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STATISTICAL STUDY ON THE IMPACT OF FLOOD VULNERABILITY IN NIGER DELTA REGION

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Abstract

The study examined the impacts of flooding on residents of the Niger Delta Region. It employed cross-sectional and descriptive research designs using six from the nine states of the region. A multistage random sampling technique was used to determine the sample frame, followed by simple random sampling to select three communities from each chosen Local Government Area (LGA). A sample size of 500 respondents was served questionnaires. Both primary and secondary data was utilized. This research identified both direct and indirect impacts of flooding, such as the destruction of farmlands, crops, and produce; loss of trees and vegetation; damage to homes; fatalities; loss of domestic and wild animals; destruction of properties and infrastructure; environmental pollution ; health issues and emotional distress; loss of income; and disruption of the school calendar. Conversely, the study also observed benefits of flooding: increased fish stocks, enhanced soil nutrients, and improved navigation between coastal communities. Thus, flooding can potentially benefit agro-businesses and promote wealth creation. The study recommend that governments, agencies, and NGOs provide sustainable relief and assistance following flood events, such as soft loans, agricultural tools and machines, seedlings and fertilizers, building materials, financial grants, and educational resources. It suggests establishing and operationalizing State Emergency Management Agencies (SEMA) and Local Emergency Response Committees (LERC) in all states and L.G.As.

Key words: Flooding, Vulnerability, Multistage random sampling, Environmental pollution, Agro-Business

1.0 INTRODUCTION

Over the years, the world has witnessed numerous notable disasters causing significant fatalities, devastating economic losses, and immense environmental damage, with the most profound impacts of natural disasters being felt at the community level. Floods are among the most devastating natural disasters globally, claiming more lives and causing more property damage than any other natural phenomenon, and they are the most widespread (Kundu & Kundu, 2011; Rabalao, 2010). Statistically, approximately 100 million people are affected by flooding episodes globally each year (Sayama et al., 2010). Developing countries, particularly in Africa, are highly vulnerable to flood disasters due to weak state infrastructure and the absence or poor implementation of disaster reduction and prevention policies. Nigeria is one of the most disaster-prone countries in Africa, with floods being the most common and recurring natural disaster. The frequency, severity, and extent of these floods are increasing (FGN, 2013). One of most devastating floods in Nigeria's history occurred between July and October 2012, affecting 25 of the 36 states, resulting in 363 deaths, 5,851 injuries, 3,891,304 affected people, and 387,153 displaced individuals (FGN,

2013). African cities are particularly prone to flooding not only because of their vulnerable locations but also due to inadequate infrastructure, poor physical planning, and a high population of poor residents living in vulnerable areas. These communities often lack the capacity to anticipate, cope with, resist, and recover from flood events (Adelekan, 2010). Rapid urban development puts enormous pressure on the environment and existing infrastructure, increasing the risk of floods (Hardoy et al., 2001; Douglas et al., 2008). The risk exposure of communities varies based on their location relative to flood hazards and their socio-economic circumstances. Inhabitants of these communities differ in their perception of risk and the impacts of resulting disaster events. Riverine cities are exposed to additional flood risks from upstream activities such as poor watershed management and dam failures.

Flooding disrupts the socio-economic life and livelihood of affected citizens, with devastating effects that some may never fully recover from. In Delta State, where the population predominantly consists of wildlife habitats and crop farmers, contaminated floodwaters often overflow riverbanks, affecting agricultural produce. Floods often lead to hunger, famine, disease, and epidemic outbreaks (Mmom and Aifeshi, 2013). Vulnerability to flooding is high in low-lying coastal regions, deltas, and small basins (Japhet, 2018). All settlements within these regions are vulnerable to flooding, and Delta State has experienced significant floods in recent years (Amangabara and Obenade, 2013). The 2022 flood disaster was more severe than the 2012 floods. The Director General of the National Emergency Management Agency (NEMA, 2012) stated that "The 2022 flooding is the worst in Nigeria's history, impacting thousands of communities and wreaking havoc in all 36 states and the Federal Capital, Abuja."

Udoh and Aniefiok (2014) and Okereke (2013) summarized the consequences of flooding to include loss of human lives, submerging of residences and streets, inflow of sewage causing municipal pollution and health hazards, traffic obstruction, aesthetic discoloration, disruption of services, infrastructural damage, and economic loss.

