

# Household Perceived Impact of Flooding on Socio-Economic Activities in Port-Harcourt Metropolis, Nigeria

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## Abstract:

A total of 573 respondents were randomly selected across the 13 flood zones that make up Port-Harcourt to elicit information on household perceptions of socio-economic impact of flood disaster in the study area. Findings indicated that although high awareness level was demonstrated by respondents, they were not properly informed of likely flood occurrence earlier enough. It was revealed through findings that perceived natural causes of flood occurrence were attributed to increased precipitation, sea level rise and low-lying terrain. Anthropogenic factors include building in flood prone areas such as along rivers, flood plains and wetlands, blocked drainage system and dam failure. There were significant variations in the household perceived socio-economic impact such as disruption of trading activities ( $F=12.136$ ,  $p<0.05$ ), disruption of farming activities ( $F=31.144$ ,  $p<0.05$ ) constraint to vehicular and pedestrian movement ( $F=10.32$ ,  $p<0.05$ ), scarcity of portable water ( $F=12.11$ ,  $p<0.05$ ), widespread of disease epidemic ( $F=13.996$ ,  $p<0.05$ ), reduction in the value of landed property ( $F=13.10$ ,  $p<0.05$ ), as well as disturbing education ( $F=12.4$ ,  $p<0.05$ ) across the 13 zones.

Victims lacked institutional support and government interventions were limited in scope. Flood adverse effects can however be reduced by creating more effective early warning and awareness outreach across the study area, avoiding building in flood prone locations and improving resilience capacity of the vulnerable populations. In addition, government should formulate policies that will reduce the vulnerability of people living in flood-prone areas.

**Keywords:** Socio-economy, Flood, reception, Vulnerability, Household

## Introduction:

Flooding is one of the most reoccurring, wide spread and disastrous natural hazards across the world. Moreover, its impact in terms of material damage and human loss have become more frequent, intense and unpredictable of recent. Reports from UN-Habitat (2019) noted that about 0.2 million more persons as well as 6 million more properties across Africa are under threats of flooding annually. Similarly, Boyd, Jones and Millinship (2019) and Cabrera and (2020) opined that the disastrous events of flooding adversely affect the growth of the socio-economic well-being of many low income communities

in developing countries including Nigeria. This, according to the authors, has led to the inability of most communities within this context to live above the poverty line.

In similar vein, flooding has ravaged different parts of Nigeria especially in the river and coastal areas. Port-Harcourt is one of the most adversely affected areas in Nigeria. The low relief nature of these area, high water table, urbanization and uncontrolled human activities among others are identified as major drivers of flood occurrence in the city. Annually, NEMA reports incidences of sacked residential areas in the city. Recently, NEMA (2022) claimed that 250 buildings were totally wiped out while about 700 residents were displaced from their homes. Incidences of buildings being submerged, several properties including farmlands, food and cash crops destroyed as well as human activities being disrupted were also reported. The city is one of West Africa's "most important" coastal areas because of its huge population and its importance as an economic hub for the region (UN-Habitat, 2019). The city also represents a particularly important case because of its specific flood-vulnerable nature (Percival & Teeuw, 2019). Until recent years, flood disaster reduction in the city have been on assessing the physical and environmental impacts of floods. The persistence of flooding has attracted interventions from a number of studies (Onwuebele, 2018; Nwaogu & Ezekwe, 2018; Wahab & Ojelowo, 2018, Buba, 2021) attempting to mitigate the menace suggesting diverse approaches. These approaches range from structural to non-structural measures of flood management. However, most flood management measures often overlook public perception of a threat. Moreover, there are always disparities in perception of risk especially between the authorities

and the affected public owing to the disconnection that many risk management plans concerning flooding have failed in the past. As earlier pointed out by Botazzi, Winkle and Biolat (2008) the formulation of appropriate risk mitigation and adaptation strategies will not evolve from physical science knowledge alone, but in combination with an understanding of public knowledge and perception of risk and behaviour when faced with it. It is against this background that this study evaluated the household views of the socio-economic impact of flooding in the metropolis.

