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Vulnerability of Households to Flood Disaster in Rivers State, South-South, Nigeria

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Abstract

Flood disasters are often embedded in human-induced vulnerabilities, which manifest through numerous actions that interact with the environment like building in flood-plains, abusive exploitation of resources, population rise, and urbanisation, all together have escalated the mortalities and damages resulting from flood. This study examines vulnerability of households to flood disaster in Rivers State, South-South, Nigeria. The study adopted the cross-sectional research design. The purposive sampling was used to select 12 local government areas (Port Harcourt, Obio/Akpor, Okrika, Akuku-Toru, Degema, Emohua, Bonny, Andoni, Opobo/Nkoro, Ogu/bolo, Asari-Toru, and Ahaoda-East) from the 23 that constitute Rivers State. Thereafter, 33 communities were purposively selected from these 12 selected LGAs. Both primary and secondary data were used. Data were collected through questionnaire administration. Taro Yamane formula was used to determine the sample size of 400 upon which the study questionnaire was randomly administered to household heads. Descriptive statistics such as frequency distribution, percentages and means were used to analyse the data. Findings revealed that poor drainage system, dumping of waste in drains, and heavy rainfalls were leading causes of flooding. Major impacts of flooding were destruction of farmlands and crops; destruction of homes; destruction of wildlife, and environmental pollution; while kwashiorkor, cholera, diarrhea, and typhoid were major ailments associated with flooding. Prominent factors of residents vulnerable to flooding were nearness to river/waterbodies; building houses on flood plains; poor infrastructural development, and flood frequency. The study concludes that amid the frequency, severity and damages from flood, vulnerability reduction strategies from indigenous knowledge continually proved unsustainable, thus exacerbating their vulnerability. It is recommended that authorities should halt the building of houses on flood plains and waterways; and agencies should be strengthened.

Keywords: *Vulnerability, Flood Disaster; Household; South-South, Rivers State.*

1. Introduction

Natural disasters such as floods have been linked to considerable rise in economic damages for onward of more than forty years (Botzen et al., 2019). Largely, disasters cause austere interruption and disorder in the active existence of a place, its people and activities involving extensive human, material, economic or environmental losses and impacts, which often are beyond the aptitude of the community or society affected to cope with using its own resources (United Nations International Strategy for Disaster Risk Reduction [UNISDR], 2009). Moreso, flood disaster is recognised as one of the foremost environmental dilemmas as it takes the

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position of about one-third of all natural disasters (UNISDR, 2005). As the most recurrent sort of natural disaster, floods happen when land that is normally dry is submerged with an excess flow of water often resulting from heavy precipitation, fast melting of snow or a storm gush from a tropical cyclone or tsunami in littoral zones (World Health Organisation [WHO], 2023).

As severe and devastating as the effects of floods could be, societies have established their communities within flood plains due to associated benefits. Nardi et al. (2019) and Di Baldassarre et al. (2013) reports that plenty communities had been set up near rivers and their floodplains from antiquity, because these areas stimulate socio-economic development as they are often fertile for agriculture and permits ease of movements. This was the case of ancient Mesopotamia and Egypt within the Tigris-Euphrates river region (Di Baldassarre et al., 2013). Nonetheless, the escalation in the mortalities resulting from flood can be linked to the concentrated human settlements in flood-prone zones (Ridolfi et al., 2019). This is why even though Di Baldassarre et al., (2013) contends that currently nine among the 10 largest urban conurbation in the world are found in deltas or floodplain zones; the question whether the derivable benefits outweighs the demerits of living in such areas is subject to personal experience or scholarly debate at least in comparison with the ancient times.

The rise in the rate and magnitude of disasters both nationally and internationally is shocking. In Nigeria, urbanisation, combined with a lack of effective local governance, has been identified as primary contributor to urban flood risk (UNISDR, 2009). Furthermore, large stretches of land, hitherto penetrable, are currently covered with impervious urban surfaces such as building roofs, roads and pavements which encumber the flow of water to rivers at a faster rate than under natural conditions (Mahmoud & Gan, 2018). Additionally, urban areas in Nigeria are confronted with increased vulnerability to flooding due among other factors to inadequate drainage infrastructure, transformation of natural absorbent soil into concrete, and

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deforestation of hillsides (Gulati & Scholtz, 2020). In Rivers State generally, floods are recurrent problems, mostly prompted by heavy rainfall, river overflows, and a lack of adequate urban planning and drainage systems (Nwigwe & Emberga, 2014).

