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Assessing the Impact of Tidal Waves on Learners' Education of Residents of Some Coastal Communities in the Western Region of Ghana

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Abstract

Purpose: The study aimed at exploring the effects of tidal waves on education of learners of four coastal communities in the Western Region of Ghana.

Methodology: The study employed mixed-method design. The target population under study was 268(475) made up of 25 teachers, 240(446) learners and two Circuit Supervisors from Ghana Education Service Shama District and two opinion leaders. The study used a sample of 24 teachers, 208 learners, two GES personnel and opinion leaders employing Krejcie and Morgan Table (1970) for determining sample size. Data was collected using questionnaires. The data for the research questions was analyzed quantitatively and qualitatively and presented using frequency and percentage tables.

Findings: The study revealed incidence of tidal waves along the coastal four communities in the Western Region. The study also revealed many and diverse effects of tidal waves on the education of the four coastal communities in the Western region of Ghana. Notable among these are loss of space and destruction of educational infrastructure. The one way ANOVA was used to test hypothesis to establish if there was statistical difference between schools and effects of tidal waves. At $p< 0.05$ there was significant difference between the four schools and effects tidal waves education. $F (3, 204) =5.622$, Sig. = .001.

Unique Contributions to Theory, Policy and Practice: The study addressed the gaps that exist in available literature on effects of tidal waves on coastal communities leading to vital contributions. First the study expands the limited research on impact of tidal waves on coastal communities. This study is the first to consider the impact of tidal waves on learners' education. Secondary, empirical studies on the impact of tidal waves on learners' education in coastal communities does not exist. Existing research has always focused on general impact of tidal waves on coastal communities. The theoretical lens for the study is the comprehensive theory for disaster management. Most natural disaster management practices are based on this theory. This theory has four distinct components: mitigation, preparedness, response, and recovery. Monitoring and evaluation should form an integral part of this theory and should be considered in all the four components of the theory in managing natural disasters.

Keywords: *Tidal Wave, Tidal surge, Flooding, Erosion, Infrastructure*

1.0 Introduction

1.1 Background to the Study

Available literature attribute global warming triggered by climate change as leading cause of surge in sea level. While global warming is associated with tidal waves, human activities such sand wining and removal of coastal mangroves for fuel have contributed to the increase in the devastating effects of tidal waves posing a threat to the very existence of coastal communities. This observation is corroborated by the recent COP26 climate summit in Glasgow (UFCC, 2021), the United Nations which identifies more than 100 million extremely poor people in Africa threatened by accelerating climate change.

Tidal waves are exceptionally large ocean waves especially one caused by an underwater earthquake or high surface winds. Tidal waves are phenomena seen most at coastal areas and are in most cases very dangerous. When high wind and the seismic force of an earthquake combine, they can create powerful disturbance on the surface of the ocean that can have devastating effects. The higher the wind speed and the stronger the earthquake, the more dangerous the Tidal Waves. Tidal waves, in their most basic form, are waves that follow a tide and are moved by the wind. Studies from Nonlinear Ocean Dynamics that there are tidal waves that are twisted by the gravitational pull of the sun and moon on the earth. The tidal wave harm will likewise be upgraded over the back-reef seashore as the ocean level ascents, particularly closer to the underlying shoreline in the immersion zone. Extra defensive strategies or adaptations might be essential to lessen the tidal impact on low-lying zones of the coast.

Ghana's shoreline stretches approximately 550 kilometres (340 miles) which accommodates a quarter of the country's population living by the sea (AFP, 2021). A major problem facing coastal communities is the incidence of tidal waves. Huge devastation of coastal communities occur in almost all cases of tidal waves. According to Baba and Nayak (2002), the coastal stretch has high

interfacing tidal waves, especially low-lying landforms that influence both permanent and episodic shoreline change. Many coastal communities in Ghana have already been forced to abandon homes and livelihoods.