### **Study Area:**

Port Harcourt Metropolis lies within longitude of  $60^{\circ} 4' 10''$  to  $70^{\circ} 01' 1''$  E and latitude  $40^{\circ} 40' 1''$ - $50^{\circ} 00' 1''$  N and covering an estimated area of 1811.6 square. As of 2016, the Port Harcourt urban area has an estimated population of 1,865,000 inhabitants, up from 1,382,592 as of 2006 kilometer (Aduke & Ogbodo, 2015). It is the second largest sea ports in Nigeria. It is located on the Bonny River about 64km, (40miles) from the sea). Port Harcourt Metropolis lies within longitude of  $60^{\circ} 4' 10''$  to  $70^{\circ} 01' 1''$  E and latitude  $40^{\circ} 40' 1''$  to  $50^{\circ} 00' 1''$  N and covering an estimated area of 1811.6 square kilometer. The metropolis falls under the Af (Tropical Rainy) climatic zone of the Koppen classification (Koppen, 1936) where the mean temperature for every month is higher than  $18^{\circ}\text{C}$  and with virtually all the month experiencing rainfall. Two seasons, that is, dry and rainy seasons are also prominent in the area. The Metropolis lies along the low-lying coastal plains of southern Nigeria which structurally belong to the sedimentary formations of Niger Delta (National Emergency Management Agency, 2018). The ridge barrier islands are elevated within about 13m above sea level. The flow of the

Bonny River commences from the West towards the East before turning sharply to flow down to the south smaller rivers drains the southern part of Diobu and creeks. The flow finally empties into the West-East of the Bonny River creek. This creek joins the trunk known as the primerose creek which links Bonny River with the New Calabar River. The Diobu is drained by the Abonnema River. Surface run-off from Rumuigbo area mainly empties into mini Apalugbo stream, which flows Northeast wards before joining the Woji River which

itself flows south Easterly to trans-Amadi industrial area which then flow into a mangrove swamps ear port Harcourt zoological garden. The streams traverse the various residential zones of the city. The distribution of the thirteenth zones of Port harcourt Metropolis is shown in Figure 2. It consist of Rumukurushi, Rumuadara, Elekahla, Eligbolo, Bori, Bodo, Orogbum, Golf-Course, Mgbuoba, Rumuekinikom, Mgbuosimini, Amatagwolo, and Town.