2.0 PROBLEM OF STUDY/ JUSTIFICATION

As discussed previously, flooding is a recurrent issue in Nigeria. The 2012 floods, in particular, took the nation by surprise, affecting 30 of the 36 states. This disaster resulted in the loss of approximately 500,000 barrels of crude oil output per day. Following a post-disaster needs assessment conducted between November 2012 and March 2013, in collaboration with the World Bank and the Global Facility for Disaster Reduction and Recovery, The Punch Newspaper reported on May 27, 2013, that unusually heavy rainfall caused severe flooding across nearly the entire country, leading to significant casualties and widespread displacement.

The United Nations, development partners, and relevant ministries and agencies estimated the total value of destroyed infrastructure and assets at $9.6 billion, while the economic losses were valued at $7.3 billion. The combined value of damages and losses was estimated at $16.9 billion (Amangabara and Obenade, 2013). These severe consequences have been linked to poverty, poor governmental planning and budgeting, reckless fund management, lack of insurance, weak institutions, inadequate response preparation, and issues with emergency response (The Punch Newspaper, 2013).

Despite the profound challenges and consequences of flooding, the government's response and that of other key agencies in vulnerable areas have been inadequate. While budgets allocate funds for ecological control, it is common for politicians to divert these funds without proper investment. Disaster preparedness in Nigeria, particularly in the Niger Delta Region, remains an unrealized goal. According to the Pan American Health Organization (PAHO, 2009), effective disaster preparedness requires proactive planning, collaboration among disaster experts, communicators, and administrators, training, teamwork, and investment.

3.0 OBJECTIVE OF THE STUDY

This study examines the perceived impact of a recent flood event on the lives and livelihoods of residents in Niger-Delta communities. Specifically, it aims to (i) analyse the socio demographic profiles of the area's inhabitants and how these vary between neighbourhoods; (ii) identify the key characteristics of the 2012 and 2022 floods in the study area; (iii) assess the perceived impact of the flood and the coping mechanisms adopted by residents; and (iv) determine whether significant variations exist in the quantifiable losses sustained by residents across different neighbourhoods. A post-disaster analysis of this large-scale flooding is expected to provide reliable insights that would inform policy and action on flood mitigation and abatement in the flood-prone, riverine communities of Nigeria.

4.0 LITERATURE REVIEW

The Nigeria Hydrological Services Agency in its annual flood outlook identifies the major causes of flooding in Nigeria as soil moisture, extreme weather conditions due to climate change, the functioning of dams (especially those near the country's borders), and topography. Adegboyega et al (2018). attribute urban flooding to changes in land use, such as urbanization. Abolade et al (2013), find extreme precipitation to be a natural cause, while human activities like inadequate drainage, dumping refuse into waterways, building on waterways, and river/dam overflow exacerbate the issue. Aderogba (2012) highlights the main causes of flooding in Lagos, which include: inadequate drainage systems, torrential rain, and encroachment. Agbonkhese et al. (2014) emphasize heavy precipitation as the major cause, along with climate change and human activities. Komolafe et al. (2015), point to heavy downpours and river storms as natural causes, with broken water pipes, inadequate drainage systems, and dam overflow as human-induced factors.

Flooding has displaced millions, destroyed businesses, disrupted academic institutions, polluted water resources, and increased disease risk, as evidenced by the flooding of Delta State University, Oleh campus. In the last decade, flooding has been the most frequent natural hazard in Africa, with Nigerians experiencing two significant flood events in 2012 and 2018, and a more catastrophic flood in 2022. According to Mustapha Habib Ahmed, Director General of the National Emergency Management Agency, the 2022 flood was the worst in Nigeria's history, affecting all 36 states and the Federal Capital, Abuja, resulting in 612 deaths, 3,219,780 people affected, 1,427,370 displaced, and extensive damage to houses and farmland. The agency warns of similar flooding risks in the coming year. Poverty and increases in prices of commodities are believed to occur as a result of flooding (NEMA, 2013). Floods have an enormous impact both on the individual and society.

