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Kampala International University ISSN: *2415-0843*; 3(1): 265–272

Precipitation, High Temperature and Global Warming as Correlates of Students' Academic Performance in Public Secondary Schools in Igbokoda Local Government Area of Ondo State.

BOLAJOKO F. OJENIYI, OLUWATOSIN E. AKINSUROJU
Federal University, Oye-Ekiti, Ekiti State, Nigeria.

Abstract. This study was carried out to determine how climatic or aerial factors exert influence on students' academic performance in Public Secondary Schools in Igbokoda Local Government Area of Ondo State. A descriptive survey research design was adopted for the study. Simple random sampling technique was used to select twelve 12 (67%) public secondary schools out of the 18(100%) public secondary schools in the Local Government Area. Stratified proportional random sampling technique was used to select 567 (34.2%) SSS 2 students from the population of 1,640 which make up of the 12 selected public secondary schools. The data collections for the study were two instruments; Precipitation, High Temperature and Global warming Questionnaire (PHTGQ) and Students' Academic Performance Questionnaire (SAPQ) that gave r'= 0.81 and 0.75 respectively. Five null hypotheses formulated were tested at 0.05 level of significance.

Finding however indicated that Precipitation, High Temperature and Global Warming have significance relationship with students' academic performance ($r = 0.838$, $P<0.05$), ($r = 0.475$, $P< 0.05$) and ($r = 0.452$, $P < 0.05$) respectively. Findings also revealed that each of the independent variables covered in this study have individual effect on students' academic performance ($R^2 = 0.18$, $P<0.05$). Findings finally shown that there is a joint or composite significant effect of independent variables on students' academic performance ($F = 483.03$, $P< 0.05$). Based on the above findings, some of the recommendations made include; there should be adequate sensitization and mobilization of both the students and stakeholders in education on the common ways of controlling erosion thudding. Children should be immunized against preventable diseases that come with climate change and should not be allowed or be exposed to heat. Curriculum developer should include environmental education in the curriculum of all levels of education system.

Keywords: Precipitation, High Temperature, Global Warming, Academic Performance.

1. Introduction

The expectation of all the stakeholders of education system is for the students to have good academic performance. Education has been described as the bedrock of development of any nation (Ijaduola, 2004). A nation that fails to provide education for her citizens is surely treading on a dangerous path. A cursory look at happenings in our educational system today in Nigeria, most especially in secondary schools reveal a dismal situation under which teachers and students perform daily tasks. Researches have equally shown greater interest in knowing what factors influence high or low academic achievement/ performance in school examinations, and why some schools performed better than others that are of the same status and even within the same geographical area. It was

in view of this that Adesina (2000: 18) observed that there is a clear impression all over Nigeria that the quality of education in the country has fallen.

However, the environment has been the focus of attention in contemporary times, due largely to the increasing outcome of human interaction with the earth's physical environment. One critical component of the earth's system that is rapidly changing at the present time is the global climate (Ayoade, 2003). Issues such as global warming, Precipitation (rainfall), High Temperature (hot weather) etc have consequently emerged as subjects of critical concern at both global and local scales. Global warming is mostly due to man-made emissions of greenhouse gases, mostly Co_2. Over the last century, atmospheric concentrations of carbon-dioxide increased from a pre-industrial value of 278 parts per million to 379 parts per million in 2005, and the average global temperature rose by 0.74%. according to scientists, this is the largest and fastest warming trend in the history of the earth (UNFCCC, 2007).

Human influence on climate has been detected in surface air temperature, sea level pressure, free atmospheric temperature, and ocean heat content. Also, anthropogenic forcing has had a detectable influence on observed changes in average precipitation within latitudinal bands, which cannot be explained by internal climate variability or natural forcing (Zhang, et al, 2007). Studies have suggested that human-influenced global warming may be partly responsible for recent increases in heavy precipitation (Trenbeth, 2007, Min and Zhang, 2011). Through its varied impacts, global warming will directly affect all regions and countries of the world.

