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TURBULENT CLIMATIC ELEMENTS OF RAIN AND WIND AND ADMINISTRATION OF PUBLIC SECONDARY SCHOOLS IN BAYELSA STATE, NIGERIA

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Abstract

This study was on turbulent climatic elements of rain and wind on administration of public secondary schools in Bayelsa State, Nigeria. Two (2) objectives, research questions and hypothesis respectively guided the study. Specifically, the objectives included to; determine the relationship between heavy rainfall; and stormy wind on administration of public secondary school in Bayelsa, State. A total of 453 respondents comprising public secondary schools' Principals, Vice-principals and Teachers were selected through proportionate random sampling technique. A set of structured questionnaire with a reliability co-efficient of 0.84 obtained using Cronbach's alpha reliability analysis was administered to respondents. Inferential statistical tools of regression and Pearson's Product Moment Correlation Co-efficient (PPMC) were used for the data analysis. Hypotheses of the study were tested at 0.05 levels of significance. Results of the study indicated significant relationship between administration of public secondary schools and turbulent climatic elements of heavy rainfall ($r = .516$, $r^2 = .266$, coefficient = 26.6%) and stormy wind ($r = .389$, $r^2 = .152$, coefficient = 15.2%) It was therefore concluded that turbulent climatic elements significantly affected the administration of public secondary schools in Bayelsa State, Nigeria. It was recommended that planned vegetation to stabilize soil and prevent erosion/runoff as well as tree planting for wind breaks and shades against windy storm can be budgeted and put in place by administrators of public secondary schools.

Keywords: climatic elements, wind, rain, administration, public secondary schools

INTRODUCTION

Climate represents the systematic arrangement of weather phenomena driven by solar energy in a particular locale and influenced by factors such as wind patterns, precipitation otherwise rain, and the intensity of sunlight (Ogwu, 2022). However, when modifications and variations occur in these earth's climatic conditions of temperature, wind patterns, and precipitation or rain, particularly due to elevated levels of carbon monoxide (CO₂) (Nanthakumar et al., 2018), then change in climate could result. Climate change therefore involves significant variation and statistical shift in the frequency and intensity of anomalous weather occurrences poised to persist over an extended duration, typically spanning a decade or more, alongside steady increase in the global average surface temperature (Ogbuabor & Egwuchukwu, 2017). Similarly, Becken & Mackey (2017); Lynch et al. (2021), reports that over recent decades, climate change has not only manifested but is also projected to persist for numerous decades ahead. Unfortunately, climate change phenomenon has engulfed all aspects of human endeavour as change leads to significant transformations in the weather patterns of specific location over an extended duration (Ogwu, 2022).

Climate change events like stormy wind, heavy rainfall, floods and heat waves though prominently emerging in Bayelsa State, extend beyond the confines of Nigeria and Africa; impacting many parts of the world. In line with this, Ogwu (2020) submits that heightened rainfall intensity has been documented in Nigeria and various regions globally. While, marked rise in soil erosion, increase in storm occurrences, desert encroachment, and heightened temperatures are happening in some places, alterations in wind and rainfall patterns; encompassing variations in timing, intensity, and duration, have led to flooding even in previously unaffected regions. These phenomena collectively underscore the undeniable reality of climate change and turbulent climatic elements, that present serious problems for the environment, society, and economy of the African continent and the entire globe (Pinga et al., 2019).

Rainfall is regarded as the liquid water droplets that condense from atmospheric water vapour and represents a form of precipitation that transpires when atmospheric water vapour undergoes condensation, resulting in droplets that exceed the capacity for suspension within the air. The alteration of rainfall patterns could refer to the fluctuations in precipitation levels observed in a given region, which can lead to droughts, floods, erosion, and various climate-related calamities. Heavy rainfall, has been identified by Mensah et al. (2020) as a significant natural contributor to climate change. Often times, rainfall and wind go together with either the wind preceding the rain or both occurring simultaneously and accompanying each other. The occurrence of rainfall notably is influenced by various factors, including prevailing wind direction, ground elevation, geographic positioning within a continental mass, and proximity to mountain ranges, all of which significantly affect the likelihood of precipitation.

