promoted farm output at p<0.01 possibly due to higher skills which contributed to appropriate use of modern inputs. Farm size (18.243) had a significant positive effect on production of arable crops at p<0.01 showing that the soil sufficiently support plant growth as arable land. Seed planted (32.458) significantly increased arable crop production at p<0.10. This could be attributed to the use of improved and viable seed varieties. Fertiliser (17.225) and agrochemical (23.451) both significantly increased the production of arable crop in the area at p<0.01 implying the importance of fertiliser restoration of the soil fertility while the mixture of the agrochemical possibly washed of dust particles on the crops thereby promoting photosynthesis and increased farm output. The response of the farmers (4.201) indicated that dust pollution significantly affected the production of arable in the area at p<0.10.

Table 4: Estimates of Factors Affecting Arable Crop Production in the Area (n=150)

Variable	Coefficient	T-value	Std. Error	Coefficient	T-value	Std. Error
Constant	126.082**	2.511	50.204	404.132***	14.970	26.996
Age	3.396	0.486	6.985	-83.673***	5.378	15.558
Level of formal education	30.452*	1.690	22.222	5.307***	7.848	0.676
Farming experience	2.893	1.367	2.116	1.688	1.094	1.543
Farm size	11.136***	6.663	16.713	18.243***	4.465	4.086
Seed planted	34.523**	2.559	13.491	32.458*	2.341	13.865
Farm labour	18.196	0.067	2.711	14.225	1.618	8.791
Fertilizer used	44.157*	1.777	24.842	17.225***	8.791	1.959
Agrochemical used	-9.319	-0.491	18.975	23.451***	5.670	4.136
Dust pollution on farm	0.151***	3.601	0.421	21.799***	5.189	4.201
Goodness of fit (R^2)	0.631			0.678		
Adjusted R^2	0.577			0.665		
F- value	86.656***			28.101***		

Source: Field survey, 2023. *** Significant (1%), ** Significant (5%),* Significant (10%).

The coping strategies adopted by the respondents: Table 5 shows the coping strategies adopted against pollution by the respondents in the area. About 15.3% used face masks to prevent dust inhalation, 20.0% of the farmers cultivated early maturing crop varieties during the first planting season when intensity of rainfall was probably high to reduce dust accumulation. Another 8.0% reported that they planted drought resistant crops, 34.0% of the farmers reported that a pressure group was formed to request for compensation from the cement factory while 40.0% of them diversified into non-farm jobs secondary source of livelihood. A few (3.3%) among the respondents claimed that they ensured regular checkups in the hospital to reduce the effect of air pollution on their health.

Table 5: Distribution of Farmers by Adopted Coping Strategies (n=150)

Strategies	Frequency	%
Using face masks to protect nostrils against pollution	23	15.3
Early season cultivation/ planting of early maturing crops	30	20.0
Adoption of resistant/ improved crop varieties	12	8.0
Request/ enforcement of compensation by pressure group	51	34.0
Diversification into non-farm activities	60	40.0
Regular healthcare/ checkups	5	3.3

Source: Field survey, 2023

Conclusion and Recommendations: The findings of this study revealed that dust pollution from the cement plant had a significant effect on farm production which include low soil fertility due to dust particles, low farm output/ crop failure, dust accumulation on crops/ vegetation, stunting growth of plants while the farmers perceived the effect of dusty air pollution on their health conditions. However, cough or catarrh was the most persistent ailment affecting the farmers. Consequently, 40.0% of them diversified into non-farm jobs while 15.3% used nose masks to prevent dust inhalation. The result of inferential analysis also revealed that arable crop production was significantly affected by dust pollution, age of the farmer, formal education, farm size, seed planted, fertilizer and agrochemical.

Therefore, social responsibility of the cement factory should include distribution of fertilizer among food crop farmers at affordable cost to restore soil fertility to boost food production and farm income in the area. The farmers should adopt early season planting during the period that dust pollution could be reduced by rainfall. Meanwhile, the factory should adopt the use of pollution reducing technology in cement production. Agricultural policies by government and private stakeholders in the area should also focus on improving the healthcare services among the farmers in the surrounding communities. There should be distribution of nose marks free of charge to those with proves of respiratory allergies and cough/catarrh. Finally, the regulatory agencies of Government should monitor how effective environmental acts are implemented by the factory to control pollution and ensure air quality. This would help in reducing environmental hazard in the cement production areas.

References

Agbede O. T., Adeofun C. O., Adetunji M. T., Taiwo A. M. and Arowolo T. A. (2022). Environmental Impacts of Cement Production on Surface Water Quality Vegetation and Workers' Health, Research Square, 1-11.

