Physical and Infrastructural Perception of Residents' Quality of Life in Flood-Prone Area of Ibadan, Region

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Abstract

The study examined physical and infrastructural perception of resident's quality of life in flood-prone area of Ibadan, region with a view to providing information that could guide planning policies and strategies that could enhance the ways residents' perceive their neighbourhood condition to achieve life satisfaction.The methodology adopted stratified the household member residing within 45m setback to the river (Ogunpa; Orogun, and Kudeti) into three stratum. Thus, buildings below (15m) to the river formed the first stratum; between (15.1-30.0m) to the river is the second stratum, while the third stratum consist of buildings within (30.1-45m) set-back to the river in the area prone-flood. Investigations include site visits, interviews of affected inhabitants, and analyses of flood data collected during the field investigations. These investigations were complemented with review of past records of flooding, especially for inaccessible area. Results obtained from infrastructure across the five local government areas of Ibadan region indicated that 16,638 residential buildings were constructed within the fourth-five meters statutory set back to the rivers and streams while 2,105 of residential buildings were flooded each time its rain. The three major variables influencing resident's perception of infrastructural quality in the study area were; neighborhood quality, economic opportunities and environmental amenities. However, environment lack basic facilities and services. It is recommended that urban renewal schemes be adopted to improve the quality of infrastructural facility in the area. The study further recommended the creation of employment opportunities at all levels in sequence to enhance the residents' toward their quality of life in the area prone to flood in Ibadan region.

Keywords: Environment, Quality of life, Flood-prone, Infrastructure, Perception of residents.

Introduction

The role of infrastructure in the development of a region, in relation to quality of life of an individual cannot be overemphasized. United Nation (2017) remarked that rural infrastructure plays a critical role in poverty reduction, economic growth and employment for the rural poor. The poor in the society have been identified to be the most of the victims of flood, by having no choice, but to end up living in flood-prone area (Lutz, Sanderson and Scherbov 2008). In the view of Stephen (2011), the loos of life due to flood is lower in the developed countries compared to the developing countries. The assertions of Stephen (2011) and Lutz *et al* (2008) appeared to be right because in developing countries.

There are absence of effective zoning regulations, flood controls, emergency response to infrastructure and early warning systems. Bangladesh is developing country and one of the most susceptible countries to flood disasters in the world. Up to30% of the county has been covered with flood water. In 1991, more than 200, 000 lives were lost due to flood in Bangladesh (Stephen, 2011). The poor in either developed or developing countries usually reside where the value of land is cheap, like river banks which are flood-prone areas, thereby endangering their lives due to flood. Floods all over the world in the recent time

have been related to the occurrence and reoccurrence of prolonged heavy rain (Welch *et al*., 1977; Christopher, 1997; Action Aid 2006; Adeaga, 2008; Aderogba, 2011; Wright, 2011; Pigrim and Cordery, 1993 and Popoola, 2019). Climate change is an attributed cause of flooding because when the climate is warmer it result to heavy rains, relative sea level will continue to rise around most shoreline, extreme sea levels will be experienced more frequently (Bariweni, Tawari and abowei, 2012) most of the recent deadly floods have happened where the population has increases more. Due to the population increase, there is also an increase in human settlements in floodplains (Hardoy *et al* 2001; Douglas, Alam, Maghenda, McDonnell, McLean, and Campbell, 2008; Popoola., 2024).

Human activities such as dam construction, irrigation, bridges and others have negatively impacted on free flow of water in the drainage channels, rivers and streams. Particularly at the urban centres, construction of roads, buildings, factories, manufacturing plants, bridge and curvets, farmlands and others have reduced drainage channels and erosion passages and or diverted natural courses of the flow of water (Aderogba, 2012). For instance, in Lusaka, the capital of Zambia, flood risk has strongly increased because of the fast growth of the city in flood-prone areas (Nchito, 2007). Ibadan in Nigeria also experienced great damaged in 2012, flood. The Senegalese Capital, Dakar and the Burkina Faso's Capital, Ouagadougou, strongly affected by 2009, flooding. Poorest people, in particular, often have a limited choice and end up living in high flood risk zones, such as riverbanks and coastlines, unaware of the risk and unprepared to react to floods (Lutz *et al.,* 2008).

The case of urban flooding in Ibadan, a non-coastal city in Nigeria is a typical example of man-made flood disaster. Ibadan has been afflicted by very devastating flood incidents since 1933, when Gege-river drowned houses of those living on its banks. During flooding water is contaminated. Clean drinking water becomes scarce unhygienic conditions and spread of water-borne diseases result. People, buildings infrastructure, agriculture, open recreational space and the natural word are at risk. In extremely cases flooding may cause a loose of life. Torrential rains pushed rivers over their banks, collapsed mud houses and washed away livestock (Adeleye and Rustum 2017). The economy can also be severely affected by flooding. Businesses may lose stock and patronage. Destruction of utilities and transport infrastructure can have knock-down effects on a wider area. Tourism, Farming and livestock can equally be affected. Vital infrastructure may be damaged or destructed. Road links railways, Canals etc. May be blocked causing destruction to the wider quality of life, (Popoola, 2024).

The aim of this study is to assess the physical and infrastructural perception of residents' quality of life in flood-prone Area of Ibadan, with a view to providing information that could guide planning policies. In order to achieve this aim, the specific objectives of the study is to; determine the variables that are most important to residents in improving their quality of life in flood-prone area of Ibadan region.