Literature reveals that tidal waves have destroyed lives and properties of coastal dwellers in Ghana and for that matter West Africa. For instance in 2019, tidal sea waves washed away three-quarters of the total Landscape of the Puveme community in the Keta Municipality of the Volta Region of Ghana ((Vomafa-Akpalu, 2019). The incidence caused massive destruction to fishing industry the main pre-occupation of the community, portable water and relocation of residents. Vomafa-Akpalu further reported. The residents of Puveme attributed the huge impact of the waves to recent sea defense wall constructed at a nearby community. This assertion is subject to scientific verification. Again in the same year, Noretti (2019) also reported 521 people from Agavedzi-Sarakope in the Ketu South Municipality displaced by tidal waves with 67 houses totally submerged in the deluge. The National Disaster Management Organization (NADMO) gave the statistics of people rendered homeless as 165 male adults, 201 female adults, 60 male learners and 89 female learners. Noretti further reported.

In a similar incidence, about 600 residents of Adina and Amutinu a coastal community in the Ketu South Municipality of the Volta Region were displaced by sea tidal waves. Homes, property and Aflao-Keta road were destroyed (Noretti, 2021). The NADMO District Co-ordinator expressed fear for the future of the local basic school where all the classrooms were filled with water. Incidence of tidal waves and its devastating effects in Ghana has been found to be huge in the Ketu South of the Volta. According to AFP (2021) massive tidal wave occurred in several coastal communities in the Volta region of Ghana on November 10, 2021. From the report Keta district had 1,557 individuals displaced and 239 houses affected. Anloga district, had 1,394 displaced and 134 houses affected, and Ketu South 1,027 displaced and 149 houses affected as a result of tidal waves. The report further indicated that houses were completely destroyed and at least one school and a cemetery were also affected. AFP observed that tidal wave of this magnitude has not been experienced in many years. In these string of events of tidal waves in 2021, Ghana's sector Minister for Work's and Housing observed that vulnerable people such as learners and elderly housed in schools, community centres and churches. Tidal wave related flooding of farms in communities has also been sighted at Agbledomi, Galo, Sota, Agortoe, Dzidokpui, Gamenu, Atiteli, Tunu, Bomigo, Savietula, Yenui, Fiahor, Alakple and Anloga. The major effects on the communities are, destruction fauna and flora, loss of livelihood. (Vomafa-Akpalu, 2022).

Some coastal communities of the Western Region namely, Anlo Beach, Shama, Abuesi and Aboadze have not been spared of tidal waves and its devastating effects on environment. Tidal waves have been responsible for reduction in arable land, flooding, erosion, and infrastructural damage (Nurse et al, 2014). News of tidal waves lower township of Sekondi, filling up the streets and some portions of street market in April 2022 has been reported. (Tagoe, 2022). Flooding of

portions of Sekondi and market stalls have become regular feature whenever tidal waves occur. Residents live in fear that there could be more devastating waves which could be deadly. Tagoe further added. In a similar report over 400 residents of Anlo beach, a coastal community in the Shama District of the Western Region have been displaced by tidal waves. This coastal community for several years has been ravaged by tidal waves. According to Quansah (2022) over 90% of the community has been swept away by tidal waves.

In another report 40 houses have been ravaged by tidal waves at Anglo Beach, a fishing community in the Shama District of the Western Region. The violent waves swept through the entire community destroying properties, rendering about half of the population homeless. (Tagoe, 2022).

One widely held aim of education is to equip learners with the knowledge, skills, attitudes and competencies that enable them to render useful services to themselves and to the society at large. According to Todaro (1992) a country's formal education system is the main institutional mechanism employed to develop human skills and knowledge. Worldwide countries especially developing countries have placed priority education as way of improving school quality and student performance (De Grauwe, 2001). Unfortunately for coastal communities of the Western Region of Ghana, this aim of education appear to be mirage.

Literature has shown that wherever tidal waves occur it leaves behind devastating effects bringing almost all the activities of the affected communities to a temporary or permanent halt. While education has been identified as a major tool in the formation of Ghana's human resource, tidal waves are making access to education almost impossible in coastal communities. This study specifically explored the effects of tidal waves on education delivery among coastal dwellers in the Western Region of Ghana.