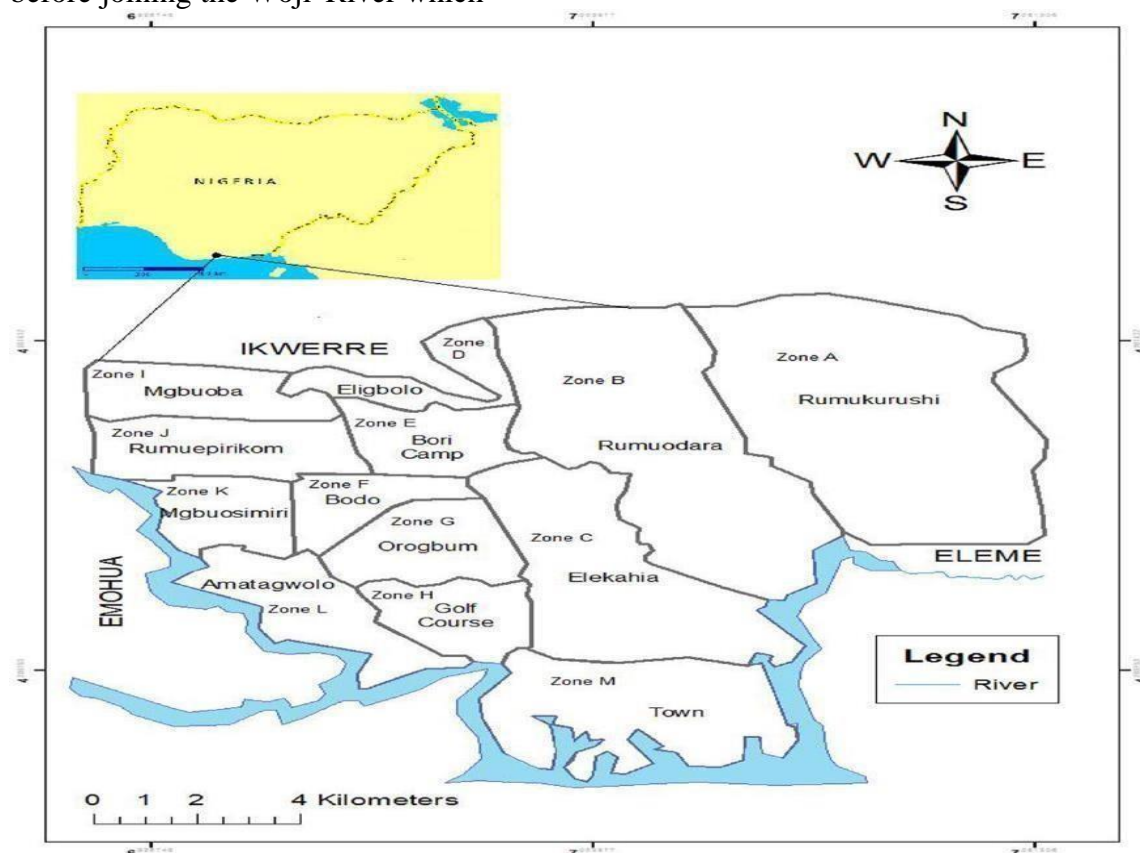


Figure 1.1 Map of Port Harcourt Metropolis (2021)

**Methodology:**

**Data collection**

Primary and secondary data were collected for the study. Primary data were obtained through questionnaire while the secondary data were obtained from maps and census figures of the study area.

**Sampling Techniques**

A multistage sampling technique was employed in the selected of respondents in the study. First, the number of zones that made up the city were identified through the metropolitan master plan. Port Harcourt Metropolis consists of thirteen (13) zones

as revealed in the plan. The zones are Rumukurushi, Rumudara, Elekahla, Eligbolo, Bori, Bodo, Orogbum, Golf-Course, Mgbuoba, Rumuekinikom, Mgbuosimini, Amatagwolo, and Town. Furthermore, the number of streets in each zone were obtained from the Metropolitan Master Plan as presented in Table 3.1. It was revealed in Table 3.1 that Rumukurushi, Rumudara, Elekahla consisted of 131, 125 and 127 flood-prone streets respectively. Eligbolo, Bori, Bodo, Orogbum also comprised 159, 196, 75 and 107 streets respectively. Other zones such as Golf-Course Mgbuoba, Rumuekinikom, Mgbuosimini, Amatagwolo, and Town comprised 121, 125, 83, 107,

95 and 127 flood-prone streets respectively. In order to provide an extensive study, one out of every five flood-prone streets in each zone were systematically selected in the next stage. This implies that 27, 25, 26, 32 and 40 streets were selected from Rumukurushi, Rumudara, Elekahla, Eligbolo and Bori respectively. Also, 15, 22, 25, 25, 17, 22, 19 and 26 flood-prone streets were selected from Bodo, Orogbum, Golf-Course, Mgbuoba, Rumuekinikom, Mgbuosimini, Amatagwolo, and Town respectively. In the fourth stage, one out of every ten buildings in each chosen street were further selected in a systematic order for questionnaire administration.