Floods can cause widespread devastation, resulting in loss of life and damages to personal property and critical public health infrastructure. Between 1998 and 2017, floods affected more than 2 billion people worldwide. People who live in floodplains or non-resistant buildings, or lack warning systems and awareness of flooding hazard, are most vulnerable to floods (WHO, 2023). In Nigeria, the Niger Delta is considered as one of the most vulnerable to the effects of climate change. For instance, in the last two decades, especially in year 2012, floods in the Niger Delta accounted for 39% of total natural hazards/disaster that cost the Niger Delta communities, on the average, in excess of ₦300,000,000 loss (Mmom & Aifesehi, 2013).

Numerous dimensions of flood subject have been reported by studies in different regions of the globe. Week and Wizor (2020) investigated the effect of flood on food security, livelihood and socio-economic characteristics in Bayelsa, Delta and Rivers State and found that basic food is often scarce after all flood incidences, thereby increases food insecurity and unavailability of staple food. Ajiboye and Orebiyi (2022) in their study in Anambra State, Nigeria found a significant correlation between flood incidence and socio-economic factors. Uzoh (2022) in his study in south-eastern Nigeria found among others that households were highly exposed to flood hazards with the rural communities being highly vulnerable. Tibara et al. (2021) in their earlier flood vulnerability assessment in Kilembe, Uganda also repoted similar results as Uzoh (2022). Pathak et al. (2020 in Nepal, India reported that vulnerability level of most households to flooding resulted from higher exposure to flood and lower adaptive capacity. Akukwe (2014) analysed the determinants of flooding in Port Harcourt and discovered that absence of/poor drainage facilities, heavy rainfall, unplanned urban development, meteorological factors, low-

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lying topographical factors, and human factors were leading causes of flooding in the metropolis. Common among these previous studies is the fact that not enough attention has been given to vulnerability of the population to flooding, and as well, omission of households' perception on flood vulnerability is discernible from these studies.

2 Materials and Methods

2.1 The Study Area

Rivers State is located in South-south of Nigeria and is a component State of the Niger Delta Region. Rivers State lies between latitudes 4º 30'N and 5º 40'N and longitudes 6º 25'E and 7º 33'E, and it is bounded in the south by the Atlantic Ocean, west by Bayelsa and Delta States, north by Imo, Abia and Anambra States and east by Akwa Ibom State. Rivers State is found in the sub-equatorial region. It has a tropical climate with a mean temperature of 30^0C with abundant amount of sunshine, a relative humidity of 80%-100%, and a mean annual rainfall of between 2000mm and 2400mm, which is always high but varies with seasons, in presence of plentiful surface water which typifies the poor drainage (Mmom & Fred-Nwagwu, 2013).

The geological structure of the State is of the Pleistocenic formation that is underlain by the coastal plain sands (Nwakoala & Warmate, 2014), with sediments which are deposits of gravel, clays, peats, sands and silt from the River Niger (Joab-Peterside, 2005). The spread of the deposits exhibitions enormous sandstones superimposing an interchange of sandstones and clays of slightly marine source which has developed to be marine clays. Sands make up the dominant type of rock in the area. Nonetheless, peat forms from animal and vegetal remains which are found in shallow pits. Gravels and pebbles make up the last part of the sub-surface rock types and settle at the river channel floors (Joab-Peterside, 2005). The topography is relatively flat terrain with an elevation of about 12m above mean sea level. This flat topography maintained by Port Harcourt is basically as a result of the ever changing river channels of the

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estuaries of the River Niger (Mmom & Fred-Nwagwu, 2013). This flat terrain is made up of coastal plains crisscrossed by maze of swamps, creeks and waterways signifying a relatively paucity of strong and extensive land areas (Umeuduji & Auseubeogun, 1999). Rivers State is lavished with flourishing and intricate diversity of Tropical rainforest vegetation found in the inland parts and mangrove swamps towards the coast the Atlantic Ocean (Ojeh, 2011).



