



Vulnerability and Capacity Assessment of Residents to Flood Hazard In Selected States In The Niger Delta, Nigeria.

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ABSTRACT

The research study with topic: vulnerability and capacity assessment of residents to flood hazard in selected states in the Niger Delta, Nigeria, was necessary because of how rural flooding has impacted negatively in the study area in the past eight years after 2012 flood disaster which severely left some households homeless, livelihood of the people and infrastructural system that makes life meaningful were damaged, loss of life's and other social aspects that contributes to human existence destroyed. The sample size of 399 as determined using The Taro Yamane formula was deployed in the research. A total of three hundred and ninety-nine (399) questionnaires using PRA method were administered with three hundred and ninety-nine (399) returned well filled giving a percentage response of 100%. The questionnaires were used for data collection. Data collected were analyzed using both descriptive and inferential statistics. The null hypotheses were tested at 0.05 level of significance, using Analysis of variance (ANOVA). The result indicated that the probability level of significance $P (.884)$ is greater than 0.05. The finding reveals that the low-lying of the area and proximity to the river bank makes the rural communities vulnerable to seasonal flooding. The consistent flooding whenever it rains heavily has resulted in the loss of crops and livestock which is the main source of livelihood of the people. The findings also expresses that the rural community people are yet to recover from the severe impacts of flood events, but are applying some adaptive measures to become resilient to the flood hazard. Some coping mechanism that was engendered by the people includes; relocation out of flood plain area, reconstruction of most houses with reinforcement of materials like the use of bricks and blocks as against the predominant mud/thatch houses that existed prominently before, raising DPC level of houses above annual flood levels, erecting temporary structures along river banks, channeling of water ways to ease evacuation of flooding water, constant dredging of of river and drainage outlets, construction of dykes and fumigation of stagnant flood water to reduce mosquito parasites. The study recommends the advancement of public enlightenment campaign, advocacy, early warning, disaster preparedness, and development rural small scaling safety units amongst the people to improve resilience.

KEY WORDS: PRA, VCA, CAPACITY, VULNERABILITY.

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I. INTRODUCTION

Disaster risk management practice advises that a community is expected to have possible capacities on its population and environments to cope until further assistance is received from either national, international government or humanitarian support groups, this assertion is in line with the United Nations International

Strategy for Disaster Reduction (UNISDR, 2009), which defines capacity as the strengths, attributes and resources available with a community, society or organization that can be used to achieve so far experience the catastrophic nature it comes with, and also agrees that several ugly situations as posed by flood events overtime in the world has created researchable concern to knowledge contribution.

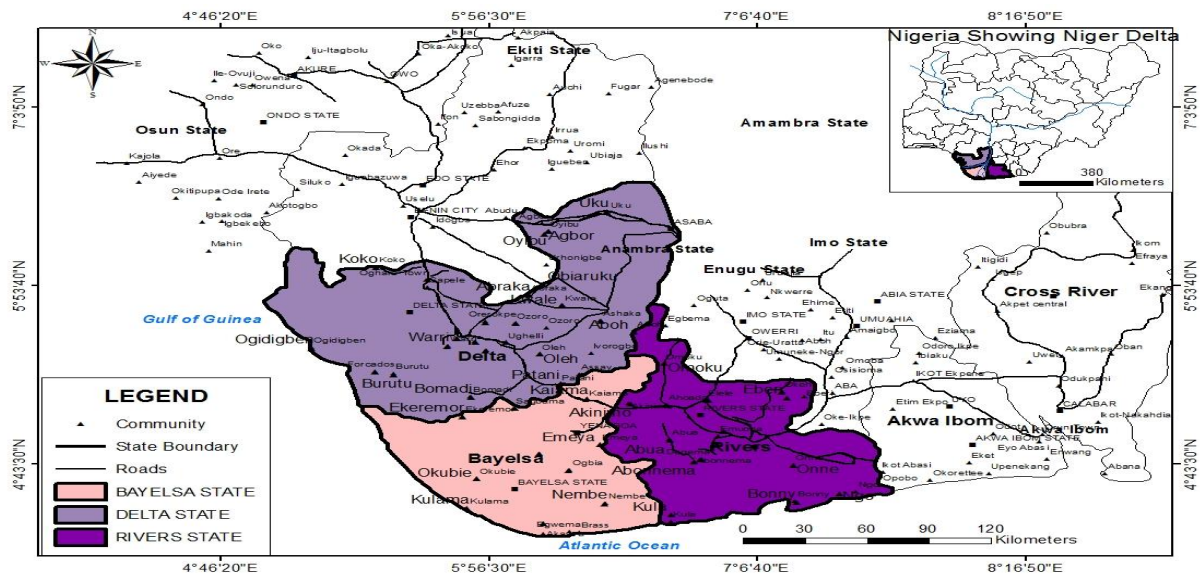
The capacities to strengthen human with coping ability to natural disasters includes infrastructure, institutions, societal knowledge and skills to minimize further damage or impacts of flood events, according to (IFRC, 1999) Vulnerability and Capacity Assessment (VCA) is defined as a process used to identify the strengths and weakness of households, communities, societies and nations, the VCA is viewed as strong tool that help to support decisions making in relation to disaster preparedness and the development of mitigation program, the first step in assessing vulnerability and capacity of a place is by gathering records of actual impacts of the hazard with regards to six special categories such as individual, social, natural, physical, attitudinal and economic. The information's gathered will help to understand to a great extent the scope, nature or level of risks that vulnerable people face, where the root of the risks is coming from; who or gender will be worst affected; what resources or capacities is available at all levels to help reduce the unwanted risks and what proactive measures or initiatives can be mustered to strengthen awareness.

According to the United Nations (UN) International Decade for Natural Disaster Reduction (IDNDR) on participants forum organized by its reputable organization in 1999 to mark a strategy for safer world in the 21st century towards disaster and risk reduction adopted participants statement that hazard is inevitable and elimination of all possible risk is impossible but holds the view that there are several technical measures, traditional practices and public experience available to reduce the extent of economic and social loss to disaster, it also agreed that hazards and emergency are part of human existence to a partway of living with nature which believed can change human behavior, hence undertaking the responsibility to reduce risk of disaster and mitigating it likely impacts is the key note statements of 9th July, 1999 Geneva mandate on Disaster Reduction, and was echoed by several international humanitarian sector that being proactive is better than reactive actions to help reduce people's vulnerability to both natural and man-made hazards, and that measures must be taken at the international, national and local levels to establish hazard-resilient communities for all wellbeing, the forum further advised all sectors such as National Red Cross and Red Crescent Societies to see the Geneva statement as a step on how vulnerability and capacity assessments (VCA) can help them to improve in understanding the needs of the people at greatest risk of natural and man-made disasters, and prepare more appropriate actions to assist them cope, and recovering from eminent hazards, the guide includes National Society case studies examples describing VCA's usefulness and lessons learned.