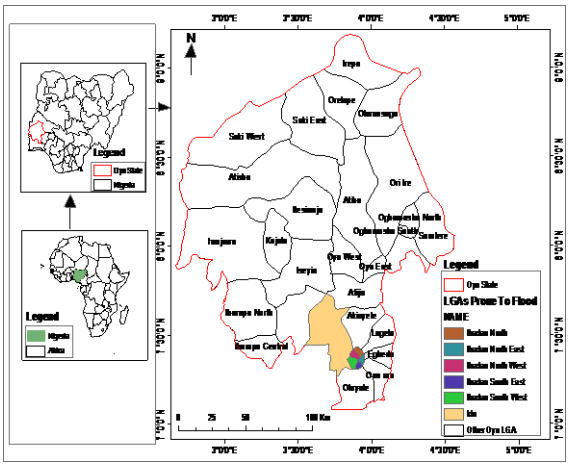


Figure 1.1: *Map of Ibadan Showing Local Government Prone to Flood*
Source: Author field Compilation, 2024

From the vulnerability analysis using the weighted overlay function, the result indicates that Ibadan North-East falls completely in areas most likely to be moderately affected by flood (Moderately Vulnerable Zone), the areas lies within 190 meters and 240 meters elevation above sea level. Within Ibadan North LGA, it shows parts of Bodija, Secretariat, Agodi, and some parts of Bere are prone to High vulnerable flood zones while other areas still within the Local Government are contained within the moderately vulnerable zone. Only around Agodi gate environs did this study identified areas least vulnerable to flood. The polytechnic Ibadan, Sango, parts of Eleyele and Inanlede are zones liable to be impacted and which falls in high vulnerable flood areas within Ibadan North-West Local Government Area. Jericho, Aleshinloye, Alalubosa, parts of Bode and Bere falls within moderate flooding areas. Ibadan South-West takes a greater percentage of places vulnerable to high flooding and this cannot be unconnected to the nature of the terrain (as it lies within the 90-130 meters above sea level) which also houses on two of the major rivers (River Ona and Alaro) within the study area flowing from north of the map southward. Major flooding hotspot falling within the area is Podo, Oluyole, Adegbite, Idi-oro, Yabiye and Fokobode to mention but a few, Iyagonku and environ happened to isolated and which falls in areas of moderate vulnerability. One third of Ibadan South-West areas lies in highly vulnerable zone while two third of the area is likely to be impacted with moderate flooding. However, all this have direct bearing on people vulnerability and the extent of this reflection on their socio-economic and religion activities.

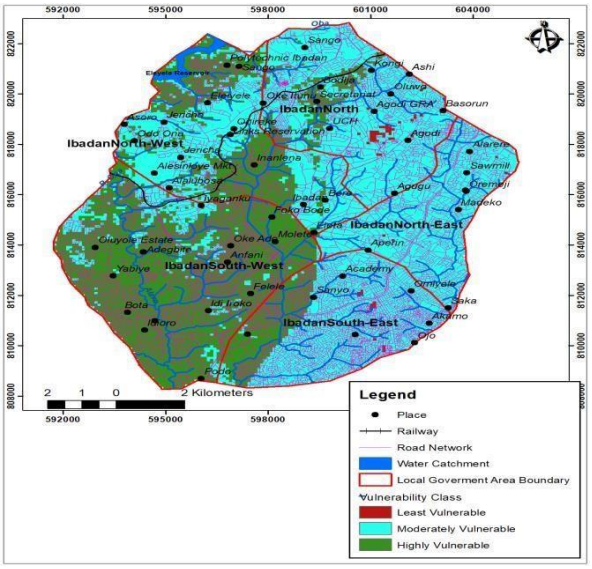


Figure: **1.2**: Vulnerability Map of study area overlay with vector features weighted overlay of re-classed datasets
Source: Author field Compilation, 2024

Physical Setting

Location

Ibadan is located on south-western Nigeria and is the capital of Oyo State. Ibadan is centred about latitude 7º 5 north and longitude 3º 5 East (Figure 1) and is located approximately 145 km² north of Lagos. It is situated close to the boundary between forest and grassland which makes it a melting point for people and products of both the forest and grassland areas. Ibadan is regarded as the largest indigenous city in tropical Africa. Since its founding in the 1800s, Ibadan has played a prominent role for people living in the south-west of Nigeria. It was the capital of the Old western region when Nigeria had only three regions.

The territory of the old western region has since been divided into seven states and a sizable part of the present Lagos state belonged to the western Region. Ibadan hosts the premier university in Nigeria (the University of Ibadan) which established as a college of the University of London in 1984. As a result of these historical antecedents, Ibadan has continuously witness infix of people which has contributed to its rapid growth both in population and physical expansion to cover a very large land mass.

In terms of demographic growth, Ibadan experienced geometrical increase in population between 1851 and 192. By 1856 the population as estimated at 60,000 (Hinderer, 1856) which rose to over 200.000 in 1890 (Milson, 1891), 238,094 in 1921 and 386.359 in 1931 (Mabogunje, 1962), the 1991 census in Nigeria put the population at 1,222,570 (Ayeni, 1994) with a density of 475, 11 persons per square kilometre. Its population is estimated to be about 2,550,593 according to 2006 estimates by the national Population is estimated to projected population by 2010 using 3.2% growth rate is about 2,893,137 (Table 1).

Table 1: The Population Growth of Ibadan 1856-2010

Year	Population
1856	60,000
1890	200,000
1921	238,094
1931	386.359
1991	1,222,570
2006	2,550,593
2010	2,893,137

Source: Wahab (2011)

Table 2: Physical Expansion of Ibadan (1830-1988)

Year	Land Size
1830	100 ha
1831	12Km²
1963	30Km²
1973	112Km²
1981	136Km²
1988	214Km²

Source: Wahab (2011)

In term of physical expansion and land coverage, this pre-colonial urban centre has expanded very fast sprawling daily into the hinterland. Fabiyi (2006) noted that developed land in Ibadan increase from only 100ha in 1830 to 12km² in 1931, 30km² in 1963 112km² in 1973, 136km² in 1981 and 214km² in 1988 (Table 2). An aerial photograph in 1964 showed that the city has spread beyond the drainage basins of Ogunpa and Kudeti and to the catchment area of Ogbere stream in the east (figure 2). Today the city spread has extended to Odo-Onakekere village in the south to Iroko/Motunde villages in the north, Asejire in the east and Bakatari in the west (Central Council of Ibadan indigenes, 2011).

