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PERCEPTION OF FLOOD RISK COPING AND ADAPTIVE STRATEGIES OF RESIDENTS: EXAMPLE OF MUSHIN, NIGERIA

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ABSTRACT

The study perception of flood risk coping and adaptive strategies of residents in Mushin, Lagos State, Nigeria. Both primary and secondary data were utilized for this study. Personal interview entailed holding discussion with residents in the study area and also staffs from the relevant agencies in charge of the environment, especially a staff from Lagos State Ministry of Environment and Lagos State Physical Planning and Development Authority (LASSPDA). The research population for this study was number of buildings in the selected drought prone areas of the community through reconnaissance survey. A total of 429 buildings was counted using Google Earth map. The number of buildings on each street within the study area and the number of questionnaires distributed in the street, using a systematic random distribution technique. Therefore, a total number of 196 questionnaires represent the sample size of the study area, since all areas cannot be covered due to constraint of time. Data gathered from field survey was examined using descriptive and inferential statistics. The study therefore recommends that there must try as much harder to increase flood control and management, disaster management must be put in place, readily available to tackle flood issues, climate change reduction and adaptation initiatives, so as to increase the flexibility capabilities of our environment and its components.

Keywords: Perception, Flood Risk, Coping and Adaptive Strategies, Environment, Mushin

1. INTRODUCTION

Worldwide, catastrophes are said to have catastrophic impact on profitable growth, incomes, agriculture, and health, social and anthropogenic existence (Wood, 2005). They are unexpected incidents that may bring about deaths or wounds. Abam (2006) described flood as a global catastrophe which occurs when a huge magnitude of water which happens at and occupy the river passage and its flood plain in a period too brief to avert harm to profitable undertakings including properties. It is a natural hazard like drought and desertification which happens as an utmost stream flow (run off) event (Nwafor, 2006; Yoade and Onifade, 2020). It could also be seen as the overflow of an area not normally enclosed with water, through a short increase in level of stream, river, lake or sea (Emodi, 2012). Protracted rainfall occurrences are the major usual origin of flooding globally. Floods are basically considered as acute stream flow occurrences, where there is surplus of water which may have catastrophic outcomes and results (Hula and Udoh, 2015; Yoade, Onifade and Olajide, 2019).

Flooding is one of the most significant environmental challenges pervasive in Nigeria (Onwuka, Ikekpeazu, and Onuoha, 2015). The challenges of flooding are as an outcome of sea-level rise and storm surges creates a notable

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origin of menace to life, property, livelihoods, and infrastructure in flood susceptible regions (Ezirim, 2010). According to Nwilo (2011), flooding is among the major destructive natural menace in the state demanding many lives and compelling harms to properties (mostly houses and farmlands) and infrastructure than any other natural incident. Lagos state has a mainland of 3,577 sq. km with a total estimated population of 21,000,000 people (www.wikipedia, 2018). A good amount of the mainland of Lagos state was overrun by the 2012 flood. This accumulates huge area of land engulfed and a considerable size of people affected in one form or the other in this community (Abolade, Muili, and Ikotun, 2013). However, several studies have shown that the pains of flood have become the lot of almost every nook and cranny of the metropolis (West, 2010).

Occurrences of flood are not a new happening to residents of Lagos as they have been residing in drought susceptible zone areas for centuries. Like major built-up areas of developing countries, Lagos state has experienced a speeded-up population increase which has led to transformations in the land use undertakings. And about 44% of the inhabitants of Lagos state, lives along its' coastline areas (UN Atlas, 2016), which are flood prone. Land use changes especially, have a direct effect on the volume and attitude of floods (Civco et al 2002). Flash floods are usual attributes in Nigeria in the course of the rainy period (May-October) but the country's flood events of the year 2012 have been stated as the major destructive in over 40 years (Hula and Udoh, 2015).

Evidently, the two major events that changed the face of flooding in Nigeria, transpire between the months of September and October 2012, namely the Ladgo Dam flood in Adamawa State, and the River Benue and Niger neighboring States floods (Niger and Benue States). The occurrence drive majority of the country's rivers over their banks and engulf hundreds of kilometers affecting both urban and rural land. This arises in extensive disastrous flood catastrophe that hit the country ranging across most cities in about 14 states in the country. The flood drowns houses and many conveying channels throughout the concerned zones across the country. Overall, a projected 1.3 million people were evicted and about 431 people lost their lives with lot of hectares of farmland damaged (MISNA, 2012). According to the report of National Emergency Management agency (NEMA) in 2012, predicted that over one million Nigerians may die because to the effects of floods before 2015, if no preventive course of action is taken.

Despite the predicted impact of flood on both human and the environment, especially buildings, due to the expansion in periodical and enormousness of flood in the Nigeria and Nigeria cities, always Lagos state, a couple of the aftermath evaluation research on the socio-economic income of the persons have been initiated to set-up approaches building and building environment resilient during flooding, the basic causes of residential susceptibility. In the absence of broad data and information, the degrees to manage with flood have lingered haphazard (Hula and Udoh, 2015).

Surveys on building and housing status have indicated qualitative and quantitative deficiencies in residential accommodation in most towns and cities in Nigeria (Izueke and Eme, 2013). Undoubtedly, poor housing conditions can be found majorly in the built- up areas in Nigeria, inclusive of Lagos state. Despite all efforts, acute shortage of suitable and decent accommodation particularly among the low income groups in urban areas like Lagos still persist which has posed a serious urban planning challenge. Specifically, (Okafor and Onuohah, 2016; Yoade, 2018) pointed out that Lagos metropolis is generally crowded with poor housing structures that are most disarray situated. They further stated that the city has now grown and developed in an spontaneous way resulting in the degradation of the worth of the property and social condition of the estate environment.

Using Mushin LGA of Lagos state as a focus area, it can be stated that the housing condition in the area is very low due to a number of problems associated with housing availability in Mushin Local Government Area of Lagos State which have become shameful and constituted total blister to the environment. These include environmental and housing decay, facilities overburden, slum creation, squatter housing, overpopulated, poor building maintenance, as well as deprived planning standard of housing handling of the building integrals, and socio-spatial disarray among others (Aluko, 2011). Notwithstanding, the more recently erected buildings in the area tend to be more livable than the ones built much earlier. This is in line with Alao (2008) who averred that there is a relationship between relative serenity of housing and their periods.