The international Federation's disaster preparedness department in her response believed that VCA a proactive tool will surely help to contribute to better understanding on the nature and level of risks in the face of vulnerable people; where these risks is coming from; who will be the worst affected; what available capacities at all levels to help reduce the risks and what possible initiatives to be undertaken to strengthen the impact of National Society programmes to improve the capacity of people at risk, the statements as stated are key focus of the study.

1.1 Study Area

The study area is located in Niger Delta region, and share part of the Delta in Niger River sitting directly on the Gulf of Guinea on the Atlantic Ocean in Nigeria, located within the coasted Southern Nigeria States, and stretched through latitude the 4^o 43' 30."N and 5^o 53.40'' N while longitude 4^o 46' 20'' E and 8^o 16' 50'' E. The study area comprises Bayelsa, Delta and Rivers States as core Niger Delta States in (Map 3.1). The three States amongst others have electoral and economical values that sustain Nigeria as a nation, it was sometime called oil Rivers due to palm oil production and later called oil Rivers protectorate from 1885 until 1893 when it was expanded and became Niger coast protectorate, and also known as petroleum rich region. It can also be described as a center of international controversy over pollution, upon its geographical areas within 70,000km² (27,000 sq m) which make up part of 7.5%.



Map 1.1: Core Niger Delta

Source: Rivers State Ministry of Land and Housing

II. MATERIAL METHOD

The researcher adopted a cross sectional research study to ensure it doesn't interfere with the subject of the investigation but intends to observe the phenomena of the study. Cross sectional research design which is focused on the observational study; deals with the investigational measure toward achieving the outcome and exposure of the study participants at the same time (Sardana et al., 2016, p. 61:45-52); (Shinde et al., 2009, p.75:41-6). While the control studies where participants are being selected as a result of the outcome status or cohort studies, the participants selection as based on the exposure status, but in cross sectional research study participants are selected based on the inclusion and exclusion criteria set of the study.

The data collected was analyzed qualitatively and quantitatively to determine the weights in PRA of few representative communities selected in the study states as aggregated with mean and standard deviation separating in respective flood events of 2012 and 2018, and considering state wise to arrive at the final weight to be classified/prioritized with regards to severity of vulnerability of flood hazard seeking the urgency of coping capacity/adaptive measures.

The comparison of PRA of the both flood disasters will show the fluctuation in vulnerability, coping and adaptation of community. The household survey will be analyzed using MS Excel and SPSS to produce cross tables and charts or table for comparing different factors of the three selected states in Niger Delta. The research will further explore the use of triangulation where necessary with respect to qualitative and quantitative analysis to examine the similarities and differences; to provide a likely linkage of formal and informal changes; and proffer a global/community base recovery process that will improve resilience of the people in the study area.

Frequency tables were constructed to indicate responses from each item used while inferential statistics, Analysis of Variance (ANOVA) were used to analyze the Null hypotheses, the null hypotheses were tested at 0.05 level of significance. While responses were coded, processed, and entered into the computer using Microsoft excels and word program.

2.2 Study Population

The population of the research study is focused on the few selected communities as representative of people living in Bayelsa, Delta and Rivers States vulnerable to flooding as projected for 2006 and 2019 census population in Nigeria as described in the table 2.1.

2.3 Sampling Technique

The simple random sampling technique will be utilized to enhance the administering of certain copies of the structured questionnaires to community's household heads of population affected by 2012 and 2018 flood disasters within the local government areas in the Niger Delta selected States, to achieve this purpose the lottery method will be applied.

2.4 Sample Size Determination

The Taro Yamani formula that enhances equal opportunity of selection was adopted and put in use to determine the research study sample size in relation to the study area population households, the calculated sample size will give an idea of a certain numbers of the study area population to be administered with questionnaires focused in achieving the research objectives without bias.

A. Taro Yamani formula is written as thus:

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

Where:

n = sample size

N = population

1 = 1 is constant

e = error limit or margin of error or level of precision at 5% or (0.05)²

B. To determine the sample communities in the three selected states in Niger Delta, the proportional method will be applied as written bellow:

$$n_h = \left(\frac{N_h}{N}\right) * n \dots\dots\dots 2$$

Where n_h is the sample size for stratum h ,

N_h is the population size for stratum h ,

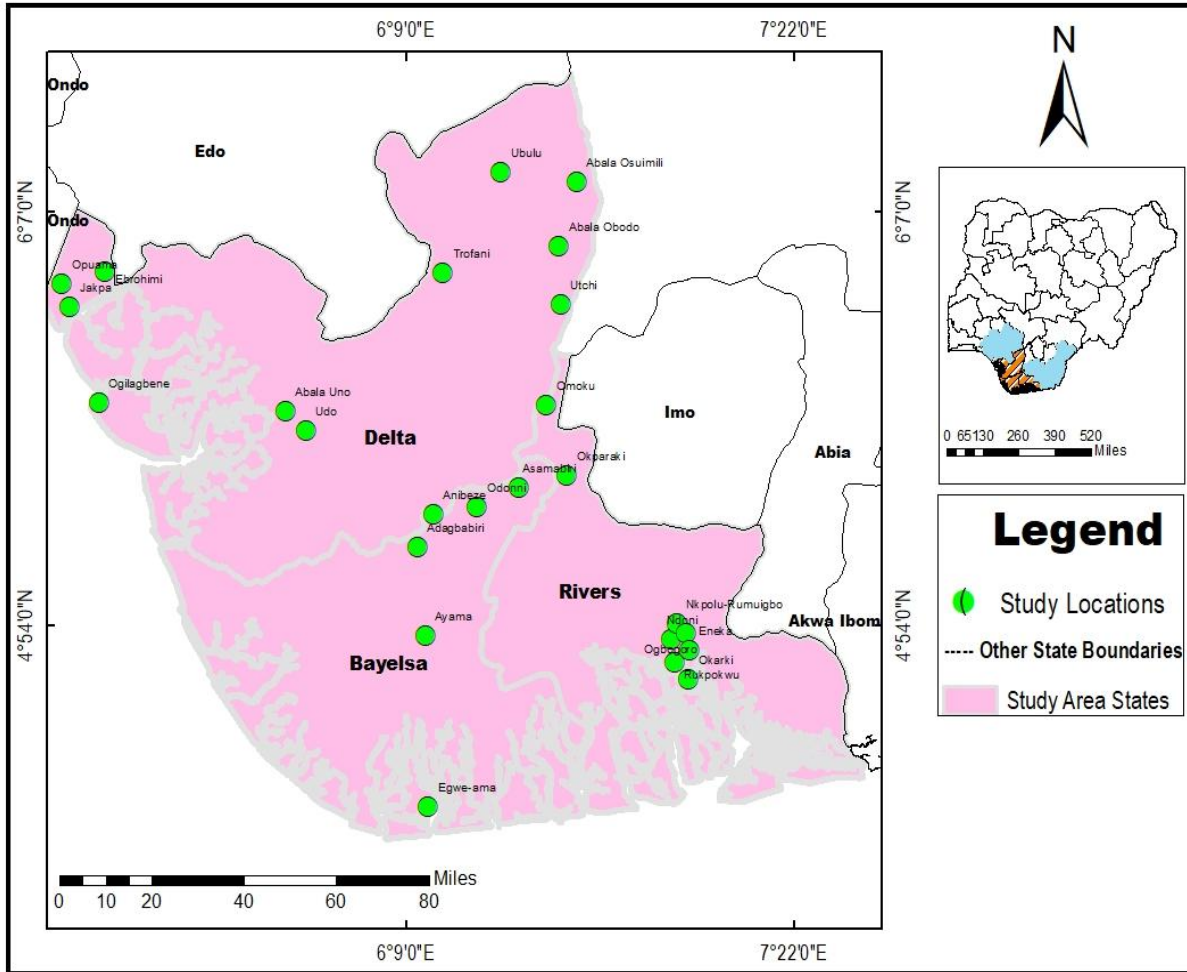
N is the population size,

n is the total sample size, Applying the formula,

Table 2.1: the computed population and sample size relative to flood affected nine representative communities in the selected Niger Delta States

Source: Author’s Computation, 2019.

S/No	Study State	Sample Communities	Communities Population 1991 Census, Nigeria	Communities 2006 Population Projection Based 2.9% Growth Rate NPC Standard @ 15 Years	Communities 2019 Population Projection Based 3.4% Growth Rate NPC Standard @ 13 Years	Communities Sample Size Calculation	Communities Expected Sample Size
1	Bayelsa	Trofani	2,326	3337.81	4813.12202	39.91277663	39
2		Adagbabiri	2,490	3573.15	5152.4823	42.72691909	43
3		Asamabiri	2,617	3755.395	5415.27959	44.90616355	45
		Total	7,433	10666.36	15380.88	127.5459	127
1	Delta	Jakpa	1,252	1796.62	2590.72604	46.92761087	47
2		Abala Uno	2,088	2996.28	4320.63576	78.26266094	78
3		Abala Obodo	1,011	1450.785	2092.03197	37.8944206	38
		Total	4,351	6243.69	9003.39	163.085	163
1	Rivers	Rukpokwu	5,080	7289.8	10511.8916	26.74530916	27
2		Ogbogoro	9,360	13431.6	19368.3672	49.27875861	49
3		Eneka	6,219	8924.265	12868.7901	32.74194442	33
		Total	20,659	29645.7	42,749	108.766	109
	Grand Total Expected Sample Size						399



Map 2.1 Study Area Locations

III. RESULTS AND DISCUSSION

This chapter dealt with the presentation, analysis, and interpretation of data resulting from the field survey illustrated using the procedure and statistical tool described in the material method. The presentation and analysis of specific data were done in line with the objectives of the study.

A total of three hundred and ninety-nine (399) questionnaires were administered to respondents in the area of study. All the three hundred and ninety-nine (399) questionnaires were received adequately filled as follows Bayelsa 127(31.8%), Delta 163(40.9%) and Rivers 109(27.3), giving a percentage response of 100.0%. Mugenda (2003) argues that a response rate of 50 % or higher is adequate for data analysis. This implies that 100.0% response rates were very appropriate for data analysis.

First, the data showing the demographic characteristics of the respondents in the study area were presented and discussed. To identify elements at risk and examine the variation of social, economic, human, attitudinal, political, natural and physical categories of vulnerability of communities in the study area, identify the types and level of capacities in the study area, determine the level of awareness of flood hazard, risk, warning system, preparedness measures and ability to use information to counter or reduce flood hazard in the study area and to identify the laws and policies which provide a formal basis for counter disaster action in the study states.

Finally, the chapter was concluded with a discussion of the findings of the previous study.

3.1 Socio-Economic Characteristics of Respondents

Respondents' gender ratio in table 3.1 was included to gain a perspective on the assessment of vulnerability and capacity of flood hazard in selected states in the Niger Delta.

Table 3.1: Gender of the Respondents

States	Gender
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	Male	Female	Total
Bayelsa State	85(21.3%)	42(10.5%)	127 (31.8%)
Delta State	134(33.6%)	29(7.3%)	163 (40.9%)
Rivers State	76(19.0%)	33(8.3%)	109(27.3%)
Total	295 (73.9%)	104 (26.1%)	399(100%)

Source: Researcher's Fieldwork, 2021

The results show a total of three hundred and ninety-nine 399(100.0%) with 85(21.3%) male and 42(10.5%) females in Bayelsa, 134(33.6%) male, 29(7.3%) female in Delta and 76 (19.0%) male, 33(8.3%) females in Rivers responded to the instrument. The majority were males who contributed 295 (73.9%) and females contributed only 104 (26.1%). Everyone participated in the study by completing the questionnaire. This implies that there are more males than females in the study areas.

3.2 Years Lived in the Community

The participants were asked for how long they had been living in the studied communities and their responses are as summarized in table 3.2 below.