It has been observed that the effect of some elements of climate is now in dynamic forms. For instance, sunshine has been so serious and hot these days which causes abnormal heat here and there, rainfall also at its extreme as we experience floods where not in some decades past, effects of high temperature and pressure also pose some problems to our schools, even the student academic performance. Though researches carried out in this area of climatic change and students' academic performance is scarce. Therefore, the study would expose other researchers and scholars' works on the effect or influence of aerial or climatic change on students' academic performance.

2. Review of Related Literature

2.1 Precipitation (Rainfall) and Students' Academic Performance.

It is heavy rainfall that results into floods. Some climate models simulations of precipitation trends for West Africa provide evidence that wetter than average season will dominate Southern Nigeria and Western Cameroon during the twenty-first century (Ayoade, 2003). These models also predict increased rainfall intensity during the peak rainfall months of August, September, and October in the future. Increased occurrence of extreme rainfall events increases the probability of flood occurrence. Milly, et al (2002) noted that the intensification of the global water cycle expected under climatic change is likely to lead to an increased threat of riverine flooding from high rainfall over catchments. Economically, this will affect commercial activities like trading, marketing and even education where some schools are over-logged and students with their teachers would find it difficult to carry out teaching and learning activities. For example, Abeokuta floods of 2007 which claimed some school buildings (Adelekan, 2011).

According to Adelekan (2011), over 1500 persons were rendered homeless in Abeokuta town in 2007 flood, while about 500 houses and up to 100 vehicles were ravaged. Students of most school could not go to school. More than 1000 people were moved into temporary shelters at local schools. These were the schools that were not affected by the floods. Then, when these schools were subjected to house the victims of this disaster, how could teaching and learning go on in the schools that were seeing as shelters? Some students ceased this opportunity to run away from schools. Some of these schools allowed children of school age to join some classes in order to continue with their studies since some parents came to beg for their wards' temporary admission and this resulted to population explosion. Then, teachers could not have good classroom management and control.

From the researchers' point of view, cases of precipitation or excessive rainfall will surely resulted to flooding which will eventually paralyzed economic and social activities (including educational activities) in any state or country of occurrence. When teaching and learning activities are hampered by precipitation, definitely it will affect performances of students either in internal or external examinations.

2.2 High Temperature (Hot Weather) and Students' Academic Performance.

The impact of climate change is calamitous given that it is accountable for most of the disasters witnessed in the world in recent times. The educational system is not exceptional. Hot weather poses a lot of challenges to teaching and learning. As the season of hot weather approach, it is essential for educators to have up-to-date relevant teaching materials that present the basic concepts in ways that stimulate students' interest. It is important to recognize that students as well as teachers often have misconception about global climate that can negatively impact the construction of new knowledge. By understanding these misconceptions, teachers are in a better position to devise strategies for successfully addressing them in the classroom. Although, the challenges to teaching and the complexity of high temperature (hot weather) offer a discourage opportunity to students in higher thinking skills and in an inter-disciplinary and multi-disciplinary analysis of issues.

Kaushik (2008) opined that within 10,000 years of the current interglacial period, the mean temperature fluctuated by 0.5 to 1c, over a 100-200 years period. This stable climate for thousand of years helped in teaching and learning and increased students' enrolment. Kaushik further that, every high temperature usually disturbs the learning habits of students which lead to poor academic performances within the system. Burnham (1990) is also of the opinion that hot weather is difficult to handle because of the nature of the knowledge, skills and attitude of those things involved in the educational changes occasioned by climate change. Researches have also shown that hot weather seriously have implications on effective classroom organization because under any serious and harsh weather, the entire classroom is affected, either the students are sick or the classroom will be too hot, thereby stopping any activity in the classroom, including teaching and learning process.