1.2 Statement of the Problem

Research on shoreline reveals the negative impact of tidal waves on residents of coastal communities. The issue of tidal waves or tidal surge have been an issue of major concern for coastal dwellers of the Western region of Ghana. Greater part of communities in the Western coastline of Ghana has been destroyed by the action of tidal waves. The phenomenon causes destruction to infrastructure, disrupts several services namely loss of portable water, interruptions in electricity supply and loss of recreational grounds which have direct link to education. Furthermore an alarming number of coastal dwellers are displaced or relocated. Adjusting to new environment takes time and most often expensive to people whose very livelihood is eroded by the action of tidal waves. Loss of livelihood may have implication on parents' ability to fully support learners' education. Again coastal dwellers live in fear of the recurrence of more tidal waves. The unfortunate situation of living in uncertainty may also affect the education of learners in affected coastal communities. This study explored the direct effects of tidal waves on the education of learners of four most affected coastal dwellers in the Western Region of Ghana.

1.3 Purpose of the Study

This research aims at exploring the effects of tidal waves on the education of basic school learners in Shama (A), Aboadze (B), Aboasi (C) and Awona Beach (D) in the Western Region of Ghana and to provide empirical evidence to help mitigate the effects of future tidal waves.

1.4 Research Questions

The research questions which guided the study were:

1. How often do tidal waves occur along the coast of Western Region?
2. What resources are mostly affected by tidal waves?
3. What direct effects do tidal waves impose on education of learners in coastal dwellers?

1.5 Research Hypothesis

Ho: There is no significant difference between schools and effects of tidal waves on learners' education.

2.0 Literature Review

Disaster could be generally perceived as "a natural or human-caused event, which occurs with or without warning, causing or threatening death, injury or disease, damage to property, infrastructure or the environment, which exceeds the ability of the affected society to cope using only its own resources" (Alfredo, 2017). The incidents of tidal waves presents a classical example of natural disasters imposing huge impact on human activities, properties and resources in coastal communities. It is in such situations that disaster management is key in minimizing impact on society thereby protecting life and property and civilization.

The Basic Theoretical Assumption of Disaster Management

The use of the term disaster management implies the ability to "manage" a very destructive and chaotic event. In reality though, it is more of a mitigation against the various threats that emerge from a disaster, in order to lower the degree of total damage. In some situations, where a disaster is expected, for instance the possibility of a nuclear terrorist attack, steps may be taken to prevent it. However in some cases the disaster may be generally expected, but the time when it happens may not be known, such as in areas affected by earthquakes and hurricanes.

Disaster management therefore must always concern itself with analyzing potential threats, protecting against those threats, having contingency plans ready should threats materialize, and finally have a concrete plan or system in place to repair any damage sustained. This represents the standard theory of disaster management.

According to Alexander (2002) comprehensive disaster management is based upon four distinct components: mitigation, preparedness, response, and recovery. Although a range of terminology

is often used in describing them, effective disaster management utilizes each component in the following manner:

1. Mitigation. Involves reducing or eliminating the likelihood or the consequences of a hazard, or both. Mitigation seeks to "treat" the hazard such that it impacts society to a lesser degree.
2. Preparedness. Involves equipping people who may be impacted by a disaster or who may be able to help those impacted with the tools to increase their chance of survival and to minimize their financial and other losses.
3. Response. Involves taking action to reduce or eliminate the impact of disasters that have occurred or are currently occurring, in order to prevent further suffering, financial loss, or a combination of both. Relief, a term commonly used in international disaster management, is one component of response.
4. Recovery. Involves returning victims' lives back to a normal state following the impact of disaster consequences. The recovery phase generally begins after the immediate response has ended, and can persist for months or years thereafter.

Due to scarce resources and limited time, it is impossible to protect effectively against every threat, so targeting efforts toward what is more likely seems quite practical (Alfredo, 2017). Yet the problem does not always lie with the known risks, sometimes it lies with the unknown risks. That makes it difficult to accurately predict events in the medium and long term future, making the current disaster management approach problematic.

Going beyond the essence of what disaster management is, there are also different theoretical approaches that sometimes conflict with one another in terms of how best to protect against the dangers of disasters. For example, much of the contemporary thinking surrounding disaster management comes out of the management sciences discipline, which uses statistics and mathematical modeling to maximize managerial efficiency. Disaster management often makes use of such models for the purpose of determining which events are more likely than others.

3.0 Methodology

The research design adopted in this particular study was mixed method explanatory sequential design. The quantitative method was used to gather information about the incidence of tidal waves and frequency of occurrence along the coasts and resources mostly affected by tidal waves. The qualitative method was used to explore the effects of tidal waves on learners' education.

