ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Assessment of Risks Associated with Physical Development Activities in Flood Prone Area in Ile-Ife, Nigeria

AFOLABI Henry., ADETAYO Olorunjuwon David., ADEYEMI Temitope Ruth., OLAJIDE Oyedele Isaac and AYOOLA Oyewole Victor

Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

DOI: https://doi.org/10.51244/IJRSI.2024.1109075

Received: 31 July 2024; Accepted: 07 August 2024; Published: 14 October 2024

ABSTRACT

This study assesses risks associated with physical development activities in flood prone area in Ile-Ife, Nigeria. The GIS was used to create 200m buffer round streams in the area. Equally, the buildings within a 500m radius from the selected location and intersect buffer 200m were selected. Using systematic sampling technique to select first building and the subsequent selection of buildings was every 12th buildings. A total number of 160 household heads were sampled in each selected buildings. Findings revealed that, most of the houses surveyed have no flood history. The study further revealed that there is a disruption to service to premises such as electricity and water supply. Other noticeable environmental pollution, such as land accounted for (27.4%), water (59.6%), air (5.5%) and noise (7.5%). Apart from this, there is presence of the diseases prevalence during the raining season, such diseases include malaria, typhoid, cholera, pneumonia, dysentery and fever. Study concluded that in order to reduce the associated risks of flood-prone areas on physical development, landowners should be well educated on the concept of the highest and best use to guarantee sustainable development and to prevent unforeseen circumstances associated with flooding and human population skyrocket.

Keywords: Risks, Physical Development, Flood Prone Areas,

INTRODUCTION

The flood-prone areas cannot be avoided by the developers. Although, some flood-prone areas are usually abandoned before by the city dwellers because such land is usually cheaper and more abundant than the land on higher ground. Economic realities are driving a vast expansion of development in flood-prone areas. In fact, between 2000 and 2016, there is more population growth in flood-prone areas of the cities in the United States than the normal areas (Mazur, 2019). In developing nations like Nigeria, increases in rural-urban migration, and economic inequality among others are contributed factors for physical development in flood prone areas. Also, the quest for development and human advancement such as construction of roads and buildings in the flood-prone area increase water runoff and increase the likelihood of urban flooding and risks attached to it (Badola and Husain, 2005, as cited in Danladi, 2019). However, the word ‘’development’’ is perceived differently by different authors. Myrdal (1974) defines development as "the entire system's upward movement." The system of community remains static or may shift up or down, or may also pivot around its axis. According to United Nation (2023), development encompasses digital transformation, inclusive growth,, and human capital improvement among others. There are two strategies for development, they are: *i) the fight against poverty and ii) the analysis of long-term economic and social development.* The development in this study is conceived as 1817 British Town and Country Planning Act describes development as "the conduct of building, rebuilding, engineering, mining and other operations in, on, under or over land or making material change in the use of land or building. It also include the conversion of a single apartment into two or more, placement of advertisement, addition of an existing deposition of the superficial area among others.

Olanrewaju (2009) argued that investment in social and economic development induces physical development. The physical development such as residential, commercial, institutional, recreational, public, and semi-public with no regard to urban planning regulations especially in flood-prone areas. The development activities in

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

most cases, if not well guided, the result of which is physical environmental catastrophe that our cities are facing. A typical example of it is the physical development in an area prone to flood, which attributed risks, include loss of the place of abode, loss of personal valuables, and insecurity among others. The vulnerability of flooding in an area described such area as flood prone areas. Any area vulnerable to water related phenomenon with the evidence of human and materials losses is refers to as flood prone areas. Flood prone areas is common and used for different purposes in the developed and developing nations. Majorly, greatest part of the areas are suitable for agricultural activities instead of physical development activities. However, having introduced another uses differ from what such an area is meant for prone to an unpredictable result of an activity or event which has to do with human value or likelihood of loss of lives and properties. (Okunola, 2018).

Human advancement and quest for development have made the environment more vulnerable to natural disasters such as flooding (Badola and Husain, 2005, as cited in Danladi, 2019). Construction of roads and buildings in the flood-prone area increase water runoff and increase the probability of urban flooding (DoswelL III, 2023). According to Ayoola (2021), opined that for any hazards, there must be risks attached to it. The word risk refers to probability, chance, or likelihood that a certain bad phenomenon will occur. Risks in the flood-prone areas where physical development activities carrying out are multidimensional.

Mason, Andrews, and Upton (2010), opined that flood has impact on the human settlement such as medical, social, and economic while the risks on individual could be directly or indirectly. According to World Health Organization (2017), the direct impact of flood and risks attached to the physical development in the region prone to flood include the destruction of houses, crops, livestock, and health-related problems such as injuries, drowning and waterborne diseases among others by floodwaters. Others are low productivity and poverty resulting from damages to means of livelihood and interruptions to the supply chain. However, there is need to identify the risks associated with physical development activity in a flood prone areas in Ile-Ife, Nigeria. This is to draw distinctions between the residents' exposure to diseases prevalence and damages to buildings high-risk areas (100m) and moderate risk areas respectively.