Table 3: Analysis of Buildings within River Set-back in the Eleven LGAs of Ibadan

S/No	Local Government	No of Buildings within statutory setback	No of Buildings flooded August, 26th, 2012	River/stream Length (km)
1	Akinyele	2,527	382	4,355
2	Egbeda	2,703	332	2,293
3	Ibadan Northeast	4,621	228	4,117
4	Ibadan North	3,291	260	3,323
5	*Ibadan North west	4,543	162	6,009
6	*Ibadan South East	2,435	55	4,769
7	*Ibadan South West	3,931	369	7,535
8	*Ido	3,368	788	8,865
9	Lagelu	913	682	2,741
10	Oluyole	366	63	6,630
11	Ona-Ara	850	108	26,553
	Ground Total	**26,553**	**2,105**	**54,841**

Source: National Emergence Management Agency/ Town Planning Board, Oyo State, (2018)

Relief and Drainage

Ibadan lies mostly on low land which is punctuated by rocky outcrops and series of hills. These outcrops are mainly granitic. Three major landforms of hill, plains and river valleys dominate the whole landscape of the region. The average elevation is 230m above mean sea level. The metropolis is drained by three important rivers, R. Ogunpa, R.Odo-ona and R.Ogbere (figure 3) and their several tributaries including Omi, Kudeti, Alaro and Alapata.

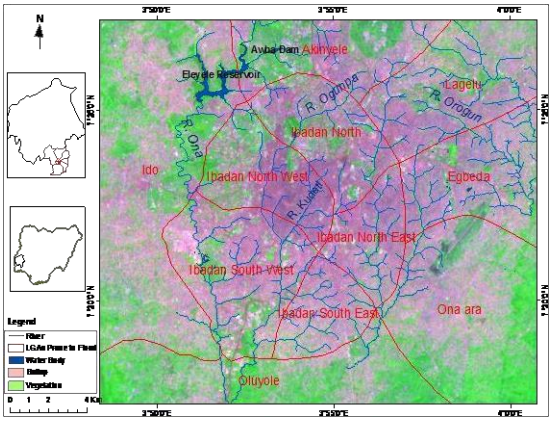


Figure1.3: *Drainage Map, Land use cover and Local Spatial distribution of Ibadan*
Source: Author field Compilation, 2024

This combination of hills and rivers valleys provide a good drainage for the city but it has suffered a lot of abuse due to blockages of the water courses by solid waste coupled with the construction of structure along the river courses and sometimes right within the river course itself. These practices constitute the major reason for the incessant flooding as occasioned by the recent flood disaster on the night of 26th, August, 2011. There are several tributaries of these rivers.

The major tributary of R. Ogunpa is the R. Kudeti, both of them drain the eastern part of Ibadan. The Western part of the City which consists of more recent residential and other developments is drained by the R. Odo-Ona and its numerous tributaries, including the Alalubosa, Oshun and Yemoja streams.

Climate and Vegetation

Oyo State exhibits the typical West Africa Monsoon climate marked by distinct seasonal shifts in the patterns. Between March and October, the City is under the influence of moist maritime south-west Monsoon winds which blow inland from the Atlantic Ocean, marking the rainy season. The dry season occurs from November to February when the dry dust-laden winds blow from the Sahara desert. The area experiences high relative humidity and generally two rainfall maximal regimes during the rainfall period of March to October.

The means temperature are highest at the end of the Harmattan (averaging 28ºC), that is from the middle of January to the onset of the rains in the middle of March. If during the rainfall months, average temperature are relatively high, between 24º C and 25ºC, while annual fluctuation of temperature is about 6ºC. Most areas of Ibadan are covered by the rain forest and derived savannah. Growth and development however, leaded to significant loss of vegetation. The wetlands are threatened by urban expansion into the wetlands and rural areas. The tick, low-lying forests are prone to flooding as observed in areas like Ajibode, National Institute for Horticultural Research (NIHORT) and Oke-ayo along the course of R, Odo-Ona.

Geology and Soils

Ibadan is underlain by basement complex rocks which are mainly metamorphic rocks of Precambrian age with granite, quartzite and migrate as the major rock types. The minor rock types include pegmatite, aplite and diorite. The soils of Ibadan region were formed from the underlying rocks especially granite gneisses, quartz-schist, biotitic gneisses and schist. They were formed under moist semi-deciduous forest cover and belong to the major soil group called ferruginous soils (Hopkins, 1965; D Hoore, 1964). Aweto (1994) identified four main soil associations in Ibadan region on the basis of soil parent materials as the Iwo, Okemesi, Egbeda and Mamu soil associations. The soils of the Iwo association were formed from coarse grained granites and gneisses and those of Okemesi from gneisses, schist and quartzites. Those of Egbeda and Mamu were formed from fine grained biotite and schist and from sericite schist respectively.

2.0 Literature Review for the study

A review of research works showed that arrays of studies have been carried out on environmental problems in terms of its quality and wellbeing of residents (prakash, 2005; Wong and Law, 2009). Majority of these studies focused on the indoor environmental quality and paid less consideration on outdoor environmental quality. For instance, Lai (2009) examined indoor environmental quality acceptance on residential buildings in Hong Kong. The study revealed that certain factors such as operative's temperatures, carbon-dioxide concentration, and noise level illumination level all had important effects on the overall indoor environmental quality acceptance. Apart from the fact that this study did not consider outdoor environmental quality, they were not focussed on the residents' socioeconomic perception of core areas.

Studies of Ozo (1998); Faniran (2012) established that perception are strongly influenced by socioeconomic status of the residents. Ozo (1998a) examined residents' perception of industrial pollution in Benin City. He ascertained that man's perception of environmental phenomena depends on whether it has a very noticeable and serious effect on his economic activity, development and healthy living. In similar vein, Faniran (2012a) examined residents' perception of the monthly environmental sanitation exercise in Ibadan metropolis, Nigeria.

The study concluded that the determinants of the perception of the monthly environmental sanitation exercise were the residents' socioeconomic and demographic varied along the different residential areas of Ibadan metropolis. However, a common issue with all these studies discussed above

is that they did not considered residents' socio-economic perception of Environmental Quality in flood prone area of Ibadan. Also resident's perception of their environment is important, as this will enable bottom up approached to decision making. In the past, effort at improving the quality of environment has failed since policy makers determine the view of residents on certain problems and what they feel could ameliorate the problem. This is essence in planning for and with the people. The study will be helpful in understanding factors influence environmental quality from residents' perspective in flood prone areas of Ibadan.