The target population was some coastal communities in the Western Region of Ghana. The communities were, Aboadze, Shama, Aboasi and Awona Beach comprising teachers (TRs), learners, circuit supervisors (CS) from Ghana Education Service (GES) and opinion leader's (OP) from the coastal communities. The population was 268 made up of 25 TRs, 240 learners, two CS and two OP. The sample size for the study was determined using Krejcie and Morgan sample size

table (1970). To obtain the sample for the study, the simple random sampling was employed where a number was assigned to every student in the school "A" register from 1 to 60. A random number generator was used to select 52 learners. This was replicated for schools "B", "C" and "D" to obtain a sample of 52 learners for each school. Twenty four teachers, two opinion leaders and two circuit supervisors were used for the study.

Questionnaire used to solicit information from learners, TRs, CS and OP. Both open and close ended questionnaires were employed. The questionnaires were made up of two sections. Section A was about incidence of tidal waves in the coastal communities and section B, resources mostly affected by the waves. An interview was conducted after the administration of questionnaire for teachers, circuit supervisors and opinion leaders to explore the direct effects of tidal waves on learners' education. Focus group discussions involving experts from various departments of the Quality Assurance Units in four selected Colleges of Education in the Western Region of Ghana were used to generate questions and to create the questionnaire. Step-by-step procedures were followed for pilot testing, face validity and content validity.

Research question one was on how often tidal waves occur along some selected coastal communities of Western Region. Data collected was analyzed using frequency and percentages. The research question two was on resources mostly affected by tidal waves and data was analyzed the same way as the research question one. The research question three was about the effects tidal waves on learners' education. The research question one was on how often tidal waves occur along the coast of Western Region and the data collection was analyzed using frequency and percentages. The research question two was on resources mostly affected by tidal waves and was analyzed the same way as the research question one was. The research question three was about the effects tidal waves on learners' education. Data collected were pulled together and organized into key statements. The one-way ANOVA was used to test the hypothesis to establish if statistical difference exist between schools affected by tidal waves and its effects on learners' education. The one-way ANOVA was used to test the hypothesis to establish if statistical difference exist between schools and effects of tidal waves on learners' education.

4.0 Results

4.1 Incidence of Tidal Waves

This section focuses on learners'' response on the incidence of tidal waves in their community. For each of the statements, they were given the option to select "Agree" or "Disagree". The results were organized into four communities denoted by A, B, C and D.

The results were calculated in frequencies and percentages as shown in Table 1.

Table 1: Learners' Response on the Incidence of Tidal Waves **N = 208**

Statements	School A				School B				School C				School D			
	Agree		Disagree		Agree		Disagree		Agree		Disagree		Agree		Disagree	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
There is a history of tidal waves on our coastline	52	100	0	0	52	100	0	0	52	100	0	0	52	100	0	0
Tidal waves occur at least once a year	50	96.2	2	3.8	49	94.2	3	5.8	52	100	0	0	47	90.4	5	9.6
Tidal waves occur at least once every month	2	3.8	50	96.2	0	0	52	100	0	0	52	100	0	0	52	100
Tidal waves occur at least once every week	0	0	52	100	0	0	52	100	0	0	52	100	0	0	52	100
Tidal waves occur in the night	49	94.2	3	5.8	47	90.4	5	9.6	48	92.3	4	7.7	47	90.4	5	9.6
Tidal waves occur in the day time	46	88.5	6	11.5	39	75	13	25	51	98.1	1	1.9	47	90.4	5	9.6
Occurrence of tidal waves are unpredictable	46	88.5	6	11.5	26	50	26	50	6	11.5	46	88.5	38	73.1	14	26.9

Source: Field Survey, 2022

Results show that there is regular incidence of tidal waves in all the four coastal communities. Table 1 reveals that tidal waves occur at least once a year in all the four coastal communities. (A = 96.2 %, B = 94.2 %, C = 100%, D = 90.4%). From Table 1 most incidence of tidal waves occur in the night. (A = 94.2%, B = 90.4%, C = 92.3%, D = 90.4%). Furthermore the majority of learners agreed that occurrence of tidal waves are unpredictable. (A = 88.5%, C = 88.5%, D = 73.1%).

4.2 Teachers, Circuit Supervisors and Opinion Leaders' Responses on Incidence of Tidal Waves

This section focuses teachers, circuit supervisors and opinion leaders' responses on the incidence of tidal waves. The results were computed in frequencies and percentages.