The problems of flooding are complex and distinct to both residential zones like Mushin, Ogba, Surulere, Lawanson, Oko Baba, Bariga and Alapere and industrialized and commercial zones like Victoria Island, Balogun and Ikeja, of Lagos state. This study therefore assesses the resilience of building during and after flooding, in Mushin LGA. In Mushin, Lagos state, flooding is a very serious problem during the rainy season, the undulating topography of the area, blockage of waterways, limited capacity of drainage alongside other factors that this study intends to examine, may have been a contributor to the incidence of flooding with Mushin. Flood menace in Lagos metropolis

has been tackled in various ways with different measures, although natural disasters or hazards cannot be accurately predicted, it can be prevented. Hence workable measures should be taken to minimize its effects.

2. LITERATURE REVIEW

Flooding frequently evolves in extensive havoc and damages to lives and properties. And among urban inhabitants, slum settlers are more susceptible to flood menace than the other parts of the urban population (McGranahan, 2007). This can be attributed to the attributes of slum settlements, which are often informal, unintended, massively populated and lacking in basic infrastructure and sanitation. Sometimes, they are uniformly situated in floodplains, wetlands and other flood-prone sites (United Nations, 2014; Jha *et al,* 2012; Adelekan, 2010; Yoade, Adeyemi and Adelabu, 2020).

Despite this high vulnerability to flood menace, slum dwellers are still massively populated (Jha *et al,* 2012; McGranahan, 2007). This is because slum inhabitants have devised coping strategies to flood menace. Wisner et al (2003) argue that slum residents have not remained as mere submissive casualies of flood menace. Aware of the hazards constituted by flood hazards to their lives and properties, they have developed measures to cope with flood menace. Coping can be defined as the manner in which people act within the limits of existing resources and range of expectations to achieve numerous ends. It consists of actions before, during and after a disaster event. Thus, coping strategies involve defense mechanisms, active ways of solving problems and methods for handling stress (Wangui *et al*, 2012; Wisner *et al*, 2003).

There are numerous ways of coping with a disaster or stressful event. Wangui *et al* (2012) identify four wide classifications of coping mechanism as economic/material, technological, social/organizational and cultural. In terms of flood disaster, coping strategies involve activities carried out to prevent flood hazards, mitigate its effect while the event is taking place, and the activities carried out after the flooding event. From Wangui *et al* (2012) perspective, economic coping strategies in flood hazards refer to material goods and resources, such as having multiple streams or alternative source(s) of income. Technological strategies refer to the structural activities employed by households to minimize damage and losses, such as building their houses with reinforced materials (Konrad, 2016). The social/organizational strategies relate to the social networks within and outside the community that help individuals/households to minimize the impact of flood hazards and to cope with the resultant stress such as kinship networks, community organizations, Non-Governmental organizations, etc. Cultural strategies include risk perception and religious views as well as environmental knowledge about flood hazards. Empirical studies in diverse locations such as Lagos, Dhaka, Accra, Sekondi-Takoradi, Kampla, Maputo, etc. show that residents of these communities have adopted these strategies to cope with flood hazards (see Atufu & Holt, 2018; Danso & Addo, 2016; Abheuer, Thiele - Eich & Braun, 2013; Ajibade, McBean and Bezner-Kerr, 2013; Wangui *et al*, 2012; and Douglas *et al*, 2008).

Mushin community is massively populated community within the Lagos Metropolis of Nigeria. The community is highly vulnerable to flood hazards and have been experiencing persistent flooding over the years. So how do the residents of these communities survive with flood menace? Have they remained passive casualties of flood menace or have they become resilient, devising coping strategies to tackle flood hazards, as done by their counterparts in other climes? What types of coping strategies have they devised? These are the issues that this study intends to interrogate.

2.1 Urban Flooding and Adaptation

The study employs the social vulnerability and adaptation approach as espoused by Wisner *et al* (2003) and Cannon (2000) to explain urban flood disaster and the coping strategies of slum residents. The approach views disasters as a consequence of natural hazards and human action. It argues that the risks involved in disasters must be analyzed from the perspective of the connections between the risks people face and the reasons for their vulnerability to hazards. Therefore, the perspective argues that disasters should be analyzed within the broader political, economic and social structures of the society. Thus, for Wisner *et al* (2003), it is not only natural events that cause disasters but disasters occur as the result of a mix of social, political and economic factors with the natural environment. These structures (social, political and economic) shape the lives of people in the society, differentially. Thus, different groups of people in the society have different degrees of vulnerability to natural menace.

From this vein, Wisner *et al* (2003) define vulnerability as the characteristics of a person or group and their situation that influence their capacity to anticipate, survive with, resist and recover from the impact of a natural hazard.

This they argue is determined by a complex mix of variables. Thus, the degree to which a person's life, livelihood, property and other assets are vulnerable to disaster hazards is shaped by class, occupation, caste, ethnicity, gender, disability/health status, age, immigration status and the nature and extent of social networks. Despite the limitations posed by these variables on some individuals that may increase their vulnerability to disaster hazards, Wisner *et al* (2003) also acknowledge that such individuals are often not just passive receptors of change. They do have the capacity to resist hazard's harmful effects on them and to recover from such effects. Thus, they conclude that disaster victims do possess the capacity to anticipate, survive with, resist and recover from the dangerous impacts of natural menace.

This study intends to add to the literature on the coping strategies to flood hazards by investigating the adaptive strategies of the residents of Mushin communities within the Lagos Metropolis of Nigeria.

2.2 Study area

Mushin is a suburb of Lagos; Nigeria and it is one of Nigeria's 774 Local Government Area and the fourth largest area in Lagos. Its major inhabitants are the Yorubas, Igbos and Hausas. The major towns making up Mushin includes Idi-oro, Papa Ajao, Ilupeju, Matori, Ladipo, Idiarabe and Ojuwoye (Figure 1, 2, 3). The major land use in the study area is mixed uses. It is located 10km north of the Lagos city core, adjacent to the main road to Ikeja and it is largely a congested residential area with inadequate sanitation and low quality housing. It had about 633,009 inhabitants as at the 2006 census. The core center of Mushin is centered on Ojuwoye town. Mushin has a fairly flat terrain in the Western part. However, in the eastern part, the ground is gently undulating rising at a level of about 2.5 meters in the south to about 6.00 meter in the north above sea level. On the whole, except for a small stretch of land in the northern part, the ground level in the rest of the study area ranges from about 2.5m to 5.0m above sea level (World Bank, 2013).

