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COMMUNITY PERCEPTION ON AIR POLLUTION AND PUBLIC HEALTH: A CASE OF EWEKORO AND REMO-NORTH COMMUNITIES IN OGUN STATE, NIGERIA

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ABSTRACT: *Air pollution has become an issue of concern in Nigeria with its consequent effects on human health. Hence, this study is an empirical investigation on community perception on the effect of air pollution on public health in Ogun State, Nigeria. The study was conducted in Ewekoro and Remo-North local government areas in Ogun State. The focus study area was Ewekoro as a result of the activities of LAFARGE Cement factory in the community. Primary data were used for the study. A total of 200 structured questionnaires were distributed to respondents through systematic random sampling techniques to elicit information on air pollution and health. Both descriptive and inferential statistics were used for the analysis. Results from the study show that the people are fully aware of air pollution, and there is prevalence of air pollution in Ewekoro which is largely caused by the activities of LAFARGE Cement. The findings show that air pollution has a significant negative effect on public health. Also, health risk associated with air pollution has a significant negative relationship with public health.*

KEYWORDS: Air pollution, public health, Ewekoro, LAFARGE Cement

INTRODUCTION

Air pollution has been considered as one of the major environmental and public health concerns in the world today. Both natural and anthropogenic (man-made) activities affect the quality of the natural environment which in turn poses great threat to the health of the public and the entire ecosystem. The constant activities of man such as burning and clearing of bush, agricultural and industrial activities in the quest for development result to pollution emission. This degrades the natural environment and adversely affects the human health, animals and vegetation (Konstantinos et al, 2015).

Nigeria is classified among the countries in the world with high level of air pollution. Four of its cities (Onitsha, Kaduna, Umuahia, and Aba) ranked worse among the cities with high level of air pollution in the world[1], while 12 of its cities have an annual mean of $PM_{2.5}$ above the World Health Organization (WHO) standard limit. Burning of fossil fuel, household burning of wood fuel for cooking, gas flaring, vehicle smoke emission, heap of refuse at various dump sites, industrial activities which emit hazardous chemicals into the atmosphere, among others contribute to air pollution in the country.

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Possible health implication of ambient particulate pollution in Nigerian cities include cough, catarrh, eye infection, asthma, chronic bronchitis and other cardiovascular diseases (Tawari, *et al.*,). A total of 30,435 cases of air pollution related diseases were reported in Rivers State between 2003 and 2008. Kano, Uyo and Calabar recorded urban air emissions beyond the safe limits which resulted to respiratory disorders, cardiovascular diseases, impairment and other debilitating air pollution related illnesses within these cities (Ajayi *et al.,* 2002). Globally, World Health Organization reported that household and outdoor air pollutions account for about 680,000 premature deaths which correspond to 76 deaths per lakh of population. The mortality rate attributed to household-air pollution and ambient-air pollution in Nigeria was 90 per lakh of population in 2012, which is higher than other countries in Africa (WHO, 2012).

The drive towards industrialization has led to the establishment of many heavy and light industries that generate high volume of air pollution in the country. Ogun State – one of the Nigerian states – is home to over 50 manufacturing industries; one of which is the LAFARGE Cement factory located in Ewekoro local government. Observable outcomes by the researchers of the production activities of LAFARGE Cement in Ewekoro community include cement dust, noise from machine operation, and vibration. Also, roof tops of houses, vegetation, land, road, and items sold in nearby shops are covered with cement dusts. In addition, the area has a low visibility view as a result of air pollution from cement dusts.

Cement dust contains lots of hazardous chemicals and heavy metals like chromium, nickel, cobalt, lead, and mercury, which are harmful to human health (Zerrouqi *et al*, 2008). Also, it is the major source of such particulate matter as SO_x, NO_x, and CO_2 emissions (Stanley *et al*., 2014). It therefore becomes dangerous for humans to be exposed to such air pollution. Thus, this study is carried out to determine community perception on the effect of air pollution on public health in Ogun State, Nigeria.