2.1 Concept of Environmental Quality

Environmental quality is a set of properties and characteristics of the environment, either generalized or local, as they impinge on human beings and other organisms (Johnson, 1997). It is a measure of the condition of an environment relative to the requirement of one or more species and or to any human need or purpose. It is an environment of high quality that conveys a sense of wellbeing and satisfaction to its population through characteristic that may be physical, social or symbolic.

The immediate meaning of environmental quality is the material aspects of the physical environment like air, water pollution, consequences of overpopulation and noise among others which have certain effects on people (Poport, 2009). Environmental quality is seen as a container concept, different theories relate to different aspects of Environmental quality and multi-dimensional (kamp *et al*, 2003). Concept of enviornmental quality overlap, and often used as synonyms to concepts of liveability, living quality, living environment, quality of place, residential perception and sactisfaction. The evaluation of the residential and living environment, quality of life and sustainability (Kesalkhen,2012). In line with this, RIVM (2012) regarded concept of environment quality as a larger or broader concept of ''quality of life'' combining of basis qualities as health, safety with aspects of welfare and grace.

3. Methodology

The researchers has used to the area very well which make familiarization to the study area possible with a view to understanding the physical, and infrastructural perception of residents in the study area. Both the primary and secondary sources of data were adopted for the study which includes – the type of house, nature of house, age of house, type of building materials, housing condition, housing facilities,waste management control mechanism and environmental sanitation among others.

The target population is composed of household member residing within 45m setback to the river (Ogunpa; Orogun, and Kudeti). Which was later stratified into three strata, thus, buildings below (15m) to the river formed the first stratum; between (15.1-30.0m) to the river is the second stratum, while the third stratum consist of buildings within (30.1-45m) set-back to the river in the areas. The choice of this stratification is informed by the minimum standard of building setback to a river which is 45m as stipulated in building regulation by-law. Hence, one hundred and three (103) areas prone to flood in Ibadan region were stratified into three residential strata as indicated in the table 3.1 below.

Table 3.1 Identified Areas Prone to Flood in Ibadan Region

LGAs	Areas	Streets
Ibadan northeast	Bodija	Ilupeju, Carpenter,Ogundele, Vulcanizer,Aba-apata, kekere,aloba close.
	Orogun	Celetia, Akande, Oyesola, Salami , GRA, Duroladipo ,Agbowo, Ijokodo, University areas, Apete.
	Adekile	Bokusoro, Oniwata, Adeoye, Adekola, Onibudo, Ile-eja and Obisesan compound
	Ogbeere	Babanla, Ojaogbeeregbangba and Moradeyo
	Oje	olodo, Osunline, Alakia-Olosan, Ifelodun, Apata, Olomi, alafara, Ijamun compound,
	Odeaje	Adewonmodo, Lananse, Atipe, aderongba, TemidireOdo
Ibadan southeast	Kudeti	Okeayo, Ileepo, Adeola, Motulasu, Kole, Ararorni Papa-ashafa, Ajegunle and Odo-ogun.
	Labo	Odo-onna, Odo-Onnaelewe, Okeayo, Ileepo, Adeola, Motulasu, Kole, Araromi Papa-ashafa, and Ajegunle.
	Foko	Fawole, Oloya, Arolasade compound and Adagbada
	Eleta and Agbongbon	Ajibade, church area, Ilupeju, Oluyole and Alarostram, Kadelu, Ajani, Adabale, Adegbulugbe, Moradeyo,
Ibadan southwest	Agugu	Apete, Atako, Okeayo, Ileepo, Adeola, Motulasu, Kole, Araromi Papa-ashafa, Ajegunle and OdArolasadeii, Itaege, Efungade, Mojekobaje, Moradeyo, kobiowuMoradeyoOloya and TemidireOdo-ona, Apata, Odo-onaeleweApete, Atako
Ibadan north		Ogbere, Oluyole, Ijokodo, Kudeti, Agbowo, Orogun, Agbokojo, Ilupeju, Moradeyo and Oluyole estate.
Ibadan Northwest	Agbongbon	Adiwonmodo, Celetia 1, celestial 2,Araromi, Isolo, Ijomun, Arolasade, Atipe and Aderogba.
Total	**20**	**103**

Source: *Adapted from OYSEMA (2018).*

The stratification consists of 7,748 residential buildings in the first strata that is <15m to the river. 3,202 residential buildings are within 15.1-30.0m to the river in the second stratum. Six-hundred and thirty sixty residential buildings (636) are between 30.0-45m to the river in the third residential stratum. Altogether, consists of eleven thousand five hundred and eighty (11,586) residential buildings. For questionnaire administration, 2.5% of the residential buildings were selected using systematic sampling technique. One out of every forty residential buildings based on the streets numbering system of houses were selected for questionnaire administration. To ensure a random start, the first buildings sampled were chosen randomly out of the first forty residential buildings. Where the sampled building is not residential, the next residential buildings were chosen for questionnaire administration. The targets were respondent adult in selected building. Using this procedure, a total of two hundred and ninety (290) questionnaires were administered and retrieved (286) of questionnaire in the study areas which formed the sample size 96% considered appropriate for the study as contained in the Table 3.2 below.