Mushin Local Government area by virtue of its geographical location which has a maximum temperature that occurs around February or March and the lowest temperature occurs around July or August. The monthly mean maximum temperatures are in the range of 80^0F to 90^0F. There is very little variation in the daily mean minimum temperature. Mushin Local Government falls within equatorial region supported by abundant type of dense vegetation of the tropical rainfall, because of the high rainfall and high temperature. The growing period in equatorial regions is not confined by either drought or cold. Plant growth is continuous throughout the year. The equatorial vegetation comprises of great variety of vegetation such as evergreen floras that yield tropical hardwood e.g. mahogany. There are smaller palm trees, creeping plants like the Lianas or rattan which may be hundreds of meters long, and epiphytic and parasitic floras that live on other plants; under the trees grow a broad diversity of creepers ferns or chides and Lang.

The climate of Lagos State is the wet equatorial type influenced by its nearness to the equator and the Gulf of Guinea. It is affected by atmospheric interactions in which the Inter- Tropical Convergence Zone (ITCZ) is a controlling factor. The northward movement of the ITCZ is connected with the coming onshore of a warm, humid maritime tropical air mass, while its retreat is associated with the hot and dry continental air mass from the interior. These two air masses give Lagos two contrasting seasons; a rainy period, which usually lasts from April to October; and a dry season, which lasts from November to March. The rainy season has two peak rainfall periods: May to July and September to October, with rainfall being heaviest during the first peak period. Floods normally take placer during this period of peak rainfall. These floods are aggravated by the poor surface drainage systems of the coastal lowlands. All this are contributing factors to sustained rainfall which results to flooding.

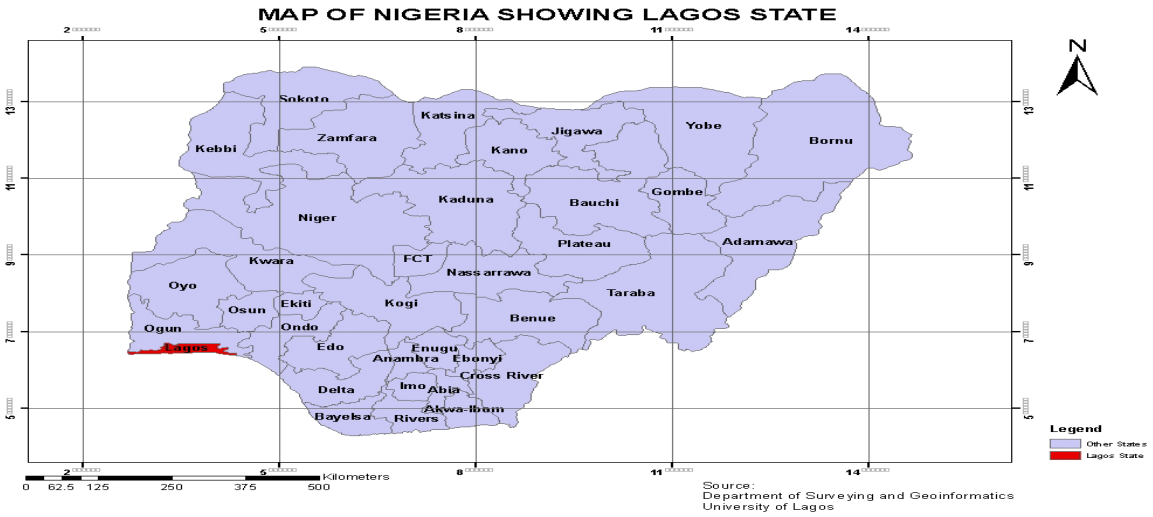

Figure 1. Map of Nigeria showing the thirty six states and FCT
(Source: LASPPPA, PWD Ikeja Lagos, 2014)

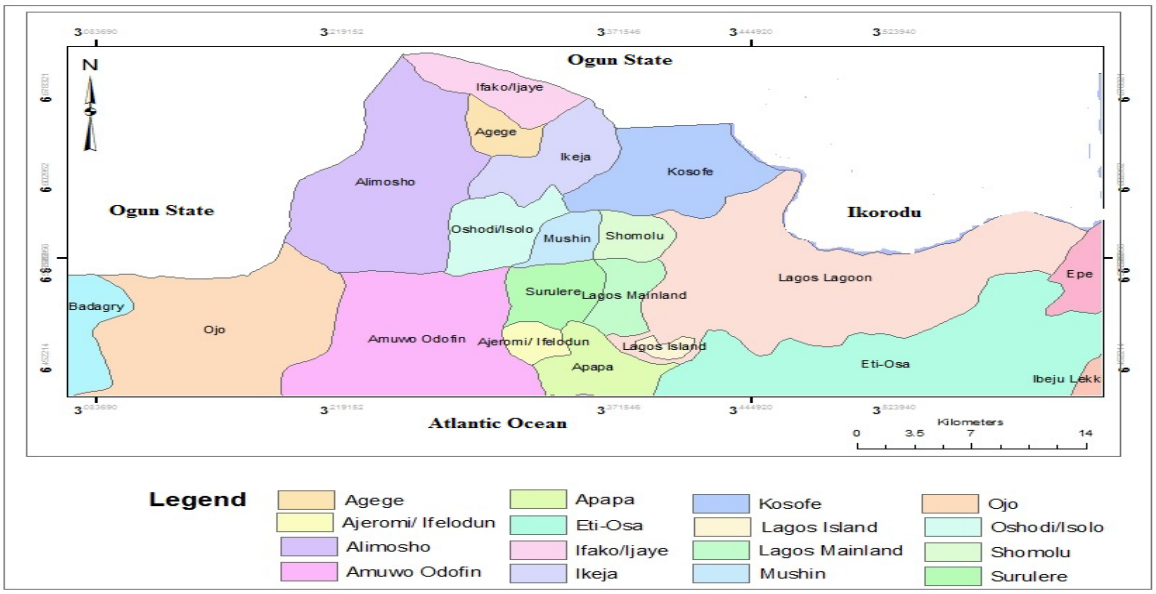

Figure 2. Map of Lagos state showing Ikeja Local Government Area.
(Source: Lagos State Ministry of Environment and Physical Planning, Alausa, Ikeja.)