This study is justified in that it will give an insight into the issue of air pollution in the communities and its health implications on the lives of the residents. Also, the perception of the residents is critical in understanding their feeling about the incidence of air pollution as regards their health, and how this affects their lives and daily activities. Hence, from the outcome of the study, appropriate measures would be taken by relevant agencies and institutions to control and mitigate any adverse effect so as to improve the lives of the residents. Specifically, questions pertaining to community perception on air pollution level, health risks associated with air pollution, and public health will be answered by the study. This study is organized into five sections; the introduction, literature review, methodology, data analysis and discussion, and conclusion and recommendation.

LITERATURE REVIEW

Stanley et al (2014) collected and sampled soil inside the cement plant and from fields located 100m, 300m, 500m and 1 Km away from the cement plant. Soil samples were taken from a depth of 0-10cm and analyzed for physicochemical and microbiological properties. They adopted the Analysis of Variance (ANOVA) as statistical analysis tool. Their result showed that the levels of

heavy metals and pH inside LAFARGE Cement factory and adjourning areas were high. The levels of all the metals (Cr, Fe, Pb and Ni) except Zn were significantly high.

Oyetunde *et al*., (2014) conducted a study on societal perception of the corporate social responsibility (CSR) of LAFARGE Cement industry LAFARGE Cement in Ewekoro. They administered 1200 questionnaires to residents living in the community close of the company area. Data collected were analyzed using simple Percentages analysis and the hypothesis tested through Z score statistics at 0.5 % significance. The study found that there is a positive influence of CSR on promoting peace and harmony in the host community, and there is significant relationship between LAFARGE Cement CSR projects and community expectation. The study concluded that there should be social harmony and mutual sustainable development on the part of corporate organizations and their host communities, and also, there is imperativeness for a relationship management framework that will facilitate these environmental indices.

Aribigbola *et al.,* (2012) adopted empirical observation and interview of residents of the area. About 200 questionnaires were administered randomly on workers and residents. Their study revealed the prevalence of air pollution related diseases in their study with 19.7, 11, 13.9, and 5.2 per cents of respondents reporting asthma, heart diseases, skin cancer, and diarrhea, respectively. Based on coping with the activities of LAFARGE Cement industry and the pollution in the area, 86.6 per cent of the total respondents prefer to live with the effects of the pollution, while 1.7 per cent would prefer to take to protest. Majority of the respondents would prefer to live in the air polluted area due to various reasons such as economic, family ties and psychological attachment to the community (Aribigbola *et al*., 2012). Another study conducted by Otti *et al.,* (2014) on the environmental health effects of exposure to air pollution in industrialized area found that air pollution has caused twice as many deaths from heart disease as it does from lung cancer and other respiratory ailments.

In the Niger Delta region, there is high level of direct exposure to oil in their environment. Exposure metrics were found to be significant predicators of health effects influencing factors (Jerome *et al.*, 2006). The study documents high levels of disease symptoms and environmental distress associated with oil pollution in the Niger Delta. Empirical investigation was carried out by Thaddaeus *et al.,* (2013) with focused on community perceptions of air pollution and related health risks in Nairobi Slums (Korogocho and Viwandani villages). About 55 per cent of the respondents in Viwandani reported industrial activities as a major source of air pollution. Cough/cold, difficulties in breathing, headache and eye problems were the most common health risks related to air pollution. Also from the study, the average score of perceived air pollution level was 46.9 in Viwandani and 41.4 in Korogocho. The average score for perceived level of health risk related to air pollution was 43.6 in Viwandani and 44.6 in Korogocho (Thaddaeus *et al.*, 2013). The conclusion on their findings was that perceived air pollution level and related health risks in the study community were low among the residents indicating the need for proper sensitization and more awareness in the slums.

METHODOLOGY

Area of Study

This study was carried out in Ogun State, South-West Nigeria, with a focus on Ewekoro and Remo-North local governments. The choice for the two local governments was as a result of the presence of LAFARGE Cement factory situated in the former and the proximity of the later to the former. Ewekoro is a rural community which falls within the tropical lowland rainforest with its people majorly engaged in farming and craftsmanship, while the people of Remo North are mainly farmers.

Data Collection and Sources

Data was obtained from respondents through well-structured questionnaires. These were self-administered to the respondents in Ewekoro and Remo North local governments to elicit information which was used for the study. The questionnaire contains some questions adapted from Thaddaeus *et al.,* (2013) on the perception of respondents on the activities of LAFARGE cement factory, air pollution, and health risk of air pollution.

