

Effective Management of Flooding In Nigeria (a Study Of Selected Communities In Anambra State)

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Abstract

The paper x-rayed the importance of effective management of flood in Nigeria with particular reference to some selected communities in Anambra State (Aguleri and Umuleri). The paper tries to determine the extent to which building of dams across the river channels could help in the effective management of flooding in Anambra State, examine the extent to which construction of wing dykes could help in the effective management of flood, the paper also evaluates if afforestation could bring about improvement in the management of flood in Anambra State. The study adopted a survey design; questionnaire method of collection of data from residents of the studied communities was employed. The population of the study was 1,832,000 and sample size was 400 which was determined using Taro Yameni formula. The study found that there was no proper management of flood in the studied communities. The communities were not use to the proactive measures of flood management, hence they waited for the commencement of flooding and their possible evacuation to camps at the upland or at other parts of the state where flooding was not endemic. The paper recommended that proper management of flooding should be put in place by the affected state and local governments. Measures like: building of dams across river channels, wing dykes, diversion spill ways, trees and afforestation should be undertaken. Again, government should embark on immediate reconstruction of damaged bridges and other hydraulic structures in flood ravaged areas in order to prevent recurrent flooding of such areas.

Key: *Management of Flooding, Dams, Communities, Anambra State*

Introduction

A flood is a natural event that can have far reaching effects on people and the environment. Put simply, a flood is too much water in the 'wrong' place (www.watersafetykids.co.uk/pdfs/flooding.pdf Dec, 2015). Flooding occurs most commonly from heavy rain fall when natural water courses do not have the capacity to convey excess water. However, floods are always caused by heavy rainfall. They can result from other phenomena, particularly in coastal areas where inundation can be caused by a storm surge associated with a high typical cyclone, a tsunami or a high tide coinciding with higher than normal river levels. Dam failure, triggered for example by an earthquake, will result in flooding of the downstream area, even in dry weather condition (hazards/flood/basics/causes 11 Dec 2015). As Obeta (2014) opines in many parts of Nigeria, flooding continue to be an increasing problem, catching individuals and communities by surprise in a repeatedly exasperating way and causing disruption of social activities, damages of

infrastructure and even death of people and livestock. According to him in 2003, severe flooding resulting from dam failure submerged farmland in Zamfara state. In the same vein, Obebi (2013) asserts that Nigeria 923,768sq km land area is made up of 13,000sq km of water. Nigeria has had her own fair share of floods. In 2001, for instance, Abia, Adamawa and Akwa Ibom states witnessed heavy down pour and rain storm which affected about 5,000 people. Explaining further, Obebi (2013) confirms that in the same year, about 12,300 people were displaced by torrential rain which destroyed farmlands, damaged properties and submerged buildings in Zamfara state. Emeriobeole (2015) asserts that floods are among the most devastating natural disasters in the world, claiming more lives and causing more property damage than anyone would imagine. According to him, in Nigeria though not leading in claiming lives, flood affects and displaces more people than any other disaster. It also causes more damage to properties and at least 20 percent of the population is

Some of the recorded havoc caused by floodings in Aguleri and Umuleri, Anambra State



at the risk from one form of flooding or another. But not withstanding all these enumerated facts, effective management of flood by either state, local government or communities in the endemic areas have not been witnessed in either of the states.

Aguleri and Umuleri both in Anambra State are towns with so many rivers and lakes; as a result, they are prone to experiencing flooding mostly in raining season. Aguleri has three (3) villages namely; Igboezunu, Ivite and Enugu na Eziagulu and they are located at the bank of rivers Omambala and Ezu. While traditionally, Umuleri is broadly divided into 3 clans: Ezi, Ikenga and Ivite. The clans are further divided into villages and sub-villages. But with advent of colonialism and modernization, the town was consciously grown and governed just like other Igbo communities. Whenever there is heavy rain in the wet season, the rivers normally overflow their banks and cause flooding. Furthermore, flooding happens when there is more water upstream than usual and as it flows down stream to the flood plain, there is a burst and water gets into the land. It is therefore against this background that this study was carried out in order to know how effective management of flood in Nigeria, particularly selected communities in Anambra State could be achieved. And to recommend the measures that should be imbibed by both the state, local government and communities themselves in order to ameliorate the dangerous effect of flooding as well as bring about the effective management of floods in the studied communities

OBJECTIVES

Some of the objectives of the study are to:

1. Determine the extent to which building of dams across the river channels could help in the effective management of flooding in Anambra State.
2. Examine the extent to which construction of wing dykes could help in the effective management of flood in Anambra State.
3. Evaluate if afforestation could bring about improvement in the management of flood in Anambra State.