**Table 1. Sample Size of the Respondents Selected in each Zone in the Study Area**

Zone	No. of Flood-Pr Streets	No. of Selected Flood-Prone Streets (20%)	Sample of Buildings Selected (10%)
Rumukurushi	131	27	45
Rumudara,	125	25	19
Elekahla	127	26	42
Eligbolo	159	32	46
Bori	196	40	88
Bodo	75	15	28
Orogbum	107	22	40
Golf-Course	121	25	55
Mgbuoba,	125	25	51
Rumuepinkom	83	17	36
Mgbosimini	107	22	51
Amatagwolo	95	19	31
Town	127	26	41
Total	1569	321	573

Source: River State Urban Development Board (2020) Modified by the Author (2020)

A household head in each chosen building was questionnaire to elicit information intergender, age, income level, highest education attained, occupation and household size. Other information sources included their awareness of flood occurrence interval and seasonality, previous experiences of flood disaster and its impacts on their socio-economic activities. Physical

observation was also conducted to observe situation of the activities before, during and after the flood incidences in the study area. Focus group discussions with key informants were also conducted to obtained qualitative data as this provided opportunity for respondents to air their views and reveal some likely peculiar issues that were not

directly in the literature or captured by close ended questionnaire.

### Analytical Techniques

The collected data were analysed with descriptive and statistical methods (SPSS. Version 21.0). Level of awareness of flood occurrence was computed using a flood awareness index measured on a five-point Likert scale data. The selected household heads (respondents) were requested to rate their level of awareness with flood occurrence and its seasonality on a 5-point Likert scale (1= not aware at all, 2 = slightly aware, 3 = somewhat aware, 4 = highly aware and 5 = extremely aware). The designated values of 1,2,3,4 and 5 were used to allot weight to the options in the course of analysis. In order to obtain sum of weighted value for each variable, the product of the frequency of responses of each rating for a variable and the respective weight of the value expressed with the equation,

$$SWV = \sum_{i=0}^5 FiVi$$

(1) Where SWV denotes the Sum of Weighted Value,  $F_i$  is the frequency of respondents rating for variable  $i$  and  $V_i$  represented weight attached to variable  $i$ , while  $i$  was the designated value of the Likert point response. The mean index for individual variable was thus calculated by dividing the SWV of each variable by the total number of respondents (N=573). Flood Awareness Index (FAI) was therefore obtained which is expressed as:

$SWV/N$

(2). Household views on the impact of flooding on socio-economic activities in the study area were placed on a 5-point Likert Scale (5-Very High, 4-High, 3-Moderate, 2-Low and 1-Very Low). Thus, the findings served as the bases for suggestion on flood control in the study area. Hypothesis was tested using ANOVA to explain the significant difference (if any) in respondents' level of awareness of flood event, residents' awareness of

causes, residents' previous experience of flood, as well as respondents' opinion on the impact of flood on various socio-economic activities in the study areas such as disruption of farming activities, disruption of trading activities, constraints to pedestrian and Vehicular movement, loss of lives and disruption of education.

### Results And Discussion:

#### Socio-economic Status of Respondents

Presented in this section are the findings and discussion for the study. Findings were discussed based on the results in the tables accordingly. In Table 2, it was revealed that 76.3% and 23.8% of the respondents (sampled households) were male and female respectively. This appreciable increase in the number of men compared to women may be owing to Nigerian context of household since men are the heads of the family. Most of the respondents were married (65.0%) while some were single (12.5%). Only few were divorced (7.1%) while some (8.2%) had lost their partners. In addition, some respondents claimed to have separated (2.2%) with their spouse but did not divorce legally. This suggests that high value was attached to marriage in the study area. Most (44.5%) respondents were civil servants, followed by traders (28.0%), Artisans (20.3%) and few (7.0%) engaged in farming. This implied that most of the residents in the study area were engaged with white collar jobs.

Residents between the ages of 36 to 45 represented 49.3%. Those within the age bracket of 46 to 65 accounted for 33.8% and those within ages 18 to 35 accounted for 16.3%. The aged (those above 65) represented the least with a percentage of 0.8%. By implication, the age structure of the residents in the study area comprised mainly the working population. Findings also revealed that 23.8% earned 30,000 Naira and below monthly while 29.0% earned between 31000 to 60000 Naira.