Tawari-Fufeyin (2015) conducted a study to evaluate the effects of the 2012 Nigerian floods on selected towns in Bayelsa and Delta States, focusing on various physical and chemical parameters. The study concluded that, while the floods adversely affected the communities' livelihoods and potentially impacted potable water sources, there were no significant or drastic effects on the water quality, as most parameters measured were within the allowable limits set by the World Health Organization (WHO, 1989). In addition to direct impacts, flooding also results in complex interactions within the natural environment and human resource use in cities and towns (Nkwunonwo et al., 2015), which are not immediately noticeable and hard to quantify. These include damage to environmental resources such as vegetation and soil, as well as various psychosocial effects on affected individuals, such as trauma and loss. They observed that flood survivors often experience severe trauma and symptoms of posttraumatic stress disorder (PTSD), depression, and anxiety.

5.0 METHODOLOGY

5.1 Study Area:

The study was conducted in the Niger Delta Region of Nigeria, situated between latitudes 4º and 6º north of the equator and longitudes 5º and 7º east of Greenwich (Mmom and Aifesehi, 2013). This region receives substantial annual rainfall, ranging from 3000mm to 4500mm (Mmom and Aifesehi, 2013), and experiences average temperatures between 27°C and 28°C (Emielu, 2000 in Adejuwon, 2012). The Niger Delta spans nine states: Abia, AkwaIbom, Bayelsa, Cross River, Edo, Delta, Imo, Ondo, and Rivers States, and is home to about 40 ethnic groups speaking over 250 native languages. It holds vast reserves of crude oil and natural gas (NDDC, 2006; Mmom and Aifesehi, 2013) and is ecologically rich with diverse plant and animal species (NDDC, 2006; Mmom and Aifesehi, 2013). The region also boasts timber and non-timber forest products, agricultural resources, marine resources, wildlife, bitumen, and other solid minerals (NDDC, 2006). The primary sources of livelihood in the Niger Delta include construction, artisanal work, agriculture, fishing, farming, trading, and traditional arts (NDDC, 2006).

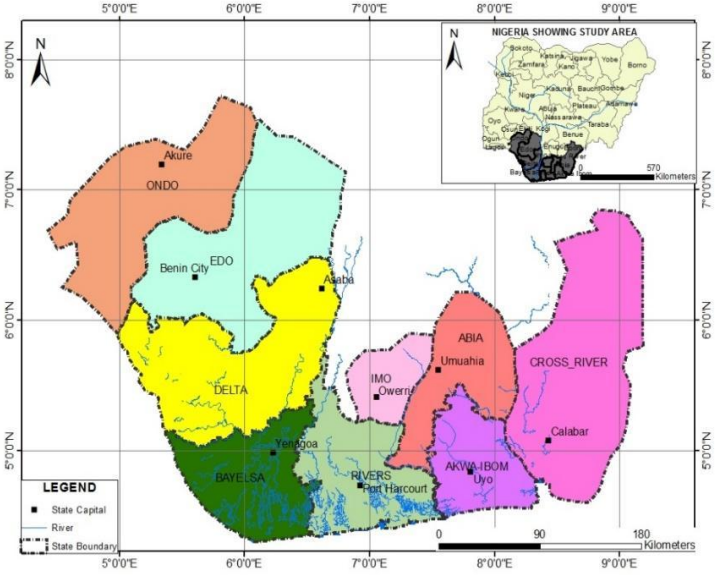

Figure 1: Niger Delta Region showing states

5.2: Data collection/ Data Analysis:

This study will utilize both cross-sectional and descriptive research designs. The multistage sampling technique will be employed to establish the sample frame. From the nine states comprising the Niger Delta region, six states - Bayelsa, Rivers, AkwaIbom, Cross Rivers, Edo, and Delta - have been selected based on the Nigeria Hydrological Services Agency (NIHSA) 2020 Annual Flood Outlook (AFO), which identifies them as highly probable and probable flood risk states. Additionally, these states were chosen because they border the coastal areas of the region.The multistage random sampling technique will be used to select the sample frame. Initially, the simple random sampling technique will be employed to select four highly probable and probable flood risk Local Government Areas (LGAs) from each of the six selected states, totaling 24 LGAs. Subsequently, four communities will be randomly selected from each of the 24 LGAs, resulting in a total of 72 communities. Data collection will involve primary data obtained through a study questionnaire administered to respondents, supplemented by secondary data sourced from existing literature and institutional publications. The sample size of 400 respondents has been determined using the Taro Yamane (1967) formula, with the 400 questionnaires distributed to the selected communities based on proportional allocation relative to each community's population. The formula is presented as follows:

$n = \frac{N}{1+N(e)^2}$ ..... (1)

Where;

n is sample size required

N is total population

1 is constant

e is level of significance (0.05) or level of tolerance.