LITERATURE REVIEW

In Nigeria, urban flooding is a growing issue. Flooding in several urban areas in Nigeria has been a serious issue for the past decades. Lack of or inadequate implementation of urban development policies and regulations are the main causes of uncontrolled physical development such as residential, commercial, institutional, recreational, public, and semi-public in flood-prone areas with no regard to urban planning regulations (Wahab & Ojolowo, 2018). Consequently, the effects of flooding can be severe to the people living in flood-prone areas. This includes loss of the place of abode, loss of personal valuables, insecurity, post-disaster trauma among others. Based on the aforementioned effects, the word risk refers to probability, chance, or likelihood that a certain bad phenomenon will occur. Risks in the flood-prone areas where physical development is taking place are multidimensional. Mason, Andrews, and Upton (2010) opined that the impact of the flood on the human settlement could be medical, social, and economic and it could affect the individual directly or indirectly. According to World Health Organization (2017), the direct impacts of floods have to do with the destruction of houses, crops, and livestock among others by flood waters. Health-related problems such as injuries, drowning and waterborne diseases are also the direct impact of the flood. Indirect impacts on the other hand are induced by the direct impact, they include low productivity and poverty resulting from damages to means of livelihood and interruptions to the supply chain.

Commission for Accreditation of Parks and Recreation Agencies (2016) (CAPRA) identified two classes of vulnerability in flood-prone areas, these are physical vulnerability and non-physical. Physical vulnerability is the damage to physical structures in flood-prone areas while non-physical vulnerability has to do with economic loss due to disruptions of various economic activities taking place in the area. Flood vulnerability is often affected by factors such as infrastructure, settlement conditions, population, economic patterns, and social inequalities among others (Rudari, 2017). According to Adetunji and Oyeleye (2013) studied the causes and effects of floods in Apete, Ibadan, and opined that property loss is the major risk of physical development in flood-prone areas as the flood causes damage to buildings and other structures. Constructing buildings in flood-prone areas where flowing of water is likely will result in a building being subjected to increased pressures and forces according to Hawkesbury-Nepean Floodplain Management Steering Committee

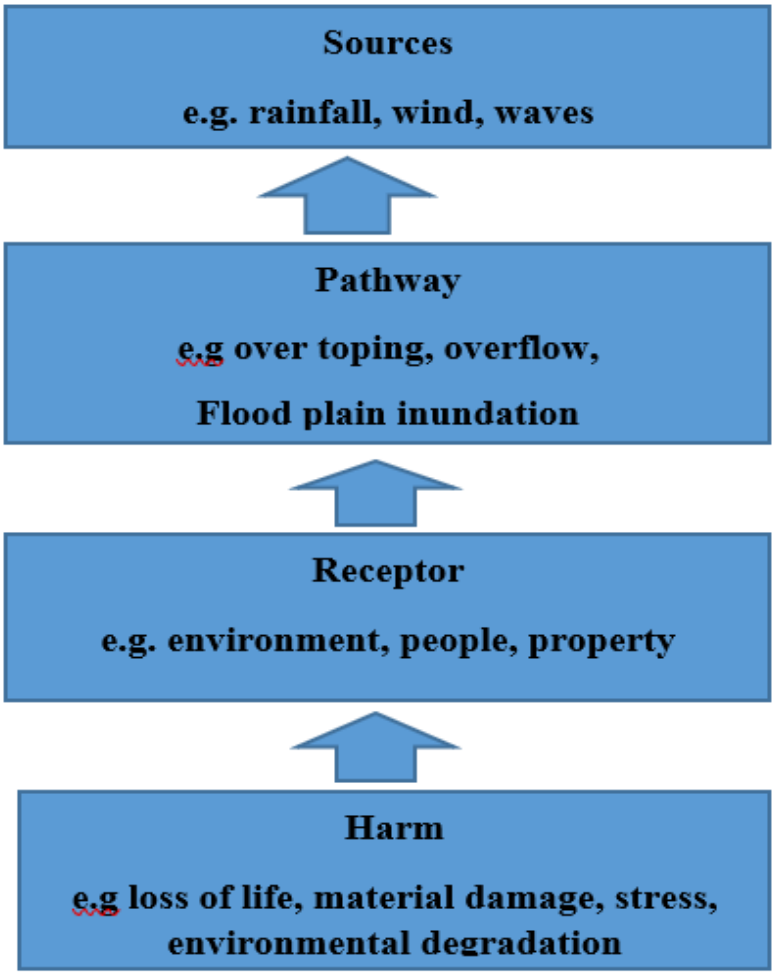
ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

(HFMSC), (2017).

