Social-Economic Indicators and Public Perception on Urban Flooding in Lagos, Nigeria

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Abstract

Urban flooding is a serious disaster in the world, which not only causes serious damage, disturbs normal life and working conditions, but also pollutes the city and causes sanitary problems. It often also leads to loss of lives. In Lagos, urban flooding has largely become the focus of development initiatives. This paper examined the socio-economic impact and public perceptions of flooding in Lagos using questionnaire survey, personal observation, In-depth Interview (IDI) and Focus Group Discussions (FGD). The findings show that urban flooding has led to the damage of personal and public properties ranging from house utensils, foods, books to cars, buildings and schools. About 39% of the respondents have their economic activities affected by flood and the monetary value of loss in business due to flooding from single storm event range from $84.75 to $8474.58. Loss of goods and properties is more severe for the low income earners than the high income ones and the ratio of those that have benefited from flooding to those that have lost goods and properties is 1:7. The public perceive urban flash flood to be harmful, but other issues, such as acquisition of landed property in any part of Lagos are perceived to be more significant than the seasonal inconveniences and losses, which accrued from urban floods hazard. Involvement of all stakeholders in decision making process on the issue of de-flooding Lagos is recommended.

Key words: Flooding, Socio-Economics, Public perception, Lagos

Introduction

Flood is defined in a variety of ways, according to type, origin and magnitude. Generally, it is an unusual high stage of water in a stream channel (Ward, 1974) or the stage at and above which the stream channel becomes filled and overflows its banks. When it causes damage to goods and properties or impairs human activities, flood becomes a hazard. In urban areas, flood hazard occurs when there is sufficient overland flow of urban drainages over the streets to cause significant property damage, traffic obstruction and nuisance, as well as health hazards. Urban flooding is a serious disaster in the world, which not only causes serious damage, disturbs normal life and working conditions, but also pollutes the city and causes sanitary problems (Chen, 2004). It also often leads to loss of lives. Urban floods include river flood, flash floods and flood poundage within an urban setting.

The socio-economic component of urban flooding represents the sensitivity of the land to flooding in economic and social terms and relates to land use and social perception of people on flooding. The analysis of socio-economic component of urban flooding adopts long-term risk management strategies grounded in an understanding of exposure to the flood hazard, characteristics and pattern of vulnerability, and the relationship between different stakeholders in the perception of flood risk (Brown and Damery, 2002). Different social groups have different needs when a disaster occurs, particularly in urban environments. Generally, the marginalized group has less social power and fewer economic resources and physical capacity to anticipate, survive and recover from the effects of

disaster. There is an intrinsic relationship between poverty and vulnerability. In addition, the elderly, the disabled and children are particularly vulnerable, and gender is especially important to flood risk reduction (UN, 2004).

Flooding in most urban areas is localized, but its cumulative effect on the socio-economic, environment and proper functioning of the supporting systems such as electricity, road network, communication, and service industries could be monumental. Therefore a proper understanding of the processes governing the flow of urban storm as it relates to the existing spatial arrangement of land utilization as well as the ability to properly identify the risk zones are essential for urban flood control.

There are three major human response and adjustment approaches to urban storm managements and urban flood hazards. These are Engineering Approach (Wilson, 1990), Ecological Approach (Bernard, 1990) and System Approach (Ayeni, 1979). The aim of engineering approach to urban flooding has been to get rid of the excess water as quickly as possible. Based on the result obtained from either field observation and or the use of quantitative modelling techniques such as the rational formula, the flood discharge expected from rainstorm are estimated and storm drain is constructed to accommodate the floodwater. Roadways, lawns and other open surfaces within the urban area are graded to quickly shed water into the storm drain, which funnels it into the nearest convenient stream. Also, the natural or semi-natural streams that exist in the urban environment are channelized. The channelized streams 'canals' carry both water and sediments more efficiently, so that hazard of flooding in the area is greatly reduced. However, the canals have little, if any semblance with the natural stream it replaces. Water flows continue to alternate between surges and dryness and, in addition, all the crevices and pools that might have supported aquatic and other wildlife during dry periods are eliminated. More importantly, water removed may not necessarily drain to large water body such as rivers, lakes, lagoon and ocean but may only be removed from one area to another (Odunuga, 2010).

