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Flood Management Strategies And Students' Academic Achievement In Riverine Secondary Schools In Bayelsa And Delta States

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Abstract : *This study examined the relationship between flood management strategies and students' academic achievement in riverine secondary schools in Bayelsa and Delta States. Using an ex-post-facto research design and a correlational method, the study sampled 480 respondents—240 teachers and 240 students—from 48 public secondary schools located in flood-prone areas of these states. Data were collected using two primary instruments: "Flood Management Strategy Questionnaire" (FMSTQ) and "Academic Achievement Proforma" (AAP). The FMSTQ assessed various flood management strategies, including periodic risk assessments, early warning systems, awareness programs, flood-resistant infrastructure, emergency evacuation plans, and temporary learning spaces. The AAP collected academic achievement scores from students' third-term examination results for the 2019–2023 academic sessions. The findings revealed that essential flood management strategies were largely unavailable in the schools, with periodic risk assessments and early warning systems showing a significant positive relationship with students' academic achievement. Additionally, the study found that flood management strategies such as awareness programs, flood-resistant infrastructure, and emergency evacuation plans were either insufficient or nonexistent. These results highlight the crucial role that effective flood management strategies play in ensuring a conducive learning environment, thereby improving academic outcomes. The study concludes that government intervention is necessary to implement and enhance flood management strategies—particularly periodic risk assessments and early warning systems—to mitigate the adverse effects of flooding on students' academic performance in these regions. Based on these findings, it is recommended that the government conduct regular risk assessments in flood-prone schools and deploy early warning systems to improve preparedness and safeguard students' academic achievement during flood events.*

Keywords: Management Strategies, Periodic Risk Assessment, Early Warning Systems, Students' Academic Achievement

INTRODUCTION

Education is a lifelong process of acquiring knowledge, skills, values, and understanding, playing a fundamental role in personal and societal development. Secondary school education serves as a crucial gateway to tertiary education, providing higher-level learning opportunities for primary school leavers. According to the Federal Republic of Nigeria (2014), secondary education aims to: (i) Deliver a diverse curriculum to bridge gaps in skills, opportunities, and future roles; ii) Produce qualified workers in applied sciences, technology, and vocational trades. In riverine communities—where unique ecosystems shape daily life—secondary education also fosters environmental awareness and sustainable practices, helping to preserve these fragile environments. Despite its critical role, academic achievement among students in riverine secondary schools, which serves as the primary measure of education quality, has remained unsatisfactory. Several factors contribute to this underperformance, including poor infrastructure, teacher shortages, and limited access to learning materials. However, one often overlooked yet vital factor is the effectiveness of flood management strategies.

Flood management strategies refer to the comprehensive plans and actions put in place to mitigate the adverse effects of flooding. Flooding is a natural disaster that occurs when water overflows onto normally dry land. It can be caused by heavy rainfall, rapid snowmelt, or the failure of dams and levees. The purpose of flood management strategies is to minimize the impact of floods on human lives, infrastructure, and the environment (Disse, Johnson, Leandro, & Hartmann 2020). Several flood management strategies are often implemented in different part of the world whenever flood occur. Some these management strategies include early warning systems, emergency evacuation plans, construction of flood-resistant infrastructure, and provision of temporary learning spaces during flood events. However, the study focused on how periodic risk assessment and early warning systems impart students' academic achievement in riverine secondary schools in Bayelsa and Delta States.

Periodic risk assessment as flood management strategy involves assessing the risks associated with flooding on an ongoing basis. This can help to reduce the likelihood of damages and losses in case of a flooding event. Periodic assessments allow officials to address new/emerging threats effectively by understanding how they interact with their community's changing environment over given periods of time - thereby informing long-term preparedness plans Periodic risk assessment as a flood management strategy is becoming increasingly popular due to its effectiveness in reducing the potential for flooding. This type of strategy involves assessing the likelihood and severity of floods on an ongoing basis, and then taking steps to mitigate or reduce this risk (Wang, Zhang, Chen, Wang, & Fu, 2023). When conducting periodic risk assessments, it is important to consider environmental factors such as rainfall amounts and terrain changes, land use patterns, population growth rates, infrastructure maintenance regimes. By regularly assessing

these risks periodically it is possible to identify areas where further actions may need to be taken to prevent future flooding events from occurring. Periodic risk assessment not only protects the physical infrastructure of educational institutions but may also has a positive impact on academic achievement in riverine areas in Bayelsa and Delta states as it enhanced preparedness which in turn enhances the safety of students, enabling them to focus on their academic pursuits without fear of immediate threats.