Conceptual Framework

A flood is caused by a combination of heavy rainfall causing river/ocean to overflow their banks, and can happen at any time of the year, not just in the winter or rainy season. Floods generally develop over a periods of days when there is too much rain water to fit in the rivers and water spreads over the land next to it (the

flood plain). However, they can happen very quickly when lots of heavy rain falls over a short period of time. These “flash floods” occur with little or no warning and cause the biggest loss of human life than any other type

https://en.wikipedia.org/wiki/flood_control 12 Jan. 2016. Coastal areas are also at risk from sea flooding, when storms and big waves bring seawater onto the land. The worst cases of flooding may occur if there is a combination of storms, 'spring tides' and low atmospheric pressure. According to <http://www.environment-agency.gov.uk/flood> (Jan, 2016), Flooding can be very dangerous – only 15cms of fast-flowing water are needed to knock you off your feet! Floodwater can seriously disrupt public and personal transport by cutting off roads and railway lines, as well as communication links when telephone lines are damaged. Floods disrupt normal drainage systems in cities, and sewage spills are common, which represents a serious health hazard, along with standing water and wet materials in the home. Bacteria mould and viruses, cause disease, trigger allergic reactions, and continue to damage materials long after a flood. Again, soil can be eroded by large amount of fast flowing water ruining crops, destroying agricultural land/buildings and drowning farm animals. Severe floods not only ruin home/businesses and destroy personal property, but the left behind causes further damage to property. The environment and wildlife is also at risk when damage to business cause the accidental release of toxic materials like paints, pesticides, gasoline etc. But in all these, effective and early control of flood remains the best approach.

Flood Management

Some measures could be proactively taken by both state, local government and the studies communities in order to combat the dangerous effect of flooding and bring about effective and proactive management of flood in Aguleri, Umuleri in Anambra State. Some of the measures include building of dams, Wing Dykes, Diversion Spillways, Afforestation and Artificial Levee:

Dams are the classic hard engineering solution to flooding problems. A dam is a giant wall built across a river's channel to impede its flow. Water builds up behind the dam and forms a reservoir which can then be steadily drained at a controlled rate over time. This helps keep discharge downstream of the dam low even during prolonged heavy rainfall. Besides being highly effective at reducing the risk of flooding, dams can also be used to generate hydroelectric power that



can bring economic benefits to an area by attracting manufacturing factories or being exported to other countries. The reservoir that develops behind a dam can be used as a drinking source or for leisure activities. Although dams are good flood control, its can as well pose a huge risk too. They store thousands of litres of water behind them so if they were to fail, they did cause wide spread of death and damage down stream as all the water is released at once.

Wing Dykes are slats that are placed in a river's channel at 90° to the banks. Generally they will be placed in pairs on either side of the channel with a gap between them that allows boat to pass through them behind dykes, sediment builds up and the channel is narrowed, forcing water to flow faster. This helps reduce the risk of flooding by getting water away from an area at risk of flooding as quickly as possible, preventing a buildup of water. They also aid navigation greatly.

Diversion spillways are artificial channels that a river can flow into when its discharge rises. These channel move water round an area at risk of flooding and send it either back into the river but further downstream, or into another river. Spillways generally have flood gates on them that can be used to control the volume of water in the spillway.

Afforestation involves the planting of trees in drainage basins to increase interception and storage while reducing surface runoff. This reduces a river's discharge and so makes it less likely to flood. Afforestation also prevents mass wasting which reduces the amount of soil entering the river and keeps the river's capacity high. Afforestation has the benefit of creating new habitats for animals and improving water quality by filtering pollutants out of rain water.

A levee is a low wall built at the side of a river to prevent it from flooding, it can equally serve as a place where boats can let passengers on or off etc. unlike natural levees, artificial levees are larger and are generally constructed out of a materials like concrete that is resistant to erosion. The main advantage of an artificial levee is that it allows the flood plain to build on. Furthermore, if they did fall, like the embankments along the Mississippi in 1972, the damage from the flood would be far worse than if the embankments didn't exist.

Furthermore, the government should enact laws that will guide against building of house on water ways.

This will in no small measure ameliorate the effect of flooding and also help in the proactive and effective management of flood in Anambra State.