In contrast to the engineering approach, the ecological / conservation approach is to keep the storm water near where it falls and preserve the natural infiltration / runoff ratio in such a way that the runoff after development does not exceed the ratio before development (Bernard, 1990). The methods adopted by this concept include:

1 Dry wells and trenches; these are broad, shallow, rock filled wells or trenches that receive runoff and then let it percolate into the ground.
2 Swales with barriers and depressions; grading a lawn area so that the "would be" runoff will accumulate in its broad shallow depression from where it infiltrates into the ground.
3 Parking lots with porous surfaces
4 Retention ponds; these are ponds built within the developed area to collect the runoff and drain it away slowly. They may additionally support pockets of wildlife, or may provide a practical source of water for non-drinking purposes such as car washing or lawn watering, thus lessening the stress on the municipal water system. It may also serve as a recreational facility.
5 Also, rooftops of buildings and parking lots may be built so that they "pond" the water and let it trickle away slowly.

The adoption of one or more of the above methods tends to promote the already impaired natural hydrological processes and provide a means by which the urban flood water can be used

to support urban water systems. However, the rate of natural processes such as infiltration in urban area is far below the rate of storm water accumulation during rainfall. Therefore, ecological methods of balancing the natural processes can only marginally reduce flooding in an urban environment (Odunuga, 2010). Lack of proper planning and inadequate provision of open spaces in most cities of developing countries serves as a limiting factor for the adoption of ecological approach to urban flood problem. Water poundage in the humid tropics constitutes health hazard, as the pounded water becomes the breeding place for mosquitoes thereby promoting the spread of malaria parasites. In all, ecological approach to flood mitigation only marginally copes with the floodwater and creates other environmental and health problems.

In many Nigerian urban catchments, the concentration of people and development is very high and the rate of growth remains high so that some exposure to storm hazards would be expected solely on random probability basis (Oyebande, 1974). Flood, like other hazards of hydro-meteorological origin, have some unique properties and the magnitudes of energy involved in such hazards seem to place them beyond man's control. However, the effects of the natural factors such as heavy rain storm events and low topography of Lagos are believed to be aggravated further by a number of anthropogenic factors, the most significant being violation of planning regulation, indiscriminate use of wetland, encroachments into floodplain, inadequacy of the hydraulic capacity and refuse dumping into the drainage systems (Oyebande, 1990).

The economic evaluation of flood mitigation solution is dependent on the assessment of damages and losses for specified range of flood events. Depending on the source or sources of flood, there is an extensive array of potential socio-economic and environmental impacts of flooding. However, "flood damage" is related to the physical damage of public and private assets such as infrastructure, houses, vehicles, and agriculture among others, as a result of contact with flood waters. The term "flood loss" on the other hand has much broader meaning and depicts also secondary or tertiary losses as well as intangible losses. It may involve losses to human life, environmental and others economic, social and cultural valuable items.

Consequently, there is a special need for a pattern of adjustment that seeks more than the control of nature. This paper therefore examines the socio-economic implications of urban flooding in Lagos megacity with the view to identify the needed pattern of adjustment that guarantees an holistic solution that transcend beyond engineering solution alone.

Study Area

Lagos is both a city and a state in south-western Nigeria. Lagos State lies between longitudes $2^0 42'E$ and $4^0 21'E$, and latitudes $6^0 22'N$ and $6^0 41'N$. Lagos State has an area of about 3600 km^2 of which about 1700 km^2 is water body. The topography consists of low-lying coastal beaches, extensive inland lagoons and depressions and marsh and mangrove wetlands at elevations of 0–2m amsl. And upland areas with moderately drained soils and an elevation range of 2 to 50m amsl. Surface drainage is sparse; the major rivers in the State include, the Estuary of the Ogun River, Adiyan and Osse. All discharges into the Lagos lagoon. Lagos is a conurbation and the smallest state in Nigeria (Figure 1).
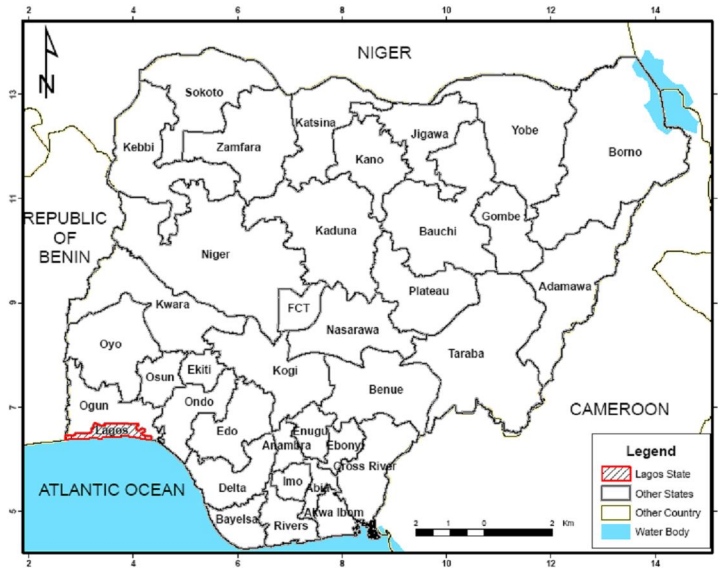
http://www.unaab.edu.ng