To determine the sample L.G.A and the sample communities in the selected states in Niger Delta region, the proportional method used as

$n_s = \left(\frac{N_s}{N}\right).n$ ..... (2)

Where n_s = The sample size for stratum s

N_s = Population size for stratum s

N = the population size

n = the total sample size. The descriptive statistics such as χ^2 -square, percentages and frequency tables were used to analyse the data; while the Kruskal Wallis Test of Variation will be used to test the study hypothesis.

5.3 States and selected local government areas: The population of the states and LGA's of Nigeria according to census results and latest population projections.

S/N	Selected States	Sample Size for State	LGA	Population of LGA by 2022 sample projection	Distribution of Sample by professional Allocation.
1	Akwa-Ibom	44	- Abak - Eket - EssienUdim - Ito Abasi	177,550 220,600 264,200 169,200 **813,500**	10 12 13 09
2	Bayelsa	92	- Ekeremor - Sagbama	401,300 278,200	22 15

			- Southern Ijaw - Yenagoa	479,000 524,000 **1,682,900**	26 29
3	Delta	65	- Burutu - Ethiope West - Isoko North - Ughelli North	285,000 275,400 196,700 439,500 **1,196,600**	15 15 11 24
4	Edo	82	- Ovia North East - Oredo - Orwa East - Egor	229,500 553,300 228,500 502,700 **1,514,000**	13 30 12 27
5	Rivers	65	- Ahoda East - Andoni - Bonny - Eleme	239,200 313,400 309,200 273,500 **1,135,300**	13 17 17 15
6	Cross River	55	- Akamkpa - Boki - Ikom - Obudu	228,000 284,200 249,300 245,900 **1,007,400**	12 16 14 13

Source: Field work of Research 2022

5.3.1 Socio-Economic Characteristics of Respondents

(a) Gender of the respondents

Variable	**Frequency**	**Percentage**
Male	260	65
Female	140	35
Total	**400**	100

(b) Marital Status

Variable	**Frequency**	**Percentage**
Single	122	30.5
Married	241	60.3
Separated/Divorced	17	4.2
Widowed	20	5.0
Total	**400**	100

(c) Level of Education

Variable	**Frequency**	**Percentage**
Primary	52	13
Secondary	112	28
Graduate	206	51.5
Others	30	7.5
Total	**400**	100

(d) Age of Respondents

Variable	Frequency	Percentage
18-30	120	30
31-40	154	38.5
41-50	86	21.5
51-60	30	7.5
Above 60	10	2.5
Total	**400**	100

(e) Duration of stay in the community

Variable	Frequency	Percentage
1-4years	22	5.5
5-10years	46	11.5
10-15years	98	24.5
Above 15years	234	58.5
Total	**400**	100

(f) Main occupation of Respondents

Variable	Frequency	Percentage
Farming	65	16.3
Fishing	70	17.5
Student	50	12.5
Trading/Business	73	18.3
Civil/Public Servants	70	17.5
Skilled self-employed	40	10.0
Unemployed	32	8.0
Total	**400**	100

(g) Average monthly income of Respondents

Variable	Frequency	Percentage
Below 20,000	30	7.5
21,000 – 40,000	195	48.7
41,000 – 60,000	48	12
61,000 – 80,000	50	12.5
81,000 – 100,000	42	10.5
101,000 – 200,000	19	4.7
Above 200,000	16	4.0
Total	**400**	100

5.3.2 Observable impacts of flood and its associated challenges

(a) Badly affected by the recent flooding

Variable	Frequency	Percentage
Strongly agreed	11.2	28
Agreed	223	55.8
Undecided	10	2.5
Disagreed	55	13.5
Total	**400**	100