Table 2: Teachers, Circuit Supervisors and Opinion Leaders' Responses on Incidence of Tidal Waves **N = 28**

Statement	Teachers				Circuit Supervisors				Opinion leaders			
	Agree		Disagree		Agree		Disagree		Agree		Disagree	
	f	%	f	%	f	%	f	%	f	%	f	%
There is a history of tidal waves on our coastline	24	100	0	0	2	100	0	0	2	100	0	0
Tidal waves occur at least once a year	24	100	0	0	2	100	0	0	2	100	0	0
Tidal waves occur at least once a month	0	0	24	100	0	0	2	100	0	0	2	100
Tidal waves occur at least once a week	0	0	24	100	0	0	2	100	0	0	2	100
Tidal wave occur in night	23	95.8	1	4.2	2	100	0	0	1	50	1	50
Tidal waves occur in the day time	20	83.3	4	16.7	1	50	1	50	2	100	0	0
Occurrence of tidal waves are unpredictable	18	75	6	25	0	0	2	100	2	100	0	0

Source: Field Survey, 2022

Results show that there is regular incidence of tidal waves in all the four coastal communities. (Table 2). All the respondents from the four communities indicated incidence of tidal waves in the four communities. (TRs = 100%, CS = 100%, OP = 100%). Again all the respondents indicated that tidal waves occur once a year in the four communities. (TRs = 100%, CS = 100%, OP = 100%). This confirms what the learners indicated. This situation may be attributed to their geographical location. The four communities lie along the same coastal stretch. Furthermore the

majority of teachers and circuit supervisors indicated that tidal waves occur at night. (TRs = 95.8%, CS = 100%). This again corroborates learners' observation. This trend poses a threat to life and property since residents may be asleep and have little or no time to recover. Ironically another majority of teachers and opinion leaders pointed out that tidal waves occur in the day time. (TRs = 83.3%, OP = 100%). The disparity may be attributed to respondents' experiences. The overwhelming majority also indicated that occurrence of tidal waves is unpredictable.

4.3 Resources Affected by Tidal Waves

This section focuses on learners' responses on resources in the coastal communities affected by tidal waves. The first five items in Table 3 relate to education whiles the next six items issues on coastal dwellers livelihood and the seventh item on residential accommodation. The last seven items are connected to learners' education. The results were calculated in frequencies and percentages as shown in Table 3.

Table 3: Learners' Responses on Resources Affected by Tidal Waves **N = 208**

Statements	School A		School B		School C		School D	
	f	%	f	%	f	%	f	%
School Buildings	52	100	52	100	52	100	52	100
Textbooks and Exercise books	51	98.1	50	96.2	49	94.2	52	100
Resource Center	45	86.5	49	94.2	47	90.4	43	82.7
District Education Office	45	86.5	40	76.9	39	75	50	96.2
School Play ground	49	94.2	52	100	48	92.3	48	92.3
Fish Landing Sites	52	100	52	100	52	100	52	100
Fishing Boats	47	90.4	42	80.2	51	98.1	52	100
Ovens for smoking fish	52	100	45	86.5	48	92.3	52	100
Fish Drying Sites	52	100	51	98.1	52	100	43	82.7
Fishing Nets	52	100	49	94.2	52	100	52	100
Outboard Motors	52	100	44	84.6	47	90.4	52	100
Residential Buildings	52	100	52	100	48	92.3	49	94.2

Source: Field Survey, 2022

Results show that resources affected by tidal waves are many and various. From Table 3, the learners indicated that school buildings are the most affected by tidal waves. (A = 100%, B = 100%, C = 100%, D = 100%). The implication here is that learners would have to be transferred or a make shift structure will have to be put in place to enable learners go to school. The alternative goes with availability of funds which may be far-fetched. Results also show that textbooks,

exercise books, resource centers, district education office and school play grounds are also affected by tidal waves. These vital resources in education delivery absence will certainly undermine teaching and learning. Table 3 also shows that the livelihood of coastal dwellers are also affected and could lead to parents' inability to support learners' education.

4.4 Teachers, Circuit Supervisors and Opinion Leaders' Responses on the Resources Affected by Tidal Waves

This section focuses on teachers, circuit supervisors and opinion leaders' responses on the resources affected by tidal waves. The results were calculated in frequency and percentage.