Early warning systems as flood management strategy is system that consist of several interconnected components that work together to provide effective flood management. These components may include the installation of sensors and gauges to measure rainfall, river levels, groundwater levels, and weather conditions. Data is collected in real-time and transmitted to a central system for analysis. Collected data is processed, analyzed, and combined with historical data and predictive models to forecast flood events accurately. This helps in identifying potential flood risks and providing timely warnings. Once flood warnings are generated, it is crucial to effectively communicate the information to at-risk communities through various channels such as sirens, text messages, mobile apps, social media, and local media outlets. Early warning systems also emphasize the importance of community preparedness. This involves educating residents about the risks, establishing evacuation plans, and conducting drills to ensure a prompt and coordinated response during flood emergencies.

Early warning systems are vital for effective flood management because it provide advance notice of impending floods, allowing school authorities in riverine areas in Bayelsa and Delta state to issue timely alerts to at-risk school communities. This enables residents to evacuate, seek shelter, or take necessary precautionary measures. These systems help in assessing the severity and potential impact of an approaching flood by monitoring various indicators such as rainfall, river levels, and weather patterns. Timely alerts and accurate information empower emergency responders to allocate resources efficiently, streamline evacuation efforts, and provide necessary assistance to affected areas. Early warning systems help minimize the economic impact of floods by reducing damage to infrastructure, agriculture, and businesses. This leads to cost savings in terms of post-disaster recovery and reconstruction. However, the effectiveness of these strategies in ensuring optimal students' academic achievement in riverine areas in Bayelsa and Delta state remains a subject of concern. Hence, this study.

Statement of the Problem

Flooding is a persistent environmental challenge in Nigeria, particularly in riverine areas such as Bayelsa and Delta States. These states are frequently affected by seasonal floods, which not only disrupt daily life but also pose significant threats to educational activities. Secondary schools in these areas are particularly vulnerable, as flood disasters often result in the destruction of school infrastructure, disruption of the academic calendar, and displacement of students and staff.

Despite the government's efforts to implement flood management strategies, such as early warning systems, flood-resistant infrastructure, and emergency evacuation plans, the academic achievements of students in these flood-prone regions remain a concern. The extent to which these flood management strategies effectively mitigate the impact of floods on students' academic performance has not been sufficiently studied, particularly in riverine schools in Bayelsa and Delta States. This study therefore explored the relationship between flood management strategies (periodic risk assessment and early warning systems) and students' academic achievement in secondary schools located in flood-prone areas of Bayelsa and Delta States

Research Questions

The following research questions were raised to guide the study:

1. What are the available management strategies in riverine secondary schools in Bayelsa and Delta States?
2. What is the relationship between periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta States?
3. What is the relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states?

Hypotheses

The following null hypotheses were raised to guide the study:

1. There is no significant relationship between Periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states.
2. There is no significant relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states.

RESEARCH METHOD

This *ex-post -facto* research design was used using correlational method. The population of the study consists of 47, 612 teachers and students in all the 315 public secondary schools in riverine areas of Bayelsa and Delta States. The sample size of the study is 480 respondents comprising 240 teachers and 240 students that was drawn from 48 public secondary schools in riverine areas of Bayelsa and Delta States. Multi-stage sampling technique was used to select the sample for the study. The instrument used for the study was questionnaire titled "Flood Management Strategy Questionnaire(FMSTQ) and Academic Achievement Proforma" (AAP). Each of the questionnaire was subdivided into two sections; Section A and B. Section A was designed to collect respondents' personal data such as; sex (male and female) and location (urban and rural). Section B of the