Figure 1: Lagos in Nigeria

Lagos State has 20 administrative local governments, 16 in the Metropolitan area (Figure 2) and four sub-urban local government areas (LGAs) consisting of hundreds of rural villages. The population of the municipal boundary of Lagos rose from 230 256 in 1956 to 650 000 in 1963 (Oyeleye, 2001). The 1991 census put the population of Lagos State at about 5.7 million. The 2006 population census put the state population at 9,013,534 people (NPC, 2006). This indicates an annual growth rate of 220902 people between 1991 and 2006.

The population of the megacity, including 20 local government areas of Lagos State and four local governments from Ogun State, namely, Ado-Odo/Ota, Ifo, Obafemi Owode and Sagamu was estimated at 13.4 million people as of year 2000. The struggle for and need to shelter over ten million people within a small space has resulted in development pattern that breeds blighted environments especially by the low income earners. Also the continuous wetland reclamation and conversion of other land use into built up area has further catalyze the flooding phenomenon within the metropolis. Thus, it is not uncommon to read newspaper headline such as "Flood take over Lagos" on the day following a heavy downpour in Lagos area. Plate 1 shows a Punch newspaper headline of July 11, 2011 reporting the flood disaster of July 10, 2011 in Lagos.
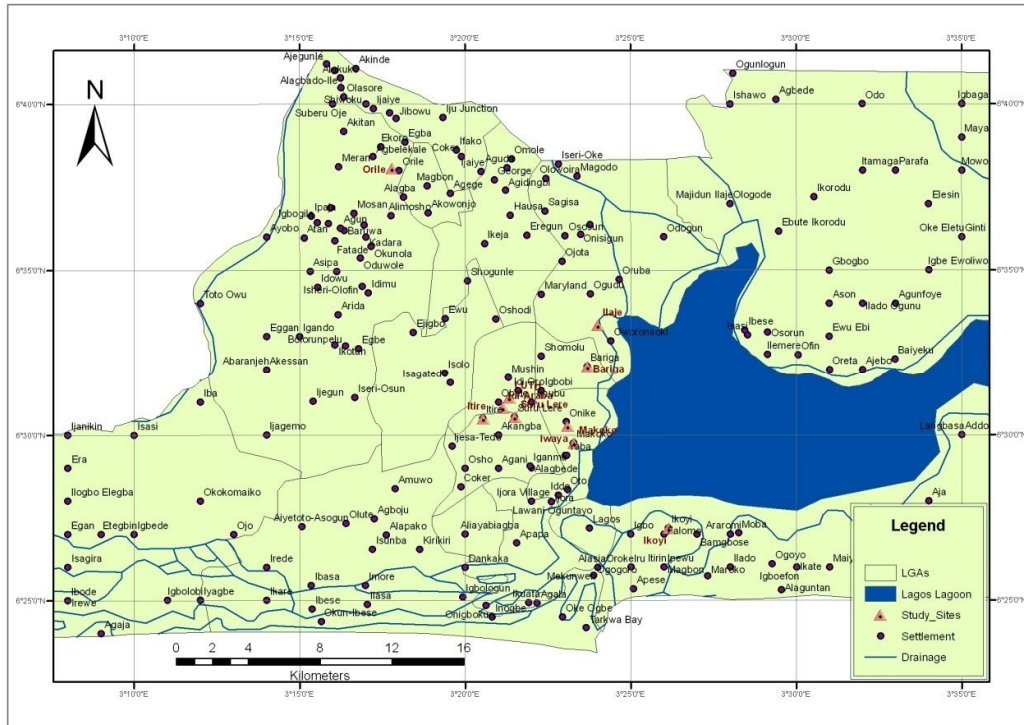
Figure 2: Lagos Metropolis Showing Study Locations