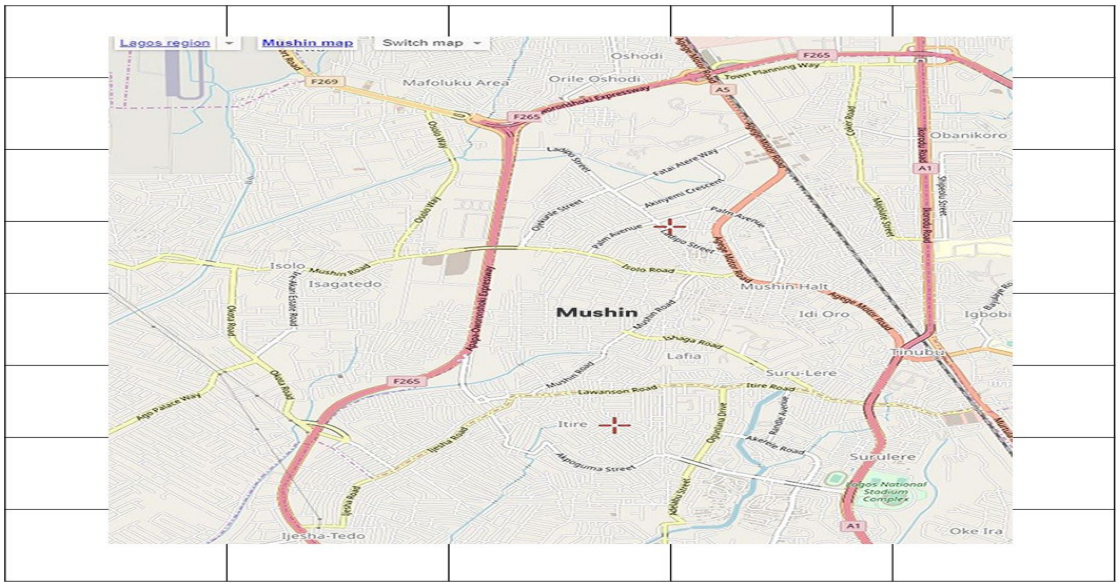

Figure 3. Mushin Street Map.
(Source: Google Earth, 2018)

3. METHODOLOGY

The research design used for this research is the survey method, with questionnaires and interview guide being the main instruments for data collection. The statistics used for this research was derived from both primary and secondary sources and was of quantitative and qualitative types. Personal observation involves getting self-acquaintance with the area and it is mostly used to identify and get the existing condition and situation of the physical features of the area of study. Also, personal interview entailed holding discussion with residents in the study area and also staffs from the relevant agencies in charge of the environment, preferably a staff from Lagos State Ministry of Environment and Lagos State Physical Planning and Development Authority. (LASSPDA). And this was also, used to assess the existing road, drainage and physical terrain/topography of the study area.

However, eight neighborhoods' in this settlement that frequently experienced flooding was selected for analysis in this study. These areas are: Idi-Oro, Alamutu, Agege motor road, Olaniyi, Matuwo, Labinjo, Bankole and Ojuwoye areas. The research population for this study was number of buildings in the selected flood prone areas of the settlement through reconnaissance survey. A total of 429 buildings was counted using Google Earth map.

The Evans Morris Model (2007) formula was used to determine the sample size;

$$n = \frac{NZ^2Pq}{e^2(N-1) + Z^2Pq}$$

Where n = sample size
N = Number of Buildings (429 Buildings) e^2= 10% = 1.0 (level of accuracy)
1 = Unity (a constant)
Z= 95%= 0.95 (level of significance)
Pq= 0.5(Population proportionality)

Therefore;

$$n = \frac{429 \times 0.95^2 \times 1.0}{0.05^2(429-1) + 0.95^2 \times 1.0}$$

$$n = 196$$

The sampling procedure that was adopted for the study was the systematic random sampling. This is the type of sampling procedure allows for sample to be taken at a predetermined regular interval or order; a building is selected on each area as a starting point for questionnaire administration and another questionnaire was administer at the next third (3rd) building, after which questionnaire was distribute in the selected building to the available eldest

person randomly. The reason for selecting eldest person was that they will have more information about the study area. Therefore, the eight neighborhoods that make up the flooded area served as the sample frame. The number of buildings on each street within the study area and the number of questionnaires distributed in the street, using a systematic random distribution technique. Therefore, a total number of 196 questionnaires represent the sample size of the study area, since all areas cannot be covered due to constraint of time. The secondary source of data which is secondary source includes text books, past research works, internet, published and unpublished academic journals, maps that assisted in providing relevant information. They provide the conceptual background and comprehensive literature review that helped to broaden researcher's knowledge about the study. Data collected from field survey was analyzed using descriptive and inferential statistics.

4. RESULTS AND DISCUSSION

4.1 Building Vulnerability

As shown in Figure 4, the study revealed the respondents perception on how vulnerable buildings are to flood. 3 (1.5%) agree that buildings are slightly vulnerable, 142 (72.4%) agree that buildings vulnerable, 50 (25.5%) are not sure and 1 (0.5%) are not vulnerable. The study emphasized that most buildings in the study area are vulnerable to flood.