Sampling Technique and Sample Size

A multi-stage sampling procedure was used for the study to select respondents from the targeted population in the study area. In the first stage, a purposive sampling was used to select Ewekoro and Remo-North local government areas in Ogun State. This was as a result of the presence and absence of cement factory in Ewekoro and Remo-North, respectively. Ewekoro serves as the research focus area while Remo-North serves as the research control area. In the second stage, 10 wards (villages) were purposively selected from the two local governments. This was as a result of proximity of the wards to the cement factory and the perceived effect of its activities on the villagers. In the final stage, systematic sampling was used to select 200 respondents from the two local governments for the study. This method has been adopted by different authors (Nwachukwu *et al*., 2002; Onyiloye, 2015; Ede *et al*., 2015). A total of 200 questionnaires were distributed to the respondents; however, only 187 (108 for Ewekoro and 79 for Remo-North) were valid and used for the study.

Air pollution is the independent variable while public health the dependent variable for the study. Questions and perception statements contained in the questionnaires such as the awareness of air pollution, prevalence of air pollution, contribution of the activities of LAFARGE Cement to air pollution, were used to capture air pollution variable. Public health was measured through information on the health condition of the people in relation to air pollution within a period of eight months – January to August, 2017. Respondents were asked to indicate from a list of 10 air pollution related sicknesses how frequently they or any of their household members have experienced them within the period.

Descriptive statistics was used to determine the frequency distribution, mean, standard deviation, and simple Percentage of the data. Inferential statistics such as Pearson Product Moment Correlation (PPMC), Chi-square, and t-test was used to test for the correlation of the variables and the hypotheses.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Respondents

Table 4.1 shows the distribution of socioeconomic characteristics of the respondents in Ewekoro and Remo- North Local Government. The finding shows that majority (38%) of respondents in Ewekoro are within the ages of 25 and 34 while majority (55.7%) of respondents in Remo-North are within the ages of 15 and 24. Respondents in Ewekoro were more of female (58.3%) than male (41.7%), while respondents in Remo-North were more of male (60.8%) than female (39.2%). Ewekoro local government seems to attract more of females who engage in petty trading to the casual factory workers working in the factories in the community. This could be the reason for the high proportion of females to males in the community. The result also indicates that 75 (69.4%) of the respondents in Ewekoro were married, 31 (28.7%) were single, and 2 (1.9%) were divorced. One the other hand, 62 (78.5%) of the respondents in Remo-North were single, 17 (21.5%) were married and none was divorced.

Majority (66.7%) of the respondents in Ewekoro local government indicated Secondary education as their highest educational qualification, while majority (58.2%) in Remo-North local government has OND as highest educational qualification. From this result, the respondents of the study could be said to be literate. This implies that the respondents in the study areas would have adequate understanding of the questions on air pollution and public health posed to them. A total number of 92 (85.2%) and 16 (14.8%) respondents in Ewekoro were employed and unemployed respectively, while 46 (58.2%) and 33 (41.8%) respondents in Remo-North were employed and unemployed, respectively. Respondents in both Ewekoro and Remo-North local governments have Petty-Trading as their major income activities with highest proportions of 46% and 24.1% respectively. This is in contrast with the finding of Stanley et al (2014) that residents of Ewekoro community are majorly farmers.

Table 4.1: Distribution of Socioeconomic Characteristics of Respondents in Ewekoro and Remo-North LGA

Variables	Ewekoro (n=108)		Remo-North(n=79)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Age Group (in years)				
15 – 24	27	25.0	44	55.7
25 – 34	41	38.0	22	27.8
35 – 44	21	19.4	7	8.9
45 – 55	13	12.0	4	5.1
55 – 65	6	5.6	2	2.5
Gender				
Male	45	41.7	48	60.8
Female	63	58.3	31	39.2