Plate 1: Punch Newspaper Headline (July 11, 2011)

Methodology

Questionnaire survey instrument, In-depth Interview (IDI), and Focus Group Discussions (FGD) were used to obtain information on socio-economic connection and perception analysis of urban flooding in Lagos. Three hundred and twenty (320) questionnaires were administered in six locations and 319 were returned. The six locations were areas with

severe flooding problems (hot spots) identified by Lagos State Ministry of Environment. Table 1 shows the locations and the number of questionnaires administered and returned in each of the locations. The distribution was based on population density / housing stock, blighted nature of the locations as well as severity of storm flood as indicated on the Lagos drainage master plan. Fifty percent (50%) for (LUTH-idiaraba, Surulere/ Itire / Lawanson), 18.75% for Iwaya-Makoko, 12.5% for Orile, 12.5% for Bariga / Ilaje and 6.25 % returned for Victoria - Island. Table 2 shows the distribution of IDI and FGD conducted during the study.

Table 1: No of questionnaire administered and returned by locations in Lagos, Nigeria

Location	No Administered	% of Total	No Returned	% of Total
V/I Ikoyi	20	6.25	20	6.25
Orile	40	12.5	40	12.50
Bariga/Ilaje	40	12.5	40	12.50
LUTH-Idi-araba	84	26.25	84	26.25
Iwaya-Makoko	60	18.75	60	18.75
Surulere / Itire / Lawanson	76	23.75	75	23.44
Total	320	100	319	100

Table 2: Number and Distribution of In depth Interviews and Focus Group Discussions

S/N	Location	IDI	FGD
1	V/I Ikoyi (Youth Leader)	1	
2	Orile (Community Leader)	1	
3	Bariga/Ilaje (Youth Leader)	1	1
4	LUTH-Idi-araba (Women Leader)	1	
5	Iwaya-Makoko (Community Leader)	1	
6	Surulere / Itire / Lawanson (Women Leader)	1	1
7	Ministry of Environment (Drainage Department)	1	
8	Ministry of Physical Planning and Urban Development	1	
9	Somolu LGA (Works Department)	1	
10	Street Urchin (LUTH-Idi Araba)	10	
10	Total	19	2

Analysis and discussions were carried out using descriptive statistics such as percentages and averages. Analysis of variance (ANOVA) based on F test between group variance and within group variance, a one way classification was used to test for hypothesis on whether urban land development as currently perceived has consequence for urban flooding. The respondents flood experience and wetland / floodplain encroachment as factor causing flooding are dependable list and factor variable respectively. The US dollar ($) was used to present the economic value of goods and properties expressed in this paper. The Naira conversion used was One Hundred and Fifty Naira 150 (₦) per one (1) US Dollar ($).

Results and Discussion

Social-economic Characteristics of Respondents

Two hundred and seven (64.9 %) of the respondents were males while 112 (35.1 %) were females. Table 3 shows the respondents' sex by location. About 5% of the respondents are 20 years and below, 81.5% is between 21 years and 40 years while 13.8% are above 40 years. The age range indicates that the majority of those interviewed are adults who are in their productive age and who can make valuable judgements concerning the subject matter.

Table 3: Respondents' Sex by Location

	Sex			
	Male		Female	
Location	No	% by location	No	% by location
V/I Ikoyi	20	100.00		
Orile	25	62.50	15	37.50
Bariga/Ilaje	23	57.50	17	42.50
LUTH-Idi-araba	61	72.62	23	27.38
Iwaya-Makoko	37	61.67	23	38.33
Surulere / Itire /Lawanson	41	54.67	34	45.33
Total	207	64.89	112	35.11

Source: Field survey (2005)

Table 4 shows the occupations of the respondents. The table reveals that the bulk of the respondents (38.58%) were artisans (Welders, Fashion designers, Carpenters, Automobile mechanics etc). The professionals (Doctors, Lawyers, and Lecturers etc) constitute 13.17%; civil servants constitute 11.91% while traders / bus drivers constitute 19.12%.

Table 4: Respondents Occupations

Occupation	Frequency	Percentage
Professionals	42.00	13.17
Civil servants	38.00	11.91
Artisans	123.00	38.56
Traders/bus drivers	61.00	19.12
Student	31.00	9.72
Unemployers	4.00	1.25
Retired	6.00	1.88
Labourers	4.00	1.25
Armed forces	3.00	0.94
Clergy	5.00	1.57
Others	1.00	0.31
No Response	1.00	0.31
Total	319.00	100.00

Source: Field survey (2005)

On income, 42.9% earn below $169.5 per month, 13.2% earn between $170 and $339, 3.1% earn above $339 while 40.8% of the respondents did not respond to the question on income.