Planning Service UK (2006) argued that the most serious consequence of physical development in flood-prone areas is on the health and wellbeing of people that may be directly caught up in flood events. The health implications of floods include drowning injury as a result of the flow of water to nearby properties, respiratory diseases as a result of contact with water, and an increase in physical and emotional stress. Ogundeji and Fadairo (2018) also studied the impact of urban housing floods in Ondo town, Nigeria, and concluded that there could be serious health issues like cholera, malaria, measles, and water-borne diseases in the flood-prone area of the city. According to Olanrewaju *et al*. (2017), urban poor communities are the most affected people as they feel the impact of floods and their consequences on health. Svetlana, Radovana, and Ján (2015) studied the economic impact of floods and their importance in different regions of the world with emphasis on Europe and stated that Germany, France, Italy, the United Kingdom, and Switzerland lost an estimated 55 billion EUR between the year 1999 and 2009. According to him, flood occurrence poses a serious economic threat to the physical development in flood-prone areas. Damages to infrastructure such as power plants, community electric installations, road networks, and bridges will disrupt the economic activities in the affected areas (Flood Manager, 2010). According to Svetlana, Radovana, and Ján (2015) economic losses to a flooding occurrence are difficult to quantify or monetize if we want to take into consideration the flora and fauna before and after the flood disaster.

Bruijn *et.al* (2009) identified four stages in assessing flood risk, they are sources, pathway, receptor, and harm. The source is the causes of flood like rainfall, the pathway (i.e. the line in which the flood travel), receptor (i.e. those affected by flooding e.g environment, property, and people), and the harm (i.e. the devastating effect of the flood) (Figure 1).

Figure 1: Sources Causes Effect Chain or SPRC model (source-pathway-receptor-harm)



Source: (Bruijn *et al.*, 2009)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Plate 1: Flood occurrence along Ede Road, Ile-Ife, Nigeria

Source: (premiumtimesng.com, 2018)

Plate 2: Flood occurrence along Ede Road, Ile-Ife, Nigeria

Source: (premiumtimesng.com, 2018)

Some of the notable flood events in Nigeria and associated hazard and number of people affected with their year according to (Etuonovbe, 2011 ; Echandu, 2020) is listed below:

Table 1: Notable flood events in Nigeria

S/N	STATE	DISASTER	ASSOCIATED HAZARD	NO. OF PEOPLE AFFECTED	DATE & YEAR
1	Abia	Rainstorm	Houses	500	July 2001
2	Adamawa	Flood	Houses & Farmlands destroyed	500	April 2001 & 2012
3	Akwa-Ibom	Flood & Rainstorm	367 houses washed away	4000	March 2001, 2012
4	Bauchi	Flood	750 Houses washed away, Farmlands destroyed	Not available	August 1988
5	Bayelsa	Flood	Houses, Schools, markets &	2/3 of the population	1999 & March

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

			farmlands submerged		2001, 2012
6	Borno	Flood	Houses & farmlands destroyed	Not available	August 1988, June/July 2001
7	Delta	Flood & Rainstorm	Houses, schools, markets & farmlands	Half of the population	1999, March/April 2001
8	Edo	Flood & rainstorm	560 houses destroyed	820	March 2001
9	Ekiti	Flood & rainstorm	Public schools & 890 houses destroyed	2,100	April 2001
10	Imo	Rain & rainstorm	1000 houses, 150 electric poles & 40,000 oil palm destroyed	Over 10,000 displaced	April 2001
11	Jigawa	Flood & windstorm	Houses, farmlands & animals destroyed	35,500 displaced in 1988; 450,150 displaced in 2001	1988; March, April & August 2001
12	Kano	Flood & windstorm	Schools, houses, farmlands & animals destroyed	300,000 displaced in 1988; 20,445 in 2001	1988,2001
13	Kogi	Flood & rainstorm	Houses, schools & farmlands destroyed	1500 displaced	March, May 2001
14	Lagos	Flood	Buildings collapsed, markets submerged, properties destroyed	Over 300,000 affected	Early 1970's till date
15	Niger	Flood & rainstorm	Houses, schools, animals & farmland affected	200,000 displaced	1999 & 2000
16	Ondo	Rainstorm	Houses & schools destroyed	800 affected	April 2001
17	Osun	Rainstorm	Houses & schools destroyed	1700 affected	April 2001
18	Oyo	Ogunpa flood	500 houses demolished, properties destroyed & bridges collapsed	500,000 affected	1948, 1963, 1978, 1980, 1985, 1987 &1990, 2012
19	Taraba	Flood	80 Houses totally swept off. 410 houses extensively destroyed	More than 50,000 displaced	August 2005, 2012
20	Sokoto	Flood, Fire, Windstorm	Houses & Farmlands destroyed	16,000 affected	July 2001
21	Yobe	Flood, Fire & Drought	Houses & Farmlands submerged, Houses razed, animals affected	100,000 affected	April & September, 2001, 2012

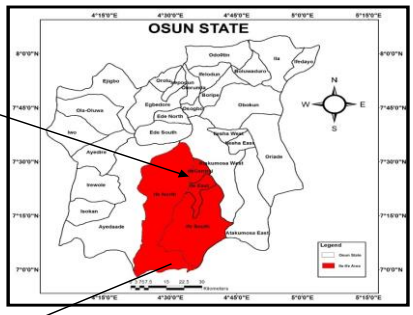
The Study Area

The study area is the flood-prone areas of two Local Government areas located within the traditional city of Ile-Ife, Osun State, Nigeria (Fig. 2). It comprises Ife Central and Ife East (Fig. 3). It is located in the tropical rainforest of southwestern Nigeria. It has a total landmass of 1,791 square kilometer and lies between latitudes 7°28′N and 7°45′N and longitudes 4°30′E and 4°34′E and on an average elevation of 268m above sea level.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Figure 2: Map of Osun State in the context of Nigeria

Source: Adapted from DIVA-GIS and modified by researcher 2024.