The researchers agreed with Okoroafor (2009), that hot weather has direct and indirect impacts on human health, which includes heat stress and potential injury on both human beings and education activities. The result of the climate change according to World Health Organization (2001), caused different diseases such as high rate of minispectis, typhoid, measles, high fever and general hotness of the body. With respect to the school system, students who are exposed to these diseases causes either by the coldness or hotness of weather will not be effective because, this will affect their lives and health. And where this happened it will automatically affect the level of performances(academically) of students in schools.

Researches also find out that most classrooms in both urban and rural areas have leaking roofs, cracked walls and many, without ceiling, doors and windows indicates that students are exposed to extreme cold during the harmattan and extreme heat during the dry season. Also, many classrooms in urban areas are overcrowded and without fans. All these lead to restlessness, loitering and lack of concentration by students which invariably lead to poor performance.

2.3 Global Warming and Student Academic Performance.

In the last two decades, the issue of global warming had become topical issue worldwide. Global warming is referred to as the progressive rise of the earth's surface temperature thought to be caused by greenhouse effect. It is known to be responsible for changes in global climate (Ecobridge, 2001). The climatic consequences of global warming if not checked according to Ayoade (1995) include rise in the sea level and consequent inundation of costal gases as a result of thermal expansion of ocean water and melting of polar ice and glaciers. As stated by Ecobridge (2001), that would be triggered off by high temperature.

The educational implication of climate change cuts across every facet of education beginning from primary to the end of education. Okeke (2010), stated that the teaching of science has been relatively stable with occasional modifications and innovations but with climate change, major modifications will emerge. In the natural sciences, curriculum will alter to suit emerging knowledge, in technological construction procedure will now alter from what is previously known and assumed, curriculum will also alter with emerging knowledge while in general education studies, teaching methods will also vary with emerging facts and levels of teaching.

The effects of global warming are enormous and consequently affect the students' academic performance. As a result of this negative effects on student' academic performance, there is need to learn the effects of global warming observed around them and in other places and those projected to occur in the future. As the traditional methods of teaching which are largely based on the transmission of knowledge are inappropriate as they do not help pupils apply the knowledge to real life situations (Okeke, 2010).

3. Statement of the Problem.

Nigeria desires good education programme with high standard of academic performance of students as the citizens. The same applies to Igbokoda Local Government of Ondo State in Nigeria. The problem of precipitation, high temperature and global warming seem to remain unabated and still constitute impediment to achieving healthy educational system in Nigeria. The climatic change or aerial factors in Igbokoda Local Government Area of Ondo State could affect teaching and learning process. It is therefore the desire of the researchers to find out correlational effects of precipitation, high temperature and global warming on students' academic performance, since some schools are in a state of disrepair and some are being affected by rainstorms, floods and so on.

4. Purpose of the Study

The following purposes were set for the study:

- to identify the climate which is friendly to good academic performance of students.
- to identify whether excess or moderate rainfall promotes good academic performance of students.

5. Hypotheses

The following hypotheses were formulated and tested:

HO_1: There is no significant relationship between precipitation and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

HO_2: There is no significant relationship between High Temperature and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

HO_3: There is no significant relationship between global warming and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

HO_4: There is no significant relative contribution of each of the independent variables (precipitation, High Temperature and global warming) on students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

HO_5: There is no significant joint contribution of the independent variables (precipitation, High Temperature and global warming) on students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

6. Methodology

This study adopted the descriptive survey research design which is a technique that is widely used for empirical research in education. The target population for this research work was SSS 2 students in all the public secondary schools in Igbokoda Local Government Area of Ondo State. Simple random sampling technique was used to select 12 (67%) public secondary schools out of the 18(100%) public secondary

schools in the Local Government Area. Stratified proportional random sampling technique was used to select 567 (34.2%) SSS 2 students from the population of 1,640 which make up of the 12 selected public secondary schools. The data collections for the study were two instruments; Precipitation, High Temperature and Global warming Questionnaire (PHTGQ) and Students' Academic Performance Questionnaire (SAPQ). The former, which is Precipitation, High Temperature and Global warming Questionnaire was a structured self-administered four point scale questionnaire that consisted of three sections to measure the effect that Cold weather, Hot weather and Global Warming will have on students' academic performance. While Students' Academic Performance Questionnaire (SAPQ) was aimed at measuring the overall and facets performance of SSS 2 Students in Two core subjects (English Language and Mathematics) in Igbokoda Local Government Area of Ondo State.

