The Influence of Air Pollution on Academic Achievement of Secondary School Chemistry Students: A Case Study in Ibeno Local Government Area of Akwa Ibom State, Nigeria

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ABSTRACT

This study was carried out to investigate the influence of Air Pollution on Academic Achievement of Chemistry Students in secondary schools in Ibeno Local Government Area, Akwa Ibom State. To guide the study, four purpose of study, four research questions and four hypotheses were formulated. Expost factor research design was used for the study. The sample for the study consist of 250 SSII Chemistry students selected from five (5) Public Secondary Schools in Ibeno Local Government where Exon- mobil unlimited is located. Questionnaire was used as an instrument for data collection. T.test was used for data analysis. The results revealed that May/June West African Examination Council 2018/2019 indicates the poor achievement in Chemistry Results in Ibeno Local Government as compared to their counterpart in other part of the state. Research shows that learners often get ill because of the air they breath as result's of emittion of poisonous gases emitted from the multinational companies into the atmosphere which is termed as Air Pollution. Based on the findings of the study, it was recommended that government at all levels should establish laws which will prohibits multinational companies from situating companies in a learning environment to avoid bringing down the standard of education in our educational system.

KEYWORDS: Air Pollution, Academic Achievement, Chemistry Student, Ibeno Local Government Area

Introduction

Air Pollution has been link with a number of detrimental health effects for children, one of the main findings of recent medical, epidemiological and economic literature is that pollution has a positive and significant influence on student achievement. Air pollution has also been associated with new onset asthma, as well as other respiratory diseases, liver-lung function hay (mc Connell, Berhane, Gilliland, Islam, Guaderman, Arol, Mngolis and Peters, 2002). Another potential substantive but previously unappreciated effect of air pollution on children is diminished academic performance, presumably resulting in reduced human capital accumulation and reduced future earning.

There are four mechanisms by which pollution could affect academic performance (i) student absenteeism due to illness caused by pollution (ii) attention problem (iii) lack of

concentration (iv) direct negative effect of pollution on brain development (Currie, Haunshek, Kaha, Neidell and Rivkin, 2007). Air pollution is the degree to which air is not suitable enough for humans, animals or plants to remain healthy. Air pollution refers to those characteristics of an environment that impact the inhabitants' health, comfort and ability to perform. When air is not suitable or clean enough for humans, animals and plant, we say that the air is polluted. Ever since the discovery of oil in Nigeria in the 1950's, the country has been suffering the negative environmental consequences of oil development. The growth of the country's oil industry, combined with a population explosion and a lack of environmental regulation, led to substantial damage to Nigeria's environment especially in the Niger Delta Region the center of the country's oil industry (Nriagu, 2011). The country also faces environmental challenges from air pollution and desertification, with the encroachment of the Sahara Desert in North and severe air pollution in over crowded cities such as Kaduna, Lagos and Abuja (Okoro, 2012).

Chemistry is the scientific discipline which is involved with compounds composed of atoms, elements and molecules that is combinations of atoms: their composition, structure, properties, behaviour and changes they undergo during a reaction with other compounds. Concepts of chemistry as embedded in the Senior Secondary School Chemistry curriculum do not play a key role in modern world but requires a conducive environment for meaningful learning to be attained. Shager and Adey (2009) noted that growth incompetence of chemistry concepts demands that the air is free from pollutant. In a separate study conducted by Kinston (2012), it was noted that in area where the quality of health was hazardous among students and poor attitude towards teaching and learning. Kelechi (2011) pointed out that air pollutants was the single largest causes of poor academic performance among senior secondary schools in Kwara state.

This study intends to investigate the influence of air pollution on academic achievement of secondary schools chemistry students in Ibeno Local Government Area of Akwa Ibom State.

Statement of the Problem

The phenomenon of poor external results in Chemistry among senior secondary students in areas where the environment is degraded and their inability to be interested in the subject to understand most concept and to retain the concept taught to have them become a source of worry to successive government and major stakeholders in the education sector. Research shows that academic achievement in WAEC/NECO since 2015 till date across the region in where Air Pollution is seen to be visible has been discouraging, student's and teacher's in public secondary schools seems to be sick due to the poisonous substances the inhale, their body organ's gets easily damage as a results of air pollution. Teachers and learners finds it difficult to compete with their collegue in another Local Government Area where the Air is not polluted. This ugly trend instigated the researcher to find out the influence of Air Pollution on the Academic Achievement of Secondary School Chemistry student in Ibeno Local Government Area of Akwa Ibom State, Nigeria.

Purpose of the Study

The purpose of the study is to determine the influence of Air Pollution on the Academic Achievement of Secondary School, Chemistry Students in Ibeno Local Government Area, Akwa Ibom State. Specifically, the study sought to:

i. To examine the influence of air pollution on academic achievement in chemistry students in secondary schools in Ibeno Local Government Area.
ii. To examine the influence of air pollution on male chemistry students in secondary schools in Ibeno Local Government Area.
iii. To examine the influence of air pollution on academic achievement of female chemistry student in secondary schools in Ibeno Local Government Area.
iv. To examine the influence of air pollution on the overall enrolment of chemistry student in secondary schools in Ibeno Local Government Area.