(b) Temporary relocated because of flood

Variable	Frequency	Percentage
Strongly agreed	186	46.5

Agreed	150	42.5
Undecided	12	3.0
Disagreed	32	8.0
Total	**400**	100

(c) Total destruction of crops, produce and farmlands

Variable	**Frequency**	**Percentage**
Strongly agreed	245	61.3
Agreed	140	35.0
Undecided	15	3.7
Disagreed	0	0.0
Total	**400**	100

(d) Loss of human lives

Variable	**Frequency**	**Percentage**
Strongly agreed	258	64.5
Agreed	123	30.8
Undecided	19	4.7
Disagreed	0	0.0
Total	**400**	100

(e) Displacement/Loss of Homes

Variable	**Frequency**	**Percentage**
Strongly agreed	255	63.8
Agreed	128	32.0
Undecided	12	3.0
Disagreed	5	1.2
Total	**400**	100

(f) Loss of vegetation/Social Areas

Variable	**Frequency**	**Percentage**
Strongly agreed	184	46.0
Agreed	196	49.0
Undecided	20	5.0
Disagreed	0	0.0
Total	**400**	100

(g) Loss of domestic/wild animals

Variable	**Frequency**	**Percentage**
Strongly agreed	198	49.5
Agreed	179	44.7
Undecided	18	4.5
Disagreed	5	1.3
Total	**400**	100

(h) Total destruction of living properties

Variable	**Frequency**	**Percentage**
Strongly agreed	205	51.3
Agreed	180	45.0
Undecided	15	3.7

Disagreed	0	0.0
Total	**400**	100

(i) Affliction of sickness/Diseases and other human disorder

Variable	**Frequency**	**Percentage**
Strongly agreed	228	57.0
Agreed	148	37.0
Undecided	24	6.0
Disagreed	0	0.0
Total	**400**	100

(j) Destruction of private/public infrastructures (Road, bridges, schools etc.)

Variable	**Frequency**	**Percentage**
Strongly agreed	200	50.0
Agreed	178	44.5
Undecided	21	5.3
Disagreed	1	0.2
Total	**400**	100

(k) Environmental pollution (Water/Air pollution)

Variable	**Frequency**	**Percentage**
Strongly agreed	249	62.3
Agreed	146	36.5
Undecided	5	1.2
Disagreed	0	0
Total	**400**	100

(l) Interruption of children school calendar

Variable	**Frequency**	**Percentage**
Strongly agreed	145	36.3
Agreed	182	45.5
Undecided	50	12.5
Disagreed	23	5.7
Total	**400**	100

5.3.3 Some Profitable Impact of Flood

(a) It enhances easier movement of timber within the coastal region

Variable	**Frequency**	**Percentage**
Strongly agreed	154	38.5
Agreed	152	38.0
Undecided	90	22.5
Disagreed	4	1.0
Total	**400**	100

(b) Abundant sand deposit during flood

Variable	**Frequency**	**Percentage**
Strongly agreed	260	65.0
Agreed	138	34.5
Undecided	2	0.5
Disagreed	0	0.0

Total	**400**	100

(c) Increase availability of fish food

Variable	**Frequency**	**Percentage**
Strongly agreed	221	55.3
Agreed	171	42.7
Undecided	8	2.0
Disagreed	0	0.0
Total	**400**	100

(d) Abundant deposit of soil nutrient

Variable	**Frequency**	**Percentage**
Strongly agreed	182	45.5
Agreed	164	41.0
Undecided	29	7.2
Disagreed	25	6.5
Total	**400**	100

5.3.4 Possible relief Assistance

(a) Soft loan will help to alleviate flood

Variable	**Frequency**	**Percentage**
Strongly agreed	214	53.5
Agreed	152	38.0
Undecided	20	5.0
Disagreed	14	3.5
Total	**400**	100

(b) Provision of grants

Variable	**Frequency**	**Percentage**
Strongly agreed	270	67.5
Agreed	84	21.0
Undecided	41	10.3
Disagreed	5	1.2
Total	**400**	100

(c) Provision of agricultural tools and Machine

Variable	**Frequency**	**Percentage**
Strongly agreed	288	72.0
Agreed	98	24.5
Undecided	14	3.5
Disagreed	0	0
Total	**400**	100

(d) Provision of seedings and fertilizers

Variable	**Frequency**	**Percentage**
Strongly agreed	293	73.3
Agreed	79	19.7
Undecided	20	5.0
Disagreed	8	2.0