Figure 3.2: Rivers State showing Local Government Areas and Communities
Source: Rivers State Ministry of Lands and Survey

2.2 Data

This study employed the purposive sampling technique to select 12 local government areas (LGAs) from the 23 LGAs that make up Rivers State, namely; Port Harcourt, Obio/Akpor, Okrika, Akuku-Toru, Degema, Emohua, Bonny, Andoni, Opobo/Nkoro, Ogu/bolo, Asari-Toru, and Ahaoda-East. Thereafter, 33 communities were also purposively selected from these 12 selected LGAs, because they are located in lowland flood-plains and regularly experience severe flooding. Subsequently, 10,454 households were drawn from these 33 communities and thereafter, heads of households were selected for inclusion in the study, and these constituted

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the units of enquiry. Taro Yamane (1967) formula was used to derive the sample size of 400 upon which the study questionnaire was allotted to the selected communities based on proportional allocation procedure with regard to their individual population strength, and thereafter randomly administered to heads of household in these communities. Out of 400 questionnaire administered, 398 were returned and used for analyses. The Taro Yamane formula as given as:

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

Where;
n = sample size
N = total number of Household heads
e = 0.05

Both primary and secondary data were used. Data were collected through administration of a structured questionnaire. To evaluate flood vulnerability, the study adopted an integrated assessment perspective which merged biophysical as well as socio-economic components of vulnerability indicators. Thus, three broad categories of vulnerability indicators, namely; exposure (proximity to water body, flood height and family size); susceptibility (health/wellbeing, illiteracy ratio and frequency of flood); and resilience (income per capita, access to hazard related information, hazard related training) were adopted for this study. Descriptive statistics (frequency distribution, percentages and means), as well as inferential statistics were used to analyse the data. The SPSS version 20.0 aided the data analyses.

3 Results

3.1 Socioeconomic and Demographic Characteristics of Respondents

Table 1 was used to assess the socio-economic and demographic characteristics of the respondents. The result shows that there were more males (72.51%) than their female counterparts (27.49%) in the sampled communities.

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Table 1: Socio-economic and Demographic Characteristics of Respondents

Variables	Frequency	Percentages
Gender of Respondents		
Male	289	72.51
Female	109	27.49
Total	**398**	**100.0**
Age of Respondents		
Below 20	25	6.28
21-30	116	29.15
31-40	30	7.54
41-50	124	31.16
51-60	47	11.81
61 and above	56	14.07
Total	**398**	**100.0**
Marital Status of Respondents		
Single	60	15.08
Married	217	54.52
Divorced/Separated	59	14.82
Widowed/Widower	62	15.58
Total	**398**	**100.0**
House Ownership Status of Respondents		
Rented	105	26.38
Owner	255	64.07
Squatter	38	9.54
Total	**398**	**100.00**
Educational Qualification of Respondents		
FSLC	20	5.03
SSCE	69	17.34
OND	74	18.59
HND	60	15.08
BSc	123	30.90
PG	52	13.07
Total	**398**	**100.0**
Income per Month of Respondents (Naira = ₦)		
Below 100,000	46	11.56
100,000-300,000	207	52.01
301,000-500,000	74	18.59
501,000 and Above	71	17.84
Total	**398**	**100.0**
Economic Activities of Respondents		
Farming/Agriculture	98	24.62
Fishing	84	21.11
Oil Bunkering	121	30.40
Oil Exploration/Exploitation	56	14.07
Lumbering/Wood Extraction	39	9.80
Total	**398**	**100.0**

Source: Author's Computation (2023)

The analysis on age of respondents shows that majority of the respondents were between 41 and 50 years (31.16%), followed in ranking by those between 21 and 30 years (29.15%), between 61 and above (14.07%), between 51 and 60 years (11.81%), between 31 and 40

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(7.54%), and those below 20 years (6.28%). Greater proportion of the respondents were married (54.52%), 15.58% were widowed, 15.08% were single, while 14.82% were divorced/separated. Majority of the households live in their own houses (64.07%), while 26.38% live in rented apartments, and 9.54% were squatter dwellers.

The analysis on educational status of respondents shows that in order of hierarchy majority of the respondents had BSc degree (30.90%), 18.59% OND, 17.34% SSC, 15.08% HND, 13.07% Post Graduate (PG) degree, while 5.03% of them had FSLC. Majority of the population earn annual income of ₦100,000 - ₦300,000 (52.01%), 18.59% earn ₦301,000 - ₦500,000, 17.84% earn ₦501,000 and above, 11.56% earn below ₦100,000. Majority of the respondents engage in oil bunkering activities (30.40%), 24.62% in farming/agriculture, 21.11% in fishing, 14.07% in oil exploration/exploitation, and 9.80% engage in lumbering/wood extraction.

3.2 Causes of Flooding in the Selected Communities in Rivers State

The result on the perceived causes of flooding across the communities is shown in Table 2. The result shows that poor drainage system was the major cause of flooding in their communities (28.3%); followed in ranking succession by dumping of waste in the drains; high rainfall, poor urban planning and river/stream overflow scoring 22.9%, 19.7%, 16.9% and 8.3% respectively.