Aragon, F. and Rud, J. P. (2012). Mining, Pollution and Agricultural Productivity: Evidence from Ghana. Discussion papers: dp 12-08, Department of Economics, Simon Fraser University, Canada.

Bada, B. S., Olatunde, K. A. and Olu-wajana, A. (2013) Air quality assessment in the vicinity of Cement Company. *International Research Journal of Natural*, 1(2):34-42

David and L. K. and Bodo, T. (2019). Environmental Pollution and Health Challenges of the Ogoni People, Rivers State, Nigeria. *International Journal of Advanced Research and Publications,* 3(2): 28-32.

Ekiyor, T. H., Horsfall, I. T.,Kalagbor, A. I. and Egbara-Dedua, B. A. (2019).Evaluating the Effects of Air Pollution on the Agricultural Yield of Selected Crops in Eleme. *Nigerian Journal of Applied Science and Environmental Management,* 23 (10): 1771- 1778.

Eta, H. C., Idiku, F. O. and Dan, U. N (2019): Perceived Effects of Quarry Activities on Arable Crop Production in Calabar Agricultural Zone, Cross River State, Nigeria. *Direct Research Journal of Agriculture and Food Science* Vol.7 (6), pp. 141-146.

Etim M., Babaremu K., Lazarus J., and Omole, D. (2021). Health Risk and Environmental Assessment of cement production in Nigeria. *Atmosphere.* 12(9): 1-16 *https://doi.org/10.3390/atmos12091111*

Gull N., Ali M, Y.N, Hussain, A. N, Nawaz R. and Mushta, S.K. (2013): Industrial Air Pollution and Its Effects on Human's Respiratory System, (A Sociological Study of Bhounshugar Mill District Jhang, Pakistan), *Academic Journal of Interdisciplinary Studies*. 2(3). 535-545.

Kabiru, S., Rufai, Y., Lukman, A. and Fatima, M (2015): Effects of Cement Kiln Dust on Some Selected Plants around Obajana Cement Factory. *J. Chem. Soc. Nigeria*, 40 (2): 63-66.

Lamare, R. E. and Singh, O. P. (2020). Effect of cement dust on soil physic-chemical properties around cement plants in Jaintia Hills, Meghalaya. *Journal of Environmental Engineering Research*, 25 (3): 409-417.

Laniyan, T. A. and Adewunmi, A. J. (2020). Evaluation of Contamination and Ecological Risk of Heavy Metals Associated with Cement Production in Ewekoro, Southwest Nigeria. *Journal of Health and Pollution*, 10 (25): 1-13.

Ming'ate F. L. M. and Mohamed Y. M. (2016). Impact of Stone Quarrying on the environment and the Livelihood of Communities in Mandera County, Kenya. *Journal of Scientific Research and Reports*, 10(5):1-9.

National Population Commission (2022). The Estimated Population of Nigeria, Abuja, Nigeria.

Ogedengbe, K. and Oke, A. O. (2011): Pollution Impact of Cement Production on Air, Soil and Water in a Production Location in Nigeria. *Journal of Science and Technology,* Vol. 31, No. 2, pp 46-56.

Ojo, O. O. and Guntimehin, A. S. (2017). Impact of Industrial Pollution on the Immediate Neighbourhood: A Case Study of Dangote Cement Ibese in Yewa North Local Govt. Ogun State. *International Journal of Engineering Science Invention*, 6 (9): 75–82.

Oran, J. O. and Zahra, M. B. (2014). Effect of cement dust pollution on physiological and biochemical activities of certain plants. *Pollution Research Journal*, 23(2): 375-378.

Oyegbile, S. A., Olawoye, J. E., Oladeji, J. O. and Oyesola, O. B. (2017). Vulnerability Of Rural Households to Risks Associated to Quarry Activities in Oyo State, Nigeria. *Nigerian Journal of Rural Sociology*, 17(2):92-101.

Voicu, G.; Ciobanu, C.; Istrate, I. A. and Tudor, P. (2020). Emission Control of Hydrochloric and Fluorhydric Acid in Cement Factories from Romania. *International Journal of Environmental Resources and Public Health*, 17:10-19.

World Bank (2021). The Falling Price of Cement in Africa. Development Economics, Development Research Group, Policy Research Working Paper 9706.

Warrah, M. M., Senchi, D.S, Fakai, I. M. and Daboh, U. M. (2021): Effects of Cement dust on Vegetation around Sokoto Cement Company. *International Journal of Environment, Agriculture and Biotechnology*, 6(1): 17-23.

Zivin, J. G. and Neidell, M. (2018). Air pollution's hidden impacts. *Science*, 359: 39-40.