Flood Benefits

Uche (2013) however, opines that floods (in particular the more frequent/smaller floods) can also bring many benefits, such as recharging ground water, making soil more fertile and providing nutrients in where it is deficient. Flood waters provide much needed water resources in particular in arid and semi arid regions where precipitation events can be very unevenly distribute throughout the year. Fresh water floods particularly play an important role in maintaining ecosystems in river corridors and are key factor in maintaining floodplain biodiversity. Flooding adds a lot of nutrients to lakes and rivers which leads to improved fisheries for few years, also because of the suitability of a floodplain for spawning (little predation and a lot of nutrients). Fishes make use of flood to reach new habitats. Birds profit from the boost in production caused by flooding.

Empirical Review/Studies

Emeribeole (2015) carried out a study on “Managing flood Disasters in Nigerian Cities: Issues and strategies towards meeting the challenges in the Modern world; the paper emphasized on prevention/mitigation than post disaster measure of managing flooding in Nigeria and by extension, Owerri, the capital of Imo State. The approach in the study also attempted to describe the application of remote sensing and GIS in environmental issues such as flooding in a developing country. A database was created using both cartographic and attributes data from these and other sources. Spatial analysis was carried out using ArcGIS Desktop 10.1 and its Arc Hydro extension. The result obtained in this study implicated that dump sites within the river channel as well as structural development within the flood plain and high amount of rainfall are the major causes of inundation in the city, especially in the wet season. The study recommended that the use of geoinformation technology, if well implemented, would provide adequate decision support information to planners and decision makers.

The second paper titled “Flood Management in an Urban Setting: A Study of Ibadan Metropolis was written by Ajayi, Agbola, Oloke Susi, Taiwo, Gbadegesin, Kolawole, Taiwo, Kolawole, Muili, Adeola, Ulutade, Shiji and Abiola (2012). The paper revisited flooding problems in Ibadan metropolis; according to the paper, flood disaster can be attributed

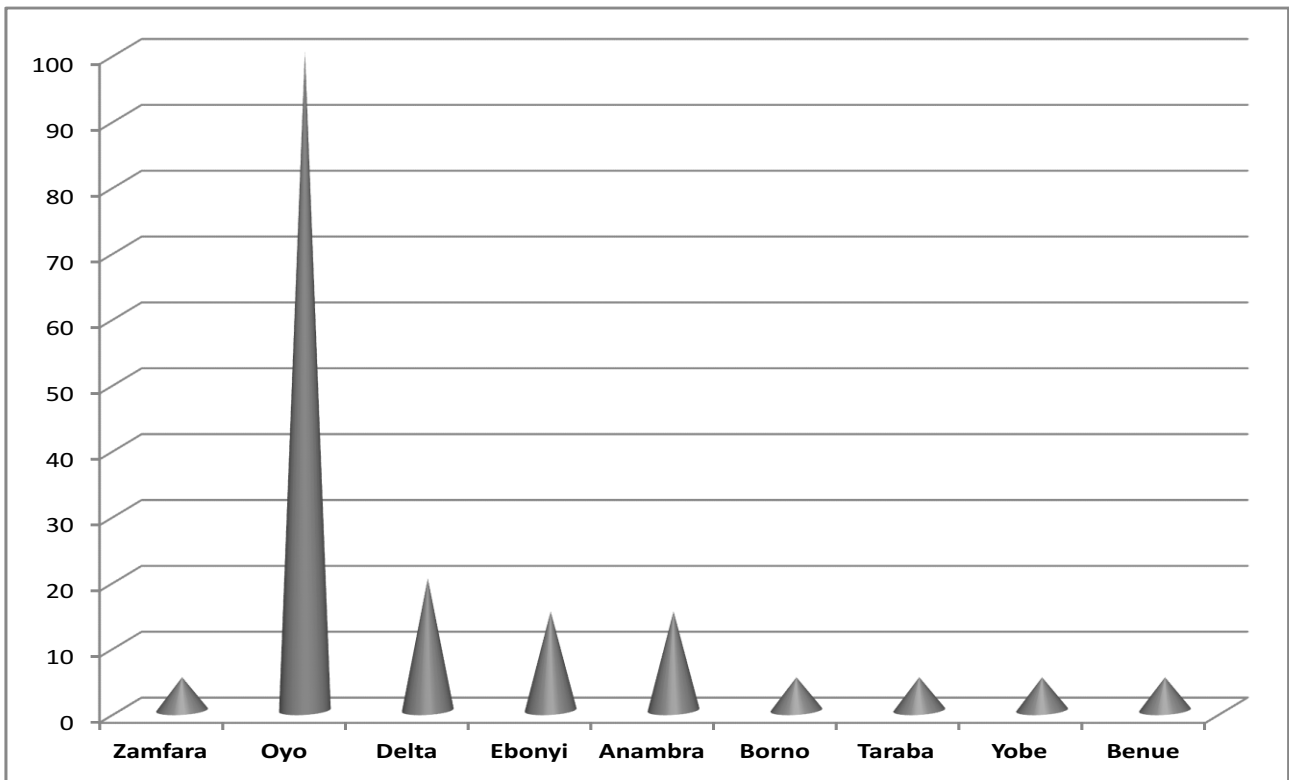
to the unnecessary risks people take when they encroach on flood plains. The methodology adopted for the flood investigations include site visits, interview of affected inhabitants, and analyses of flood data collected during the field investigations. These investigations were complemented with review of past records of flooding and interpretation of satellite imagery of flood affected areas. Result of the spatial analysis of flooding in the eleven local government areas of Ibadan indicated that 26,553 buildings were constructed within the statutory set back to the rivers and streams while 2,105 were flooded. The paper found out that the major cause of flooding in Ibadan metropolis is uncontrolled urbanization of the area, such that some of the houses are built during the dry season on what constituted the river bed itself. And it was recommended that all the major rivers and their tributaries must be de-silted and dredged prior to the onset of raining season. This should be a continuous process; wild life and Ecosystem conservation are necessary. Afforestation which is an important preventive measure against flooding should be imbibed. Trees, ornamented plants and shrubs should be planted in homes. This is believed to preserve the soil moisture, and reduce the rate of atmospheric warming. They should also identify and relocate all permanent structures/buildings, within the natural flood plain. The paper equally recommended the construction of embankments along the main river channels to reduce flooding.