Validity of instrument was established by experts and some eminent educationist. Instrument reliability was established with a test-retest that gave 'r'= 0.81 and 0.75 respectively. The retrieved questionnaires were analyzed using inferential statistics (Pearson's Product Moment Correlation and Multiple Regression). This is to establish the relationship between pairs of variables and to determine the extent to which the combination of independent variable explains the dependent variable as well as the relative contribution of each of them to dependent variable, using 0.05 as level of significance.

7. Results and Findings

Hypothesis One: There is no significant relationship between precipitation and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Table 1: Correlation Analysis Result showing the relationship between Precipitation (Excess Rainfall) and Students' Academic Performance.

Variable	N	DF	Mean	SD	R	P- Value	Remark
Precipitation	523	521	19.26	2.75	0.838	0.001*	Sig.
Students'Academic Performance.	523		60.65	5.46			

*Significant at 0.05 level of significance.

Table 1 reveals that there is a significant relationship between Precipitation and Students' Academic Performance in Public Secondary Schools in Igbokoda Local Government Area of Ondo State.($r = 0.838$, $P< 0.05$). Therefore, the null hypothesis is rejected.

Hypothesis Two: There is no significant relationship between High Temperature and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Table 2: Correlation Analysis Result showing the relationship between High Temperature and students' academic performance.

Variable	N	DF	Mean	SD	R	P- Value	Remark
High Temperature	523	521	11.79	1.39	0.475	0.001*	Sig.
students' academic performance	523		60.65	5.46			

*Significant at 0.05 level of significance.

Table 2 shows the null hypothesis is rejected at 0.05 level of significance ($r = 0.475$, $P< 0.05$). Therefore, there is no significant relationship between High Temperature and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Hypothesis Three: There is no significant relationship between global warming and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Table 3: Correlation Analysis Result showing the relationship between global warming and students' academic performance.

Variable	N	DF	Mean	SD	R	P- Value	Remark
Global warming	523	521	11.91	1.32	0.452	0.001*	Sig.
students' academic performance	523		60.65	5.46			

*Significant at 0.05 level of significance.

Table 3 indicates that there is a significant relationship between global warming and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State ($r = 0.452$, $P < 0.05$). Therefore, the null hypothesis is rejected at 0.05 level of significance.

Hypothesis Four: There is no significant relative contribution of each of the independent variables (Precipitation, High Temperature and Global Warming) on students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Table 4: Estimate of Relative Contribution of Independent Variables on students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Model	B	Std. Error	Beta weight	Rank	T	P-Value	R^2	Remark
Constant	6.284	1.972	-		3.186	0.002	0.18	
Precipitation	1.461	0.039	0.738	1st	37.463	0.000		Sig.
High Temperature	1.085	0.083	0.277	2nd	13.030	0.000		Sig.
Global warming	0.501	0.091	0.121	3rd	5.511	0.000		Sig.

Significant at 0.05 level.

Table 4 shows that Precipitation made the greatest contribution to students' academic performance (B = 1.461), the second in the magnitude of these relative is High Temperature (B = 1.085), and followed by Global warming (B = 0.501) in that order. R^2 is 0.18 i.e. 18%, this implies that independent variables only accounted for 18% of variation that occur in dependent variable.

Hypothesis Five: There is no significant joint contribution of the independent variables (precipitation, High Temperature and global warming) on students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State.

Table 5: Regression Summary of the effect of Independent variables on Dependent Variable (Academic Performance).