Table 3.2: Duration of Stay in the Area

State	(Years)			Total
	1-5	6-10	10 and above	
Bayelsa State	17(4.3%)	38(9.5%)	72(18.0%)	127 (31.8%)
Delta State	22(5.5%)	44(11.0%)	97(24.3 %)	163 (40.9%)
Rivers State	9(2.3%)	32(8.0 %)	68(17.0%)	109(27.3%)
Total	48(12.0%)	114(28.6 %)	237(59.4%)	399(100%)

Source: Researcher's Fieldwork, 2021

Table 3.2 revealed the duration respondents have lived in their respective community as follows: 1-5years 17(4.3%), 6-10 years 38(9.5%), 10years and above 72(18.0%) for Bayelsa State, Delta State: 1-5 22(5.5%), 6-10 44(11.0%) and above 10years 97(24.3%) while for Rivers 1-5years 9(2.3%), 6-10years 32(8.0%) and above 10years 68(17.0%).

The overall results on duration of stay in the area indicated that 48 (12.0%) of the respondents from the three sampled States had lived for 5 years and below while 114 (28.6%) had lived for a period of 6-10 years. On the other hand, the majority 237 (59.4%) of the respondents had lived for 10years and above. This revealed that the years respondents lived in their present community may be adequate for them to give reliable information on the history on flood vulnerability in the study areas.

3.3 Level of Education

Respondents' level of education is important to indicate their ability to respond satisfactorily to questionnaires and reduce incidents of uncertainty or no opinion responses (Malhotra 2004).

Table 3.3 Level of Education

State	Education Level				Total
	Primary	Secondary	Graduate	Others	
Bayelsa State	7(1.8%)	62(15.5%)	56(14.0%)	2(0.5%)	127 (31.8%)
Delta State	5(1.3 %)	58(14.5 %)	73(18.3%)	27(6.8%)	163 (40.9%)
Rivers State	11(2.8%)	25(6.3%)	59(14.8%)	14(3.5%)	109(27.3%)
Total	23(5.8%)	145(36.3%)	188(47.1%)	43(10.8%)	399(100%)

Source: Researcher's Fieldwork, 2021

The results presented in Table 3.3 show the educational qualifications of the respondents across the three sampled States of Niger-Delta Region. Accordingly, Bayelsa 7(1.8%), Delta 5(1.3 %), and Rivers 11(2.8%) which is 23(5.8%) of the entire respondents are holders of FSLSC certificate; 145(36.3%) with Bayelsa 62(15.5%), Delta 58(14.5%) and Rivers 25(6.3%) have SSCE certificate; 188(47.1%) with Bayelsa 56(14.0%), Delta 73(18.3%) and Rivers 59(14.8%) had bachelor's degree while the remaining 43(10.8%) are had other qualification with Bayelsa 2(0.5%), Delta 27(6.8%) and Rivers 14(3.5%) respectively.

Table 3.4 Main Occupation of Respondents

State	Farming	Fishing	Business men/women	Civil servant	Student	Total
Bayelsa State	34(8.5%)	11(2.8%)	41(10.3%)	24(6.0%)	17(4.3%)	127 (31.8%)
Delta State	41(10.3%)	7(1.8%)	54(13.5%)	37(9.3%)	24(6.0%)	163 (40.9%)
Rivers State	36(9.0%)	13(3.3%)	39(9.8%)	12(3.0%)	9(2.3%)	109(27.3%)
Grand total	111(27.8%)	31(7.8%)	134(33.6%)	73(18.3%)	50(12.5%)	399(100%)

Source: Researcher's field work, 2021

Table 3.4 shows that 111(27.8%) of the respondents engage in crop farming, 31(7.8%) engage in fishing, 134(33.6%) are into business, 73(18.3%) are civil servants and 50(12.5%) are students. This show that business and farming activities are the major sources of livelihood of the dwellers in the study area.

Table 3.5 Household Monthly income before the flood disaster

Source: Researcher's field work, 2021

State	0-5,000	6,000-10,000	10,000-20,000	20,000-50,000	80,000-100,000	100,000 and above	Total
Bayelsa State	2(0.5%)	11(2.8%)	17(4.3 %)	25(6.3%)	55(13.8 %)	17(4.3 %)	127 (31.8%)
Delta State	0(0.0%)	2(0.5%)	19(4.8 %)	51(12.8%)	79(19.8%)	12(3.0%)	163 (40.9%)
Rivers State	0(0.0%)	5(1.3%)	13(3.3%)	26(6.5%)	52(13.0%)	13(3.3%)	109(27.3%)
Grand total	2(0.5%)	18(4.5%)	49(12.3%)	102(25.6%)	186(46.6 %)	42(10.5%)	399(100%)

Table 3.5 shows the percentage responses of the respondent's income before the flood. The percentage scores indicates that most of the respondents, 46.6% earn between 80,000-100,000 monthly while 25.6% earn between 20,000-50,000. However, 12.3% of the respondents earn between 10,000-20,000; 10.5% earn 100,000 and above and 4.5% earn 6,000-10,000 respectively. The least monthly income of the respondents (0-5,000 constitute 0.5%.

Table 3.6 Monthly income of the respondents after the flood disaster

State	0-5,000	6,000-10,000	10,000-20,000	20,000-50,000	80,000-100,000	100,000 & above	Total
Bayelsa State	12(3.0%)	30(7.5%)	72(18.0%)	9(2.3%)	4(1.0%)	0(0.0%)	127 (31.8%)
Delta State	9(2.3%)	46(11.5 %)	83(20.8%)	21(5.3%)	3(0.8%)	1(0.3 %)	163 (40.9%)
Rivers State	7(1.8 %)	27(6.8 %)	57(14.3%)	16(4.0%)	2(0.5%)	0(0.0 %)	109(27.3%)
Grand total	28(7.0 %)	103(25.8 %)	212(53.1%)	46(11.5%)	9(2.3%)	1(0.3%)	399(100%)

Source: Researcher's field work, 2021

Table 3.6 result show that within 1-12 months after the flood, the average income of 212(53.1%) of the respondents was between 10,000-20,000 while 103(25.8%) of the respondents earned between 6,000-10,000. The percentages of respondents earning between 20,000-50,000 was 46(11.5%), 28(7.0%) of the respondents earned between 0-5,000, 9(2.3%) of the people earned between 80,000-100,000 while only 1(0.3%) of the respondents earned above 100,000. From the findings, it is clear that income of the respondents reduced after the flood when compared with the people income before the flood.