Table 2: Perception on Causes and Impacts of Flooding in the Selected Communities

Causes of Flooding	Frequency	Percentage (%)
Poor drainage systems	95	28.3
Dumping of wastes in drains	85	22.9
High Rainfall	78	19.7
Poor urban planning	62	16.9
Rivers/streams over flows	54	8.3
Others	24	3.9
Total	**398**	**100.00**

Source: Author's Computation (2023)

3.3 Impacts of Flooding in the Selected Communities in Rivers State

The analysis on the impacts of flooding is shown in Table 3. All respondents agreed that flooding leads to destruction of farmlands, crops and produce (100%); majority agreed that

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flooding leads to destruction/loss of homes (72.36%), 25.13% disagreed, while 2.51% were neutral. Majority agreed that flood causes death of humans and destruction of wildlife (62.06%), 35.93% disagreed, while 2.01% were neutral. Majority agreed that flooding leads to destruction properties and public infrastructure (72.36%), 24.88% disagreed; while 2.76% were neutral. All respondents agreed that flood causes environmental pollution (water, air, and land) (100%). Majority of the respondents agreed that flood leads to outbreak of sickness/disease and emotional disorder (92.46%), 5.03% disagreed, while 2.51% were neutral.

Table 3: Impacts of Flooding in Rivers State

Destruction of Farmlands, Crops and Produce		
Agree	398	**100**
Neutral	0	**0**
Disagree	0	**0**
Total	**398**	**100.00**
Destruction/Loss of Homes		
Agree	288	72.36
Neutral	10	2.51
Disagree	100	25.13
Total	**398**	**100.00**
Death of humans and destruction of wildlife		
Agree	247	62.06
Neutral	8	2.01
Disagree	143	35.93
Total	**398**	**100.00**
Destruction/Loss of properties and public Infrastructure (roads, bridges etc.)		
Agree	288	72.36
Neutral	11	2.76
Disagree	99	24.88
Total	**398**	**100.00**
Environmental pollution (water contamination, poor air quality)		
Agree	398	100
Neutral	0	0
Disagree	0	0
Total	**398**	**100.00**
Sickness/disease and emotional disorder		
Agree	368	92.46
Neutral	10	2.51
Disagree	20	5.03
Total	**398**	**100.00**

Source: Author's Computation (2023)

3.4 Vulnerability of Households to Flood in the Selected Communities

3.4.1 Physical and Socio-Economic Vulnerability Indicators of Households to Flood

The result from physical and socio-economic vulnerability displayed in Table 4 shows that greater proportion of the respondents agreed that they are vulnerable to flooding due to nearness

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to river (30.40%); 24.64% agreed that their vulnerability is because they built houses on flood plains/low land areas; 17.33% held that poor infrastructural development made them vulnerable to flooding; 14.07% blamed poverty for their vulnerability to flooding; while 13.56% held that the lack of escape means out of their locations during flood events make them vulnerable.

Table 4: Households Vulnerability to Flooding in Rivers State

Physical and Socio-economic Vulnerability Indices	Frequency	Percentage (%)
Nearest distance to river (m)	121	30.40
Poverty	56	14.07
Limited escape routes	54	13.56
Poor infrastructural development	69	17.33
Residence at low land areas (flood plains)	98	24.62
Total	**398**	**100.0**

Source: Author's Computation (2023)

3.4.2 Flood Characteristics Vulnerability Indicators of Households

Result from flood characteristics vulnerability indicators depicted in Table 5 shows that for height of flood, majority of the respondents indicated that the flood height experienced in their communities was above knee level (49.74%); while those that indicated that the flood height experienced in their communities was at waist level were 25.12%; those that indicated that the flood height experienced in their communities was at knee level were 14.07; and those that held that the flood height experienced in their communities was at a level between knee and ankle were 11.05%. Regarding frequency of flooding, it was observed that majority of the respondents constituting 64.8% held that their communities are flooded 7-8 times each year; 12.5% of them agreed that their communities are flooded 2-3 times and at least one time a year respectively; while 10.0% of them held that their communities are flooded 4-6 times each year. On the magnitude cum severity of flood events, while it was observed that greater proportion of the respondents held that their flood experience was extremely severe (44.20%); it was severe for 31.40%; moderately severe for 19.85%; not sever for 7.54%; and 1.01% were undecided.