Table 3.2.C**ommunities and buildings within 45.5m set-back to the River in Ibadan**

LGs	Flood prone Areas	>15m	15-30m	30-45m	Total (2.5%)	Questionnaire
Ibadan Northeast	Alarere, Sawmill, Madeko,Aperin, Saka, Omiyale and Eleta I.	1430	881	111	2422	60
Ibadan North	UI,Oke-itunu,Bodija, Secritariat, UCH, Agugu,Orogun and Foko	2101	622	151	2874	72
Ibadan Northwest	Jericho, Onireke, Eleyele, Sango, Aleshinloye, Alalubosa, Iyangangu and Poly Ibadan.	1282	781	93	2156	54
Ibadan Southeast	Kudeti, Labo, Foko, Oranyan, Eleta, Felele and Molete.	1,134	387	127	1,648	42
Ibadan South-west	Sanyo, Oke-ado, Anfani,Idi-iroko, Yabiye, Orogun, Ilupeeju, Moradeyo and Oluyole estate.	1,801	531	154	2,486	62
Total		**7,748 (194)**	**3,202 (81)**	**636 (16)**	**11,586**	**290**

Source*: Authors field Survey, 2024*

4.0 : Discussion of Findings

The role of infrastructure in the development of a region, in relation to quality of life of an individual cannot be overemphasized. United Nation (2017) remarked that rural infrastructure plays a critical role in poverty reduction, economic growth and employment for the rural poor. It is therefore essential to identify how residents assess the available infrastructure based on the condition and adequacy of the infrastructure in meeting their needs, and its contribution to their quality of life. To determine this, residents were provided with a list of social, economic and environmental infrastructure in the study area. They were to indicate the availability within the flood-prone, outside the flood-prone but within the local Government Area, and outside the local Government but within Ibadan region. These physical attributes were as perceived by residents in the different strata of the study area. All tables and plates in this chapter emanated from the author's fieldwork of 2024.

4.1 : Reasons for Living in Flood-Prone Areas of Ibadan Region

It is imperative to ascertain respondent's reasons for living in the flood prone areas of Ibadan region. From the information in table 4.1, the most important reason given is the affordable or cheap house rent. This represented 44.2% of response given in the study area. The next order of importance was closeness to the place of daily activities, and the people being generally friendly, which accounted for 14.6% and 9.1% respectively. However, the disaggregated data established that the three most important reasons given by residents living below 15 meters from the river were affordable or cheap house rent, closeness to the place of daily activities and being culturally tied to the area representing 48.1%, 14.1% and 6.8% respectively. In the strata lying between 15 and 30 meters to the rivers, the three most important reasons residents gave for living in the area included affordable or cheap house rent, closeness to the place of daily activities and low occurrence of crime related activities. These

respectively accounted for 27.7, 21.9 and 12.3% in the study are. Similarly, affordable or cheap house rent was the most important reason identified by residents living in the strata lying 30.1-45 metres to the rivers. Next in order of importance were people are generally very friendly and there is a high sense of neighbourliness and these accounted for 19.0% and 9.0% of the responses respectively.

From the forgoing, one can deduce that the major reasons for residents to live in flood-prone areas are affordable or cheap house rent, closeness to the place of daily activities and access to residential building in the flood-prone areas; which was mostly by footpaths. The reasons for this is not far-fetched as people living in major cities of Nigeria always cry to avoid areas prone to traffic congestion and at the same time look for apartment that suit their level of income.

Table 4.1: Reason for Living in Flood-Prone Areas of Ibadan Region

Strata	**below 15m**		**between 15-30m**		**30.1- 45m**		**Ibadan region**	
Reason residents are living in the Flood-prone area	F	(%)	F	(%)	F	(%)	F	(%)
Social amenities	17	4.9	1	0.0	4	4.0	22	3.7
People generally friendly	20	5.8	16	10.3	19	19.0	55	9.1
Heterogeneous population	23	6.6	14	9.0	2	2.0	39	6.5
Cheap home rent	167	48.1	43	27.	56	56.0	266	44.
Inherited property	2	0.6	10	6.	-	-	12	2.0
Safe place to raise children	11	3.2	5	3.2	3	3.0	19	3.2
Low occurrence of crime	11	3.2	19	12.3	-	-	30	5.0
High sense of Neighbourliness	23	6.6	13	8.4	9	9.0	45	7.5
Culturally tied to this area	24	6.9	-	-	3	2.0	26	4.3
Closeness to place of daily activities	49	14.1	34	21.9	5	5.0	88	14.6
Total	**347**	**100.0**	**155**	**100.0**	**100**	**100.0**	**602**	**100.0**

***Source**: Author field compilation, 2024*

Note: i. Infrastructure available within 45 metres setback to the river

ii. Available Infrastructure outside the flood-prone area but within the local government

iii Infrastructure outside their local government

iv Infrastructure residents accessed in the flood-prone area of Ibadan region

4.2 Physical Characteristics of Flood-prone Areas in Ibadan Region

To determine the attributes of the flood-prone area, respondents were provided with fifteen (15) variables that described the areas' Physical conditions. Respondents were to indicate their level of agreement with each of the variable describing the area. Each description was rated using one of five point Likert scales of *strongly, agree, agree, just*

agree, disagree, and strongly disagree. These rating were assigned weighted values of 5, 4, 3, 2 and 1 respectively. For ease of analysis and discussion, the data obtained using this procedure subsequently evolved into an index termed Physical Characteristic Index (PCI).

In the flood-prone area of Ibadan region, the level of agreement of respondents with the fifteen identified physical attributes was also examined. For the region, PCI mean was 2.05. There were seven of the fifteen identified physical attributes with negative deviations about the PCI mean. Details of the deviation for each of the attributes are presented in Table 4.1: Reason for Living in Flood-Prone Areas of Ibadan Region 4.2. The physical attribute with the highest PCI was road condition is bad and dilapidated. The PCI of this element was 2.98. There were seven other attributes with PCI above the mean average. Among area is congested with many building these were building are deteriorated and generally old (2.75), deficient in infrastructural facilities (2.44) the area is not properly laid out (2.40), the area is congested with many building (2.38) and most building have no direct accessible to the road (2.38). That these PCIs are closer to 3 is an indication that respondents just agreed with the statements as a true reflection of the region.