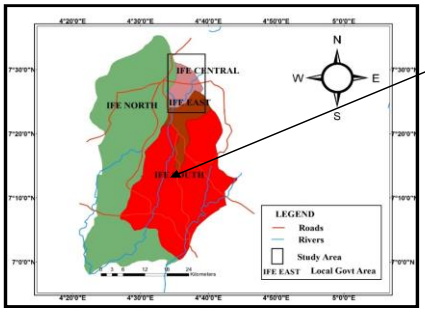


Figure 3: Map of Ile-Ife Area in the Context of Osun State

Source: Adapted from DIVA-GIS and modified by researcher 2024

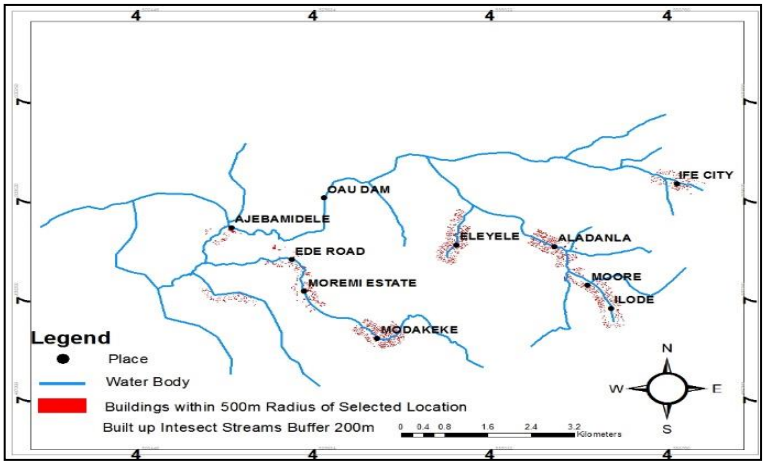
Figure 4: Map of Ile-Ife Area showing the study area

Source: Adapted from DIVA-GIS and modified by researcher 2024

METHODOLOGY

The data for this study were obtained through administration of questionnaire on residents of Ile-Ife, Nigeria. There are two Local Government Areas that are majorly attributed with physical development activities in flood-prone areas of Ile-Ife. Findings from the risks associated with physical development in the study area revealed that there are nine (9) flood-prone areas across two local Government areas of Ile-Ife. The identified nine (9) flood prone –areas to include Moremi Estate, Modakeke, Ilode, Ife City, Ajebamidele, Eleyele, Ede Road, Alandala, and Moore were used for this study. The GIS software (ArcGIS 10.4) was used to create 200m buffer around streams in the area. Equally, the buildings within a 500m radius from the selected location and intersect buffer 200m were selected. Reconnaissance survey revealed that there are 104 buildings in Ajebamidele, in Aladanla 310, in Ede Road, 105, in Ife City 165 among others within 500m, intersected 200m buffer. A total of 1980 buildings form the sampling frame. Using systematic sampling technique, every 12th building (12%) in each GCs was sampled. Thus, a total of 160 residential buildings were sampled and questionnaire was administered on resident in each selected buildings.

Figure 5: Location of Selected Flood Prone Areas



Source: Author Adapted and Modified from Landsat 8, 2023

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Table 2: Identified Flood-Prone Areas in Ile-Ife by location and number