Research Questions

i. What is the influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?
ii. What is the influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?
iii. What is the influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?
iv. What is the influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area?

Research Hypotheses

i. There is no significant influence of air pollution on academic achievement of Chemistry students in secondary schools in Ibeno Local Government Area.
ii. There is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.
iii. There is no significant influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.
iv. There is no significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area.

Significance of the Study

The research finding would be significant in the following ways:

i. It would serve as reference document for future researchers on related topics.
ii. It would guide curriculum developers to incorporate into the curriculum for teachers and learners to know the multiple effects of studying in an environment which is not free from pollutant.
iii. The recommendations of this research will help the educational sector to know why academic achievement in chemistry is poor in WAEC and measure's to be taken to guide against re-occurrences.

Research Methodology

The study was carried out in Ibeno Local Government Area of Akwa Ibom State to investigate the Influence of Air Pollution on Academic Achievement of Secondary Schools Chemistry student's in Akwa Ibom State.

Research Design

The design adopted for the study was an Expo-Facto research design that involves students as respondents.

Population of the Study

The population of the study comprised of all the SSII Chemistry students in Ibeno Local Government Area.

Sample and Sampling Technique

The population of two hundred and fifty chemistry students were randomly selected from five (5) public secondary schools located in Ibeno Local Government. Simple sampling method was adopted for the study.

Instrument for Data Collection

The instrument that was used for data collection was a questionnaire, the students were required to fill and submit. The instrument was called (Influence of Air Pollution on Academic Achievement of Chemistry Student in Secondary School (IAPAACSSS).

Validation of Instrument

The instrument was validated by 3 experts from the Department of Science Education, University of Uyo, Uyo.

Administration of Instrument

The instrument was administered to two hundred and fifty chemistry students selected from five public schools in Ibeno.

Method of Data Analysis

Data generated from the study were computed using simple percentage.

Results

The results of the data analysis for the study are presented in this section. The findings that emerged from the analyses are also presented as well as the discussion of findings. The presentation is done according to the four research questions and four hypotheses which directed the study.

Answers to research questions and hypotheses testing are done in this section

Research Question 1

What is the influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?

Table 1: Summary of Descriptive Statistics on the influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area (N=450).

Variables	Mean	SD	Difference
Influence of Air Pollu.	3.88	1.34	
			0.56
Academic Achievement	3.32	1.03	

The summary of the result presented in Table 1 indicated that the mean score influence of air pollution on academic achievement in Chemistry students in secondary schools is 3.88 and that of their academic achievement is 3.32, the mean difference between the two variables is 0.56 with students mean score on influence of air pollution leading.

Research Question 2

What is the influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?

Table 2: Summary of Descriptive Statistics on the influence of air pollution on male Chemistry on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area (N=450).

Variables	Mean	SD	Difference
Infl. of Air Pollu. on Male Stud.	3.72	1.52	
			0.40
Academic Achievement	3.32	1.03	

The summary of the result presented in Table 2 indicated that the mean score influence of air pollution on male students is 3.72 and that of their academic achievement is 3.32, the mean difference between the two variables is 0.40 with male students mean score on influence of air pollution having the highest.

Research Question 3

What is the influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area?

Table 3: Summary of Descriptive Statistics on the influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area (N=450).

Variables	Mean	SD	Difference
Infl. of Air Pollu. on Female Stud.	3.86	1.54	
			0.54
Academic Achievement.	3.32	1.03	

The summary of the result presented in Table 3 indicated that the mean score influence of air pollution on female students is 3.86 and that of their academic achievement is 3.32, the mean difference between the two variables is 0.54 with the mean of influence of air pollution on female students being the highest.

Research Question 4

What is the influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area?

Table 4: Summary of Descriptive Statistics on the influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area (N=450).

Variables	Mean	SD	Difference
Air Pollu. on Enrol. of Stud.	3.97	1.35	
			0.65
Academic Achievement	3.32	1.03	

The summary of the result presented in Table 4 indicated that the mean score influence of air pollution is 3.97 and that of their overall enrolment is 3.32, the mean difference between the two variables is 0.65 with the mean of air pollution on the overall enrolment of Chemistry students leading.

Hypothesis 1

There is no significant influence of air pollution on academic achievement of Chemistry students in secondary schools in Ibeno Local Government Area.

Table 5: t-test analysis on the influence of air pollution on academic achievement of Chemistry students in secondary schools in Ibeno Local Government Area (450).