Respondents whose monthly wage ranged between 61000 to 90000 accounted for 17.8% while 26.8% earned between 91,000 and 120,000. Only few (2.8%) received above

120,000 Naira per month. Relatively, a significant percentage of the respondents lived below the American Minimum Wage Standard of 100USD (42,000Naira)

**Table 2: Scio-economic Characteristics of Respondents**

<b>Sex</b>	<b>Frequency</b>	<b>Percent</b>
Male	95	23.8
Female	305	76.3
Total	400	100.0
<b>Marital Status</b>	<b>Frequency</b>	<b>Percent</b>
Married	120	30.0
Single	159	39.8
Divorced	81	20.4
Widowed	20	5.0
Separated but not Divorced	20	5.0
Total	400	100.0
<b>Occupation</b>	<b>Frequency</b>	<b>Percent</b>
Farming	28	7.0
Artisan	81	20.3
Trading	112	28.0
Civil Service	178	44.5
Total	400	100.0
<b>Age</b>	<b>Frequency</b>	<b>Percent</b>
18-35	65	16.3
36-45	197	49.3
46-65	135	33.8
Above 65	3	0.8
Total	400	100.0
<b>Income</b>	<b>Frequency</b>	<b>Percent</b>
Less than #10,000	94	23.5
#11000-#15000	116	29.0
#16000-#20000	71	17.8
Above 20000	107	26.8
Earning is Confidential	11	2.8
Total	400	100.0

Source: Author's Field work (2021)

### **Respondents' Awareness of the Occurrence and Seasonality of Flood**

It was revealed through findings that very few respondents (9.8%) had a very high level of awareness of flood events in the study area. Those who had just high awareness accounted for 15.0% while 15.8%, 22.0% and 37.4% represented somewhat moderate, low

and very low level of awareness respectively. The Flood Awareness Index was observed to be 3.64, indicating

A large percentage of respondents were of the opinion that flood occur mainly during the peak of rainfall (October). Of respondents opined that flood is associated with rainy season irrespective of whether it is the starting

or peak period while of them claimed that flood can strike any time of the year (whether dry or wet season). Result from the ANOVA indicated that there existed a significant (F=13.374, p<0.05) difference in the level of awareness among respondents across the 13 zones. This confirmed that respondents' awareness varied markedly across the study area. Their location determined how aware they were about flood related issues. Results also showed that 54.2% had more than 5 years flood previous experience while 33.2% had between 1 to 5 years' experience. Respondents with less than 1 year flood experience represented 12.6%. Respondents' previous experience with flood occurrence also varied significantly as indicated by the p value (p<0.05) and F=9.844. By implication, respondents in certain zones had more experience of flood events than the other.

**Respondents' Perceived Flood Causes**

It was revealed through findings that natural flood causes as perceived by respondents were owing to increased precipitation (82.0%), sea level rise

(72.3%) and poor terrain (60.5%), The anthropogenic causes were attributed mainly building in flood prone area such as rivers (85.5%), creeks (45.0%) and on wet lands (35.5%), Other causes of floods indicated by respondents were dam failure (12.5%) and blocked drainage system (63.3%) in the urban areas. Although respondents gave several views as to the cause of floods in the study area, building along rivers was ascribed the major causes of flood occurrence. It was revealed as indicated in Table 3 that there was no significant difference in their opinions about flood causal factors such as Increased precipitation ( $\chi^2=26.65$ , p>0.05), Sea level rise ( $\chi^2=31.67$ , p>0.05), poor terrain ( $\chi^2=19.23$ , p>0.05), building in flood prone areas ( $\chi^2=23.92$ , p>0.05), dam failure ( $\chi^2=20.73$ , p>0.05) and block drainage system ( $\chi^2= 19.45$ , p>0.05), as revealed in the Chi-square test. A post hoc analysis that building in flood prone areas differed significantly from other perceived flood causes. It was also reported by all interviewed respondents (100%) that the adverse effects posed by floods during this period have been significant in terms of property damage.