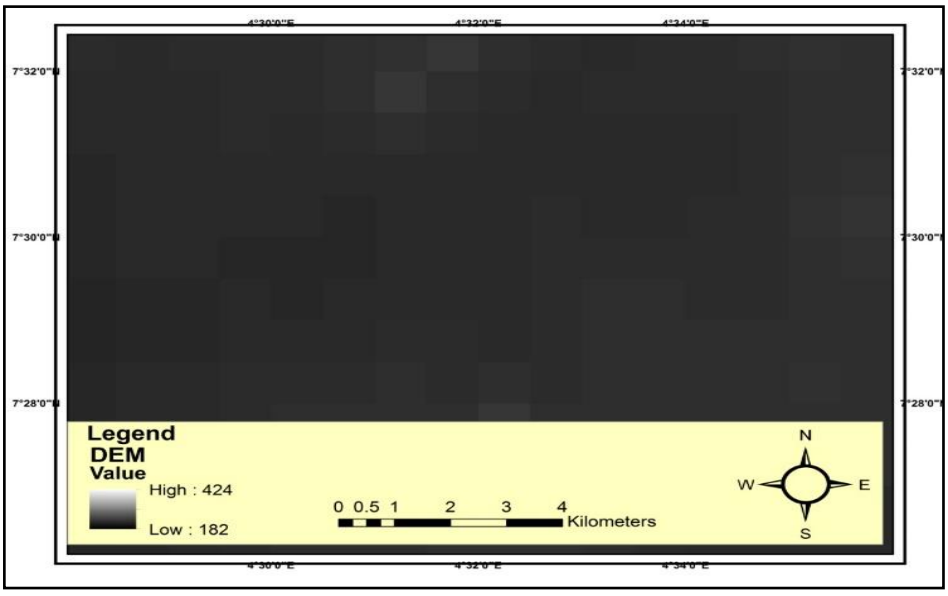
S/N	Location	Number of Buildings within 500m, intersected 200m buffer	Number of buildings sampled	% Sampled
1	Ajebamidele	104	8	7.69
2	Aladanla	310	25	8.06
3	Ede Road	105	8	7.62
4	Eleyele	315	26	8.25
5	Ife City	165	13	7.88
6	Ilode	235	19	8.07
7	Modakeke	428	35	8.18
8	Moremi Estate	138	11	7.97
9	Moore	180	15	8.33
	Total	**1980**	**160**	**8.08%**

Source: Author 2023

Digital Elevation Model (DEM) of the Study Area swap

The flow of water on the surface is usually determined by the terrain of the study area. The DEM was created primarily for the analysis of hydrological processes. The DEM of the study area can be seen in Fig. 6 the highest elevation of the study area is 424m while the lowest elevation is 182m in Ile-Ife.

Figure 6: DEM of Study Area



Source: Author Adapted and Modified from DIVA-GIS 2023.

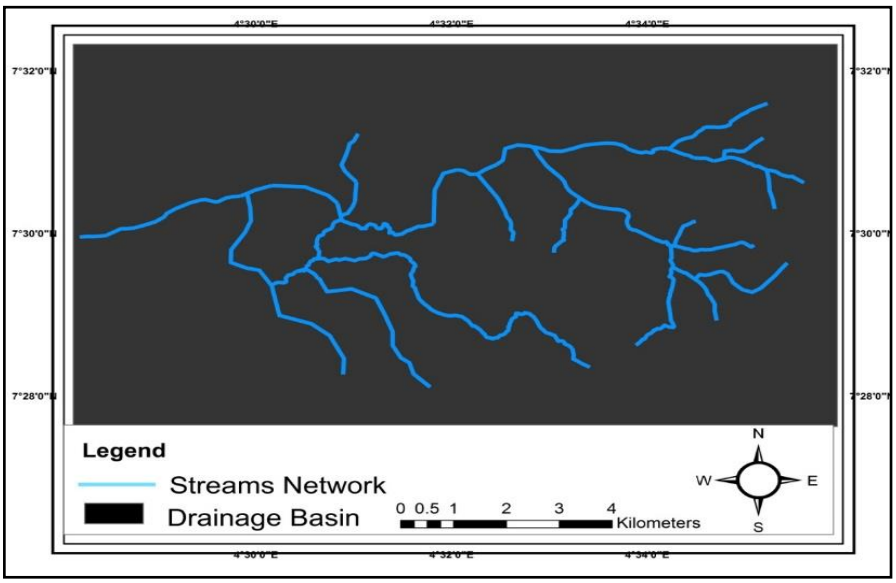
Stream Network

Stream Network captured those portions of the study area that are visible drainages from the satellite image and altitude of the study area. The stream network indicated the path of formation of a large body of flowing surface water in the occurrence of rainfall or the sudden release of a large quantity of water in the study area. The stream network in Fig. 7, displayed the path of streams in the study area and the lands that surround the

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

drainages are called drainage basins. It was deduced that built-up/urban areas close to this stream are prone to flood in case of heavy rainfall in the study area.

Figure 7: Stream Network in the Study Area



Source: Adapted from Landsat 8 and Modified by the Researcher 2023.

Buffer

It shows the areas in the study area that are at greater risks in the event of inundation, a buffer was created within 200m of the stream network. Figure 7 shows the results of the stream buffer zone created. The distance was measured from the streams to the drainage basin. Two buffers were created, the first one is 100m from the stream network while the second was created 200m from the stream network, and the former is a highly vulnerable area while the latter is moderated vulnerable area. Settlements within this area are most likely to be inundated when floods occur and will be at great risk in the event of floods. A total number of 9 notable flood-prone areas are contained in Table 2.