Marital Status				
Single	31	28.7	62	78.5
Married	75	69.4	17	21.5
Divorced	2	1.9	0	0.00
Educational Qualification				
No formal education	6	5.6	1	1.3
Primary	15	13.9	0	0.0
Secondary	72	66.7	13	16.5
OND	7	6.5	46	58.2
HND	4	3.7	7	8.9
BSc.	3	2.8	9	11.4
MSc.	1	0.9	2	2.5
PhD	0	0.0	1	1.3
Employment Status				
Employed	92	85.2	46	58.2
Unemployed	16	14.8	33	41.8
Income Activity				
Artisan	23	21.3	18	22.8
Civil Servant	4	3.7	4	5.1
Farmer	3	2.8	1	1.3
Fashion Designer	11	10.2	4	5.1
Petty-Trading	50	46.3	19	24.1
Nill	16	14.8	33	41.8
Years Lived in Community				
1 – 11	78	72.2	62	78.5
12 – 22	18	16.7	14	17.7
23 – 33	10	9.3	0	0
34 – 44	1	0.9	1	1.3
45 – 55	1	0.9	2	2.5

Source: Authors' Computation from Field Survey 2018**.**

Respondents' Awareness Level of Air Pollution

Table 4.2a shows the respondents' awareness level of air pollution in Ewekoro and Remo-North local governments. Respondents in Ewekoro indicated highest awareness level (100%) of air pollution with frequency and mean values of 108 and 1.00, respectively. Respondents in Remo-North community, on the other hand, mentioned Cigarette smoke (88.6%), Vehicle emission (82.3%), and burning of bush (81%), more often than other sources of air pollution. The awareness level of air pollution was ranked according to their various mean values. A Grand Mean (GM)

value of 0.76 (average of the sum of all the mean values for Remo-North) was obtained. Mean values greater than or equal to the GM were considered as high awareness while mean values less than the GM were considered low awareness level. Respondents in Remo-North have high awareness level on three out of the seven air pollution sources listed on the table with their degrees shown from the rank.

The summary of the awareness level of air pollution by the respondents in the two communities is presented on Table 4.2b. The summarized mean values of the both communities (1.00 and 0.84 respectively) were obtained by taking the average of the summation of all the mean values that are equal or greater than the GM (i.e., values ≥ GM). Similarly, the frequency and Percentage values were obtained through the same process. The summary table gives a clearer picture of the respondents' awareness level of air pollution, either high or low, at a glance. The result shows that both Ewekoro and Remo-North communities have high awareness level of air pollution from their mean values of 1.00 and 0.84, respectively, which are greater than the GM (0.76). This is in line with the finding of Aribigbola et al (2012) that respondents are highly aware of air pollution.

Table 4.2a: Respondents' Awareness Level of Air Pollution in Ewekoro and Remo-North LGA

Variables	**Ewekoro (n=108)**			**Remo-North (n=79)**		
	Frequency	**Percentage (%)**	**Mean ($\bar{X}$)**	**Frequency**	**Percentage (%)**	**Mean ($\bar{X}$)**
Cigarette smoke	108	100	1.00	70	88.6	0.89* (1st)
Vehicle emission	108	100	1.00	65	82.3	0.82* (2nd)
Burning of bush	108	100	1.00	64	81	0.81* (3rd)
Dust	108	100	1.00	59	74.7	0.75 (4th)
Odour of trenches	108	100	1.00	58	73.4	0.73 (5th)
Smoke from cooking fuel	108	100	1.00	55	69.6	0.70 (6th)
Industrial emission	108	100	1.00	53	67.1	0.67 (7th)

Source: Authors' Computation from Field Survey 2018. Grand Mean=0.76. *High Awareness≥0.76. Numbers in Bracket are Rank.

Table 4.2b: Summary of Awareness of Air Pollution in Ewekoro and Remo-North LGAs

Variable		**Ewekoro (n=108)**	**Remo-North (n=79)**
Awareness of Air Pollution	Frequency (*f*)	108	66
	Percentage (%)	100	76.7
	Mean ($\bar{X}$)	1.00	0.84

Source: Authors' Computation from Field Survey 2018. Grand Mean=0.76. *High Awareness =$\bar{X} \geq 0.76$