Flood Management Strategy Questionnaire (FMSTQ) consists of six subsections of different flood management strategies, with 10 items in each subsection. In this section, the respondents were asked to indicate their opinion on a four-point scale with close-ended items as Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1) points. Items in this section were adapted from Shin et al. (2021). In the Academic Achievement Proforma (AAP), Section B is the Academic Achievement Proforma that was used to collect scores and grades obtained by students in the third term examination of the 2019–2023 academic session. Face and content validity of the research instrument was carried out by experts in the department of Educational Management and Foundations Delta State University, Abraka.. The experts reviewed the various items on the instruments in terms of relevance, clarity, and appropriateness of language and response patterns as they relate to the study. The instrument was corrected based on the suggestions given by the experts. The content validation of the instrument was done using factor analysis. The total cumulative percentage was used to determine the content validity of each scale in the instrument. The total Cumulative percentage of all the 10 items in the Periodic Risk Assessment scale was 66.582% of the domain of variable with a total of unexplained variance as 33.418%. The total Cumulative percentage of all the 10 items in the Early Warning Systems scale was 66.582% of the domain of variable with a total of unexplained variance as 30.274%. The total Cumulative percentage of all the 10 items in the Awareness Programs Flood Management Strategy scale was 61.074% of the domain of variable with a total of unexplained variance as 38.926%. The total Cumulative percentage of all the 10 items in the Flood-Resistant Infrastructure scale was 65.743% of the domain of variable with a total of unexplained variance as 34.257%. The total Cumulative percentage of all the 10 items in the Emergency Evacuation Plans scale was 73.360% of the domain of variable with a total of unexplained variance as 26.64%. The total Cumulative percentage of all the 10 items in the Temporary Learning Spaces scale was 63.983% of the domain of variable with a total of unexplained variance as 36.017%.

To test for the reliability of the instrument, the researcher adopted Cronbach alpha reliability method. While using the Cronbach alpha reliability method, 50 copies of the questionnaire were administered to teachers randomly selected from 5 public secondary schools in riverine areas of Akuku-toru, local government area, River State. The reliability of different subsections in the questionnaire was computed using Cronbach Alpha. The computation of the reliability coefficient of the instrument yielded 0.821 for the Floods risk elements scale, 0.742 for Periodic Risk Assessment scale, 0.684 for Early Warning Systems scale, 0.755 for Awareness Programmes Flood Management Strategy scale, 0.799 for Flood-Resistant Infrastructure scale, 0.732 for Emergency Evacuation Plans scale, and 0.749 Temporary Learning Spaces scale (see Appendix G).

The study collected students's third-term examination results using the Academic Achievement Proforma (AAP). In cognizant of the fact that third-term examinations are standardised examinations, the study presumed that the results that the Academic Achievement Proforma" (AAP) used for data collection were reliable and were not subjected to further reliability testing since the results were already standardised by experts who developed the test items for use in examinations between 2019 and 2023 academic sessions. However, the study made an effort to obtain the psychometric properties of the standardised instrument but was unable to do so.

The researcher visited the various sampled schools and distribute the questionnaire among the teachers with the help of five coached research assistants to ensure hitch-free administration. The researcher administered copies of the questionnaire to the teachers and also used the students' academic achievement proforma to collect the previous term examination results of students from each sampled school from the form teacher. Data obtained was analyzed using mean and standard deviation, Coefficient of Determination(r^2) and Pearson product moment correlation. In the analysis research question 1 was answered using mean and standard deviation. Research question 2 and 3 were answered using coefficient of determination so as to determine the relationship between the independent and dependent variables. Hypotheses were tested using Pearson product moment correlation statistics. All hypotheses waa tested at a significance level of 0.05.

Results and Discussion

Research Question 1: What are the available management strategies in riverine secondary schools in Bayelsa and Delta States?

Table 1: Mean and standard deviation on available management strategies in riverine secondary schools in Bayelsa and Delta States

S/N	Available management strategies	Bayelsa			Delta			Both States		
		M	SD	D	M	SD	D	M	SD	D
	Periodic risk assessment	1.43	.70	-	1.61	.84	-	1.53	.78	-
	Early warning systems	2.18	.77	-	2.06	.86	-	2.12	.82	-
	Awareness programmes	1.41	.70	-	1.67	.89	-	1.55	.81	-
	Flood-resistant infrastructure	1.49	.73	-	1.62	.83	-	1.56	.79	-
	Emergency evacuation plans	1.46	.73	-	1.62	.85	-	1.55	.80	-
	Use of temporary learning spaces	1.49	.76	-	1.65	.86	-	1.58	.82	-
Average mean score		**1.57**	**.73**	**-**	**1.70**	**.85**	**-**	**1.64**	**.80**	**-**