3.7 Elements at risk to Flood hazards in the Study (2012)

Table 3.7 Human Categories

Items	Total per State					
	Bayelsa=127		Delta=163		Rivers=109	
	X̄	Std	X̄	Std	X̄	Std
1 Loss of human life	4.77	0.95	4.55	0.91	4.37	0.87
2 Increased share of vulnerable groups (children/women/elderly and disable)	4.63	0.93	4.50	0.90	4.10	0.82
3 Loss of educational materials	4.51	0.90	4.29	0.86	3.97	0.79
4 Health issues (illness, disability, diseases)	4.56	0.91	4.23	0.85	4.28	0.86
5 Level of education	4.64	0.93	4.60	0.92	4.25	0.85
6 Lack of local knowledge/awareness	4.22	0.84	4.50	0.90	3.89	0.78
Grand Mean (X̄) & Std	4.56	0.91	4.44	0.89	4.14	0.83
Natural Categories						
1 Effect on water quality	4.39	0.88	4.40	0.88	4.05	0.81
2 Loss/damage of standing crops	4.17	0.83	4.39	0.88	3.92	0.78

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3	Loss of natural vegetation	4.36	0.87	4.50	0.90	3.95	0.79
4	Loss of farm land due to degradation or erosion	4.59	0.92	4.51	0.90	4.24	0.85
Grand Mean (\bar{X}) & Std		4.38	0.88	4.45	0.89	4.04	0.81
Physical/Material Categories							
1	Loss of house	3.79	0.76	4.43	0.89	4.19	0.84
2	Loss of household items and personal belongings (beds, clothing, cutlery, cash, jewelry, food items)	3.51	0.70	4.30	0.86	4.05	0.81
3	Sanitation facilities (latrine, bath)	4.31	0.86	4.34	0.87	4.24	0.85
4	Loss/damage of food storage place	4.03	0.81	4.23	0.85	4.30	0.86
5	Loss of fertilizers/plugging tools	4.19	0.84	4.11	0.82	4.24	0.85
6	water pumps	4.31	0.86	4.38	0.88	4.24	0.85
7	Loss of village physical infrastructure (village roads, electricity, drains)	3.91	0.78	4.31	0.86	4.36	0.87
8	Loss/damage of main roads	4.38	0.88	4.33	0.87	4.17	0.83
9	Loss of transport mode (cycle, motor, tricycle)	4.20	0.84	4.53	0.91	4.08	0.82
10	Lack of access to physical infrastructure	4.87	0.97	4.37	0.87	4.37	0.87
Grand Mean (\bar{X}) & Std		4.15	0.83	4.33	0.87	4.22	0.84
Economical Categories							
1	Loss of harvested crops for sale	4.75	0.95	4.15	0.83	4.16	0.83
2	Loss of livestock	4.73	0.95	4.23	0.85	4.10	0.82
3	Employment/occupational loss	4.68	0.94	4.26	0.85	4.45	0.89
4	Increase in price of grocery items and seeds for crops	4.55	0.91	4.41	0.88	4.41	0.88
Grand Mean (\bar{X}) & Std		4.68	0.94	4.27	0.85	4.28	0.86
Social/Attitudinal/Political Categories							
1	Loss/damage of church	3.14	0.63	3.21	0.64	3.45	0.66
2	Loss/damage of health center/dispensary	3.29	0.66	3.17	0.63	3.37	0.62
3	Loss/damage of schools	3.25	0.65	3.89	0.69	3.42	0.63
4	Lack of access to public institutions (education, health, government offices) due to relationships, income, cast etc.	3.17	0.63	3.99	0.72	3.48	0.67
5	Lack of trust between government and communities	4.51	0.90	3.96	0.79	4.05	0.81
6	Loss of social relationship	4.72	0.94	4.06	0.81	4.24	0.85
7	Weakness of political structure/team work by displacement of people	3.57	0.71	4.04	0.81	4.08	0.82
8	Attritional/live style change due fear, anxiety, tension arising from the influence flood impacts	4.67	0.93	4.03	0.81	3.92	0.78
Grand Mean (\bar{X}) & Std		3.79	0.76	3.54	0.71	3.25	0.65

Source: Researcher's Fieldwork, 2021

Data in table 3.7 presented the mean scores and standard deviation of respondents across the studied States on the various elements at risk to flood hazards in the study areas. The respondents agreed on all the items (1-6) regarding human categories at risk in the table with mean scores above the criterion mean of 3.0. The aggregate mean scores of 4.56 for Bayelsa, 4.44 for Delta and 4.14 for Rivers in the table showed that the respondents agreed on all the items concerning human categories at risk of flood hazards in the table. Therefore, the various categories of human elements at risk in the study areas include: Loss of human life, Increased share of vulnerable groups (children/women/elderly and disable), Loss of educational materials, Health issues (illness, disability, and diseases), Level of education and Lack of local knowledge/awareness.

On natural categories at risk, all the items statements were equally agreed on with the mean scores above the criterion mean of 3.0. The grand mean scores of 4.38 for Bayelsa, 4.45 for Delta and 4.04 for Rivers in the table showed that the respondents agreed on all the items concerning natural categories elements at risk of flood hazards in the same table. Therefore, the various categories of natural elements at risk in the study areas include: Effect on water quality, Loss/damage of crops, Loss of natural vegetation and Loss of farm land due to degradation or erosion.

Respondents also agreed on all items statement regarding the Physical/Material Categories, Economical Categories and Social/Attitudinal/Political Categories of elements at risk to flood hazards in the study area respectively.