Respondents' Perception on Air Pollution in the Communities

Respondents' perception on air pollution in Ewekoro and Remo-North communities were evaluated through their responses to six perception statements (see Appendix II). The statements were on the scale of 5, 4, 3, 2, and 1 for 'Strongly Agree', 'Agree', 'Undecided', 'Disagree' and 'Strongly Disagree' respectively, majority of the respondents in Ewekoro 'Agree' to all the statements except statement four. On the other hand, majority of the respondents in Remo-North are in agreement with all the six statements (see Appendix II). Majority of the respondents in Ewekoro (88.0%) and Remo-North (49.4%) are in agreement that there is prevalence of air pollution in their communities. Responses from the six perception statements were aggregated and analysed to obtain an aggregate mean score, minimum and maximum values. This is to enable the categorization of the respondents into high and low perception on air pollution in the communities. Values equal to or greater than the aggregate mean score up to the maximum value were categorized as high perception, values less than the mean value down to the minimum value were categorized as low perception (Wolf et al., 2016; Liu et al., 1997; Lawrence, 1992).

From table 4.5, the maximum and minimum values obtained for respondents in Ewekoro are 9 and 30 respectively, with a mean score of 22.2. Respondents were grouped into 9 – 21 (low) and 22 – 30 (high). Majority (52.8%) of the respondents falls within the high category. On the other hand, the maximum and minimum values obtained for respondents in Remo-North are 11 and 30 respectively, with mean score of 20.7. Hence, respondents were grouped into 11 – 20 (low) and 21 – 30 (high), with 53.2 per cent of them in the high category. The result shows that majority of the respondents in both communities have high perception on air pollution. This result is in line with the findings of Oyinloye (2015) that respondents in Ewekoro community have high perception on air pollution.

Table 4.3: Category Analysis of Respondents' Perception on Air Pollution in the LGAs

Perceived Categories	**Ewekoro (n=108)**		**Remo-North (n=79)**	
	Frequency	**(%)**	**Frequency**	**(%)**
Low	51 (9 – 21)	47.2	37 (11 – 20)	46.8
High	57 (22 – 30)	52.8	42 (21 – 30)	53.2
Total	**108**	**100**	**79**	**100**

Source: Authors' Computation from Field Survey 2018**.** *(Mean score for Ewekoro = 22.23; Mean score for Remo-North= 20.77).*

Respondents' Emotional Distress on Air Pollution

Table 4.4 shows the distribution of emotional distress of respondents in Ewekoro and Remo-North local governments. The result shows that respondents in Ewekoro indicated stress (38%) as their highest emotional distress on air pollution, followed by anger (27.8%). Respondents in Remo-North indicated irritation (55.7%) as their highest emotional distress on air pollution. The finding is in accordance with the result of Jerome et al (2016) that many respondents indicated high emotional distress on air pollution. The finding further shows that respondents from both local governments have fear as lowest emotional distress on air pollution with 0.9% and 2% respectively.

Table 4.4: Respondents' Emotional Distress

Variables	Ewekoro (n=108)		Remo-North (n=79)	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Anger	30	27.8	7	8.9
Worry	17	15.7	9	11.4
Stress	41	38.0	17	21.5
Irritation	19	17.6	44	55.7
Fear	1	0.9	2	2.5

Source: Authors' Computation from Field Survey 2018.

Respondents' Perception on the Activities of LAFARGE Cement

Table 4.5 shows the category of the perception of respondents on the activities of LAFARGE Cement. Respondents were grouped based on their responses to six perception statements on the activities of LAFARGE Cement factory (see Appendix II). The statements were aggregated and analysed using the method explained earlier to enable the grouping into "high" and "low". Values equal to or greater than the aggregate mean score, up to the maximum value, were categorized as high perception, values less than the mean score to the minimum value were categorized as low perception. Table 4.5 shows the maximum and minimum outcome values, and the mean score obtained from the responses of respondents in Ewekoro as 30, 9 and 21.3 respectively. Respondents were grouped into 9 – 20 (low) and 21 – 30 (high). The result reveals that 59.3 per cent of respondents in Ewekoro have high perception on the activities of LAFARGE Cement factory in the community. On the other hand, maximum and minimum outcome values, and the mean score obtained from the responses of the respondents in Remo-North are 30, 12 and 19.8 respectively. Respondents were grouped into 12 – 19 (low) and 20 – 30 (high), with 50.6 and 49.4 per cents, respectively. Therefore, the result shows that in aggregate, the respondents in Remo-North have low perception while the respondents in Ewekoro have high perception on the activities of LAFARGE Cement in their communities. This could be attributed to the proximity of the cement factory to the two communities.