Keys: M = Mean, SD = Standard Deviation, R= Remark, + = Agree, - = Disagree

Data in Table 1 shows mean and standard deviation on available management strategies in riverine secondary schools in Bayelsa and Delta States. The result revealed that respondents from Bayelsa State disagree on all the items with mean scores less than 2.50. Also, respondents from Delta State disagree on all the items with mean scores less than 2.50. When both States were combined, respondents disagree with mean scores of 1.53, 2.12, 1.55, 1.56, 1.55, 1.58 on periodic risk assessment, early warning systems, awareness programmes, flood-resistant infrastructure, emergency evacuation plans and use of temporary learning spaces respectively. This implies that periodic risk assessment, early warning systems, awareness programmes, flood-resistant infrastructure, emergency evacuation plans and use of temporary learning spaces are not available management strategies in riverine secondary schools in Bayelsa and Delta States.

Research Question 2: What is the relationship between periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta States?

Table 2: Relationship between periodic risk assessment as management strategy and students' academic achievement

Variable	Bayelsa		Delta		Bayelsa & Delta		r	r^2	r^2 %	Remark
	Mean	SD	Mean	SD	Mean	SD				
Periodic risk assessment as flood management strategy	14.35	3.45	16.15	3.86	15.29	3.77	.813	661	66.1	Positive relationship
Students' academic achievement	8.70	1.86	8.44	2.26	8.57	2.08				

Data in Table 2 shows the between periodic risk assessment as management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states. The result shows Bayelsa State have a mean score of 14.35 SD = 3.45 for periodic risk assessment as management strategy and mean score of 8.70, SD= 1.86 for students' academic achievement. Also, Delta State have a mean score of 16.15, SD = 3.86 for periodic risk assessment as management strategy and mean score of 8.44, SD= 2.26 for students' academic achievement. When both States were combined, they have a mean score of 15.29, SD = 3.77 for periodic risk assessment as management strategy and mean score of 8.57, SD= 2.08 for students' academic achievement. The computed r value of .804 shows that there is a positive relationship between periodic risk assessment as management strategy and students' academic achievement in riverine secondary school in Bayelsa and Delta States. The r^2 value of .661 revealed that periodic risk assessment as management strategy relates to students' academic achievement in riverine secondary school in Bayelsa and Delta States by 66.1%.

Research Question 3: What is the relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states?

Table 3: Relationship between early warning systems as management strategy and students' academic achievement

Variable	Bayelsa		Delta		Bayelsa & Delta		r	r^2	r^2 %	Remark
	Mean	SD	Mean	SD	Mean	SD				
Early warning systems as flood management strategy	21.63	3.39	20.62	4.07	21.11	3.79	.787	.619	61.9	Positive relationship
Students' academic achievement	8.70	1.86	8.44	2.26	8.57	2.08				

Data in Table 3 shows the between early warning system as management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states. The result shows Bayelsa State have a mean score of 21.63 SD = 3.39 for early warning system as management strategy and mean score of 8.70, SD= 1.86 for students' academic achievement. Also, Delta State have a mean score of 20.62, SD = 4.07 for early warning system as management strategy and mean score of 8.44, SD= 2.26 for students' academic achievement. When both States were combined, they have a mean score of 21.11, SD = 3.79 for early warning system as management strategy and mean score of 8.57, SD= 2.08 for students' academic achievement. The computed r value of .787 shows that there is a positive relationship between early warning system as management strategy and students' academic achievement in riverine secondary school in Bayelsa and Delta States. The r^2 value of .619 revealed that early warning system as management strategy relates to students' academic achievement in riverine secondary school in Bayelsa and Delta States by 61.9%.

Testing of Hypotheses

Hypothesis 1: There is no significant relationship between periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta States.

Table 4: Pearson r between periodic risk assessment as Flood Management Strategy and students' academic achievement

		Periodic Risk Assessment as Flood Management Strategy	Students' Academic Achievement
Periodic Risk Assessment as Flood Management Strategy	Pearson Correlation	1	.813**
	Sig. (2-tailed)		.000
	N	460	460
Students' Academic Achievement	Pearson Correlation	.813**	1
	Sig. (2-tailed)	.000	
	N	460	2610

** Significant at 0.05

Table 4 revealed the Pearson r between periodic risk assessment as flood management strategy and students' academic achievement. The table shows a significant relationship with r value of .813 and significance p=.000. Therefore, the hypothesis which states that there is no significant relationship between periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states was rejected. Thus, there is a significant relationship between periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states.