Onwuka Ikekpazu and Onuoha (2015) in their study titled Assessment of the Causes of flood in Aguleri and Umuleri, Anambra East Local Government Area of Anambra State tried to assess the causes of flood in Aguleri and Umuleri in Anambra East Local Government Area. In doing this, questionnaire was administered randomly to the residents. The data generated were analyzed using frequency tabulation and Mann-Whitney U-Test statistical technique. The following hypothesis was tested: (i) there was no significant difference between the causative factors of 2012 floods in the two communities. In addition result also proved that there was no serious variation between the causes of 2012 flood in the two communities. In addition, they proved that anthropogenic activities induced the 2012 flood in the community. Consequent upon the findings, the study recommended that there should be flood hazard mapping in order to ascertain areas prone to flooding, so as to reduce the occurrence of flood in the area. It further recommended that the river channels in the area be constantly dredged from time to time so as to

increase their capacity for retaining water. Moreover, it recommended that the inhabitants of the area be enlightened on the causes of flood. Finally, it recommended that environmental laws, especially those relating to flood occurrence and management and land use be enforced.

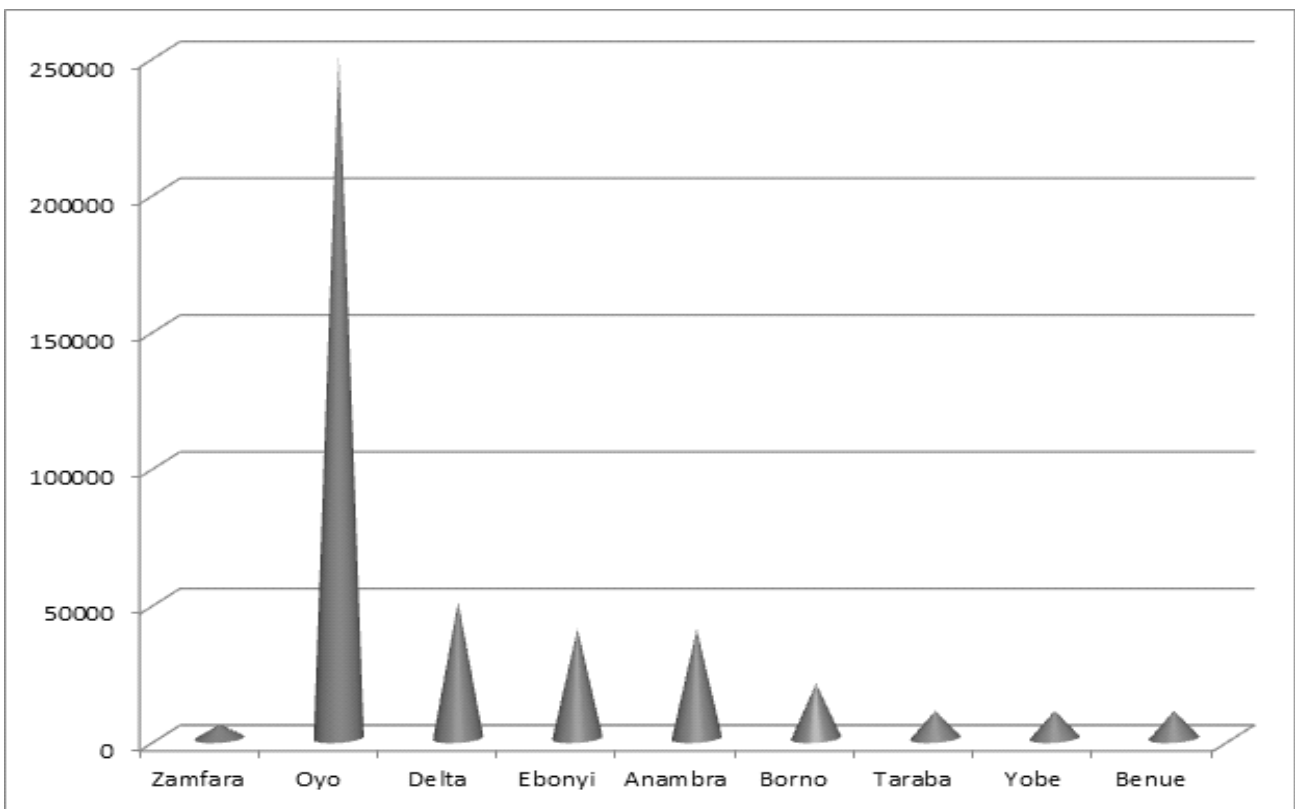
Similarly, Prekeyi, Megbuwe and Adams (2015) opine that flood waters from Cameroon entered Nigeria through the Benue River, into the River Niger on its way to the sea. Lots of physical damages were recorded, including destruction of farmlands and houses. Economic life was halted, people were displaced and some lost their lives. In this study, towns were chosen from Bayelsa and Delta States for evaluation of effects of flooding. The result revealed that in all the communities the flood waters were slightly acidic (5.4-6.9) and dissolved oxygen was high (3.9-6.9mg/l). The heavy metal chromium was also high. Most of the physical and chemical parameters analyzed were higher in flood water