Table 4.5: Respondents' Perception on the Activities of LAFARGE Cement

Perceived Categories	Ewekoro (n=108)		Remo-North (n=79)	
	Frequency	**(%)**	**Frequency**	**(%)**
Low	44 (9 – 20)	40.7	40 (12 – 19)	50.6
High	64 (21 – 30)	59.3	39 (20 – 30)	49.4
Total	**108**	**100**	**79**	**100**

Source: Field Survey, 2018. *(Mean score for Ewekoro = 21.3. Mean score for Remo-North= 19.8).*

Hypothesis

$H_0$1: There is no significant relationship between the perception of respondents on air pollution level and public health.

The result reveals a significant relationship between the perception of respondents on air pollution level and public health 0.05 significance level (see Table 1). The null hypothesis is therefore rejected. This means that there is a significant relationship between the perception of respondents on air pollution level and public health in the study area. This implies that the people in the community feel that the level of air pollution in the area has substantial impact on their health. The result also shows a negative relationship which implies that the lower the level of air pollution the better the health of the people, and vice versa. The result conforms to the finding of Thaddaeus et al (2013) on the relationship between perception of air pollution level and health risk.

Table 4.6: There is no significant Relationship between the Perception of Residents on Air Pollution Level and Public Health.

	Public Heath		
Variables	**r**	**p-value**	**Decision**
Perception of Residents on Air Pollution Level	-0.178	0.015	S

Source: Authors' Computation from Field Survey 2018**.**
r = Correlation Coefficient; p = Level of Significance; NS = Not Significant.

$H_0$2: There is no significant relationship between the perception of respondents on health risks associated with air pollution and public health.

The result in Table 2 shows a significant relationship between the perception of respondents on health risks associated with air pollution and public health at 0.05 level; hence, the null hypothesis is rejected. This means that there exists a significant relationship between the perception of respondents on health risks associated with air pollution and public health in the study area. The result further reveals a negative relationship which implies that as the level of health risks increases as a result of increase in air pollution, health of the people deteriorates, and as health risks reduces, health of the people improves. Increase in air pollution as seen above deteriorates health. Increase in air pollution causes increase in health risks associated with air pollution which also deteriorates health. Hence, it can be inferred that health risks associated with air pollution affects public health adversely. This result is in line with the finding of Aribigbola *et al.,* (2012) and Oyetunde *et al.,* (2014).

Table 4.7: There is no significant Relationship between the Perception of Respondents on Health Risks Associated with Air Pollution and Public Health

	Public Heath		
Variables	**r**	**p-value**	**Decision**
Perception on Health Risks Associated with Air Pollution	-0.79	0.014	S

Source: Authors' Computation from Field Survey 2018**.**
r = Correlation Coefficient; p = Level of Significance; NS = Not Significant.

CONCLUSION AND RECOMMENDATION

The findings from the study show that residents in Ewekoro and Remo-North communities are aware of air pollution in their communities, and there is prevalence of air pollution in the communities. LAFARGE Cement factory is a major cause of air pollution in Ewekoro. Air pollution causes stress and irritation to the residents of Ewekoro and Remo-North respectively, and at such, affect their level of productivity. Air pollution related sicknesses are mostly reported by residents in Ewekoro than Remo-North. The study further reveals that air pollution has significant effect on public health, from the perception of the respondents, with a negative relationship. This, by implication, means that higher level of air pollution deteriorates the health of the people, while lower level of air pollution improves the health of the people. In addition, health risk associated with air pollution significantly relates to public health in opposite direction. Hence, high health risk means lead to deterioration of the health condition of the people. Strikingly, it has been established from the findings that air pollution affects public health negatively.
From the findings of the study the following recommendations are made:

i. Government and Non-Governmental Organizations (NGOs) should make concerted efforts to reduce the level of pollution in the community by sanctioning and restricting industrial activities which emit high level of pollution.
ii. Effort should be made by the government to reduce the health risks (exposures and contacts) associated with air pollution in the community and the state.
iii. There should be free medical care for people with air pollution related sicknesses in the community and the state at large.
iv. Government should design policies on social intervention that will be directed towards pollution-ridden communities so as to enhance their social inclusion and standard of living.