3.8 Elements at risk to Flood hazards of (2018) in the Study

Table 3.8 Human Categories

Items	Total per State					
	Bayelsa State=127		Delta=163		Rivers=109	
	X̄	Std	X̄	Std	X̄	Std
Loss of human life	4.54	0.91	4.37	0.87	4.17	0.83
Increased share of vulnerable groups (children/women/elderly and disable)	4.28	0.86	4.40	0.88	3.91	0.78
Loss of educational materials	4.41	0.88	4.18	0.84	3.83	0.77
Health issues (illness, disability, diseases)	4.13	0.83	4.12	0.82	4.06	0.81
Level of education	4.30	0.86	4.50	0.90	4.10	0.82
Lack of local knowledge/awareness	4.31	0.86	4.44	0.89	3.75	0.75
Grand Mean (X̄) & Std	4.33	0.87	4.34	0.87	3.97	0.79
Natural Categories						
Effect on water quality	4.31	0.86	4.29	0.86	3.96	0.79
Loss/damage of standing crops	4.35	0.87	4.29	0.86	3.84	0.77
Loss of natural vegetation	4.30	0.86	4.40	0.88	3.81	0.76
Loss of farm land due to degradation or erosion	4.40	0.88	4.41	0.88	4.09	0.82
Grand Mean (X̄) & Std	4.34	0.87	4.35	0.87	3.93	0.79
Physical/Material Categories						
Loss of house	4.30	0.86	4.33	0.87	4.06	0.81
Loss of household items and personal belongings (beds, clothing, cutlery, cash, jewelry, food items)	4.31	0.86	4.20	0.84	3.94	0.79
Sanitation facilities (latrine, bath)	4.34	0.87	4.24	0.85	4.09	0.82
Loss/damage of food storage place	4.43	0.89	4.13	0.83	4.17	0.83
Loss of fertilizers/plugging tools	4.35	0.87	4.02	0.80	4.10	0.82
water pumps	4.16	0.83	4.29	0.86	4.10	0.82
Loss of village physical infrastructure (village roads, electricity, drains)	4.31	0.86	4.22	0.84	4.24	0.85
Loss/damage of main roads	4.43	0.89	4.23	0.85	4.04	0.81
Loss of transport mode (cycle, motor, tricycle)	4.44	0.89	4.45	0.89	3.94	0.79
Lack of access to physical infrastructure	4.39	0.88	4.28	0.86	4.18	0.84
Grand Mean (X̄) & Std	4.34	0.87	4.24	0.85	4.09	0.82
Economical Categories						
Loss of harvested crops for sale	4.41	0.88	4.06	0.81	3.96	0.79
Loss of livestock	4.61	0.92	4.14	0.83	3.93	0.79
Employment/occupational loss	4.29	0.86	4.19	0.84	4.29	0.86
Increase in price of grocery items and seeds for crops	4.50	0.90	4.33	0.87	4.27	0.85
Grand Mean (X̄) & Std	4.45	0.89	4.18	0.84	4.11	0.82
Social/Attitudinal/Political Categories						
Loss/damage of church	3.29	0.66	3.10	0.62	3.45	0.66
Loss/damage of health center/dispensary	3.13	0.63	3.07	0.61	3.37	0.62
Loss/damage of schools	3.20	0.64	3.89	0.69	3.42	0.63
Lack of access to public institutions (education, health, government offices) due to relationships, income, cast etc.	3.22	0.64	3.99	0.72	3.48	0.67
Lack of trust between government and communities	4.56	0.91	3.77	0.75	3.82	0.76
Loss of social relationship	4.40	0.88	3.88	0.78	4.08	0.82
Weakness of political structure/team work by displacement of people	4.46	0.89	3.85	0.77	3.92	0.78
Attritional/live style change due fear, anxiety, tension arising from the influence flood impacts	4.29	0.86	3.69	0.74	3.81	0.76
Grand Mean (X̄) & Std	3.82	0.76	3.38	0.68	3.20	0.64

Source: Researcher's Fieldwork, 2021

Data in table 3.8 presented the mean scores and standard deviation of respondents across the studied States on the various elements at risk to flood hazards of 2018 in the study areas. The respondents agreed on all the items all in each category at risk in the table with mean scores above the criterion mean of 3.0. This is an indication all the elements in the study area were at risk ranging from the human, natural, economic, physical and social.

3.9 Level of awareness to flood hazard

Table 3.9 Respondents awareness level to flood hazard

Items	Total per State					
	Bayelsa=127		Delta=163		Rivers=109	
	X̄	Std	X̄	Std	X̄	Std
1 Community people are aware that flood is a natural hazard with potential to cause harm to human, livelihoods, infrastructures, social services, environment etc.	4.16	0.83	4.52	0.90	4.14	0.83
2 People are aware that flood risk increases if they lack the capacity to withstand its occurrence like skill, knowledge, financial resources, team spirit, government/private sector/other humanitarian supports services and supports.	4.23	0.85	4.26	0.85	4.08	0.82
3 People are aware that they need to have community disaster Preparedness plan to help reduce flood impacts.	2.26	0.45	2.44	0.49	2.38	0.48
4 Awareness on flood hazard early warning and other information are gotten through television, radio, internet, newspapers, school, church, community leadership etc.	4.05	0.81	4.13	0.83	4.17	0.83
5 Community people are aware of the cause of flood.	4.03	0.81	4.31	0.86	4.32	0.86
6 Community people are aware that flood vulnerability can be reduced if they have enabling capacities.	2.51	0.50	2.40	0.48	2.45	0.49
Grand Mean (X̄) & Std	3.54	0.71	3.68	0.74	3.59	0.72

Source: Researcher's Fieldwork, 2021

The result on Table 3.9 showed the mean responses of respondents on the Level of awareness to flood hazard. The result on the table showed that all participants from the three sampled States agreed to the following items: Community people are aware that flood is a natural hazard with potential to cause harm to human, livelihoods, infrastructures, social services, environment etc with the mean rating of 4.16 (0.83) for Bayelsa respondents, 4.52(0.90 for Delta respondents and 4.14(0.83) for Rivers respondents; People are aware that flood risk increases if they lack the capacity to withstand its occurrence like skill, knowledge, financial resources, team spirit, government/private sector/other humanitarian supports services and supports 4.23(0.85) for Bayelsa, 4.26(0.85) for Delta and 4.08(0.82) for Rivers; Awareness on flood hazard early warning and other information are gotten through television, radio, internet, newspapers, school, church, community leadership etc. 4.05(0.81), 4.13(0.83) and 4.17(0.83); Community people are aware of the cause of flood 4.03(0.81), 4.31(0.86) and 4.32(0.86) respectively while on the other hands, all the respondents from the three sampled States disagreed that People are aware that they need to have community disaster Preparedness plan to help reduce flood impacts and that Community people are aware that flood vulnerability can be reduced if they have enabling capacities which attracted the mean rating below the criterion mean of 3.0. An indication that Level of awareness to flood hazard is fairly adequate with grand mean responses of 3.54(0.71) for Bayelsa, 3.68(0.74) and 3.59(0.72) for Rivers respectively.