than in Borehole and River water but generally within allowable limits. The study again show that the region suffered devastating events due to flood. Physical and parameters of flood water analyzed indicated a likelihood of effect on the portable water sources of the communities sampled. Among the recommendations are: need for wholesome water sources for inhabitants of the area: key stakeholders including local and regional Governments should as matter of urgency revamp and equip emergency response services which can further ameliorate the effects of flooding: need for a proper town planning to factor in drainage systems within these areas which will help to channel flood water quickly. Lastly but not the least, Kolawole, Olayemi, and Ajayi (2013) stated that the potential consequences of climate change are profound, particularly on people in the less developed countries. The question is therefore not whether climate change is happening but what to do about it? Over the last 20years, climate change has become an increasingly high profile issue both for a social and economic view point. It is not only the scientists and environmentalists who are concerned about climate change, Government, politicians, Management practitioners and the general publics are also taking an interest in climate change. As a result of global warming, the type, frequency and intensity of extreme event, such as tropical cyclones(including hurricanes and typhoons), floods, droughts, heavy precipitation events, are expected to rise even with relatively small average temperature increases.

Graphic Illustration of the Numbers of Death in Incidence of Flooding in the Month of August, 2011



Source: Agbonkhese, Agbonkhese, Aka, Abyo, Ocholi, Adekunle, *Journal of vicil and environmental Research* ISSN22245 790 (paper) ISSN2225-0514 (online_ vol. 6. No. 4. 2004

Graphic Illustration of Affected Population on Incidence of Flooding in August, 2011



Source: Agbonkhese, Agbonkhese, Aka, Abyo, Ocholi, Adekunle, *Journal of vicil and environmental Research* ISSN22245 790 (paper) ISSN2225-0514 (online_ vol. 6. No. 4. 2004