Table 4.2: Residents' level of agreement with descriptions of strata in Ibadan Region

Physical Attributes	**below 15m**		**between 15-30m**		**30.1-45m**		**Ibadan region**	
	PCI	**MD**	**PCI**	**MD**	**PCI**	**MD**	**PCI**	**MD**
Deficient in infrastructural facilities	2.51	0.22	1.93	0.07	2.87	0.87	2.44	0.39
Road condition is bad and dilapidated	1.09	0.80	3.04	1.18	2.81	0.81	2.98	0.93
Building are deteriorated and generally bad	3.37							
Sanitary condition is poor	2.37	1.08	2.28	0.42	2.61	0.61	2.75	0.70
The area is improperly laid out	2.25	0.08	2.13	0.27	2.31	0.31	2.27	0.22
Congested area with many building	3.12	-0.04	2.70	0.84	2.24	0.24	2.40	0.35
The env. is generally squalid	2.22	0.83	1.04	0.08	2.09	0.09	2.38	0.33
Building were not accessible to road	2.30	-0.07	1.35	-0.51	2.07	0.07	1.88	-0.17
River banks full of waste	2.71	0.01	2.86	1.00	1.97	-0.03	2.38	0.33
Drainage condition are good	1.48	0.42	1.73	-0.13	1.87	-0.13	2.10	0.05
Area is accessible to transpot	2.05	-0.81	0.98	-0.88	1.77	-0.23	1.41	0.64
Availability of open space	1.42	-0.24	1.78	-0.08	1.68	-0.32	1.84	-0.21
Adequate supply of Electricit	1.94	-0.87	1.30	-0.56	1.58	-0.42	1.43	-0.62
Adequate water supply facilitate	1.70	-0.35	1.60	-0.26	1.51	-0.49	1.68	-0.37
	1.81	0.59	1.29	-0.57	1.36	-0.64	1.45	-0.60
		-0.48	1.01	-0.85	1.30	-0.7	1.37	-0.68
Mean aggregate	**2.29**		**1.86**		**2.00**		**2.05**	

Source: Author field compilation, 2024

Note: i. Infrastructure available within 45 metres setback to the river
ii. Available Infrastructure outside the flood-prone area but within the local government
iii Infrastructure outside their local government
iv Infrastructure residents accessed in the flood-prone area of Ibadan region

A critical observation of information provided in Table 4.2 show that in the stratum lying below 15 meters from the rivers, the top three attributes with the highest PCI were that the buildings are deteriorated and generally old (3.337), the area is congested with many buildings (3.12) and road condition is bad and dilapidated (3,09). Four other attributes with PCI depicting the attributes of their area include, river banks is usually filled with domestic waste, deficient in infrastructural facilities, sanitary condition is nothing to write home about and most buildings have no direct access to the road except footpath with PCIs of 2,71, 2.51, 2.37 and 2.30 respectively. Findings also show that attributes with PCI higher than the PCI of areas situated 15-30 metres from the river include; road condition is bad and dilapidated, most buildings have no direct access to the road, the area is not properly laid out, building are deteriorated and generally old. Others are sanitary condition is nothing to write home about, the area is congested with many buildings, and deficient in infrastructural facilities with PCIs of 3.04, 2.86, 2.70, 2.28, 2.13, 1.94 and 1.93 respectively.

The PCI of the area situated between 30-45 metres of the flood prone area was 2. Most of the attributes with positive deviation about the mean value ranged between 2.87 and 2.07. These attributes are deficiency in infrastructural facilities, bad and dilapidated roads, deteriorated and generally old buildings, bad sanitary condition, improper lay out of the area, congestion of the area with many buildings and the environment being generally squalid. These are an indication that respondents just agreed with the statement as a true reflection of their area. From the forgoing, it can be inferred that the physical attributes of the region is not that good. On the other hand, that the magnitude of respondents' agreement was higher in the stratum located below 15 metres to the rivers when compared with the other two strata, implies that residents' level of agreement on this attribute is differed.

4.3 Available Infrastructure in the Flood-Prone Areas of Ibadan Region

A number of facilities that could enhance environmental quality were identified through literature search. Residents' were asked to indicate whether such facilities were available or otherwise in the three strata of flood-prone areas. Findings are presented in Table 4.3 above. The most available facility in the study area is private primary school, as shown in Table 4.3. The study established that 92.3% of respondents living in areas below 15 metres from the rivers were aware of the facilities available. In areas lying 15-30 metres and 30-45 meters. All respondents (100%) claimed that this was available. It is evident that 97.4% of the respondents were

aware of the private primary school availability in the three strata. From the above, one can conclude that private primary schools are common in the study are. It may also connote the fact that many of the respondents send their wards to these schools. When compared to the availability of public primary school, the situation indicates that private primary schools were more available. Next in importance is availability of market, in the study area, 96.7% of respondents were aware of the availability of markets, in the three strata: 96.6% in the area lying below 15 meters were aware of the availability of market, while 93.6% and 100% in area lying 15-30 meters and 30-45 metre respectively were aware of the market in their area (see Table 4.3). in the study area there are daily markets that respondents patronize fir their daily needs, some of which are Oje, Oja-Oba, and Bodija among others.

The facility ranked the third most available in the study area is private secondary school. From Table 4.3, it is seen that 94.4% of the respondents took cognizance of its availability. This facility ranked first in the area lying 30-45 metres of the rivers, and 100% of respondents claimed awareness of its availability. While in areas lying 15-30 meters, 90.6% of respondents were aware of the availability of this facility. It can therefore be deduced that respondents in the study area send their children to such schools. Availability of transport facilities that is buses, cars, motorcycles among others was the next most available facility in the study area, ranking fourth. In areas lying below 15 meters from the rivers, 74.4% of its respondents were aware of its respondents. Its level of availability is higher in both areas lying 15-30 meters and 30-45 meters from the rivers with 90.2% and 100% (See Table 4.3) response to its availability respectively.

The facility ranked fifth most available in the study area is private hospitals. When compared to the availability of general hospital and primary heath care centres. The respondents were more aware of the availability of private hospital for their heath needs. In areas lying below 15 meters from rivers, it ranked seventh, with 88% of its respondents affirming the availability of this facility. The situation is not so different in area lying 15-30 meters and 30-45 meters, with 89.6% and 80.4% (see Table 4.3) of its respondents respectively confirming the availability of private hospital in the areas. From the above, it can be concluded that residents of the flood-prone area of Ibadan region understudied go mainly to private hospitals for their medicals needs.