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Appendix I

Respondents' Perception on the Activities of LAFARGE Cement

Variables	Ewekoro (n=108)						Remo-North (n=79)					
	SA	A	U	D	SD	$\bar{X}$	SA	A	U	D	SD	$\bar{X}$
Activities of LAFARGE Cement Company are considered as satisfactory by the residents of this community.	7.4 (8)	15.7 (17)	6.5 (7)	13.9 (15)	56.5 (61)	**2.04**	20.3 (16)	21.5 (17)	36.7 (29)	11.4 (9)	10.1 (8)	**3.30**
The activities of LAFARGE Cement Company contribute to air pollution in this community.	48.1 (52)	45.4 (49)	3.7 (4)	1.9 (2)	0.9 (1)	**4.38**	12.7 (10)	16.5 (13)	48.1 (38)	21.5 (17)	1.3 (1)	**3.18**
The activities of LAFARGE Cement Company cause food/ water contamination in this community.	38.0 (41)	55.6 (60)	3.7 (4)	0.9 (1)	1.9 (2)	**4.27**	21.5 (17)	24.1 (19)	41.8 (33)	10.1 (8)	2.5 (2)	**3.52**
The activities of LAFARGE Cement Company worsen health condition of residents of this community.	36.1 (39)	56.5 (61)	4.6 (5)	2.8 (3)	0.0 (0)	**4.23**	7.6 (6)	26.6 (21)	41.8 (33)	19.0 (15)	5.1 (4)	**3.13**
The activities of LAFARGE Cement are dangerous to the health of residents of this community.	41.7 (45)	50.9 (55)	3.7 (4)	3.7 (4)	0.0 (0)	**4.27**	16.5 (13)	25.3 (20)	36.7 (29)	16.5 (13)	5.1 (4)	**3.32**
Residents of the community benefit from the activities of LAFARGE Cement.	12.0 (13)	15.7 (17)	4.6 (5)	1.9 (2)	65.7 (71)	**2.06**	21.5 (17)	27.8 (22)	32.9 (26)	8.9 (7)	8.9 (7)	**3.44**

Source: Field Survey, 2017.

SA=Strongly Agreed; A=Agreed; U=Undecided; D=Disagreed; SD=Strongly Disagreed

(Figures in Bracket are frequency while others are Percentages)

Appendix II

Respondents' Perception on Air Pollution in the LGAs

Variables	Ewekoro (n=108)						Remo-North (n=79)					
	SA	**A**	**U**	**D**	**SD**	$\bar{X}$	**SA**	**A**	**U**	**D**	**SD**	$\bar{X}$
There is prevalence of air pollution in this community.	8.3 (9)	88.0 (95)	1.9 (2)	0.0 0 (0)	1.9 (2)	**4.01**	19.0 (15)	49.4 (39)	20.3 (16)	7.6 (6)	3.8 (3)	**3.72**
Air pollution causes stress, worry and annoyance to residents of this community.	18.5 (20)	77.8 (84)	3.7 (4)	0.0 (0)	0.0 (0)	**4.15**	29.1 (23)	40.5 (32)	20.3 (16)	7.6 (6)	2.5 (2)	**3.86**
The level of air pollution is high in this community.	22.2 (24)	70.4 (76)	4.6 (5)	0.0 (0)	2.8 (3)	**4.09**	15.2 (12)	36.7 (29)	19.0 (15)	26.6 (21)	2.5 (2)	**3.35**
Air pollution causes visibility problem in this community.	3.7 (4)	9.3 (10)	18.5 (20)	2.8 (3)	65.7 (71)	**1.82**	17.7 (14)	25.3 (20)	24.1 (19)	21.5 (17)	11.4 (9)	**3.16**
Air pollution has contaminated vegetation of residents in this community.	22.2 (24)	70.4 (76)	3.7 (4)	1.9 (2)	1.9 (2)	**4.09**	17.7 (14)	30.4 (24)	25.3 (20)	20.3 (16)	6.3 (5)	**3.33**
Air pollution affects daily activities of residents in this community.	21.3 (23)	70.4 (76)	4.6 (5)	0.9 (1)	2.8 (3)	**4.06**	15.2 (12)	29.1 (23)	22.8 (18)	26.6 (21)	6.3 (5)	**3.20**

Source: Field Survey, 2017.