Hypothesis 2: There is no significant relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta States.

Table 5: Pearson r between early warning systems as flood management strategy and students' academic achievement

		Early Warning Systems (EWS) as Flood Management Strategy	Students' Academic Achievement
Early Warning Systems (EWS) as Flood Management Strategy	Pearson Correlation	1	.787**
	Sig. (2-tailed)		.000
	N	460	460
Students' Academic Achievement	Pearson Correlation	.787**	1
	Sig. (2-tailed)	.000	
	N	460	2610

** Significant at 0.05

Table 5 revealed the Pearson r between early warning systems as flood management strategy and students' academic achievement. The table shows a significant relationship with r value of .787 and significance p=.000. Therefore, the hypothesis which states that there is no significant relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states was rejected. Thus, there is a significant relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta States.

Discussion of Results

Available Management Strategies in Riverine Secondary Schools in Bayelsa and Delta States

Periodic risk assessment, early warning systems, awareness programmes, flood-resistant infrastructure, emergency evacuation plans and use of temporary learning spaces are not available management strategies in riverine secondary schools in Bayelsa and Delta States. The absence of flood management strategies, including periodic risk assessments, early warning systems, and awareness programs, in riverine secondary schools reflects a gap in regional and institutional preparedness and resources. Often, schools in rural or underserved areas receive limited funding and attention, making it difficult to implement necessary flood mitigation measures. These strategies require not only financial resources but also technical expertise and support from local and state governments, which may be lacking in these regions. Furthermore, in many riverine communities, there is limited awareness or prioritization of proactive flood management strategies in educational settings. Without clear policies or dedicated funds from the government or school management, administrators may struggle to allocate resources for such measures. The absence of flood-resistant infrastructure, emergency evacuation plans, and temporary learning spaces emphasizes a lack of long-term planning and sustainable investment in school resilience. This gap leaves schools vulnerable to the adverse effects of flooding, which could be mitigated through systematic risk management and infrastructural upgrades.

Inadequate flood management strategies, such as the lack of early warning systems, periodic risk assessments, and flood-resistant infrastructure, leave schools vulnerable and unprepared for flood events. Aderogba (2012) pointed out that the absence of preventive flood measures in Nigerian schools exacerbates the damage caused by floods, leading to frequent disruptions and higher repair costs. Comfort and Kapucu (2011) found that early warning systems and regular risk assessments enable schools to identify potential risks and develop timely interventions, reducing the impact of disasters. Olajuyigbe et al. (2012) highlighted the importance

of emergency evacuation plans and flood-resistant infrastructure, noting that schools with these strategies were better protected against damage. In Bayelsa and Delta States, the absence of these strategies contributes to prolonged closures and resource losses, which negatively impact learning continuity. These studies emphasize the critical role of proactive flood management strategies in mitigating flood effects and maintaining a safe, functional school environment.

Periodic Risk Assessment as flood management strategy and Students' Academic Achievement

There is a significant relationship between Periodic risk assessment as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states. The relationship between periodic risk assessment as a flood management strategy and students' academic achievement highlights the importance of regular hazard evaluation to ensure school safety and continuity. Conducting routine risk assessments allows schools to identify potential flood-related hazards early and implement necessary preventive measures. For instance, schools can check for structural weaknesses, electrical vulnerabilities, and health hazards that could be exacerbated by flooding. By addressing these issues proactively, schools create a safer environment that minimizes interruptions and maintains a consistent learning atmosphere. Risk assessments also allow school administrators to respond swiftly to emerging risks, reducing the likelihood of unexpected disruptions that impact students' academic performance. Therefore, periodic risk assessments are crucial for sustaining a secure, stable environment conducive to learning, ultimately supporting better academic achievement.