Rainfall as form of precipitation is very much required as a crucial component of the water cycle responsible for delivering the majority of fresh water on our planet; yet leads to flooding, erosion, diminished visibility, and among other climatic catastrophes. Similarly, wind enhance dispersal and pollination in plants even as it enables cool-off in heat conditions. The duo when turbulent, could create problems for smooth operation and/or running of activities including administration of schools. They

adversely affect the overall wellbeing of students' academic performance (Mhenbee et al., 2021). While Jor (2019) reported significant impact of the climatic elements on the efficacy of school administration, student attendance, punctuality, absenteeism, cleanliness, classroom disruptions, concentration, as well as the oversight of instruction and the upkeep of physical infrastructure, Pinga (2018) opined that the impact of precipitation on the administration of secondary educational institutions is evident in the inconsistent attendance of both students and educators, the interruption of pedagogical activities, as well as the challenges faced by school management in sustaining infrastructural assets and educational resources. To this end, Ogwu (2022) observed that various facets of human existence and the education sector are not spared by climatic elements such as high temperature and rainfall; as they result in extreme weather events that have significant impacts on teaching and learning.

Often in Bayelsa State, precipitation occurs incessantly for extended periods, rendering it unfeasible most times for students to attend school and engage in their studies; as thoroughfares become inundated, thereby impeding the mobility of individuals. Thus, Pinga et al. (2019) noted that students encounter significant challenges in attending school during the rainy season even as Echendu (2020) observed that parents are unable to determine whether rainfall will exacerbate flooding while their children are at school, leading them to prefer having their children at home where they can exert more control over their safety in the event of worsening flood conditions or the necessity of evacuation. Also, increased frequency of heavy rainfall, strong winds among others cause damage to school properties and become possible danger to students and teachers due to the movement of reptiles like snakes, blowing off of roofs, falling of trees among others. In line with this, Edo and Osuji (2016), notes that climate change causes excessive whirlwind and other severe weather conditions to negatively affect administrators in the administration of schools.

Disruptions in the usual rainfall pattern experienced in Nigeria within the last few years seem to have left the country staggering with socio-economic setbacks. The adverse impact on schools and welfare are yet to be averted in the affected parts of the country particularly Bayelsa State, South-South Nigeria; a receptacle for all water tributaries into the Atlantic Ocean and characterised by a predominance of rural areas.

Thus, in Bayelsa State, aside the untold hardship exacerbated on the citizens as occasioned by turbulent climatic elements, the school system is disrupted thus adding serious pressure on school administration especially the principals' supervisory role over staff and students' school and class attendance, the physical infrastructure, students' enrolment, sporting activities among others. For example, disruptions due to destructions, result in students' education getting to a low level where it will be difficult to salvage when schools are closed due to flood disturbances (Munsaka & Mutasa, 2020). This definitely work against the goals and objectives of teaching and learning and could have significant impact on students, who are the primary beneficiaries (Ogwu, 2020).

Education as a key vector to prepare societies for global changes, plays critical role in achieving sustainable development goals and putting into practice global agreement on climate change (Reid, 2019). Attaining this goal under turbulent climatic elements however, could be serious challenge to administrators of particularly public secondary schools. Understanding the

relationship between turbulent climatic elements of stormy wind and heavy rain and administration of public secondary schools in Bayelsa State is therefore deemed imperative.

Objectives of the study

The purpose of this study was to analyse the relationship between turbulent climatic elements of rain and wind and administration of public secondary schools in Bayelsa State, Nigeria. Specifically, the study determined the;

1. relationship between heavy rain and administration of secondary schools in Bayelsa State, Nigeria.
2. relationship between stormy wind and administration of public secondary schools in Bayelsa state, Nigeria,

Research questions

The following research questions guided this study;

1. what relationship exist between heavy rainfall and administration of secondary schools in Bayelsa State, Nigeria?
2. what relationship exist between stormy wind and administration of public secondary schools in Bayelsa state, Nigeria?

Hypotheses of the study

The following null hypotheses tested at $p \leq 0.05$ significant level of statistical significance were stated as follows to guide this study:

- H0₁: There is no significant relationship between heavy rainfall and administration of public secondary schools in Bayelsa state.
- H0₂: There is no significant relationship between stormy wind and administration of public secondary schools in Bayelsa state.

METHODOLOGY

Bayelsa State came into existence on the 1st of October, 1996, having been delineated from Rivers State. The designation “Bayelsa” derives from an acronym formed by the first letters of former three (3) Local Government Areas (LGAs): Brass, Yenagoa, and Sagbama, which were part of the former Rivers State. From Brass LGA, additional two (2) LGAs of Nembe, and Ogbia were created. Also from Yenagoa LGA, another two (2) - Kolokuma/Opokuma, and Southern Ijaw LGAs were created, while just one (1) LGA (Ekeremor) was carved out from Sagbama LGA. The state, is situated within the Niger Delta basin; possesses a substantial abundance of oil and gas resources.