**Table 3. Chi-square test of Significant Variation in Household Response on Perceived flood Causes**

Perceived Flood Causes	Chi-Square Value	df	Asymp. Sig. (2-Sided)
Increased precipitation	26.65	12	p>0.05
Sea level rise	31.67	12	p>0.05
Poor terrain	19.23	12	p>0.05
Building in flood prone areas	23.92	12	p>0.05
Dam failure	20.73	12	p>0.05
Blocked drainage system	19.45	12	p>0.05

**Household Ratings of Socio-economic Impact of Flood Disaster**

ANOVA was used to determine whether a significant difference existed in the respondents' rated socio-economic impact of flood disaster across the 13 zones in Port-

Harcourt Metropolis. The result showed that all the perceived socio-economic impact such as disruption of trading activities (F=8.136, p<0.05), disruption of farming activities (F=7.144, p<0.05) constraint to vehicular and pedestrian movement (F=10.32, p<0.05), scarcity of portable water (F=12.11,

$p < 0.05$ ), widespread of disease epidemic ( $F = 13.996$ ,  $p < 0.05$ ), reduction in the value of landed property ( $F = 13.10$ ,  $p < 0.05$ ), as well as disturbing education ( $F = 12.4$ ,  $p < 0.05$ ), loss of lives ( $F = 21.23$ ,  $p > 0.05$ ) and ( $F = 22.35$ ,  $p > 0.05$ ) varied significantly across the zones. It was revealed through a post hoc analysis the poor

neighbourhood of Rumudara, exhibited a significant difference from other communities in terms of property and live loss while Ganaja and Lokongoma differed significantly from other neighbourhoods in terms of disruption of trading activities and displaced persons respectively.

**Table 4. ANOVA in Household Perceived Flood Impact on Socio-economic Activities across the Zones**

Household Perceived Flood Impact	F	Sig.
Disruption of trading activities	8.136	$p < 0.05$
Disruption of farming activities	7.144	$p < 0.05$
Scarcity of portable water	12.11	$p < 0.05$
Widespread of disease epidemic	13.10	$p < 0.05$
Disturbing education	12.4	$p < 0.05$
Loss of lives	21.23	$p > 0.05$
Traffic holdups/Jams	22.35	$p > 0.05$

#### **Government interventions on to Flood Impact Reduction**

Only few respondents (17.5%) opined that they received warnings from at least one of the agencies (NEMA, SEMA and LEMA) prior to the flooding while majority (82.5%) of them did not. In term of relief material provision, very few respondents (14.4%) claimed to they were provided with relief materials during and after floods. According to majority (71.3%) of the respondents, the rate of response of government agencies to flood occurrence was regarded not prompt while 28.7% perceived such response as not. Only few (19.1%) of them. It is to be noted that the affected respondents reported not to have received significant assistance from the government that could aid speedy recovery

#### **5.0. Conclusion and Recommendation**

Flood adverse effects on the respondents' socio-economic activities in Port-Harcourt Metropolis was examine in the study. Respondents demonstrated a low level of awareness

about flood occurrence and its seasonality. Flood was found to have adverse effects on major activities in the study area such as farming, trading, schooling, water supply, spread of diseases, pedestrian and vehicular movement, human lives and property and landed property. However, flood disaster can be reduced by improving awareness especially in places with low awareness. Public enlightenment should be carried to enlighten residents on activities that can aggravate flood disaster Building along or on water fronts, flood plains, river banks and swamp areas should be discouraged since it was perceived as the major cause of flood disaster in the study area. Flood insurance scheme should be provided for the vulnerable groups to enable them recover easily form their loss.

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