On the purpose of individual respondents in the area, Table 5 shows that 66.1% reside in the location where they were interviewed, 11.6% work, 15.4% live and work in the areas, 6.6% were anonymous and did not respond to the question while 0.3% claimed to have other purpose in the location of interview.

Table 5: Purpose of individual respondents

Purpose	Frequency	Percent
Live	211	66.1
Work	37	11.6
Live and Work	49	15.4
No Response	21	6.6
Other	1	0.3
Total	**319**	**100**

Source: Field survey (2005)

Table 4 reveals that most of the respondents reside in the area of interview. Thus, the information they provided were of high quality due to their personal experience and direct effect that flooding have on them. Although 6.6% of the respondents do not provide information on purpose / mission for being at the point of questionnairing, only 0.9% did not respond to question on duration of staying or working in the environment. About eighteen percent (17.6%) have either stayed or worked in the area for between 1 – 4 years, 48.9% have stayed or worked or both for 5 – 10 years while 32.6% have stayed or worked or both for more than ten years.

Economic Implications of Urban Flood in Lagos

About eleven percent (11.3%) claimed to have benefited from urban flood situation, 6% was indifferent while 83% has not benefited from flood situation in any way. Out of the 11% that claimed to have benefited in one way or the other, 7.2% noted their benefit to be economic, 0.3% social and aesthetic benefits while the remaining 3.2% did not state the type of benefit that was derived from flood condition (Table 6).

Table 6: Benefits derived from flooding in Lagos, Nigeria

Benefit	Frequency	Percent
Economic	23	7.2
Social	1	0.3
Aesthetic	2	0.6
Other benefit	10	3.2
No Response	18	5.6
No Benefit	265	83.1
Total	**319**	**100**

Source: Field survey (2005)

The aesthetic benefit is mainly a situation where flood sweeps off the refuse / debris and clean the drains within the environment. Economic benefit is derived by those who assist

motorists whose vehicles broke down due to flooding and collect some form of compensation, basically in monetary terms from them. An in-depth interview with 10 people amongst those that are involved in this activity shows that, on a typical day when roads are flooded in LUTH, Idi – Araba area, a street urchin makes up to $14 (₦ 2,000:00) by helping those in need of assistance, especially the car owners/drivers. The cross tabulation to measure the strength of association between flood experience and benefit from flooding based on normal approximation in a symmetric measure reveals a chi-square test for association in a two-way contingency tables of 0.077, a phi coefficient value of 0.36, Cramer's value of 0.25 and the contingency coefficient of 0.34. All these tests reveal a weak positive relationship between flood experience and benefits during flooding. The implication of these results is that, though traces of direct and immediate benefit from urban flooding, especially by social miscreants and street urchins do exist, these benefits are of no significant value that is worth consideration in any preventive measures against flooding in Lagos.

On damage to goods and properties, it was found that flooding has caused damage to about 71.8% respondents. Twenty five percent has never suffered loss of goods and property due to flooding and 2.5% is indifferent and could not remember whether they have suffered from loss of goods and properties due to flooding. The number of times that flood has caused damage to goods and properties include 1 time for 0.6%, 2-5 times for 30.7%, 6-10 times for 19.1% and more than 10 times for 21.9%. This reveals that more people have suffered from flood damage and the ratio of those that have benefited from flooding to those that have lost goods and properties is 1:7.