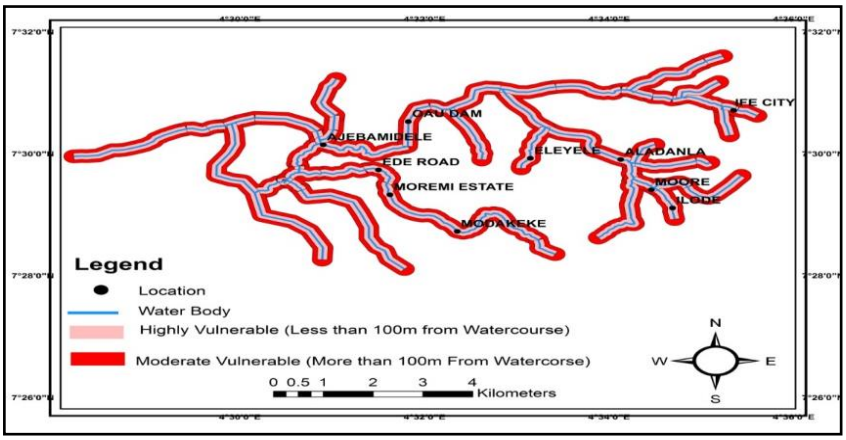
Table 2: Major Flood-prone area in Ile-Ife

S/N	**Location**	**Geographical Location**		**Altitude (Meters)**
		Latitude	**Longitude**	
1	Ajebamidele	4.515	7.502	244
2	Aladanla	4.569	7.498	264
3	Ede Road	4.525	7.496	250
4	Eleyele	4.552	7.499	269
5	Ife City	4.589	7.512	285
6	Ilode	4.578	7.485	270
7	Modakeke	4.539	7.479	260
8	Moremi Estate	4.527	7.489	255
9	Moore	4.574	7.490	270

Source: Researcher's Survey, 2021

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Figure 8: Buffer from the Stream Network



Source: Adapted from Landsat 8 and Modified by the Researcher 2023.

RESULT AND DISCUSSION

Risks Associated with Physical Development Activities in Flood Prone Area of Ile-Ife

This section examined the risks associated with physical development activities in the study area. Various risks associated with the study area, which include, economic, environmental, and health risk are examined in this section. The analysis is done using cross tabulation, frequency, and percentage.

Building Previous Flood History in Ile-Ife

Table 3 indicated that majority of the buildings 54% do not have flood history, while about 46% of the buildings have a flood history. It can be inferred from the study that although those buildings are located in flood-prone areas, some of the buildings have never experienced flood since they were constructed.

Losses of Valuables and Raining Season Water Level

From table 3 below the majority of the respondents 77.5% have not lost any valuable to flood since they have been living in the study area. However, 22.5% of the respondents indicated that they have lost some valuables to flood since they have been living in the area. Also, from the information presented in table 3 below, 80.6% of the respondents indicated that the level of water in the study area is in the ground level, 18.1% of the respondents indicated that the water sometimes came into the rooms through windows or doors, while 1.3% of the respondents indicated that the level of water sometimes rises above windows. The case of which water rises above windows was reported in Ilode area of the study area.

Disruption of Service

Respondents were asked to indicate if there has been disruption to any service to their premises. As presented in Table 3 below, 50.9% of respondents indicated that there was disruption to the supply of electricity, 42% indicated that there was disruption to water supply, while 7.1% indicated that there was disruption to other services to premises not listed above. Many serious flood disasters have been recorded in Osun State, Osogbo (2002, 2006, 2018, and 2019), Ile-Ife, and Modakeke (2018, 2019) in recent years. In 2018, several neighborhoods in Ile-Ife were flooded following a heavy downpour. Most of the areas are suitable for agricultural activities rather than physical development activities

Pollution

Respondents were asked to indicate if they observed any form of pollution in the study area. As presented in Table 3 majority of the respondents 59.6% indicated the presence of water pollution in the study area, 5.5% indicated that there is air pollution in the study area, 7.5% of the respondents indicated the presence of Noise pollution in the area, while 27.4% indicated that there is land pollution in the study area.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Cases of Diseases Prevalent During Flooding Period

The study revealed the presence of diseases that are more prevalent during the rainy season in flood-prone areas. Some of the residents claimed that their family did not experience any disease, this constitutes 46% of the respondents. However, 54% of the residents claimed that their families experienced or suffer from water-related diseases. Based on the number of respondents that claimed that their family experienced or suffer from water-related diseases as presented in table 2 below, 49% claimed to have suffered from malaria, 21% claimed to have suffered from typhoid, 12% claimed to have suffered from cholera, 8.1% claimed to have suffered from pneumonia, 4.7% claimed to have suffered from dysentery, while 5.8% claimed to have suffered from fever. It was observed that diseases are more prevalent in the highly vulnerable area of the study area than the moderate vulnerable area. About 76% of the respondents who claimed to have suffered those diseases are from the highly vulnerable area of the study area (Table 3).