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Table 5; Flood Characteristics Vulnerability Indicators

Vulnerability Indicator	Frequency	Percentage (%)
Height of Flood		
Between Knee/ankle	44	11.05
Knee length	56	14.07
Above Knee	198	49.74
Waist Height	100	25.12
Total	**398**	**100.00**
Frequency of Flood Occurrence		
At least 1	50	12.50
2-3	50	12.50
4-6	40	10.00
7-8	258	64.80
Total	**398**	**100.00**
Magnitude/Severity of Flood		
Undecided	4	1.01
Not severe	30	7.54
Moderately severe	79	19.85
Severe	125	31.40
Extremely severe	160	40.20
Total	**398**	**100.00**

Source: Author's Computation (2023)

3.4.3 Individual and Institutional Vulnerability Indicators of Households

From the analysis on individual and institutional vulnerability indicators displayed in Table 6, it is observed that with respect to length of years of the respondents in their communities, more than half of them covering 52.51% have lived in their communities for above 15 years; 22.11% have lived in their localities for between 11 and 15 years; 15.08% have lived for between 5 and 10 years; while 10.30% have lived in their localities for less than 5 years. Furthermore, the result showed that more than 2/3 of the respondents agreed that poor land use planning and control (73.12%) and type of building they live in (64.32%) make them vulnerable to flooding.

Table 6: Individual and Institutional Vulnerability Indicators

Vulnerability Indicator	Frequency	Percentage (%)
Duration of Stay in the Community		
Less than 5	41	10.30
5-10	60	15.08
11-15	88	22.11
Above 15	209	52.51
Total	**398**	**100.00**
Poor Land use Planning and Control		
Yes	291	73.12
No	107	26.88
Total	**398**	**100.00**
Type of Building		
Yes	256	64.32
No	142	35.68
Total	**398**	**100.00**

Source: Author's Computation (2023)

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3.4.4 Individual and Institutional Vulnerability Indicators of Households

Table 7 shows the result for health and wellbeing indicators of flood vulnerability of residents which was measured by the percentage of household members with chronic illness, pregnancy, disability or no ailment. The result revealed that majority of the respondents had no family member who had serious health challenges (51.0%); 23.8% of the population which were women were pregnant; 13.8% had disability; while 11.3% had some sort of chronic disease. The result also revealed that majority of the households had above 15 members (59.05%); followed by households with between 1 and 5 members (15.33%), households with between 11 and 15 members (13.32%), and households with between 6 and 10 members (12.31%).

Table 7: Health and Wellbeing Indicators

Vulnerability Indicator	Frequency	Percentage (%)
Chronic illness	45	11.3
Pregnancy	95	23.8
Disability	55	13.8
No Health challenge	203	51.0
Total	**398**	**100.0**
Household Size		
0-5	61	15.33
6-10	49	12.31
11-15	53	13.32
Above 15	235	59.05
Total	**398**	**100.00**

Source: Author's Computation (2023)

4 Discussions

4.1 Socio-economic and Demographic Characteristics

Male heads of household were more in number than female heads of households and this could be an advantage to the male folks during flooding as men can be involved in physical activities required during flood mitigation and rescue processes more than women. Also, the fact that majority of the respondents were found in age bracket of 41 years and above put them in more ominous posture. Jonkman et al. (2009) asserts that elderly people cannot deal very well with flood as compared to the younger people. Also, owner-occupiers of houses were greater in number than tenants and squatters. This situation signals that the enthusiasm and commitment

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to protect these houses against flooding would be high since they are more occupied by their owners. This stance is corroborated by Steinfuher and Kuhikle (2009).

It was also discovered that Bachelor of Science (BSc) degree was the predominant formal education certificate earned by majority of the sampled population. This is positive input to the communities as education have the aptitude of increasing awareness and comprehension of flood information. The result on the annual income of the respondents revealed that ₦100,000 - ₦300,000 was the prevalent annual income earned by majority of the respondents. This situations suggests that the standard of living of majority of the residents in the sampled communities is low, and also indicates that majority of the population earn below the Nigerian national minimum wage of ₦30,000 per month (that is, ₦360,000 per annum) as well as live below the United Nations poverty line of one Dollar per day per person. Sampson et al. (2021) and Nwanosike et al. (2021a) had also reported similar low annual income earned by residents in Port Harcourt Metropolis and the Niger Delta Region respectively.

4.2 Perceived Causes of Flooding in the Selected Communities in Rivers State

The findings indicated that poor drainage system and dumping of waste in the drains are leading causes of flooding in the sampled communities. This result agrees with the assertions of Wisner (2003) that the increase in people's vulnerability is associated with anthropogenic factors that are distant from the hazard event. It becomes disturbing to note that residents are aware that poor environmental practices results to flooding but they do not desist from these practices, thus increasing their vulnerability.