Bayelsa State lies between latitude 4° 20'N to 5° 20'N and longitudes 5° 20'E to 6° 40'E (Overview of Bayelsa State, 2020). The state is bordered to the North by the Delta State, to the East by Rivers State, and is flanked on the West and South by the Atlantic Ocean. The land area of Bayelsa State encompasses approximately 9,415.8 square kilometer and features a coastline that extends roughly 185 kilometer along the Atlantic Ocean (Jonathan, 2018). The region is predominantly situated beneath sea level, characterized by a network of winding creeks and dense mangrove ecosystems. The anticipated population for 2024 was 2,668,708, as derived from the 2006 population census given a 2.4 percent growth rate (National Population Commission (NPC), 2006).

Her average monthly temperature is between 25°C and 31°C with annual rainfall average of about 2400mm and vegetation characterized by mangrove forest, riparian forest and fresh water swamps (Overview of Bayelsa State, 2020). While the warmest

months span from December to April, the state experiences consistently high relative humidity year-round, with a slight decrease observed during the dry season (Overview of Bayelsa State, 2020). Some of the indigenous languages/dialects of the State include Izon, Nembe, Ogbia, and Epie-Atissa whereas English language remains the official and common language in Bayelsa State. Notable towns within the study area are Yenagwa, Oloibiri, Brass, Otuoke. Wilberforce Island among others.

The study adopted the correlational survey design to determine the relationship between turbulent climatic elements and administration of public secondary schools. From a list obtained from Bayelsa State Ministry of Education, Yenagoa, a population of 4527 teaching staff in the 208 public secondary schools of the eight LGAs of the State during the 2022/2023 academic session were targeted. The distribution was 202, 310 and 4015 principals’, vice-principals’ and teachers’ respectively. Sequel to this, a sample size of 453 teaching staff (10%) of the total population was selected through proportionate stratified random sampling technique. This was made up of 20, 31 and 402 principals’, vice-principals’ and teachers respectively.

Data collection on turbulent climatic elements and administration of public secondary schools was by questionnaire. All the items were measured on a 4-point rating scale of: Strongly Agree (SA) = 4-points, Agree (A) = 3-points, Disagree (D) = 2-points and Strongly Disagree (SD) = 1-point. The reliability of the instrument was tested with Cronbach’s Alpha analysis and all the calculated reliability coefficient values indicated goodness of fit of the instrument. The administration of the instrument was carried out personally by the researcher with the aid of two trained research assistants. Thus, the 453 copies were properly and correctly administered and retrieved from the respondents within ten (10) weeks. Data were analyzed with regression and Pearson Product Moment Correlation coefficient (PPMC) at 0.05 alpha. The Statistical Package for Social Sciences (SPSS) version 25 was also applied to support the analyses.

RESULTS

Research Question One

What is the extent of relationship between heavy rainfall and administration of public secondary schools in Bayelsa State?

Table 1: Regression analysis of the relationship between heavy rainfall and administration of public secondary schools

Variables	N	R	R ²
Heavy rainfall & Administration of public secondary schools	453	.516	.266

Source: Fieldwork, 2024

The findings illustrated in Table 1 reveal a correlation coefficient r value of .515, accompanied by a correlation coefficient squared (r²) value of .266. This indicates that 26.6% of the overall variance in the administration of public secondary schools can be ascribed to the significant impact of heavy rainfall. In light of the relationship between the two variables, an analysis utilizing the Pearson Product Moment Correlation coefficient (PPMC) is conducted to determine the significance of the relationship (refer to Table 1).

Research Question Two

What is the relationship between turbulent wind and administration of public secondary schools in Bayelsa State?

Table 2: Regression analysis of the relationship between stormy wind and administration of public secondary schools in Bayelsa State

Variables	N	R	R ²
Turbulent wind & Administration of public secondary schools	453	.389	.152

Source: Fieldwork, 2024

The findings illustrated in Table 2 indicate a correlation coefficient r value of .389, accompanied by a correlation coefficient square (r²) value of .152. This indicates that 15.2% of the overall variance in the administration of public secondary schools can be ascribed to the stormy wind. In light of the relationship between the two variables, an analysis utilizing the Pearson Product Moment Correlation coefficient (PPMC) is conducted to ascertain the significance of the relationship (refer to Table 2).