Table 3: Risk Associated with Physical Development Activities in Flood Prone Areas in Ile-Ife

Associated Risk	**Risk Management by Area**		**Total**
Previous Flood History	**High**	**Moderate**	
Yes	55(34.4%)	18(11.2%)	73(45.6%)
No	45(28.1%)	42(26.3%)	87(54.4%)
Total	100(62.5%)	60 (37.5%)	160(100%)
Did you lose any Valuable?			
Yes	26(16.3%)	10(6.2%)	36(22.5)
No	74(46.3%)	50(31.2%)	124(77.5%)
Total	100(62.5%)	60 (37.5%)	160(100%)
Level of Water			
Ground level	76(47.5%)	53(33.1%)	129(80.6%)
Came into the rooms through windows/doors	23(14.4%)	6(3.8%)	29(18.1%)
Above windows	1(0.6%)	1(0.6%)	2(1.3%)
Total	100(62.5%)	60 (37.5%)	160(100%)
Disruption of Service to Premises**			
Electricity	43(38.4%)	14(12.5%)	57(50.9%)
Water	32(28.6%)	15(13.4%)	47(42.0%)
Others	6(5.4%)	2(1.8%)	8(7.1%)
Total	81(72.3%)	31(27.7%)	112(100%)
Pollutions**			
Air	3(2.1%)	5(3.4%)	8(5.5%)
Noise	5(3.4%)	6(4.1%)	11(7.5%)
Water	63(43.2%)	24(16.4%)	87(59.6%)
Land	27(18.5%)	13(8.9%)	40(27.4%)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Total	98(67.1%)	48(33.9%)	146(100%)
Diseases Prevalent in the Study Area			
Cholera	6(7.0%)	4(4.7%)	10(11.6%)
Malaria	32(37.2%)	10(11.6%)	42(48.8%)
Typhoid	14(16.3%)	4(4.7%)	18(20.9%)
Dysentery	2(2.3%)	2(2.3%)	4(4.7%)
Fever	5(5.8%)	0(0.0%)	5(5.8%)
Pneumonia	6(7.0%)	1(1.2%)	7(8.1%)
Total	65(75.6%)	21(24.4%)	86(100%)

**** Multiple Response Question**

Source: Researcher's Survey, 2023

DISCUSSION

Risks Associated with Physical Development Activities in Flood Prone Areas of Ile-Ife

From the findings, most of the houses surveyed have no flood history; this implies that although the building is located in a flood-prone area but majority of the buildings never experience a flood. Also, the water levels during the raining season in the study area are usually at the ground level. The study further revealed that there is a disruption to service to premises such as electricity and water supply. Observation revealed that some environmental pollution, such as land, water, noise, and air pollution are evident. Apart from this, there is presence of the diseases prevalent during the rainy season; such diseases include malaria, typhoid, cholera, pneumonia, dysentery, and fever in the study area. Others are: loss of the place of abode, loss of personal valuables, insecurity, and post-disaster trauma among others. Also, those diseases are more prevalent among the residents that are living closer to a watercourse. Consequently, the effects of flooding can be severe to the people living in flood-prone areas. This includes loss of the place of abode, loss of personal valuables, insecurity, post-disaster trauma among others.

CONCLUSION

The study focused on assessment of risks associated with physical development activities in flood prone area. Data were obtained and analyzed on previous history of flooding, pollution, diseases observed, and loss of valuables experienced among others. The study established that significant distinctions be drawn between high-risk areas (100m) and moderate risk areas. This is in terms of damaged to human health, personal properties, public properties and exposure to diseases prevalence during the raining season. Information on associated risks with physical development on different households living in the flood prone area is not accurate when considering only high-risk areas. However, such information is accurate when comparing the high-risk areas and moderate risk area. With this, the vulnerability to risks associated risks with physical development in flood area can be clearly stated and residents or households can be properly guide..

RECOMMENDATION

It was revealed that flood negatively impacted lives and properties of the community. In order to reduce the risks and level of vulnerability to flood. This study recommended that the government do dredging of water channels and construction of concrete drainages. The people living in flood-prone areas should be adequate provide with necessary assistance in a proactive measure. Although, the government through ecological funds constructed a flood control system in some locations in the study area. In addition, it is recommended that flood control system should be extended to cover all the flood-prone areas of the study area to mitigate the

effect of flood and its impact on physical development.