The damaged goods and properties include: house utensils, foods, and books (49%), cars (4.4%), buildings (9.4%), buildings and cars (0.3%), utensils and cars (1.6%), buildings, utensils and cars (2.2%). About four percent (4.2%) could not remember the particular good and property loss during flooding. About sixty percent (60.38%) of the male respondents had lost one thing or the other while 53.57% of the female respondents claimed to have lost goods and properties to urban flooding. The monetary value of the damaged goods and properties as indicated by the respondents were $84.8 - $169.5 (38.6%), $170 – $423.73 (19.4%), $423.8 – $847.46 (10%) and $847.5 – $4237.29 (2.8%). Some 4.2% could not attaché monetary value. On gender and monetary value of property loss, 20.29% of the male respondents lost goods and properties worth between $84.8 and $169.5 while 25% of the female respondents have lost the same worth of goods and properties. Over eight percent (8.70%) of the male respondents, lost properties worth between $170 and $423.73, while more than twelve percent (12.5%) of female respondents lost the same range. Another four percent (4.83%) of the males, lost properties worth between $423.73 and $847.46, while 2.65% of female respondents lost the same range of goods and properties. The pattern, however, shows that the male gender lost more goods and properties than the females for their loss is at the higher values than the losses recorded by the females. However, in an environment with over 80% of the population within the age group of 21 – 40 years and where more than 50% of the same population earn less than $339 per month, annual destructions worth the figures quoted above can be classified as a disaster, for this will impact seriously on other monetary resource allocations and especially the children's education.

On business and other commercial activities, 39.2% noted that the sustainability ventures, private or otherwise, are affected by flooding while 54.8% have never experienced any loss in their business ventures. Six percent of the interviewees had no response. Of the 39.2%, whose commercial activities were affected, 23.8% noted that flood damaged and adversely affected their economic activities more than ten times, 7.5% between 6 – 10 times and 8.5% between 2 - 5 times. The types of business and commercial activities affected include; small scale industries (4.7%), medium scale industries (2.2%), service industry (3.4%), retail commercial activities (10.3%), wholesales (1.9%) and artisan (18.5%). This, however, indicated that it is the small scale business and retail commercial activities that are mostly affected by flooding. The low income earner and female gender are those that engaged in these types of commercial activities. Thus, the low income and female gender are particularly vulnerable to flooding in these parts of Lagos and by extension in the metropolis. The monetary value of loss in business due to flooding from single storm events as shown in Table 7 are; $84.75 - $169.49 (19.1%), $169.5 – $423.73 (10%), $423.8 – $847.46 (4.1%), $847.5 – $4237.29 (4.1%), $4237.30 – $8474.58 (1.6%) and more than $8474.58 (0.3%). The values also indicated severe impact on small and medium scale industries.

Table 7: Monetary value of losses due to flooding in Lagos, Nigeria

Monetary value of losses ($)	Frequency	Percent
84.75 – 169.49	61	19.1
169.5 – 423.73	32	10
423.8 – 847.46	13	4.1
847.5 – 4237.29	13	4.1
4237.30 – 8474.58	5	1.6
> 8474.58	1	0.3
No loss in business	175	54.8
No Response	19	6
Total	**319**	**100**

Source: Field survey (2005)

On public utility, 96.6% of respondents agreed that flooding did damage public utility in Lagos. The affected utilities are: roads (21.3%), markets (21.3%) and communication facilities (6.9%). Others are; schools, electric power installation and public water facilities. Urban flash flood resulted in loss of lives in Idi-Araba as 19 respondents (6%) from LUTH – Idi Araba location indicated that 3 people died in Ashimowu canal / stream due to flooding. It is therefore seen that though flooding leads to loss of lives, in some locations in Lagos, the general impact is the loss in goods and properties as well as man-hours during flooding in addition to nuisance and inconveniences.

The man-hour losses are particularly related to transportation as most commuters are hindered from getting to their destination during flooding. Eighty one percent (81%) of the respondents agreed that flooding led to the following: increase in transportation fare by more than 100%, break down of private and commercial vehicles, road damage while also making them (major, minor and feeder roads) impassable. It is, therefore, important that routine maintenance of drainages and roads should be intensified during the raining season.

From the foregoing, it is evident that the social-economic impact of urban flash flooding, especially as it relates to loss of goods and properties, is more severe on the low than the high income earners. Also, the value of goods and properties loss is higher on men than on women, though there are more women losses for the low income earners. The higher values for men for the medium and high income are due to loss in cars and building damages. One characteristic of flash flooding in Lagos is that, the operations of the big industries are not in any way, seriously and directly affected by flooding. Thus, it is a little difficult, to convince these industries to intervene through corporate socio – responsibility programme.

Peoples Perception of Urban Flooding

Most people in the metropolis have experienced flood. For instance, 83.33% of the respondents from LUTH-Idi Araba claimed to have experienced flood while 15.48% answered on the contrary (Table 7). Over ninety seven percent (97.33%) respondents in Surulere have experienced flood while Orile and Bariga have all the respondents (100%) claimed to have experienced flood in one way or the other. In Victoria Island, only 35% claimed to have experienced flooding while 65% indicated otherwise (Table 8). The low response to flooding in Victoria Island might be attributed to the fact that most respondents do not live there and the fact that flooding and erosion, due to ocean upsurge, are the most dreaded problem in the Victoria Island environment. Nevertheless, many streets in Victoria Island are almost permanently flooded by flash flood, due to storm rainfall.