Table 4.3: The level of Infrastructural facility in the study area

Infrastructures	below 15m		between 15-30m		30.1-45m		Ibadan region	
	Freq	%	Rank	Freq	%	Rank	Freq	% Rak
Private primary school	108	9.11	4	173	10.24	1	107	10.58 1
Market	113	9.54	2	162	9.59	6	107	10.58 1
Private secondary school	106	8.95	6	173	10.24	1	99	9.79 5
Transport Facilities	87	7.34	10	156	9.24	7	107	10.58 1
Private hospital	103	8.69	7	155	9.18	8	86	8.51 6
Public primary school	109	9.20	3	173	10.24	1	60	5.93 9
Well water	92	7.76	8	164	9.71	5	60	5.93 9
Public secondary school	117	9.87	1	173	10.24	1	00	0.00 14
Primary health care	108	9.11	4	137	8.11	9	40	3.96 13
Borehole water	90	7.59	9	102	5.45	10	82	8.11 7
Waste disposal	51	4.30	12	92	0.30	11	62	6.13 8
Electricity	57	4.81	11	05	1.18	13	107	10.58 1
Drainage system	34	2.87	13	20	0.24	12	53	5.24 11
Recreational Space	10	0.84	14	04	0.00	14	41	4.06 12
Pipe borne water	0	0.00	15	0	0.00	15	0	0.00 14
General hospital	0	0.00	15	0		15	0	0.00 14

Source: Author field compilation, 2024

Note: i. Infrastructure available within 45 metres setback to the river

ii. Available Infrastructure outside the flood-prone area but within the local government

iii Infrastructure outside their local government

iv Infrastructure residents accessed in the flood-prone area of Ibadan region

The public primary school ranked the sixth most available facility in the study area. The study established that 923.2% of respondents in the area lying below 15 meters of the rivers were aware of facility's availability. In area lying 15-30 metres, 100% of its respondents were aware of its availability. The situation was a bit different in the third stratum (30-45) meters with a little above average of its respondents (56.1%) being aware of the availability of this facility in their area. From the above, it was concluded that respondents in area lying below 15 meters from the rivers and 15-30 meters, send their wards to public schools. While the reaming 43.9% from the area lying 30-45 meters from the rivers use other alternatives for their wards.

Water is supply through pipe borne, borehole, well, rivers among others. In the Ibadan region under study, Well water is the most available source of water supply in the area (see Plate 1). Well water supply ranked the seventh most available facility. In areas lying below 15 meters and 15-39 meters, well water supply was ranked the eighth most available facility, with 78.6% and 56.1% of its respondents respectively affirming its availability. In the area lying 15-30 meters from the river, 94.8% of respondents claimed that well water was available and ranked it fifth.

The five least available facilities in the study area are; electricity, drainage system, recreational space, pipe borne water and water

and general hospital. Some of the methods of supplying electricity is through the national grid, public power, generating set, solar system, inverter among other. In areas lying below 15 meters, 48.7% of the respondents confirmed to have had access to electricity through public power. While in areas lying 15-30 meters, 100% of the respondents claimed they rarely have public power supply, they relied mainly on generating sets and inverters. In the area lying 30-45 meters, 100% of the respondents confirmed the availability of power supply. In the study area in general, electricity was one of the least available facilities. This situation reflects the epidemic power situation in Nigeria.

Also among the least available infrastructure in the study area is drainage facility. Drainage is very important in road designs. Where it is not available, flooding becomes a likely challenge. In the area lying below 15 meters to the rivers, 29.1% responded that the area had challenge. In the area lying 15-30 meters the situation was critical, as only 11.6% perceived that there was drainage, while in highlighted may not be adequate in meeting the need of the residents of the flood-prone

4.4 Infrastructural Adequacy in Flood-Prone area in Ibadan Region

Many times facilities may be available but inadequate. It is not the availability of facilities that enhance the quality of environment, but the residents' perception of their adequacy. In order to determine the level of adequacy attached to the facilities in the

the area lying 30-45 meters, 49.55 of respondents claimed that there was no drainage (See plate 1). It is therefore evident that area lying below 15 meters from the rivers and 15-30 meters might be experiencing incessant flooding incidence during raining season due to inadequate drainage system.

Drainage Channel in the third strata

Recreational facilities include the formal: football pitch, basketball court, golf course etc and informal such as relaxation centres, gyms etc. The availability of recreational facility in areas lying below 15 meters and 15-30 meters is low, as only 8.5% and 2.3% respectively were aware of it existence, while 38.2% claimed knowledge of its availability in area lying 30-45 metres from the rivers. Similarity, availability of pipe borne water in the study area is poor. Finding showed that none of the respondents was aware of it availability. This implies that respondents relied on other sources of water supply such as well water, and borehole among others. However, it is likely that available facilities area of Ibadan. This uncertainty would be the focus in the next sub-heading.

study area, respondents were asked to rate each facility identified in the questionnaire using 5 Likert Scale of ' very Adequate (VA), Adequate (A), just Adequate (JA) Not Adequate (NA), Not adequate at all (NAA). For ease of analysis, an index known As Facility Adequacy Index (FAI) was arrived at (the same process for HCI).