REFERENCES

1. Adetunji, M., & Oyeleye, O. (2003). Evaluation of the Causes and Effects of Flood in Apete, Ido Local. Civil and Environmental Research , 19-26.
2. Bruijn, K. d., Klijn, F., Ölfert, A., Penning-Rowsell, E., Simm, J., & Wallis, M. (2009). Flood risk assessment and flood risk management; An introduction and guidance based on experiences and findings of FLOODsite. UK: an EU-funded Integrated Project).
3. Commission for Accreditation of Parks and Recreation Agencies (CAPRA) (2016). Methods in Flood Hazard and Risk Assessment. Washington DC 20433: International Bank for Reconstruction and Development/World Bank.
4. Danladi, A. (2019). Indigenous Knowledge in Flood Disaster Risk Reduction in Kaduna Town Nigeria. ph.D. thesis, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia.
5. Dewan, T. H. (2015). Societal impacts and vulnerability to floods in Bangladesh and Nepal. WeatherandClimateExtremes , 36-42**.**
6. Don-Okpala V. U. (2013). The Environmental Effects of Flood Disaster in Anambra State. Department of Physics, Anambra State University, Uli, Anambra State. International Journal of ISSN:0976-8610. www. Pelagiaresearchlibrary.com**.**
7. Doswell III, C. (2003). Flooding. Norman, Oklahoma, USA: Elsevier Science Ltd.
8. Jacobs, S. (2018). Proffer Solutions to future occurences. Retrieved February 25, 2021, from Osun Defender: http://www.osundefender.com/expers-blame-residents-for-ile-ife-flood-disaster.
9. Echandu, A. J. (2020). The Impact of Flooding in Nigeria Sustainable Development Goals (SDGs). Ecosystem Health and Sustainability .
10. HFMSC. (2017). Reducing Vulnerability of Buildings to flood: Guidance on Building in Flood Prone Areas. New South Wale, Australia: Hawkesbury-Nepean Floodplain Management Steering Committee, Department of Environment and Climate Change.
11. Jacobs, S. (2018). Proffer Solutions to future occurences. Retrieved February 25, 2021, from Osun Defender: http://www.osundefender.com/expers-blame-residents-for-ile-ife-flood-disaster
12. Konrad, C. P. (2003). Effects of Urban Development on Floods. Tacoma,United States: U.S. Geological Survey stream gaging and the National Streamflow Information.
13. Kovacs, Y., Doussin, N., & Gaussens, M. (2017). Flood Risk and cities in Developing Countries. SEPIA Conseils.
14. Mason, V., Andrews, H., & Upton, D. (2010). The Psychological Impact of Exposure to Floods. Psychology, Health & Medicine , 61-73.
15. Mazur, L. (2019, October 8). Development in flood-prone area. Retrieved May 12, 2020, from www.usnews.com: www.usnews.com
16. NOAA. (2013). Types of Flood. National Flood Safety. US National Oceanic and Atmospheric Administration (NOAA).
17. Njoku. C. & Okoro G. C, (2015). Effects of Flooding on Soil Properties in Abakaliki South Eastern Nigeria. Department of Soil Science and Environmental Management, Faculty of Agriculture and Natural Resources. Research Gate https://www.researchGate.net
18. Odunsi, O. M. (2016). Students' Perception of Environmental Hazards and Risks in Selected Public Tertiary Institutions in Oyo State, Nigeria; Department of Urban and Regional Planning, Faculty of Environmental Design Management, Obafemi Awolowo University, Ile-Ife, Nigeria.
19. Ogundeji, P. A., & Fadairo, G. (2018). Impact of Urban Housing Flood in Ondo, Nigeria. Journal of Environment and Earth Science , 25-35.
20. Ojolowo, S. (2019). Communal Flood Mitigation Strategies in Ibadan, Nigeria. African Journal for the Psychological Study of Social Issues , 88-102.
21. Okunola, O. A. (2018). Disaster and Risk Management in Lagos, Kaduna and Port Harcourt, Nigeria, Ph.D. project. Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife.
22. Olanrewaju, O. A., Olanrewaju, C., Chitakira, M., & Louw, E. (2017). Impacts of Flood Disasters in Nigeria: A Critical Evaluation Health Implications and Management. Journal of Disaster Risk Studies.
23. Planning Service. (2016). Planning Policy Statement 15 (PPS 15): Planning and Flood Risk. Belfast:

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Department of Environment United Kingdom.
24. Rudari, R. (2017). Words into Action Guidelines: National Risk Assessment. New York: United Nations Office for Disaster Risk Reduction.
25. Svetlana, D., Radovan, D., & Dobrovi□, J.. (2015). The Economic impact of floods and their importance in different Regions of the World with Emphasis on Europe. Procedia Economics and Finance 34: Business Economics and Management 2015 Conference, BEM2015 , 649 – 655.
26. United Nation (2023). The Sustainable Development Goals (SDG): Report, Special Edition, Publication. 4(14), pp 70-80
27. Uyobong S. E., Nyeneime V. R. & Aniedi A. I. (2023): Physical Development Control Measures in Nigerian Cities: An Overview of Contemporary Issues in Uyo, Akwa Ibom State.
28. Vojinovic, Z., & Abbot, M. B. (2012). Flood and Social Justice: From Quantative to Qualitative Flood Risk Assessment and Mitigation. IWA Publishing.
29. Wahab, B., & Ojolowo, S. (2018). Driver and Spatial Extent of Urban Development in Flood-Prone Areas in Metropolitan Lagos.
30. World Meteoriological Organization. (2016). The Role of Land-use Planning in Flood Management. Integrated Flood Management Series.
31. World Health Organization. (2017). Health Risks in WHO European Region. Retrieved from www.euro.who.int.
32. Young, A., Bhattacharya, B., & Zevenbergen, C. (2021). A Rainfall Threshold-based Approach to Early Warnings in Urban Data-scarce Region: a Case Study of Pluvial Flooding in Alexandria, Egypt. Journal of Flood Risk Management .