Total	**400**	100

(e) Provision of educational resources

Variable	**Frequency**	**Percentage**
Strongly agreed	306	76.5
Agreed	76	19.0
Undecided	8	2.0
Disagreed	10	2.5
Total	**400**	100

(f) Provision of building materials

Variable	**Frequency**	**Percentage**
Strongly agreed	264	66.0
Agreed	112	28.0
Undecided	12	3.0
Disagreed	12	3.0
Total	**400**	100

5.4 HYPOTHESIS TESTING

Furthering our verification on the impact of flood on Niger Delta Communities we consider three cases:

Case I: Impact of flood and the location of farm land

Case II: Impact of flood and the available infrastructures

Case III: Impact of flood and damage farmland

Each of these cases tested using

χ^2 – Squared method on this hypothesis:

H_O: The two variables of classification are independent

H_I: The two variables of classification are not independent

Case I: Impact of flood and the location of farm land

Land location		**Relocation**	**Crop Damage**	**Loss of Lives**	**Damage Buildings**	**Total**
	Sea short	50	20	90	40	200
	Low land	20	10	40	20	90
	Upland	10	30	30	40	110
	Total	80	60	160	100	400

Step I: State the hypothesis.

H_O: The two variables of classification are independent.

H_I: The two variables of classification are not independent

Step II: Calculate the expected frequencies

Step III: Compile the Chi-square statistics

Oij	Eij	Oij-Eij	$(Oij-Eij)^2$	$\frac{(Oij-Eij)^2}{Eij}$
50	40	10	100	2.5
20	30	-10	100	3.33
90	80	10	100	1.25
40	50	-10	100	2

20	18	2	4	0.22
10	13.5	-3.5	12.25	0.91
40	36	4	16	0.44
20	22.5	-2.5	6.25	0.28
10	22	-12	144	6.55
30	16.5	13.5	182.25	11.05
30	44	-14	196	4.45
40	27.5	12.5	156.25	5.68
				38.66

Step IV: Determine degree of freedom (df)

Degree of freedom (C-1) (r-1)

(4-1) (3-1)

(3) (2) = 6

Step V: Find the critical value and compare significance level (α) = 0.05

$\chi^2_{tab} = \chi^2_{0.05,\,6} = 12.592$

$\chi^2_{cal} = 38.66$

Conclusion: Since the χ^2_{cal} (38.66) is greater than χ^2_{tab} (12.592), we reject H_O and accept H_I and conclude that the two variables of classification are not independent.

Case II: Impact of flood and the available infrastructures

Infrastructure		**Severe**	**Mild**	**Low**	**Total**
	School	20	30	50	100
	Road	50	50	50	150
	Electrical facilities	40	40	70	150
	Total	110	120	170	400

Oij	Eij	Oij-Eij	$(Oij-Eij)^2$	$\frac{(Oij-Eij)^2}{Eij}$
20	27.5	-7.5	56.25	2.05
30	30	0	0	0
50	42.5	7.5	56.25	1.32
50	41.25	8.75	76.56	1.86
50	45	5	25	0.56
50	63.75	-13.75	189.06	2.97
40	41.25	-1.25	1.56	0.04
40	45	-5	25	0.56
70	63.75	6.25	39.06	0.61
				9.97

Step IV: Determine degree of freedom (df)

Degree of freedom (C-1) (r-1)

(3-1) (3-1)

(2) (2) = 4

Step V: Find the critical value and compare significance level (α) = 0.05

$\chi^2_{tab} = \chi^2_{0.05,\ 4} = 9.488$

$\chi^2_{cal} = 9.97$

Conclusion: Since the χ^2_{cal} (9.97) is greater than χ^2_{tab} (9.488), we reject H_O and accept H_I and conclude that the two variables of classification are not independent.