Variables	Mean	SD	t-value	t-critical	df	Decision
Influence of Air Pollu.	3.88	1.34				
			3.27	1.96	448	Significant
Academic Achievement	3.32	1.03				

*** Significant at 0.05 alpha level**

Table 5 showed that the calculated t-value of 3.27 at 448 degree of freedom and 0.05 alpha level of significance is greater than the critical t-value of 1.96. The null hypothesis is therefore rejected. Hence, there is a significant influence of air pollution on academic achievement of Chemistry students in secondary schools in Ibeno Local Government Area.

Hypothesis 2

There is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.

Table 6: t-test analysis on the influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government (N=450).

Variables	Mean	SD	t-value	t-critical	df	Decision
Infl. of Air Pollu. on male Stu	3.72	1.52				
			0.74	1.96	448	NS
Academic Achievement	3.32	1.03				

NS = Not Significant at 0.05 alpha level

Table 6 showed that the calculated t-value of 0.74 at 448 degree of freedom and 0.05 alpha level of significance is less than the critical t-value of 1.96. The null hypothesis is therefore accepted. Hence, there is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.

Hypothesis 3

There is no significant influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.

Table 4.7: t-test analysis of the influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area (N =450)

Variables	Mean	SD	t-value	t-critical	df	Decision
Infl. of Air Pollu. on Female St	3.86	1.54				
			3.43*	1.96	448	Significant
Academic Achievement	3.32	1.03				

***Significant at 0.05 alpha level**

Table 4.7 showed that the calculated t-value of 3.43 at 448 degree of freedom and 0.05 alpha level of significance is greater than the critical t-value of 1.96. The null hypothesis is therefore rejected. Hence, there is a significant influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area.

Hypothesis 4

There is no significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area.

Table 8: t-test analysis of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area.

Variables	Mean	SD	t-value	t-critical	df	Decision
Air Pollu. on Enrol. of Stu.	3.97	1.35				
			3.26	1.96	448	Significant
Academic Achievement	3.32	1.03				

***significant at 0.05 alpha level**

Table 8 showed that the calculated t-value of 3.26 at 448 degree of freedom and 0.05 alpha level of significance is greater than the critical t-value of 1.96. The null hypothesis is therefore rejected. Hence, there is a significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area.

Discussion of Findings

In this study, four hypotheses were formulated to guide the study on the Influence of air pollution on academic achievement of secondary school Chemistry students in Ibeno Local Government Area of Akwa Ibom State.

Influence of Air Pollution on Academic Achievement of Chemistry Students in Secondary Schools.

The result of the first hypothesis which states that; there is no significant influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area revealed that there is a significant influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. This means that air pollution in Ibeno Local Government Area negatively influence students academic achievement in Chemistry as it will make learning environment uncomfortable for the students to learn due to their inability to breath good air. Many chemistry students may not even want to attain classes because of the type of air in the environment they learn and this will elude them of hearing what the teacher is teaching and it will indirectly affects their academic achievement. This findings in line with the assertion made by Albay (2017) who stated that air pollution affects the learning environment of students and thereby influences their academic achievements.

Influence of Air Pollution on Male Chemistry Students Academic Achievement in Chemistry Students in Secondary Schools.

The result of the second hypothesis which states that: There is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area revealed that there is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. This means that air pollution did affect the academic of achievement of male students in Chemistry as they endured the environment they found themselves and still took their studies serious by attending Chemistry classes and also carrying out other academic activities. This study is not in line with the study of Daniel (2019) who observed in a study to examine the influence of air pollution on academic achievement of students that air pollution negatively influences the academic achievement of both males and female students.

Influence of Air Pollution on female Chemistry Students on Academic Achievement in Chemistry Students in Secondary Schools.

The result of the third hypothesis which states that**:** There is no significant influence of female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area revealed that there is a significant influence of air pollution on female Chemistry students' academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. This implies that air pollution influences the academic achievement of female Chemistry students negatively as it makes the learning environment uncomfortable for the students through what they breath. This work is in line with observation made by Silas (2015) that air pollution does not promote the effective learning by the students.

Influence of Air Pollution on the Overall Enrolment of Chemistry Students in Secondary Schools.

The forth hypothesis which states that; There is no significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area revealed that there is a significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government Area. This means that air pollution influences the overall

enrolment of students as parents will not find it comfortable to enroll their children in school environment that is affected by air pollution as this will negatively influence their academic achievement. This study is in line with the work of Wilson (2012) who stated that one of the negative effects of air pollution in a school environment is its decreasing effects in student's enrollment.

Conclusion

Based on the data collected and analyzed in the study, it could be concluded that:

There is a significant influence of air pollution on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. There is no significant influence of air pollution on male Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. There is a significant influence of air pollution on female Chemistry students on academic achievement in Chemistry students in secondary schools in Ibeno Local Government Area. There is a significant influence of air pollution on the overall enrolment of Chemistry students in Ibeno Local Government

Recommendations

The following recommendations were made based on the findings of this study

1. The Akwa Ibom State Ministry of Education and State Secondary Education Board should henceforth Site secondary schools at environments that will not be disturbed by air pollution.

2. State government should bring those policies that will discourage pollution of air

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