Table1. spatial distribution of disastrous floods in Nigeria (2000-2012)

s/n	Year	Name of affected Area	Number of LG as affected	Date/month of flood	Type	Recorded impacts or effect
1	2000	Ibaji-Gwarara River (Kogi State)	1	Aug./Sept. 2000	Flash	Over 150,000 persons rendered homeless
2	2000	River Kastina	2	Sept./Oct. 2001	Flash	Several farm lands and crops were submerged
3	2001	River Pai (Taraba State)	NA	Sept. 2001	Flash	Thousands of people were rendered homeless.
4	2002	No extreme flood was recorded in Nigeria				Farms, houses and roads were washed away
5	2003	Ebonyi River and Cross River	3	Sept. 2003	Fluvial	Farms, houses and roads were washed away
6	2012-2014	Anambra Rivers (Igbariam and Aguleri rivers)	4	Sept. 2012-2014	Fluvial	Farms, houses and roads were washed away
7	2003	Kubuwa Streat (FCT Abuja Suburb)	1	Sept. 2003	Urban	Vehicle and houses submerged
8	2003	Kaduna River (Kaduna State)	4	Oct. 2003	Flash	Farms, houses and roads were washed away
9	2004	River Gongola (Gombe State)	NA	Oct. 2004	Fluvial	20 people died
10	2003	Epe	NA	Sept. 2004	Coastal	Houese, vehicle etc submerged
11	2005	No extreme flood disaster reported in Nigeria				
12	2006	Ogun Rive/Lagos and Ogun State	4	June 2006	Urban	Over 20 settlement lying close to Ogun river were deserted
13	2006	Zamfara River/Zamfara/Kebbi State	NA	Oct. 2006	Fluvial	Farmlands, houses, roads and culverts were washed away
14	2007	Sokoto and Rema River (Sokoto State)	2	Sept. 2007	Fluvial	500 people were rendered homeless
15	2007	Sokoto Rive (Kebbi State)	NA	Aug. 28, 2007	Fluvial	3000 people rendered homeless; 300 house submerged
16	2007	Ngadda River (Borno State)	NA	Oct. 2007	Flash	21 villages sacked by the flood water
17	2007	Wuse River/Plateau State)	5	Oct. 2007	Flash	47 persons, 200 settlements washed away (worst in 30 years,
18	2007	Shasha River (Lagos State)	2	Aug. 2007	Flash	Vehicles, houses, farmlands & roads were destroyed
19	2009	Benin and Environs	13	Aug. 2009	Urban	Damaged urban structures (roads, bridges, houses, schools markets stc
20	2011	Ibadan and Environs	11	Aug. 2011	Urban	Damaged schools, markets, death of persons
21	2012	Niger-Benue trough	22 State	Sept. 2012	Fluvial	Damaged farms, houses, roads and displaced millions of people about 431 persons were killed by flood water

Sources: Erosion, flood and coastal zone department of Federal Ministry of the Environment, Abuja (for No. 1-18)
 2. (25) (for Nos. 19-21) Drainage Debarment of Lagos State Ministry of the Environment
 3. (7) (for No. 21) 4. NA = Not Available

METHODOLOGY

The study adopted a survey design, questionnaire method of collection of data from residents of the studied communities was employed. The questionnaire was later collated, analyzed and interpreted. The population of the study was 1,832,000 (National Population Census) (the population of two communities studies were 890,000 and 942,000 respectively according to 2006 Census given the grand total of the above population) and sample size was 400 which was determined using Taro Yameni formula which is given as:

$$S = \frac{N}{1 + N(e)^2}$$

Where S = Sample Size
 N = Number of Population
 e = The Margin of error assumed (0.05)

$$S = \frac{1,832,000}{1 + 1,832,000(0.05)^2}$$

$$S = \frac{1,832,000}{1,832,000(0.0025)}$$

$$S = \frac{1,832,000}{4,580} = 400$$

$$S = 400$$

Findings and Recommendations

The study found that there was no proper management of flood in the studies communities either by the State or Local Government and also the communities are not used to proactive measures of controlling flood hence they wait until it is too late for them to do anything. Some of them build their houses

along water ways which also impede the effective movement of water in the communities. Again, some people in the low land area built their houses near the banks of Omambala and Ezu rivers making them susceptible to flooding. The paper therefore concluded that there was no proper management of flooding either by the government and communities, hence effect of flooding in Aguleri and Umuleri communities were also tremendous. The major effect of flooding in the communities is: submergence of farmlands, houses, roads etc; furthermore, the flooding causes accidents that led to many deaths and poverty in the affected areas. In retrospect, the paper recommended that proper management of flooding should be put in place by the affected state and local governments. Measures like; building of dams across river channels, wing dykes, diversion spillways, levee and afforestation should be under taken. Again, government should embark on immediate reconstruction of damaged culverts, bridges and other hydraulic structures in flood ravaged areas.

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