Case III: Impact of flood and damage farmland

		Severe	Mild	Low	Total
Infrastructure	**Crop Yield**	55	45	50	150
	Crop Harvest	25	45	30	100
	Farm Facilities	45	50	55	150
	Total	125	140	135	400

Oij	Eij	Oij-Eij	$(Oij-Eij)^2$	$\frac{(Oij - Eij)^2}{Eij}$
55	46.88	8.12	65.93	1.41
45	52.5	-7.5	56.25	2.07
50	50.63	-0.63	0.39	0.01
25	31.25	-6.25	39.06	2.25
45	35	10	100	2.86
30	33.75	-3.75	14.06	0.42
45	46.88	-1.88	3.53	0.08
50	52.5	-2.5	6.25	0.12
55	50.63	4.37	19.09	0.38
				9.6

Step IV: Determine degree of freedom (df)

Degree of freedom (C-1) (r-1)

(3-1) (3-1)

(2) (2) = 4

Step V: Find the critical value and compare significance level (α) = 0.05

$\chi^2_{tab} = \chi^2_{0.05,\ 4} = 9.488$

$\chi^2_{cal} = 9.96$

Conclusion: Since the χ^2_{cal} (9.96) is greater than χ^2_{tab} (9.488), we reject H_O and accept H_I and conclude that the two variables of classification are not independent.

6.0 RESULTS AND DISCUSSION

6.1 Social-Economic Characteristics

Table 1a – 1f depicts the social-economic characteristics of the respondents in the Niger Delta. Table 1a shows 65% of the respondents were male and 35% were female. Table 1b shows 60.3% were married, 30.5% were single and 4.2% were separated and widowed while 5% are widowed. Table 1c shows that we have more graduate in the area making 51.5%. About 28% had secondary education while primary school certificate and others was 13 and 7.5 respectively. This shows the reason why the filling and return of the

questionnaires was effective. Table 1d reveals that 38.5% of the respondents are within the age bracket of 31-40, 30.5% are within 18-30 years of age, while 21.5% are in the age bracket of 41-50 years. Only about 2.5% are above 60 years. This confirmed that the people are within their active period. Table 1e confirm that 58.5% have lived in the communities for over 15years, while about 24.5% have stayed 10-15years. It implied that majority are conversant with the live and activities of the communities. From table (1f), the occupation of the people ranges almost evenly from farming, fishing, trade/business, civil/public services. The highest is trading/business being 18.3% and skilled self-employed being the least 10%. About 8% of the respondents are unemployed. The reason for their carrier spreading this way is as a result of their natural endowment with enormous water bodies. Table 1(g) reveals the average income of the respondents. Those who earn ₦21,000 - ₦40,000 are 48.7% and are more in number. 7.5% of the people earn below ₦20,000 while about 4% earn above ₦200,000 on monthly bases. This generally defines an average economy.

6.2 Observed Impacts and Challenges of Flood

Tables 2(a-l) depicts the result of the observed impacts and the associated challenges of flood in Niger Delta region. From Table 2a, 55.8% of the respondents said they were badly affected by the recent flood. Another 28% said they were very seriously affected. Only 13.5% were not badly affected. This confirms that flood is having bad impact to the people.From table 2b, 46.5% strongly agreed that they were temporary relocated because of flood, another 42.5% then agreed they were relocated and only 8% were not relocated. This showed that flood impact is high causing temporal relocation.

From 2c, we could observe that 61.3% of the respondents seriously agreed that flood destroy crops, produce and farmlands, another 35% agreed that flood destroy crops and farmland. In fact, none disputed this fact. Table 2d, 64.5% of the respondents strongly agreed that flood causes loss of human lives, more 30.8% of the respondents further agreed that many lives are lost to flood, nobody disputed this. Table 2(e) confirmed the displacement/loss of their homes, 63.8% strongly agreed that they were displaced subsequently lost their homes to flood, 32% agreed while only 1.2% disagreed. Therefore, flood results to displacement and loss of homes. Besides, from table 2(f) 46% strongly agreed and another 49% agreed that they lost vegetation and social areas to flood. Table 2(g) showed that domestic/ wild animals are lost to flood. 49.5% and 44’7% of the respondents strongly agreed and agreed respectively. Only 1.3% did not agree. In the same vain, from table 2(h) 51.3% strongly agreed and 45% agreed that flood destroy living properties. Nobody disagreed. Table 2(i) affirms that flood causes sickness, diseases and other human disorder. 51% strongly agreed, 37% agreed and 6% were undecided. No body disagreed. Table 2(j) confirms that flood destroy private/public infrastructures such as roads, bridges and schools 50% of the respondents strongly agreed to this, 44.5% still agreed, 5.3% were undecided and only 0.2% disagreed. It was confirmed from table 2(k) that flood causes environmental pollution (water/air pollution). 62.3% and 36.5% strongly agreed and agreed respectively, while 1.2% were undecided, nobody disagreed. We have from table 2(l) that flood interrupts children school calendar, 36.3% strongly agreed, 45.5% agreed, 12.5% undecided, only 5.7% disagreed.