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.908	0.824	0.822	2.30166

ANOVA

Model	Sum of Square	Df	Mean square	F	P-Value	Remark
Regression	12794.40	5	2558.88	483.03	0.001*	Sig.
Residual	2738.87	517	5.30			
Total	15533.27	522				

*Significant at 0.05 level of significance.

Table 5 shows that the three independent variables: precipitation, High Temperature and global warming have positive correlation with students' academic performance (R= 0.908). this means that the three independent variables are in good position to determine the students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State. The variables further explain that about 82.2% of the total variation in independent variable (Adjusted R Square = 0.822). The adjusted R Square value of 0.822 revealed that the three variable accounted for 82.2% of the total variance in the dependent measure. The

remaining 17.8% could be due to errors and factors that are not considered in this study. Hence, the computed joint effect of the independent variable on students' academic performance is significant.

8. Discussion of Findings.

The analysis in table 1 indicated that excess rainfall has significant relationship with students' academic performance. Excess rainfall as highlighted by Adelekan (2011) in the review of literature has positive relationship with students' academic performance in our community today, many people were rendered homeless while many school buildings, roofs, windows etc., were destroyed by the heavy rainfall and wind and when there is no place for such students to sit or stay for learning, there is no alternative left for the school authority than to let the students proceed on unnecessary break which will adversely have negative effect on the academic performance of the students.

Table 2 revealed that there is a significant relationship between hot weather and students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State. The finding supports the earlier findings of Burnham (1990) and Kaushik (2008) that hot weather usually disturbs the learning habits of students which leads to poor academic performances within the system.

Table 3 indicates that global warming has significant relationship with students' academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State. This is perhaps correlates with the earlier study of Explore (2005) that global warming is a threat to mankind (the education system) mainly because the earth's average surface temperature has increased over the years. Global warming has direct and indirect impacts on students' health and prevalent rates of diseases of various types. In this wise, their education and health suffer accordingly.

Table 4 attempted to establish relationship between each of the predictor variables and students academic performance in Igbokoda Local Government Area of Ondo State (precipitation, High Temperature turned to be the most powerful determinant of academic performance in terms of the magnitude of the weight of regression co-efficient). The analysis shows that there is a joint or composite significant effect of independent variables on students' academic performance. Since, the value of F(483.03) is greater that the P. value (0.001) at a significant level of 0.05, this leads to the rejection of null hypothesis and the acceptance of the alternative one. This is in agreement with Ajala (1986) who identified the effectiveness of educational policy or practice, the home and the school climate or problems as potent factor for students' academic performance.

Table 5 established that each of the independent variables(Precipitation, High Temperature and global warming) has relative contribution to students academic performance in public secondary schools in Igbokoda Local Government Area of Ondo State using multiple regression. Each of the variables mentioned in this study turned to have strong relationship with students' academic performance in terms of the magnitude of the weight of regression co-efficient(Beta). The standardized regression coefficient (Beta) was used to determine the relative contribution each of the variables on Students' achievements. The significance of each variables contribution was also tested and all of them were significant at $P< 0.05$. this means that if the school authority can pay more attention to climatic factors, there is the livelihood that students will perform more excellently in their studies. This is in agreement with Burnham (1990; Explore, 2005; and Ajala, 1986).

9. Conclusion

So much is being said about the falling standard of education in Nigeria as a whole, what is certain is that the negative effects of climate change is a threat to environment, life and properties, it also affects all the indicators of internal efficiency in the secondary schools. Individuals, organizations, nations and the international community ought to recognize the danger posed by this, for the present and the future generations. So, all hands must be on deck to check this ugly trend.

Based on the findings of this study, the following recommendations were made:

- There should be adequate sensitization and mobilization of both the students and stakeholders in education on the common ways of controlling erosion thudding.
- Children should be immunized against preventable diseases that come with climate change and should not be allowed or be exposed to heat.
- Curriculum developer should include environmental education in the curriculum of all levels of education system.

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