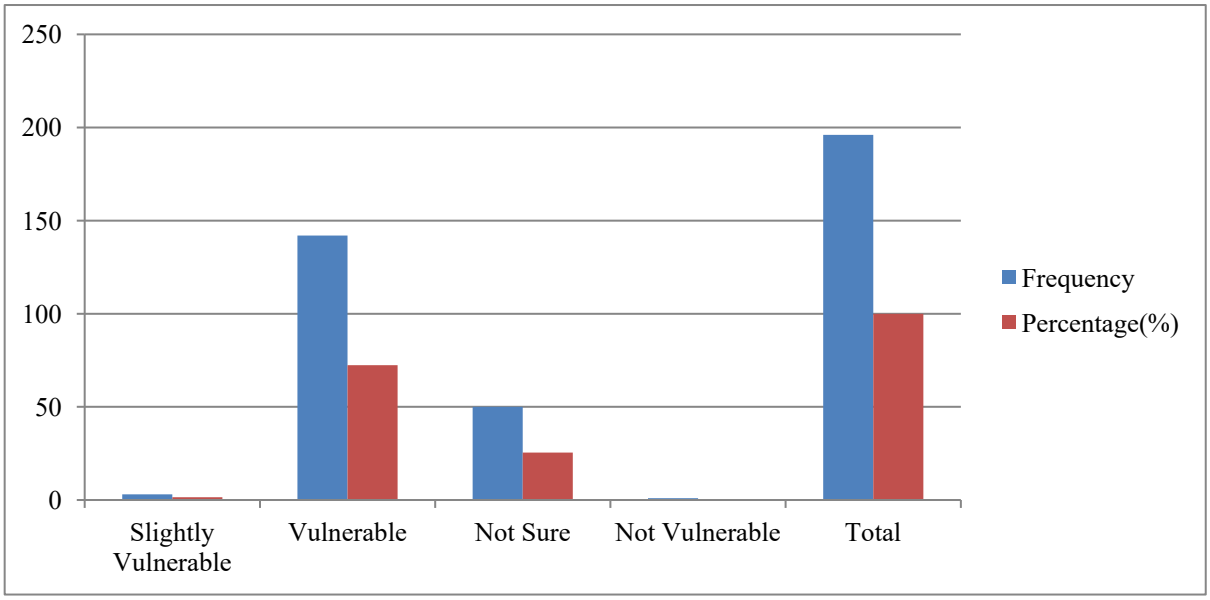

Figure 4. Level of building vulnerability

4.2 Perception of respondents on coping strategies during Flooding

Likert scale is used to examine the perception of respondents on the coping strategies during flooding in the study area. This is done by attaching values to different degrees of response as shown below;

Not Severe (NS) ---1, Severe (S) ---2, Not Sure (Ns) –3, Moderately Severe (MS) –4, Highly Severe (HS) --5

The table 1 revealed the Respondents Perception Index (RPI), Households' Perception Index (HPI) and (Respondents Perception Index (RPI) - Households' Perception Index (HPI))^2 of each variable.

As shown in Table 1 revealed the perceptions of respondents on the coping strategies during flooding. The **RPI mean value (3.02)** is revealed, this defines the significance of each variables. This means variables with RPI value greater than the RPI Mean value are considered significant or the most affected component, while those variables with RPI value that is less than the RPI Mean value is insignificant. Therefore, the significant variables in the table are prayers (RPI, 3.72), forced relocation (RPI, 3.71), use of quality construction materials (RPI, 3.71), building maintenance (RPI, 3.70), support from families and friends (RPI, 3.69), raising household materials above the ground

(RPI, 3.66), road filling with debris (RPI, 3.65), clearing of drainage (RPI, 3.64), build up flood barriers (RPI, 3.64), use of rain boots (RPI, 3.64), use of sand bags (RPI, 3.63), and indebtedness through borrowing (RPI, 3.59). While the insignificant variables with RPI value that is lower than the calculated mean includes are insurance (RPI, 1.61), government support (RPI, 1.73), being indoor (RPI, 1.69), periodic sanitation (RPI, 1.63) modification of house (RPPI, 2) and following media warnings (RPI, 1.72).

Table 1. Perceptions of Respondents on Coping Strategies During Flooding

	NS(1)	S(2)	Ns(3)	MS(4)	HS(5)	SWV	RPI	RPI-HPI	$(RPI-HPI)^2$
Prayers	0	8	150	556	15	729	3.72	0.69	0.8362
Forced relocation	0	8	150	564	5	727	3.71	0.68	0.8307
Raise household materials	0	12	138	572	5	727	3.71	0.68	0.8301
Road filling with Debris	1	8	147	560	10	726	3.70	0.67	0.8270
Clearing of drainage	1	14	144	556	10	725	3.69	0.66	0.8240
Build up flood barriers	0	40	123	484	70	717	3.66	0.64	0.7988
Use of quality construction materials	0	36	126	504	50	716	3.65	0.63	0.7956
Maintenance of house	1	40	120	492	60	713	3.64	0.61	0.7859
Support from family/friends	0	42	120	488	65	715	3.64	0.63	0.7924
Use of rain boots	1	42	120	480	70	713	3.64	0.61	0.7859
Use of sand bags	0	42	123	496	50	711	3.63	0.60	0.7794
Indebtedness through borrowing	0	50	120	484	50	704	3.59	0.57	0.7561
Insurance	136	12	153	0	15	316	1.61	-1.41	-1.874
Government support	122	50	117	0	50	339	1.73	-1.29	-1.135
Being Indoor	122	44	126	40	0	332	1.69	-1.33	-1.152
Periodic community sanitation exercise	126	42	117	40	0	325	1.66	-1.36	-1.166
Modification of houses	119	46	3	164	60	392	2	-1.02	1.001
Following warnings from media	118	50	123	48	0	339	1.72	-1.29	-1.135
							54.42	3.02	

4.3 Level of Awareness

As shown in Figure 5 represents the level of awareness created on flooding, it is revealed that 158 (80.6%) are well aware of flooding through past experiences, 22 (11.2%) was through official campaigns related to flooding, 12 (6.1%) through community meetings and 4 (2.0%) through media information. The study emphasized that the level of awareness of respondents is mostly as result of their past experience with flood.