Table 3.10 Respondents Perception on the Management of flood hazards

Items	Total per State					
	Bayelsa=127		Delta=163		Rivers=109	
	X̄	Std	X̄	Std	X̄	Std
1 Flood early warning information was first had through community town crier, community development committee meeting, youth meeting before other organization like NEMA, NIMET, NGO, L.G.A, and State announcement through radio and internet.	4.04	0.81	4.16	0.83	3.92	0.78
2 Early warning flood information by the community was immediate the flood was sited while government agencies took some weeks before announcement.	4.09	0.82	4.41	0.88	3.86	0.77
3 After flood hazard early warning announcement by government, it created IDP camp as safe shelter area for households exposed to flooding.	2.44	0.49	2.41	0.48	2.40	0.48
4 Government through NEMA commenced evacuation process of households exposed to flood to the nearest IDP camp.	2.44	0.49	2.36	0.47	2.47	0.49
5 Some households were evacuated to the nearest IDP camp while some left to close relative's homes.	2.53	0.51	2.26	0.45	2.44	0.49
6 Most households evacuated their belongings before, within and after the flood event.	4.17	0.83	4.32	0.86	3.91	0.78
7 Evacuation of households' belongings was delayed due to the fear of looting, bad road, needed more time to think and because their house was yet to be affected by flood.	4.10	0.82	4.23	0.85	3.78	0.76
8 Some options of safe areas to be considered as IDP camps if	4.19	0.84	4.31	0.86	3.94	0.79

9	not flooded include: church, school, hotel, hospital, tent house and huts etc. Supply of utilities by humanitarian donors, NEMA, companies, international organizations, national Red Cross, and other government supporting agencies were present in the affected communities and IDP camps.	3.24	0.65	3.28	0.66	3.07	0.61
Grand Mean (\bar{X}) & Std		3.47	0.69	3.53	0.71	3.31	0.66

Source: Researcher's Fieldwork, 2021

The result on Table 3.10 showed the mean responses of respondents on the management of flood hazards. The result on the table revealed that respondents from the three sampled States agreed to the following items 1, 2, 6, 7, 8 and 9: Flood early warning information was first had through community town crier, community development committee meeting, youth meeting before other organization like NEMA, NIMET, NGO, L.G.A, and State announcement through radio and internet with the mean rating of 4.04 (0.81) for Bayelsa respondents, 4.16(0.83) for Delta respondents and 3.92(0.78) for Rivers respondents; Early warning flood information by the community was immediate the flood was sited while government agencies took some weeks before announcement 4.09(0.82) for Bayelsa, 4.41(0.88) for Delta and 3.86(0.77) for Rivers; Most households evacuated their belongings before, within and after the flood event 4.17(0.83), 4.32(0.86) and 3.91(0.78); Evacuation of households' belongings was delayed due to the fear of looting, bad road, needed more time to think and because their house was yet to be affected by flood 4.10(0.82), 4.23(0.85) and 3.78(0.76); Some options of safe areas to be considered as IDP camps if not flooded include: church, school, hotel, hospital, tent house and huts etc. 4.19(0.84), 4.31(0.86) and 3.94(0.79)

and Supply of utilities by humanitarian donors, NEMA, companies, international organizations, national Red Cross, and other government supporting agencies were present in the affected communities and IDP camps which attracted the mean rating of 3.24(0.65), 3.28(0.66) and 3.07(0.61) respectively while on the other hands, items 3, 4 and 5 were disagreed by the same respondents which are: After flood hazard early warning announcement by government, it created IDP camp as safe shelter area for households exposed to flooding; Government through NEMA commenced evacuation process of households exposed to flood to the nearest IDP camp and Some households were evacuated to the nearest IDP camp while some left to close relative's homes which attracted the mean rating below the criterion mean of 3.00. An indication that there is some level of flood Management by the affected communities with grand mean responses of 2.70 and 2.72 for school administrators and inspectors respectively.

3.11 Hypothesis Testing

Hypothesis : Poor level of awareness of flood hazard, risk, warning system, and preparedness measures and ability to use information to counter or reduce flood hazard varies across the communities in the study States.

Table 3.11: Summary of Analysis of Variance (ANOVA) on Poor level of awareness of flood hazard, risk, warning system, and preparedness measures and ability to use information to counter or reduce flood hazard varies across the communities in the study States

Status	Sum of Square	Df	Mean Square	F	Prob.	Remark
Between Groups	29.483	2	9.828	.202	.884	
Within groups	18105.093	397	48.152			H0 retained
Total	18134.571	399				

Table 3.11 shows the f-ratio value (.202) at 2 df 399 and at the 0.05 level of significance. The probability level of significance P (.884) is greater than 0.05. This means that there is no significant difference in the level of awareness of flood hazard, risk, warning system, and preparedness measures and ability to use information to counter or reduce flood hazard varies across the communities in the study States. Therefore, the null hypothesis is retained.

IV. DISCUSSIONS OF FINDINGS

This study was aimed at assessing the vulnerability and capacity of residents to flood hazards in selected States in the Niger Delta. Its objectives were to examine the followings: identify elements at risk and examine the variation of social, economic, human, attitudinal, political, natural and physical categories of vulnerability of communities in the study area, and identify the types and level of capacities in the study area, identify the level of awareness of residents to flood hazard, risk, warning system, preparedness measures and ability to use information to counter or reduce flood hazard in the study area.

The hypotheses formulated were tested using Analysis of variance ANOVA. However, to give general description of the respondents on the issues raised, frequencies mean and simple percentage were used. The following are discussions arising from the major findings of the study.

4.1 The Elements at Risk to Flood Hazards

The first objectives identify elements at risk to flood hazard (social, economic, human, attitudinal, political, natural and physical categories) of vulnerability of communities in the study area. From the data analysis, there is no significant difference in the opinion of respondents on this research question. Table 3.7 presented the mean scores and standard deviation of respondents across the studied States on the various elements at risk to flood hazards in the study areas. The respondents agreed on all the items (1-6) regarding human categories at risk in the table with mean scores above the criterion mean of 3.0. Therefore, the various categories of human elements at risk in the study areas include: Loss of human life, Increased share of vulnerable groups (children/women/elderly and disable), Loss of educational materials, Health issues (illness, disability, diseases), Level of education and Lack of local knowledge/awareness.