Periodic risk assessments can be vital in reducing flood impacts on education by identifying potential risks and implementing preventive measures. Regular assessments can provide timely information about infrastructural vulnerabilities and help develop strategies to protect school facilities from flood damage. Studies by Muhammed et al. (2010) in Pakistan revealed that schools with regular risk assessments were better prepared, as early identification of vulnerabilities allowed for timely reinforcements, reducing flood-related disruptions. Similarly, Susan (2014) in Kenya emphasized the importance of these assessments in preventing structural collapses and waterborne diseases, ultimately safeguarding students' health and attendance, which directly correlates to academic achievement. recent studies have further validated the importance of periodic risk assessments in enhancing school preparedness for floods. For instance, Adeoti and Lawal (2020) conducted a study in flood-prone areas of Nigeria, concluding that schools with structured risk assessments had lower instances of flood-related disruptions due to proactive reinforcement of vulnerable structures. Similarly, Oduyemi et al. (2021) found that regular assessments not only helped in identifying critical infrastructural risks but also promoted the development of tailored emergency responses, thereby minimizing health hazards for students. Furthermore, Ekeocha and Afolabi (2022) emphasized the importance of such assessments in enabling schools to adopt preventive health measures, especially for waterborne diseases, which positively impacted students' attendance and overall academic performance. These findings collectively affirm that consistent risk assessments are critical for maintaining educational continuity and safeguarding student well-being in flood-prone regions.

Early Warning Systems as flood management strategy and Students' Academic Achievement

There is a significant relationship between early warning systems as flood management strategy and students' academic achievement in riverine secondary schools in Bayelsa and Delta states. The significant relationship between early warning systems and students' academic achievement illustrates the value of preparedness in mitigating the negative effects of flooding on education. Early warning systems provide advance notice of potential flooding, enabling school administrators and students to take precautionary actions before a flood occurs. With sufficient warning, schools can secure valuable educational materials, prepare temporary learning spaces, or enact evacuation plans to protect students and staff. This level of preparedness reduces chaos, limits physical and psychological harm, and maintains some degree of educational continuity. When schools are better prepared, students are less likely to experience disruptions or stress related to sudden flood incidents, allowing them to focus on learning despite environmental challenges. As a result, early warning systems contribute significantly to creating a more predictable, stable educational environment, supporting academic achievement in flood-prone areas.

Implementing early warning systems enables schools and communities to respond proactively to floods, minimizing disruption and maintaining academic continuity. Chipo (2014) found that early warnings in Muzarabani District allowed families to evacuate safely, securing educational materials and preventing damage to school infrastructure. Eimuhi and Ogedegbe (2016) in Nigeria noted that early warnings can help schools take protective measures, like moving materials to safer areas, which reduces the immediate impact on learning resources. These studies suggest that early warnings significantly contribute to student safety and well-being, indirectly supporting consistent academic performance. In addition to findings by Chipo (2014) and Eimuhi and Ogedegbe (2016), more recent studies have confirmed the effectiveness of early warning systems in protecting educational infrastructure and continuity. A study by Musa and Ibrahim (2019) in Northern Nigeria showed that schools equipped with early warning systems could implement rapid responses, such as relocating students and valuable educational materials, thus significantly reducing damage. Similarly, Chen et al. (2020) found that in areas of Southeast Asia, early warning alerts allowed schools to enact protective measures in time, thereby preserving classroom environments and minimizing post-flood repair needs. Okafor and Ugwu (2021) also highlighted that early warnings contribute to psychological preparedness among students, reducing anxiety and promoting resilience, which positively impacts their focus and academic performance after flood events. These studies collectively suggest that early warning systems are essential for safeguarding both physical and mental well-being in flood-prone educational settings.

Conclusion

This study examined the relationship between flood management strategies and students' academic achievement in riverine secondary schools in Bayelsa and Delta States. The findings revealed that essential flood management strategies, including periodic risk assessments, early warning systems, awareness programs, flood-resistant infrastructure, emergency evacuation plans, and the use of temporary learning spaces, are largely absent in these schools. the study also concludes that certain flood management strategies, particularly periodic risk assessments and early warning systems, have a significant positive relationship with students' academic achievement in these schools. Thus effective flood management strategies, including risk assessments and early warning systems, are essential for ensuring a conducive learning environment and enhancing students' academic achievement.

Recommendations

The following recommendations were based on the findings of the study:

1. Government should conduct regular risk assessments in schools located in flood-prone areas to identify potential hazards and proactively address flood-related risks that compromise student safety and academic performance.
2. Government to Deploy early warning systems to provide timely alerts of impending floods, enabling schools to take preventive measures and evacuate if necessary.

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