Hypothesis One

There is no significant relationship between heavy rainfall and administration of public secondary schools in Bayelsa State.

Table 3: Pearson Product Moment Correlation coefficient (PPMC) analysis of the relationship between heavy rainfall and administration of public secondary schools

		Heavy rainfall	Administration of public secondary school
Heavy rainfall	Pearson Correlation	1	.516*
	Sig. (2-tailed)		.000
	N	453	453
Administration of public secondary school	Pearson Correlation	.516*	1
	Sig. (2-tailed)	.000	
	N	453	453

* = Significant at 0.05 alpha level; Degree of Freedom (df) = 451; N = 453

Source: Fieldwork, 2024

The information illustrated in Table 3 indicates that the Pearson Product Moment Correlation coefficient (PPMC) analysis demonstrates significance at the p < 0.05 alpha level, as the computed p-value of .000 is below the threshold p-value of 0.05, with 451 degrees of freedom and a correlation coefficient r-value of .516. Consequently, the null hypothesis asserting that there exists no significant relationship between heavy rainfall and the administration of public secondary schools in Bayelsa State can be dismissed. Consequently, the alternative hypothesis posits that a significant relationship exists between heavy rainfall and the administration of public secondary schools in Bayelsa State is supported.

Hypothesis Two

There is no significant relationship between stormy wind and administration of public secondary schools in Bayelsa State.

Table 4: Pearson Product Moment Correlation coefficient (PPMC) analysis of the relationship between stormy wind and administration of public secondary schools

		Turbulent wind	Administration of public secondary school
Stormy wind	Pearson Correlation	1	.389*
	Sig. (2-tailed)		.000
	N	453	453
Administration of public secondary school	Pearson Correlation	.389*	1
	Sig. (2-tailed)	.000	
	N	453	453

* = Significant at 0.05 alpha level; Degree of Freedom (df) = 451; N = 453

Source: Fieldwork, 2024

The information displayed in Table 4 reveals that the Pearson Product Moment Correlation coefficient (PPMC) analysis holds significance at the p < 0.05 alpha level, as the computed p-value of .000 is below the threshold p-value of 0.05, with 451 degrees of freedom and a correlation coefficient r-value of .389. Consequently, the null hypothesis asserting that there exists no

significant relationship between stormy winds and the administration of public secondary schools in Bayelsa State can be dismissed. Consequently, the alternative hypothesis posits that a significant relationship exists between disaster and the administration of public secondary schools in Bayelsa State, and this assertion is upheld.

DISCUSSION OF FINDINGS

Relationship between heavy rainfall and administration of public secondary schools

The findings presented in Table 1 reveal a positive correlation between heavy rainfall and the administration of public secondary schools, evidenced by a correlation coefficient r -value of .516. This suggests a moderate intensity accompanied by a favourable orientation. The correlation observed between substantial rainfall and the administration of public secondary schools indicates that an increase in heavy rainfall is associated with a rise in the scores of public secondary school administration, and conversely, the reverse holds true.

Upon conducting an analysis using the Pearson Product Moment Correlation Coefficient (PPMC) to evaluate the null hypothesis, the resulting r -value was .516, which demonstrated statistical significance at the 0.05 alpha level with 451 degrees of freedom. The findings thus suggest a notable positive correlation between substantial rainfall and the management of public secondary educational institutions. The results of this study align with the observations made by Ortsa and Akwam (2021), who similarly noted that rainfall has a significant effect on teachers' performance in secondary schools in Benue State, Nigeria, pertaining to the governance of public secondary educational institutions.

The correlation between heavy rainfall and the management of public secondary schools in Bayelsa State was determined to be .516. The coefficient of alienation was determined to be .857. This value indicates an absence of correlation between substantial rainfall and the management of public secondary schools. Consequently, this elucidates that, whereas the degree of correlation was .516, the degree of absence of correlation was determined to be .857.

The proportion of the relationship, or the coefficient of determination, was calculated to be 26.63%. This illustrates the significance of the correlation between substantial precipitation and the management of public secondary educational institutions. This value signifies a moderate correlation between the two variables examined in the study. Consequently, the percentage reduction in the error of prediction (r^2) concerning heavy rainfall and the administration of public secondary schools was ascertained, yielding a result of 26.63. This suggests that an understanding of heavy rainfall scores will decrease the prediction error for the administration of public secondary schools by 26.63%, and conversely. This indicates that the management of public secondary schools can be anticipated based on the understanding of heavy rainfall scores to a mere extent of 26.63%. This outcome further delineates the moderate correlation between substantial precipitation and the governance of public secondary educational institutions.