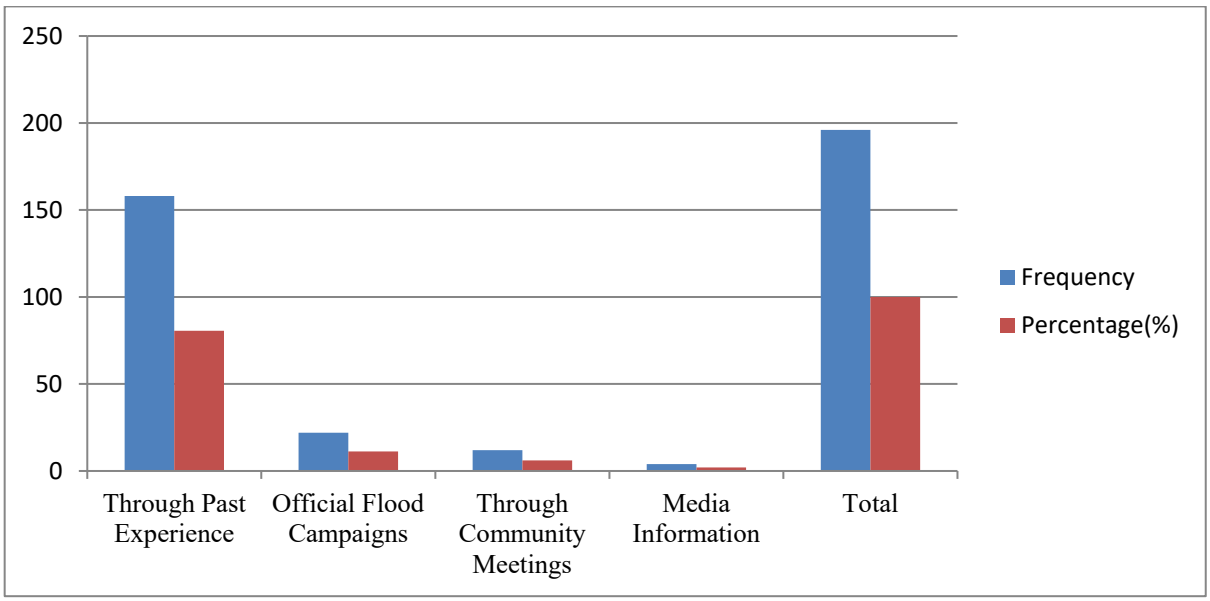

Figure 5. Level of awareness

4.4 Level of Preparedness

Results from Figure 6 revealed the level of preparedness of respondents to flooding in the study area. 137 (69.9%) agree to be very prepared, 33 (16.8%) agree to be slightly prepared, 22 (11.2%) are not sure about the preparedness and 4 (2.0%) are not prepared. It is evident that most respondents are well prepared in future flooding scenarios.

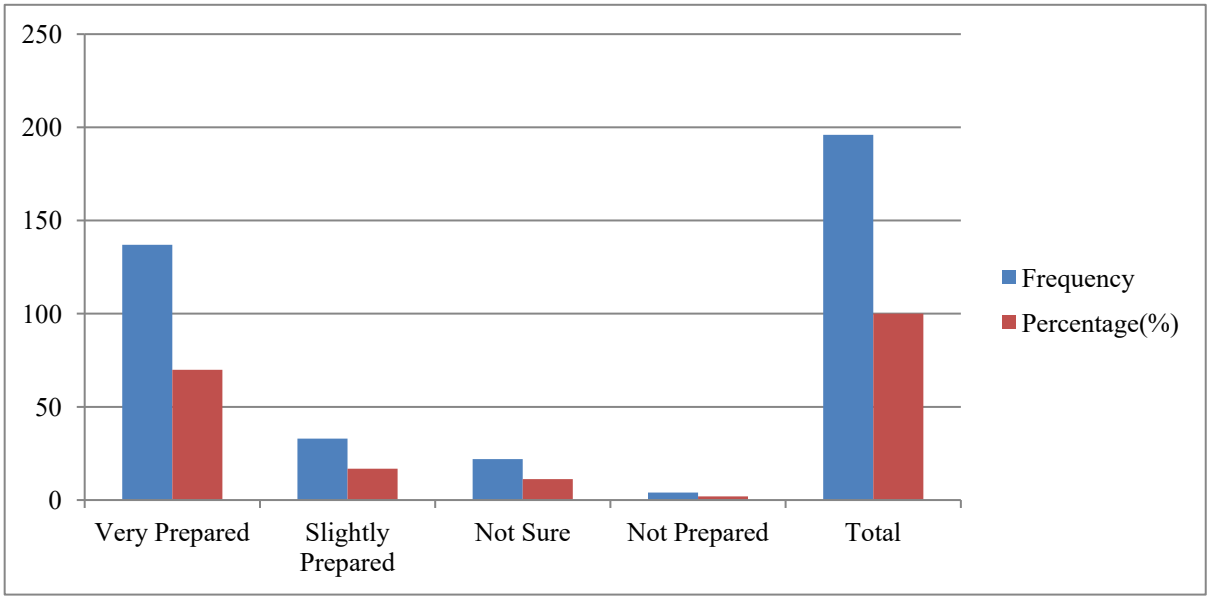

Figure 6. Level of preparedness

4.5 Level of Engagement

Results in Figure 7 represents the level of engagement, it is revealed that 59 (30.1%) always engage in activities to hinder flood, 121 (61.7%) sometimes engage, 12 (6.1%) are not sure, and 4 (2.0%) never engage. The study emphasize that most respondents sometimes engage in practice to hinder flooding.