Table 8: Flood experiences of respondents in Lagos, Nigeria

Location	No Response	% by Location	Yes	% by Location	No	% by Location
				Flood Experience		
V/I Ikoyi		0.00	7	35.00	13	65.00
Orile-Iganmu		0.00	40	100.00		0.00
Bariga		0.00	40	100.00		0.00
LUTH - Idi-Araba	1	1.19	70	83.33	13	15.48
Iwaya-Makoko		0.00	60	100.00		0.00
Surulere		0.00	73	97.33	2	2.67

More than ninety five percent (95%) of the total respondents perceived urban flooding to be harmful while 11 respondents (3.4%) do not share similar view on urban flooding. Three respondents (0.9%) were indifferent and did not answer the question on whether urban flooding is harmful or not. More than ninety five percent (95.3%) of the respondents specified that drainage blockage lead to flooding while 4.7% were indifferent to the question of drainage blockage. Forty percent (40%) could not explain why people still dump refuse in the drainage channels despite the harmful consequences of the practice. About fifty percent (50.3%) identified the reasons why people dump refuse in the drainage to include: lack of government refuse vehicle in the area (15%) (Iwaya Makoko 7%, Orile-Iganmu 5% and Bariga 3%), crossing of major roads to dump refuse (10.3%) (Bariga 4%, Idi-Araba 2%, Surulere 4%), and filling of swamp area for reclamation 25% (Bariga-Ilaje 8%, Orile 6%, Iwaya Makoko 6%, Surulere 3%, Idi-Araba 2%.

From the statistics provided above, it is evident that people perceived urban flash flood to be harmful, but other issues such as the desire to acquire landed property in Lagos and

under any circumstance are perceived to be more significant than the seasonal inconveniences and losses occassioned by urban floods. Another peculiar characteristic of the people dumping refuse in the drainage is that 58% of them earn less than twenty thousand naira ($169.49), 7% earn between twenty thousand naira ($169.49) and forty thousand naira ($338.98) per month. The remaining 35% are amongst those who did not declare their income. This shows an intrinsic relationship between poverty and unhealthy practices of refuse dumping in drainages. It can, therefore, be argued that it is the low and, to a reasonable level, medium income earner that constitute the majority of those that dump refuse in the drainage. Therefore, any intervention programme on drainage crises cannot be done in isolation; it must involve improvement in the socio-economic welfare of the affected people.

On other factors causing flooding, 91.8% agreed that high intensity rainfall is the major causative factor of floods in Lagos. About 8% of the respondents do not see heavy rainfall as a problem if other factors, especially the humanly induced, are removed. However, since rainfall characteristics cannot be controlled, dealing with other factors, especially the humanly induced factors, may be the only option left for sustainable free flow of drains in Lagos. Inadequate drainage capacity and amount are also pointed out as major factors causing flooding in Lagos. Over ninety percent (90.3%) agreed to this fact while 9.7% are indifferent. About Ninety one percent (90.9%) of the respondents also allude to poor drainage maintenance as another major factor in the drainage crises. Although the issue of maintenance is being addressed through the establishments of the "Drain Dock" and "The Emergency Flood Abatement Gang (EFAG)", meaningful impact is yet to be achieved. The two agencies are state government initiatives, and are only busy clearing the state road drainages, most time in a manner that is ineffective by clearing without immediate charting away of the refuse, sand and other materials removed from the drainage channels. In most cases, these materials are push back into the drains by rainfalls and pedestrians. Also, the agencies do not adopt the watershed approach that sees the whole catchment as a single unit from which water drains.

A striking peculiarity of the respondents' perception is that most do not see wetland reclamation and floodplain encroachment as factors causing flooding in the urban area. Over ninety percent (90.6%) declined to sea wetland and floodplain reclamation as a factor causing flooding even when this is done in a haphazard unsustainable manner. The researcher's personal discussions / interview with some landlords and tenants in reclaimed areas, especially the educated and high income earners that live in mansions on reclaimed wetlands, reveals that they do not perceive this action as hazardous. They are hasty in citing examples from developed countries where cities are built on land below the sea level without any serious flooding problem. Even the low income earners, living in slums and blighted wetland environments such as Bariga / Ilaje, Orile and Mokoko also share the same view that encroachments do not cause flooding. They claimed that, flooding is caused by the inefficiency of government agencies, not in terms of sustainable planning and regulating the use of such fragile environments but in terms of provision and maintenance of drainage facilities, even without approval of building plans for infrastructural development in the area.