Conversely, the error percentage in predicting heavy rainfall from the administration of public secondary schools and vice versa was determined to be 73.37%. Consequently, when considering the prediction of one variable based on another, it indicates that merely 26.63% of heavy rainfall scores can be elucidated or accurately forecast through the scores of public secondary school administrations, while a substantial 73.37% remains unaccounted for or cannot be clarified through these administrative scores. Consequently, it is essential to note that the correlation between heavy rainfall and the administration of public secondary schools was determined to be statistically significant. The strength of this

correlation was moderate, and the percentage of prediction of one variable from the other was likewise moderate.

Relationship between stormy wind and administration of public secondary schools

The findings presented in Table 2 indicate a positive correlation between turbulent winds and the administration of public secondary schools, evidenced by a correlation coefficient r value of .389. This suggests a minimal intensity accompanied by an affirmative orientation. The correlation observed between stormy winds and the administration of public secondary schools indicates that an increase in stormy wind occurrences is associated with a rise in the administrative scores of these institutions, and conversely, a decrease in stormy winds correlates with lower administrative scores.

Upon the application of the Pearson Product Moment Correlation Coefficient (PPMC) analysis to evaluate the null hypothesis, the resulting r -value was determined to be .389, which was deemed statistically significant at the 0.05 alpha level, with a total of 451 degrees of freedom. The findings indicate a noteworthy positive correlation between stormy winds and the management of public secondary educational institutions.

The correlation between stormy winds and the management of public secondary schools in Bayelsa State was determined to be 0.389. The coefficient of alienation was determined to be .849. This value suggests an absence of correlation between stormy winds and the management of public secondary educational institutions. Consequently, this illustrates that, although the degree of relationship was .389, the degree of lack of relationship was determined to be 0.849.

The coefficient of determination, representing the percentage of the relationship, was calculated to be 15.13%. This illustrates the significance of the connection between stormy winds and the management of public secondary educational institutions. This value signifies a minimal correlation between the two variables examined in the study. Consequently, the percentage reduction in the error of prediction (r^2) for stormy winds and the administration of public secondary schools was ascertained, yielding a result of 15.13. This suggests that an understanding of stormy wind scores will decrease the prediction error for public secondary school administration scores by 15.13%, and conversely. This implies that the management of public secondary schools can be anticipated based on the understanding of stormy wind scores to a mere extent of 15.13%. This finding further corroborates the minimal correlation between stormy winds and the management of public secondary educational institutions.

Conversely, the error percentage in predicting stormy winds from the administration of public secondary schools, and vice versa, was determined to be 84.87%. Consequently, when considering the prediction of one variable based on another, it indicates that merely 15.13% of stormy wind scores can be elucidated or accurately forecast through the scores related to the administration of public secondary schools, whereas a substantial 84.87% remains unaccounted for or cannot be elucidated through the scores of public secondary school administration. It is essential to acknowledge that the correlation between stormy winds and the management of public secondary schools has been determined to be statistically significant; however, the strength of this relationship is minimal, and the predictive capacity of one variable based on the other is also limited.

The findings additionally indicate a noteworthy correlation between substantial rainfall and the governance of public secondary educational institutions. Also, notable correlation exists between stormy winds and the administration of public secondary educational institutions.

The findings are summarized as follows:

1. There is a significant relationship between heavy rainfall and administration of public secondary schools in Bayelsa State. Similarly, that there is a positive significant relationship between Heavy rainfall and administration of public secondary schools in Bayelsa State, with r-value of .516, r^2 value of .266 and 26.6% co-efficient.
2. There is a significant relationship between stormy wind and administration of public secondary schools in Bayelsa State. In the same vain, findings showed a positive significant relationship between Stormy wind and administration of public secondary schools in Bayelsa State, with r-value of .389, r^2 value of .152 and 15.2% co-efficient.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study that; heavy rainfall and stormy wind have significant relationships with administration of public secondary schools, it was concluded that turbulent climatic elements of heavy rainfall and stormy wind affects public secondary schools in Bayelsa State Nigeria. Planned vegetation to stabilize soil and prevent erosion/runoff as well as tree planting for wind breaks and shades against stormy windy can be budgeted and executed by administrators of public secondary schools was recommended.

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