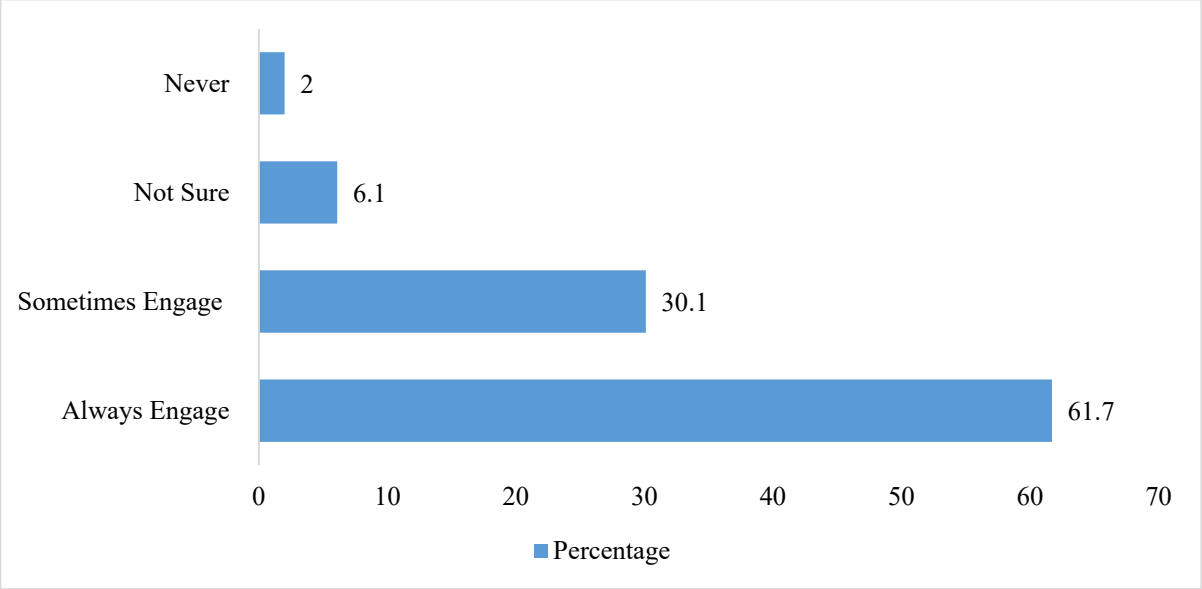

Figure 7: Level of Engagement
Author's Field Work, 2018

4.6 Reasons for taking Precautions against Flooding

Results in Figure 8 revealed the reasons for taking precautions by respondents against flood in the future. 20 (10.2%) agree to learn from professional advice like architects and planners, 121 (61.7%) learns from previous experiences, 41 (20.9%) learns through sensitization programs and 14 (7.1%) learns from other media outlet. The study emphasized that most respondents take precautions against flood due to their previous experience of flooding.

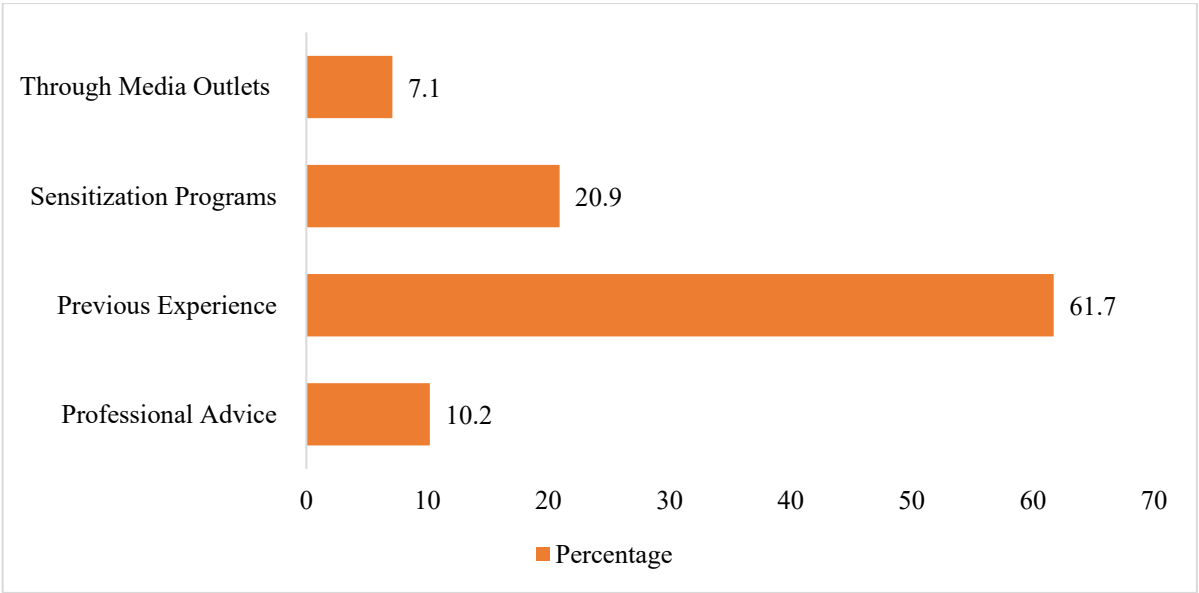

Figure 8. Reasons for Precautions

4.7 Reasons for not taking precaution

Results in Figure 9 revealed the reasons for not taking precautions against flood. 17 (8.7%) no professional advice, 14 (7.1%) inaccessibility to flood related information, 41 (20.9%) no or low sensitization campaigns and 124

(63.3%) cost of implementing preventive measures. It is evident in the study that most respondents do not take precaution due to cost of implementing preventive measures.

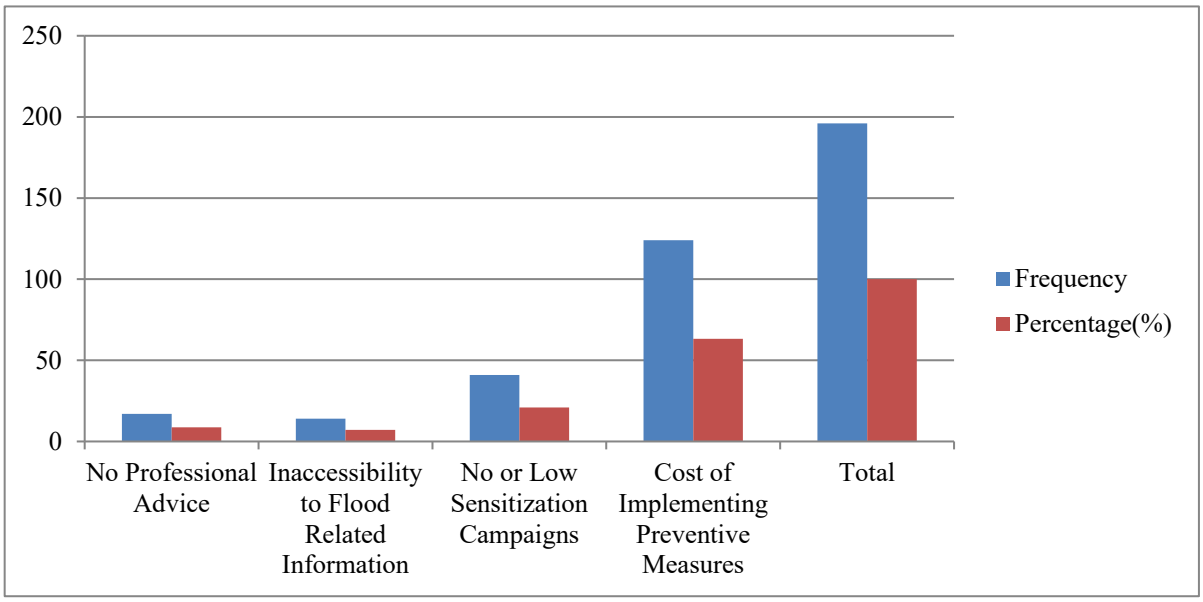

Figure 9. Reasons for not taking precaution

4.8 Willingness to take measure

Findings in Figure 10 established the willingness of respondents to take measures for building resilience against flooding. 172 (87.8%) are willing to take measures and 24 (12.2%) are not willing to take measures for building to be resilient against flooding.