On natural categories at risk, all the items statement were equally agreed on with the mean scores above the criterion mean of 3.0. The grand mean scores of 4.38 for Bayelsa, 4.45 for Delta and 4.04 for Rivers in the table showed that the respondents agreed on all the items concerning natural categories elements at risk of flood hazards in the same table. Therefore, the various categories of natural elements at risk in the study areas include: Effect on water quality, Loss/damage of crops, Loss of natural vegetation and Loss of farm land due to degradation or erosion.

Respondents also agreed on all items statement regarding the Physical/Material Categories, Economical Categories and Social/Attitudinal/Political Categories of elements at risk to flood hazards in the study area respectively. This is an indication all the elements in the study area were at risk ranging from the human, natural, economic, physical and social. This disagrees with an earlier study by (Efobi and Anierobi, 2013) that despite the wide-spread devastating impacts of flood all the elements at risk, rural dwellers attested to its benefits, particularly in the areas of abundant harvest of fishes, consumable delicacies, sea and wild animals that were traded for financial gains.

4.2 The level of awareness of flood hazard in the study area

The second objective is to determine the level of awareness of residents to flood hazard, risk, warning system, preparedness measures and ability to use information to counter or reduce flood hazard in the study area. The result showed that all participants from the three sampled States agreed to the following items: Community people are aware that flood is a natural hazard with potential to cause harm to human, livelihoods, infrastructures, social services, environment etc with the mean rating of 4.16 (0.83) for Bayelsa respondents, 4.52(0.90) for Delta respondents and 4.14(0.83) for Rivers respondents; People are aware that flood risk increases if they lack the capacity to withstand its occurrence like skill, knowledge, financial resources, team spirit, government/private sector/other humanitarian supports services and supports 4.23(0.85) for Bayelsa, 4.26(0.85) for Delta and 4.08(0.82) for Rivers; Awareness on flood hazard early warning and other information are gotten through television, radio, internet, newspapers, school, church, community leadership etc. 4.05(0.81), 4.13(0.83) and 4.17(0.83); Community people are aware of the cause of flood 4.03(0.81), 4.31(0.86) and 4.32(0.86) respectively while on the other hands, all the respondents from the three sampled States disagreed that People are aware that they need to have community disaster Preparedness plan to help reduce flood impacts and that Community people are aware that flood vulnerability can be reduced if they have enabling capacities which attracted the mean rating below the criterion mean of 3.0. An indication that Level of awareness to flood hazard is fairly adequate with grand mean responses of 3.54(0.71) for Bayelsa, 3.68(0.74) and 3.59(0.72) for Rivers respectively.

On the management of flood hazards in the study area, the result on the table 4.9 revealed that respondents from the three sampled States agreed to the following items 1, 2, 6, 7, 8 and 9: Flood early warning information was first had through community town crier, community development committee meeting, youth meeting before other organization like NEMA, NIMET, NGO, L.G.A, and State announcement through radio and internet with the mean rating of 4.04 (0.81) for Bayelsa respondents, 4.16(0.83) for Delta respondents and 3.92(0.78) for Rivers respondents; Early warning flood information by the community was immediate the flood was sited while government agencies took some weeks before announcement 4.09(0.82) for Bayelsa, 4.41(0.88) for Delta and 3.86(0.77) for Rivers; Most households evacuated their belongings before, within and after the flood event 4.17(0.83), 4.32(0.86) and 3.91(0.78); Evacuation of households' belongings was delayed due to the fear of looting, bad road, needed more time to think and because their house was yet to be affected by flood 4.10(0.82), 4.23(0.85) and 3.78(0.76); Some options of safe areas to be considered as IDP camps if not flooded include: church, school, hotel, hospital, tent house and huts etc. 4.19(0.84), 4.31(0.86) and 3.94(0.79) and Supply of utilities by humanitarian donors, NEMA, companies, international organizations, national Red Cross,

and other government supporting agencies were present in the affected communities and IDP camps which attracted the mean rating of 3.24(0.65), 3.28(0.66) and 3.07(0.61) respectively while on the other hands, items 3, 4 and 5 were disagreed by the same respondents which are: After flood hazard early warning announcement by government, it created IDP camp as safe shelter area for households exposed to flooding; Government through NEMA commenced evacuation process of households exposed to flood to the nearest IDP camp and Some households were evacuated to the nearest IDP camp while some left to close relative's homes which attracted the mean rating below the criterion mean of 3.00. An indication that there is some level of flood Management by the affected communities with grand mean responses of 2.70 and 2.72 for school administrators and inspectors respectively.

4.3 Conclusion

This study assessed the vulnerability and capacity of residents to flood hazard in selected States in the Niger Delta. It is clear from the study that floods have had adverse impact on the socio-economic status and livelihoods of the people of Niger-Delta especially the sampled States. Flooding affects more people on an annual basis than any other form of natural disaster in the study area. Its frequency and intensity are on the increase every year.

In terms of livelihood, the study discovered that the flood incident has seriously devastated the economy and every elements of the rural community that make them function especially farming which is the major source of livelihood of the people. Farmlands were submerged and agricultural produce were destroyed. It has also affected the environment by causing serious gully erosion. However, the rural dwellers have devised means to cope with the disaster which include: relocation out of the flood plain, reconstruction of houses with reinforced materials, raising of houses above flood plains, creation of water channels for flood water evacuation, frequent removal of sand from blocked drainages, building of dikes using sand bags and fumigation of stagnant flood water. Unfortunately, these coping mechanisms are not sustainable in the long run.

4.4 Recommendation

In light of the findings of the study, the researcher recommends that: -

1. There is need for repair and construction of new drainages and construction of flood diversion channels which involves the construction of artificial channels along main river channels to evacuate excess water during floods.
2. Governmental and Non-Governmental organizations to assist in enlightenment campaign and dissemination of early warning to the local communities.
3. Adequate medical facilities should be provided for the treatment of various environmental diseases resulting from flood.
4. The construction of houses using durable materials for the flood victims and away from the flood prone areas should be considered. Community based coping strategies should be incorporated for strengthening the mitigation measures.
5. Relocation to a higher ground is a necessary condition. Also, there should be a deliberate policy to compel communities especially in rural areas to build house using durable materials and away from the flood prone areas.

4.5 Contributions to Knowledge

The research has established the level of vulnerability of the people and it environs to flood hazards.

There is an established pattern of behavior driven by their tradition especially among the sampled communities in the study States.

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