SA=Strongly Agreed; A=Agreed; U=Undecided; D=Disagreed; SD=Strongly Disagreed

(Figures in bracket are frequency while others are Percentages)

Appendix III

Air Pollution Related Sickness Experienced by Respondents

'Regularly (RE)', 'Seldom (SE)', 'Cannot Tell (CT)', 'Rarely (RA)', 'Never (NE)',

Variables	**Ewekoro (n=108)**						**Remo-North (n=79)**					
Frequency of the following air pollution related	**RE**	**SE**	**CT**	**RA**	***NE***	$\bar{X}$	**RE**	**SE**	**CT**	**RA**	**NE**	$\bar{X}$
Heart disease	7.4 (8)	11.1 (12)	12.0 (13)	0.9 (1)	68.5 (74)	**4.12**	12.7 (10)	8.9 (7)	16.5 (13)	6.3 (5)	55.7 (44)	**3.84**
Lung disease	6.5 (7)	12.0 (13)	18.5 (20)	0.0 (0)	63.0 (68)	**4.01**	5.1 (4)	15.2 (12)	20.3 (16)	7.6 (6)	51.9 (41)	**3.86**
Nose irritation	85.2 (92)	1.9 (2)	4.6 (5)	0.9 (1)	7.4 (8)	**1.44**	26.6 (21)	21.5 (17)	17.7 (14)	12.7 (10)	21.5 (17)	**2.81**
Cough	80.6 (87)	3.7 (4)	2.8 (3)	0.9 (1)	12.0 (13)	**1.60**	25.3 (20)	25.3 (20)	15.2 (12)	25.3 (20)	8.9 (7)	**2.67**
Difficulty in breathing	24.1 (26)	15.7 (17)	19.4 (21)	0.0 (0)	40.7 (44)	**3.18**	20.3 (16)	17.7 (14)	21.5 (17)	11.4 (9)	29.1 (23)	**3.11**
Cancer	8.3 (9)	1.9 (2)	18.5 (20)	0.0 (0)	71.3 (77)	**4.24**	6.3 (5)	12.7 (10)	26.6 (21)	7.6 (6)	46.8 (37)	**3.76**
Eyes problem	37.0 (40)	13.0 (14)	9.3 (10)	0.0 (0)	40.7 (44)	**2.94**	15.2 (12)	15.2 (12)	22.8 (18)	11.4 (9)	35.4 (28)	**3.37**
Asthma	21.3 (23)	3.7 (4)	8.3 (9)	0.0 (0)	66.7 (72)	**3.87**	15.2 (12)	12.7 (10)	22.8 (18)	7.6 (6)	41.8 (33)	**3.48**
Stomach disorder	52.8 (57)	11.1 (12)	6.5 (7)	0.9 (1)	28.7 (31)	**2.42**	16.5 (13)	21.5 (17)	17.7 (14)	22.8 (18)	21.5 (17)	**3.11**
Skin diseases	41.7 (45)	8.3 (9)	6.5 (7)	3.7 (4)	39.8 (43)	**2.92**	25.3 (20)	17.7 (14)	12.7 (10)	16.5 (13)	27.8 (22)	**3.04**

Source: Field Survey, 2017. Figures are in %, while figures in Bracket are Frequency

Distribution of Respondents according to Health Facility Visited for Treatment in Ewekoro and Remo-North LGAs

Health Facility	Ewekoro (n=108)			Remo-North (n=79)		
	Yes	**No**	**($\bar{X}$)**	**Yes**	**No**	**($\bar{X}$)**
Primary Health Centre	42 (38.9)	66 (61.1)	1.61	17 (21.5)	62 (78.5)	1.78
General Hospital	28 (25.9)	80 (74.1)	1.74	35 (44.3)	44 (55.7)	1.56
Specialist Centre	3 (2.8)	105 (90)	1.97	6 (7.6)	73 (92.4)	1.92
Chemist Shop	24 (22.2)	84 (77.8)	1.78	12 (15.2)	67 (84.8)	1.84
Traditional Centre	12 (11.1)	96 (88.9)	1.89	2 (2.5)	77 (97.5)	1.97

Source: Field Survey, 2017. Figures in Bracket are the % while Figures outside the Brackets are the Frequency