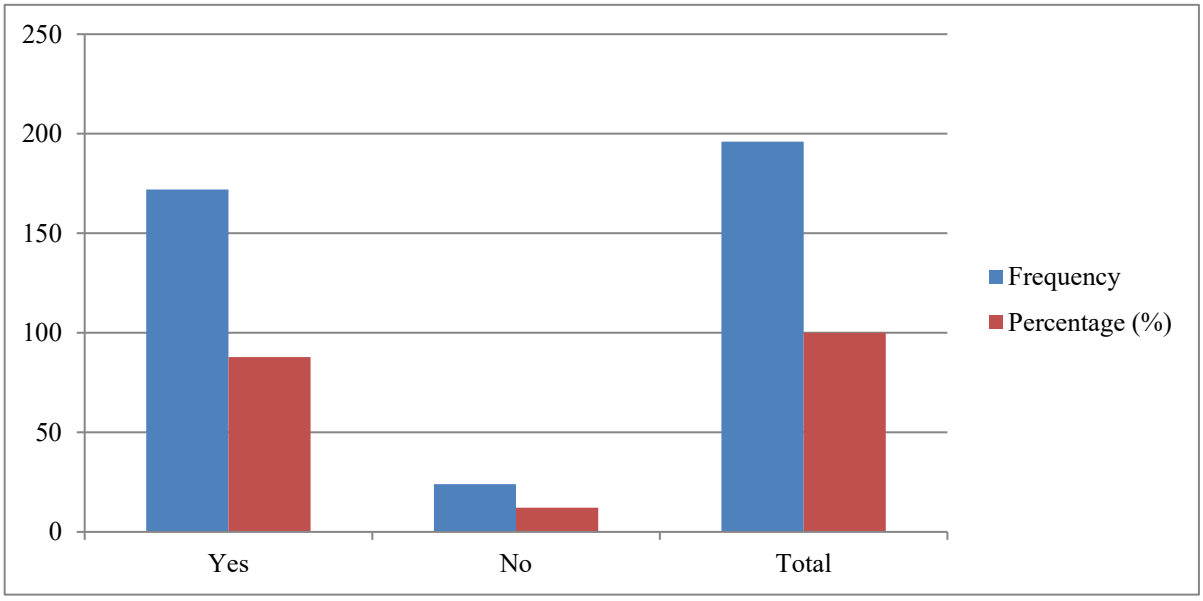

Figure 10. Willingness to take measures

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, the drainage department, in charge of Mushin Local Government area, Lagos State Public Works Corporation (LSPWC) communicated that the major causes of flooding is linked to human factors such as ignorance, low lying areas, nonchalance attitude, lack of maintenance culture of the residents, has been one of the major challenge in the study area and Government should desilt the heavily silted System (6C) drains which is the primary drainage to avoid further happening of flooding in the study area. Moreover, physical planners and policy makers should know those natural calamities such as floods have calamitous ability and could be much unexpected, irregular and others. These therefore are indicator to relevant planning and predict. To realize the goal of remodeling environmental management and enhanced development, for sustainable growth and development of the cities and towns and the nation at large, there must be aggravate attempts to broaden flood control and management, disaster management must be put in place, readily available to tackle flood issues, climate change alleviation and adaptation initiatives, so as to increase the potency capabilities of our environment and its components

However, the research investigated building resilience due to flooding, using selected areas of Mushin LGA as a case study. The recommendation serves as a suggestion based on the summary of findings. If the cities and towns will resist the experiment of era and perform the urban actions to the commendation of the urbanites and admire the law of nature, the problems of floods must be debated. It should be retained too that global warming and climate change is a global problem that must be questioned. All hands must be on deck to question the problems. Not only the people in the study area, but also the manufacturing companies and assemblage plants, offices, markets and stores, hospitals and maternity homes, schools and colleges and others should be constrained to guarantee that their neighboring, the drainage medium and erosion channels are clean, transparent and free of waste before, amid and after rainy periods. That is, everyone must imbibe the practice of weekly opening of gutters in his neighboring.

Especially, it is of key significance that:

- The research further suggests that factors influencing the quality of buildings like the wall material, roof material and design, zoning etc., there is still need for improvement in the town planning sector of the nation; creating policies, enacting programs, implementing laws and regulation, monitoring developments, and sanctioning defaulters of planning laws.

- Furthermore, the problem of mismanagement of waste and drainage is a major concern and can be resolved if drainages are channeled well and cleared, if proper waste disposal and management procedure or agencies are structured and the re-establishing the regular monthly sanitation practice to keep environment cleanliness in check. The reestablishment of existing dump sites and creation of new ones that must be geographically well organized situated will also be able to handle the affair of wastes along the drainage medium and erosion passages.

- Adequate details on flood prevalence, causes and other relevant ones should be made available to every citizen. This will allow the public be aware on areas that are vulnerable to flooding, the consequence of building at rivers' setback and dumping of waste into flowing rivers.

- Flood maps that will set out the overflow zones should be processed for states as this will demoralize the act of building at drought prone areas.

- Metropolitan government should carry out genuine evaluation and mapping of submerged zones at bearable danger level in order to provide significant instruments needed with regard to achieving an combined flood pre catastrophe and lead time blueprint within the whole region.

- Development of well-organized eroding and outpouring check control, administration, enforcement of environmental laws and rules to meet international standard for the mega city are required; construction, excavating and re-dredging and reformation of existing drainage routes and canals are imperatively needed; Proper directing and building of new drainage method.
- Residents, as category and as individuals, and corporate entities should be appeal to and reassured to commence on some healthy measures such as excavating and re-dredging of drains, erosion passages and others; and building of embankments and transportation of some channels that are expose to flooding; While canals may be further cleared and broadened, side gutters and drains could have consolidated solid or steel cover for mitigate of nurture.

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