4.3 Impacts of Flooding in the Selected Communities in Rivers State

The major physical and socio-economic consequences of flooding are destruction of farmlands, crops and produce; destruction of homes; death of humans and destruction of wildlife; destruction of properties and public Infrastructure; environmental pollution; and outbreak of

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disease. Aggregately, kwashiorkor, cholera, diarrhea, typhoid, and lung problems are prevalent ailments associated with flood in the sampled communities. A thorough look at these array of ailments reveals that most of them are water borne diseases, therefore there is no surprise that they are commonly experienced in the area. Some of these findings on impacts of flood are similar to the findings earlier reported by Nwanosike et al. (2021a) in the Niger Delta Region.

4.4 Vulnerability of Households to Flood in the Selected Communities in Rivers State

Generally, the results show that both natural phenomenon such as topography, and other anthropogenic factors make the residents of the sampled communities vulnerable to flood disasters. The findings revealed that cumulatively, prominent factors of the residents vulnerable to flood were nearness to the river; building of houses on flood plains; and poor infrastructural development. Building on flood plains may have been done either out of ignorance, land availability and affordability constraint, low cost of land, or cultural/traditional factors. The highest height of flood was observed above the knee level. This result corroborates the earlier findings reported by Nwanosike et al. (2021b) in their study in Niger Delta, Nigeria. Viljoen et al. (2001) had posited that flood level is directly proportional to the velocity and depth of inundation, implying that the probability of flood impact on the residents increases as the flood height increases and velocity increases. Thus flood that gets to knee could lead to the loss of lives of children, livestock, pets and cause severe damage to properties. This is an indication of high flood vulnerability in the study area.

Analysis shows that highest frequency of flood across the sampled communities was found to be 7-8 times each year. The implication of this result is that the higher the frequency the higher the risk of exposure of the population, the higher their vulnerability. In addition, this high frequency of occurrence flooding may be indicative of flash floods regularly experienced in urban areas. On the magnitude cum severity of flood events, it was found that the flood

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experience was extremely severe across the sampled communities. The result is consistent with the earlier findings reported by Nwanosike et al. (2021b). It is also observed that the longest length of years that the respondents had lived in their respective communities was above 15 years. However, on the aggregate, more than 80% of the respondents had lived in the study locations for a minimum of 11 years, which suggests that more persons might be familiar with the situation of flood incidents in their respective places.

From the analysis of health and wellbeing indicators of residents which was measured by the percentage of household members with chronic illness, pregnancy, disability or no ailment vis-à-vis their vulnerability to flood disasters, it was discovered that greater proportion of the respondents had no family member who had serious health challenges; while health conditions which make them vulnerable were found to be pregnancy among women; disability; and one kind of chronic disease or the other. The implication of this result on health of residents vis-a-vis vulnerability to flooding is that in the face of disaster the family members cannot concentrate on the situation without having to worry about health challenges of their wards which would further complicate the problem. Besides, the pregnant residents, those having disability, and those suffering from chronic ailments may be incapacitated to swiftly respond to issues like evacuation or relocation or other emergency risk reduction measures. Further to this, the large predominant households' sizes of above 15 persons, between 11 and 15 members and between 6 and 10 members across the sampled communities made them highly vulnerable to flooding.

5 Conclusion and Recommendations

The study assessed vulnerability of households to flood disasters in Rivers State, South-South, Nigeria. In addition to loss of human life and wildlife, losses arising from flood incidents in Rivers State run into billions of Naira each year, and this loss is made worse by the low level

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of preparedness both by individual, communities, and all tiers of government which in turn increases the vulnerability of the population. Unfortunately, amid the frequency, severity and attendant damages of flood disasters in the study area, vulnerability reduction strategies marshalled out by the population from their indigenous knowledge has proven not to be sustainable or completely effective, thus exacerbating their vulnerability to flooding. This study therefore offer the following recommendations:

1. The citizenry should be constantly enlightened on the need to always open the drainage systems and stop dumping of waste in the drains and other water courses/channels.

2. In the face of the impacts of flooding, efforts should be geared towards strengthening environmental regulatory agencies so as to be able to effectively achieve their mandate.

3. Practical socio-economic and health measures should be put in place by the various governments and stakeholders to checkmate the impacts of floods, and also the scope of the communication media should be extended to incorporate traditional/local media

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