6.3 Some Profitable Impact Of Flood

Although flood has lots of negative impact in the communities, it is observed to have some profitable impact in the communities (see tables 3(a-c)). From table 3(a), it reveals that 38.5% of the respondents strongly agreed that flood enhance easier movement of timber produce within coastal regions, another 38% agreed, 22.5% were undecided, while only 1% disagreed. From table 3(b), it was revealed that flood enhances abundant sand deposit which becomes economically viable for the communities, 65% strongly agreed to this, 34.5% agreed, 2% were undecided and nobody disagreed. Table 3(c), showed that flood increases availability of fish for food, 55.3% strongly agreed, 42.7% agreed, 2% undecided and no body disagreed. From table 3(d), it was confirmed that flood enhances deposit of soil nutrient,45.5% strongly agreed, 41.8% agreed, 7.2% were undecided and only 6.5% disagreed.

6.4 Possible Relief Assistance

This section reveals that if the following relief assistance (table 4(a-f)) is given to the communities it will help to reduce the impact of flood in Niger Delta Region.

From 4(a), it showed that soft loan will help to alleviate flood impact, 53.5% of the respondents strongly agreed, 38% agreed, 5% were undecided, while 3.5% disagreed. Table 4(b), reveals that provision of grants could be very helpful to reduce the impact of flood; 67.5% strongly agreed, 21% disagreed. It can also be seen from table 4(c) that provision of agricultural tools and machine will help reduce flood impact, 72% strongly supported this, 24.5% also agreed, 3.5% were undecided, and nobody disagreed. Table 4(d) showed that provision of seedlings and fertilizers will be very useful to alleviate flood impacts. 73.3% strongly agreed, 19.7% also agreed, 5% were undecided, and 1% disagreed. Table 5(c) equally confirmed that provision of educational resources will help to reduce impact of flood. 76.5% of the respondents strongly agreed, 19% agreed, 2% were undecided and only 2.5% disagreed. From table 4(f), it confirmed that provision of building materials will greatly help to reduce the impact of flood. 66% strongly agreed to this, 28% also agreed, 3% were undecided, while only 3% disagreed.

6.5 Inference From Hypotheses

From the analysis of cases (I-III) above

(i) The location of a farmland can result to high impact of flood. Farmers should be mindful about this.

(ai) Flood could have a greater impact on our infrastructures leading to high economic loss

(bi) Flood could damage our farmland thereby leading to poor yield of production, hunger and low creation of wealth.

7.0 CONCLUSION AND RECOMMENDATION

This researchexamined the direct and indirect impacts, as well as the associated challenges, of flooding in communities across the states. These impacts include the destruction of farmlands, crops, and produce; loss of trees, vegetation, and green areas; damage to or loss of homes; human and animal fatalities; destruction or loss of properties and infrastructure such as roads and bridges; environmental pollution leading to water contamination and poor air quality; increased incidence of sickness, disease, and emotional distress; loss of income; and disruption of the school calendar. Additionally, the researchidentified potential benefits of flooding to the residents of the Niger Delta, such as an increase in fish stocks, deposition

or enhancement of soil nutrients, and improved ease of movement and navigation within and between coastal neighbourhoods. These benefits could lead to heightened economic activities, increased agricultural yields, and seamless transportation of goods, resulting in greater revenue generation for the populace. Consequently, flooding may be viewed as advantageous for agribusinesses and wealth creation in the region.

Based on the findings, this study proposes several recommendations. Firstly, governments, their agencies, and donor organizations (NGOs) are advised to prioritize providing relief items and assistance that can ensure long-term sustainability following any flood event. Examples include offering soft loans, agricultural aid in the form of tools, machinery, seedlings, and fertilizers, as well as providing building materials, financial grants, and educational resources. Additionally, it is suggested that State Emergency Management Agencies (SEMAs) and Local Emergency Response Committees (LERCs) be established and effectively operationalized across all states and Local Government Areas within the Niger Delta Region.

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