Table 4.5: Infrastructural Adequacy in the study Area

Infrastructure	**below 15m**		**between 15-30m**		**30.1-45m**		**Ibadan region**	
	FA**I**	**MD**	**FAI**	**MD**	**FAI**	**MD**	**FAI**	**MD**
Public primary school	3.88	0.89	4.3	1.42	1.87	0.73	3.53	0.72
Private primary school	3.52	0.53	3.64	0.76	3.2	0.6	3.49	0.68
Private secondary school	3.66	0.67	3.55	0.67	3.07	0.47	3.45	0.64
Sanitary condition is	3.5	0.51	3.95	1.07	3.14	0.54	3.44	0.63
poor	3.33	0.34	.3.29	0.41	3.87	1.27	3.42	0.61
Private hospital	3.36	0.37	3.51	0.63	3.31	0.71	3.41	0.6
Market	3.13	-0.04	3.65	0.77	2.41	-0.19	3.16	0.35
Transport facilities	3.76	0.72	3.29	0.41	2.13	-0.47	3.12	0.31
Water supply through	3.46	0.47	3.17	0.29	1.33	-1.27	3.1	0.29
well	3.09	0.1	2.42	-0.46	3.45	0.85	2.84	0.01
Primary health care	1.85	-1.14	2.83	-0.05	2.95	0.35	2.58	0.00
Public secondary school	2.36	-0.63	2.00	-0.88	4.43	1.83	2.57	0.23
Water supply borehole	2.41	0.58	2.06	-0.82	2.16	-0.44	2.11	0.07
Waste disposal	2.91	0.08	2.06	-0.82	1.28	-1.32	1.93	0.88
Supply of Electricity	2.16	-0.81	0.98	-0.88	1.77	-0.23	1.41	0.64
Drainage system	1.46	-0.24	1.78	-0.08	1.68	-0.32	1.84	-0.21
General hospital	2.05	-0.87	1.30	-0.56	1.58	-0.42	1.43	-0.62
Recreational Space		-0.35	1.60	-0.26	1.51	-0.49	1.68	-0.37
Water supply through		0.59	1.29	-0.57	1.36	-0.64	1.45	-0.60
Tap		-0.48	1.01	-0.85	1.30	-0.7	1.37	-0.68
Mean aggregate	**2.99**		**2.88**		**2.60**		**2.81**	

Source: Author field compilation, 2024

Note: i. Infrastructure available within 45 metres setback to the river

ii. Available Infrastructure outside the flood-prone area but within the local government

iii Infrastructure outside their local government

iv Infrastructure residents accessed in the flood-prone area of Ibadan region

The third most adequate facility in the study area is private secondary school. The FAI for this facility is 3.45 in areas lying below 15 meters from rivers. It had an FAI of 3.66 and was the third most adequate facilities, but ranked sixth in availability. In areas lying 15-30 meters, it had FAI of 3.5 and ranked the fifth in adequacy, but ranked first in availability. For areas lying between 30-45 meters, the FAI for private secondary was 3.07, it ranked the seventh most adequate facility and respondents ranked it the fifth available facility.

Private hospital is the fourth most adequate facility in the study area. It was ranked by respondents as the fifth most available facility in the study area and had a FAI of 3.44. In areas lying below 15 meters from rivers, the FAI for this facility was 3.50; respondents ranked it the fifth most adequate facility and

seventh most available facility. In the areas lying 15-30 meters, it was ranked the second most adequate facility with FAI of 3.95, but its availability was low; as the eighth most available facility. In areas lying between 30-45 meters, this facility ranked the sixth most adequate facility with FAI of 3.14 and was also ranked the sixth most available facility by respondents.

The least adequate facilities in the study area include all public facilities; that is facilities that should be provided by the government. They are; waste disposal, electricity supply, drainage system, general hospital, recreational space and pipe borne water. All these had negative deviation about the mean. Their FAI in the study area were 2.58, 2.57, 2.11, 1.93, 1.64 and 1.14 respectively, their values were lower than the average FAI of the study area of 2.81. As shown in Table... all these facilities had negative deviation about the mean in the three strata too. It is clear that residents of the study area had to improvise to make a living in the area, as private individuals and not the government, mostly provided the adequate facilities. The average facility adequacy index (FAI) for Ibadan region is 2.81. While the Fai for the area situated 15 meters. 15-30 meters and 30-45 meters from the rivers are 2.99, 2.88 and 2.6o respectively (that is FAI=2.99, FAI=2.88 and FAI=2.60). The adequacy of the available facilities in the selected strata varies from one area to another. The result of the One Way Analysis of Variance suggest that this variation is not statistically significant (F=0.s777 and P=0.466).

5.0: Summary of Findings, Conclusion and Recommendation

5.1 In Summary

The study has examined infrastructural perception of residents' quality of life in flood-prone area of Ibadan region. The study revealed that facilities such as water supply, restaurant, dispensary, drainage, electricity supply, waste disposal, and fire station, among others, were insufficiently available in the study area. The study concluded that infrastructure facilities in flood-prone area of Ibadan region are inadequate. Based on the findings of this study, it is significant to provide basic and adequate infrastructural facilities at all levels in sequence to enhance the residents' toward their quality of life in the study.

5.2 Conclusion

The need for quality housing is highly imperative and should be the concern of all. Low quality housing in flood prone community has negative implications and that should be avoided. It has shown that houses in the flood prone areas of Ibadan region can be categorized into different strata. However, buildings below (15m) to the river formed the first stratum; between (15.1-30.0m) to the river is the second stratum, while the third stratum consist of buildings within (30.1-45m) set-back to the river in the areas. Many houses in the first strata to the river are old and in bad shapes and people reside in these low quality houses which are quite injurious to human habitation.

The complex nature of physical, social and economic activities usually put much pressure on the infrastructural facilities and services which leads to the degradation of a housing environment. Low quality houses are synonymous with low income earners and poor people of the flood prone area. The poor cannot afford good quality houses hence they made do with what is available. Housing as a unit of environment has profound influence on the health, efficiency, social behavior, economic productivity and general wellbeing of the individual and the community. If the problem of infrastructures in the flood prone areas is adequately addressed, associated problems such as poverty, poor environmental quality, outbreak of diseases, and unemployment among others will be drastically reduced.

5.3 Recommendations

Based on findings of this study, a full scale urban renewal scheme is recommended especially in the first strata to ensure high quality housing environment. This can be achieved through a comprehensive land use study to ascertain the factors responsible for the degradation of the housing environment in the area under study. The public and organized private sectors should establish small scale industries and institutions to create employment opportunities and quality education for residents of the study area to improve their financial status and social wellbeing. Water supply schemes should be embarked upon to help in reducing the menace of water borne diseases and to improve sanitation. There is also the need for improvement in power supply, rehabilitation and provision of access roads, open space and recreation, health care services among others.

Government should strive to increase production of Local building materials and provide facilities for acquisition of small loans from community banks and local finance enterprises at low interest rates which will lead to the provision of quality housing in the study area. The private sector which is the largest producer of shelter should imbibe good maintenance culture for their property in order to increase property value and improve the aesthetic quality of the housing environment and general sanitation.

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