Statistical test of perceived consequences of urban land development on flooding using F test at 0.05 level of significance and Critical region: F > 2.7055 or F < -2.7055 reveals a

calculated F value of 0.934 indicating that the computed F falls in the critical region for a two-tail statistical test. The null hypothesis (Ho) was therefore rejected and conclusion that urban land development (flood plain and wetland encroachments) is currently perceived not to have consequence for urban flooding was accepted.

However, due to the intrinsic perception of the people, several measures were being taken to combat urban flooding at individual and community levels. About sixty three percent (62.7%) of the respondents do not clear their drains for free flow of water while 37.3% personally clear theirs. Clearing of drainages is done normally during the monthly environmental sanitation exercise. Over eighty seven percent (87.5%) of the total respondents have fence round their compound. The fences prevent flood water from entering enclosed properties. Eighty nine percent (89.0%) have their buildings well raised. More than eighty four percent (84.6%) scoop water out of their compound immediately after heavy rain that may result in flooding. The implication of the preventive measures is that, though the buildings are fenced and many are well raised above the assumed flood levels, flood water still found its way into most buildings as 84.6% agreed to scooping of water out of the buildings and compound during and immediately after heavy rainfall. However, only 8.2% left bare spaces and lawns within their compounds for natural draining through infiltration process. The implication of the perception and attitudes described so far is that, drains are blocked and storm runoff cannot freely flow, the alternative natural process of infiltration that could absorb the water could not take place due to impervious nature of most compounds, thus the problem of flooding becomes inevitable.

Although the issue of refuse dump into drainage channels is common practice and the consequence, especially in causing flooding problem, is known to the people, only 9.4% of the respondents have actually reported such misconduct to the appropriate authority and in all the cases, the authority did not take any measure against the offenders. Seventy three percent (73%) claimed to have been involved in one form of community de-flooding project efforts such as contributions to repair damaged culvert while 25.1% of the total respondents have been involved in public awareness campaigns. The issue is that, both the people and the appropriate authorities have not demonstrated enough concern for redressing the humanly induced factors causing flooding in most parts of Lagos. This is because they do not perceive flood-induced activities such as wetland conversion and refuse dumping in drainages as unsustainable hazardous activities that lead to flooding and other environmental degradations and nuisance.

Therefore, while technical solutions such as expanding and realigning the drainage channels to cope with the present as well as the future storm runoff might be necessary, holistic and sustainable solutions can only be attained through public reorientation and attitudinal change.

Conclusion

This paper shows that there is a weak positive relationship between flood experience and benefits of flooding. About thirty nine percent (39.2%) of the respondents have their economic activities affected by flood. The monetary value of the losses incurred in business due to flooding from single storm range from $84.75 to $8474.58. The small and medium scale industries are mostly affected. Also, the frequency of the respondents to the questions reveals that more people suffered damages from flood and that the ratio of those that have

benefited from flooding to those that have lost goods and properties is 1:7. Losses incurred by individuals are capable of impacting on other expenses such as children's education. Small scale businesses and retail commercial activities are those mostly affected by flooding. Also, loss of goods and properties is more severe for the low income earners than the high income ones. The value of good and property loss is higher on men than on women though there are more losses for the low income women. The public perceive urban flash floods as harmful but other issues, such as safety of their wards as well as the acquisition of landed property in any part of Lagos and at any cost/circumstance, are perceived to be more significant than the seasonal inconveniences, hazards and losses received from urban floods. The paper therefore recommends that

- All stakeholders living within the risk zones, irrespective of the socio-economic background should be involved in decision making on matters that affect flooding in Lagos.
- Public campaigns / enlightenment programmes to educate the people on the danger in catalytic flooding activities such as refuse dumping in drainages and conversion of wetland to other land use without genuine approval from appropriate authority should be embarked on.
- Proper orientation and education should be provided to government official on the danger in approving flood prone areas for infrastructural developmental activities.
- There should be monitoring of infrastructural developmental activities and strict adherence to planning regulations.

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