Table 4: Teachers, Circuit Supervisors and Opinion Leaders' Responses on Resources Affected by Tidal Waves **N = 28**

Statements	Teachers		Circuit Supervisors		Opinion Leaders	
	f	%	f	%	f	%
School Buildings	24	100	2	100	2	100
Curriculum Materials	24	100	2	100	2	100
Student Exercise Books	24	100	2	100	2	100
Resource Center	20	83.3	2	100	1	50
District Education Office	18	5.0	2	100	1	50
School Playground	23	95.8	2	100	2	100
Fish landing Sites	24	100	2	100	2	100
Fishing Boats	22	91.7	2	100	2	100
Ovens for smoking fish	20	83.3	1	50	2	100
Fish Drying Sites	24	100	1	50	2	100
Fishing nets	24	100	2	100	2	100
Outboard Motors	24	100	2	100	2	100
Residential buildings	23	95.8	2	100	2	100

Source: Field Survey, 2022

The results again show that educational resources and the livelihood coastal dwellers are affected by tidal waves. Again education related resources as well as resources linked to livelihood are destroyed. (Table 4). This results confirms similar to learners' observation. (Table 3). Realistic and prudent measures are required of District Assemblies and GES to enable learners receive the right and adequate education.

4.5 Direct Effects of Tidal Waves on Learners' Education

To find out the direct effects of tidal waves on learners' education, TRs, CS and OP were interviewed. The responses were pulled together and expressed as key statements as follows:

i. Class attendance of relocated learners becomes irregular because of parents inability to bear cost of transport for their wards. Observably these are parents who have lost their livelihood to action of tidal waves. As results of the academic performance of such learners begins to dwindle.

ii. Truancy is high among learners who have been relocated to new schools.

iii. Some learners dropout of school because parents are unable to provide additional support in their education. Buying textbooks, exercise books and other relevant learning materials to replace those destroyed by tidal waves becomes a challenge for parents who have lost their livelihood to tidal waves.

iv. Teachers find it difficult to meet to learning outcomes of the curriculum which results in poor academic performance of the school learners. This is a direct consequence of disruption of academic work in the event of tidal waves.

v. Learners miss out in scheduled clubs and society meetings, inter-school quiz competitions, sports and games and drama due to destruction of educational infrastructure.

vi. Learners lose study partners who are transferred to other schools. This negatively impact on learners who study better in groups.

4.6 Testing of Hypothesis

Ho: There is no significant difference between schools and effects of tidal waves on learners' education.

One-way Analysis of Variance (ANOVA) was conducted to determine if was a difference between schools and effects of tidal waves on learners' education. The normality test and test for homogeneity of variance assumptions were conducted, the results are shown in Tables 5 and 6 respectively.

Table 5: Normality test

		Shapiro-Wilk		
	selected school	**Statistic**	**Df**	**Sig.**
Total score of effect	School A	.841	52	.000
	School B	.803	52	.000
	School C	.900	52	.000
	School D	.952	52	.035

The normality assumption was conducted using Shapiro-Wilk test and the results show that the variables are not normally distributed (school A p=0.000; school B p=0.000; school C p=0.000; school D p=0.035).

Table 6: Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
7.457	3	204	.000

A test for homogeneity of variance was conducted using Levene's test and the results shows that equal variances are not assumed F (3,207) =7.457, p=0.000.

Table 7: Descriptive Statistics

					95% Confidence Interval for Mean			
	N	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**	**Minimum**	**Maximum**
School A	52	30.88	4.953	.687	29.51	32.26	17	37
School B	52	33.56	3.045	.422	32.71	34.41	23	37
School C	52	32.83	2.572	.357	32.11	33.54	23	38
School D	52	32.58	2.622	.364	31.85	33.31	25	37
Total	208	32.46	3.552	.246	31.98	32.95	17	38

The descriptive statistics from the ANOVA show, A Mean = 30.88, SD = 4.953; B Mean = 33.56, SD= 3.045; C Mean =32.83, SD= 2.572; D Mean =32.58, SD= 2.622.

The ANOVA, test was conducted and rest is displayed in Table 8.

Table 8: ANOVA Test

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	199.423	3	66.474	5.622	.001
Within Groups	2412.269	204	11.825		
Total	2611.692	207			

An ANOVA test reported of significant difference between schools and effects of tidal waves on learners' education. (F (3, 204) =5.622, Sig. = .001) A (M = 30.88 SD = 4.95) to B (Mean = 33.56, SD = 3.05), C (Mean = 32.83, SD = 2.57) D (Mean = 32.58, AD = 2.62) however a small effect size was obtained (ω^2= .033 95% CI).

Since the variances are not assumed equal, a follow-up test or a Post Hoc test was conducted using Games-Howell to find out which pairs of means are statistically different. Table 10 below show the results of the Post Hoc test.

Table 9: Multiple Comparisons

						95% Confidence Interval	
	(I) selected school	(J) selected school	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Games-Howell	School A	School B	-2.673*	.806	.007	-4.79	-.56
		School C	-1.942	.774	.066	-3.98	.09
		School D	-1.692	.777	.139	-3.73	.35
	School B	School A	2.673*	.806	.007	.56	4.79
		School C	.731	.553	.551	-.71	2.18
		School D	.981	.557	.299	-.48	2.44
	School C	School A	1.942	.774	.066	-.09	3.98
		School B	-.731	.553	.551	-2.18	.71
		School D	.250	.509	.961	-1.08	1.58
	School D	School A	1.692	.777	.139	-.35	3.73
		School B	-.981	.557	.299	-2.44	.48
		School C	-.250	.509	.961	-1.58	1.08

From Table 10, the results is statistically significant between schools A and school B (sig. value = .007, $p< 0.05$). Meaning there is difference in effects of tidal wave between schools A and school B. Comparing the rest of the schools did not yield statistically significant results. (Table 9).

5.0 Conclusions

Tidal waves have gained prominence along the coastal regions in Ghana with its devastating effects on socio-economic activities in almost all coastal dwellers in recent times. Coastal dwellers in the Western region notably, Shama, Aboadze, Aboasi and Awona Beach are communities heavily affected by tidal waves. Many and diverse negative effects of tidal waves on education of learners have surfaced in this study. In these communities, the phenomenon has wrecked huge havoc on educational infrastructure, play grounds, interruption of academic calendar and destruction of curriculum materials with the unfortunate and unpleasant action of educational authorities re-locating learners to unaffected schools. Transfer of learners does not only break fluidity of academic work but also imposes immense financial constraints on parents whose fishing occupation has succumbed to the ravaging effects of tidal waves. In extremes cases some learners drop out of school or become truant. The current educational reforms place emphasis on inclusivity therefore, tidal waves should not be a reason why pupils are excluded from education. While siting new schools far from risk zones is commendable, assessment of the impact of tidal waves on education of coastal communities, counseling for displaced learners by the District Education Directorate and increased education by the Environmental Protection Council on human activities which fuel the devastating effects of tidal waves are critical.

5.1 Recommendations

1. To minimize the impact of tidal waves on education of coastal communities, the Ghana Education Service (GES) in consultation with District Assemblies should cite future schools or educational infrastructure at places less prone to tidal waves.
2. To ensure smooth teaching and learning, the GES in collaboration with District Assemblies should better resource schools that receive relocated learners to enable them to readily accept and integrate them in the new teaching and learning environment.
3. The District Directorate of GES should put in place mechanisms or monitoring systems to check truancy of relocated students to ensure regular school attendance.
4. To reduce the impact of tidal waves on persons directly involved in the fishing industry, District Assemblies should set up emergency relief funds to support victims of the action of tidal waves to help rejuvenate and sustain businesses.
5. Government through District Assemblies should work out modalities to facilitate relocation and settlement of severely affected coastal communities.
6. Monitoring and evaluation should form integral part of all measures put in place by District Assemblies in managing the incidence of tidal waves.
7. Going forward an empirical research on the academic performance of learners relocated by tidal waves is suggested.

5.2 Limitations

The findings of this research should be seen in light of one major conceivable limitation. The findings of this study cannot be generalized as the case for all coastal communities in the Western region of Ghana because only four communities where regular incidence of tidal waves occur in recent times were considered. This limitation is attributed to financial constraints. Conducting a bigger study comprising all coastal communities in the Western Region would allow for valid generalization for the region.

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