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Impact of the 2012 Nigeria Flood on Emergent Cities of Nigeria: The Case of Yenagoa, Bayelsa State

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Abstract
This paper investigated the impact of the 2012 Nigeria flood on emergent cities of Nigeria using Yenagoa city as a case study. Both primary and secondary data were used in this paper. The primary data included the use of questionnaire and personal interview. From our preliminary investigation, the total number of communities in the study area was found to be fifty seven. Simple random sampling techniques were used to select six communities in the local government. The six sampled communities are Ovom, Opolo, Akenfa, Ikibiri, Okolobiri and Ikarama. Ten percent of the household was finally used for the household questionnaire administration. The total number of questionnaire administered for the households was 528 while 465 were retrieved. Findings from this paper shows that 86.2% of the respondents claimed that school infrastructure was damaged due to flood, 69.5% agreed that health facilities were damaged, 80.6% agreed on disruption in accessing hospital services due to flood, 77.4% agreed that sources of drinking water was affected by flood; and 85.2% perceived that sanitary facilities were affected due to flood. Further evidence from the paper indicates that the causes of vulnerability to flood in Yenagoa LGA are residing on the flooded area (52.9%) and lack of alternative livelihoods (48.8%). The coping strategies among the residents as revealed from the paper are preparing mosquito net (21.1%), construction of permanent embankment along water front (23.4%) and relocation (49.5%). The paper therefore recommends among others periodic carrying out of flood hazard and risk mapping to reduce flood damages in the flooded areas of Yenagoa LGA, construction of dams across the major rivers to regulate the volume of water and commensurate assistance to the affected residents by Government.
Key words: Impact, 2012 Nigeria Flood, Emergent Cities, Vulnerability, Disaster

Introduction

Floods are common natural disaster occurring in most parts of the world resulting in damage and loss to human life and livelihood sources, deterioration of environment and retardation to development. Hewitt (1997) explained that floods are the most common occurring natural disasters that affect human and its surrounding environment.

In tropical regions, flooding of high magnitude that has resulted in serious consequences has been caused by heavy rainstorms, hurricanes, snow melt and dam failures (Jeb and Aggarwal, 2008). It is more vulnerable to Asia and the Pacific regions and this has affected the social and economic stability of countries. The worst flood in China which occurred in 1998 affected 223 million people, 3004 people reported dead, 15 million were homeless and the economic loss was over US$ 23 billion for that year. Due to heavy flood in Cambodia and Vietnam during year 2000, 428 people reported dead and estimated economic loss of over US$250 million was recorded.. In 1991, 140,000 people across the world were reported dead and in 1998, it affected 25 million lives (UNEP, 2006). For the last 10 years due to frequent occurrence of floods, thousands of people have been affected due to flood in India, Pakistan, Korea, China, and Bangladesh with their agricultural field, residential areas i.e. livelihood and food grossly impacted upon. The effect of floods in less developed countries is more. They are linked to poverty, lack of knowledge, low livelihood sources, lack of insurance, weak institutions and above all, lot of problems with emergency response and early warning preparation.

Flood occurs when a river or stream breaks out through their natural or artificial bank due to heavy rainfall, melting of snow, dam failure etc. Floods are of mainly three types: flash flood, river flood and coastal flood. Such kinds of flood occurrence are influenced by natural phenomena and human involvement like deforestation, land management (timber harvest, reforestation and afforestation, herbicide application and controlled burning), industrial development, agriculture, regulation of rivers.). In addition, the recent causes for frequent flooding of some areas are mainly due to un-planned land use, construction and operating of dams in upstream. If a hydraulic structure is not designed properly then it could even lead to catastrophe - the dam can fail, the highway can be flooded and bridge can collapse thus increasing the risk of flood (Gebeyehu, 1989). Despite this, the obvious reason for flooding especially in municipalities and coastal areas in Nigeria lies in the wide distribution of low-lying coastal areas and river floodplains, and because these areas have fast become a long standing attraction for human settlement (Ologunorisa and Abawua, 2005)

Floods are the most costly and wide reaching of all natural hazards. They are responsible for up to 50,000 deaths and adversely affect some 75 million people on average worldwide every year. Borrows and De Bruin (2006) indicated that among natural catastrophes, flooding has claimed more lives than any other single natural hazard. According to data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS), floods claimed the lives of 2,353 people from 1970-2000. In support of this observation, the Federal Emergency Management Agency (FEMA) estimates that flood events are responsible for the death of more than 10,000 people in the US since 1900. The study undertaken in Texas established that socially vulnerable populations suffer disproportionately in terms of property damage, injury, and death as a result of physical impacts of disaster. For reasons of economic disadvantage, low human capital, limited access to social and political resources, residential choices, and evacuation dynamics are the social factors that contribute to observed differences in disaster vulnerability and economic class.

Disease outbreak is common especially in less developed countries. Malaria and Typhoid outbreaks after floods in tropical countries are also common. It has been estimated that in India and Bangladesh 300 million people live in areas that are affected by floods (Nott, 2006). Nott (2006) further stated that physical damage to property is one of the major causes for tangible loss in floods. This includes the cost of damage to goods and possessions, loss of income or services in the floods aftermath and clean-up costs. Some impacts of floods are intangible and are hard to place a monetary figure on. Intangible losses also include increased levels of physical, emotional and psychological health problems suffered by flood-affected people. It was observed that studies undertaken show that the economic impact of natural disasters shows a marked upward trend over the last several decades. In the decade 1986 to 1995, flooding accounted for 31% of the global economic loss from natural catastrophes and 55% of the casualties (Borrows and De Bruin, 2006). The hazards tend to hit communities in developing countries especially the least developed countries, increasing their vulnerability and setting back their economic and social growth, sometimes by decades. The floods have led to loss of human life, destruction of social and economic infrastructure and degradation of already fragile ecosystems. The study indicates that social impacts include changes in people's way of life, their culture, community, political systems, environment, health and wellbeing, their personal and property rights and their fears and aspirations. The study undertaken in Scotland suggests that social impacts are linked to the level of well being of individuals, communities and society. It includes aspects related to the level of literacy and education, the existence of peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, knowledge structure, customs and ideological beliefs and overall collective organizational systems. Some groups are more vulnerable than others mainly those less privileged in society (Living with Risk, 2002).

Different population segments can be exposed to greater relative risks because of their socio-economic conditions of vulnerability. Because of this, disaster reduction has become increasingly associated with practices that define efforts to achieve sustainable development. The links between disaster and the economic system, another pillar for sustainable development are essential for disaster reduction. Risk Management planning should, therefore, involve an estimation of the impacts of disasters on the economy, based on the best available hazard maps and macroeconomic data (Living with Risk, 2002).

The 2012 rainy season in Nigeria has been worse than earlier years, and heavy rains at the end of August and the beginning of September led to serious floods in most parts of the country. The Nigerian authorities contained the initial excess run-off through contingency measures, but during the last week of September, water reservoirs were overflowing and authorities obliged to open dams to relive pressure in both Nigeria and neighboring Cameroon and Niger, leading to destroyed river banks and infrastructure, loss of property and livestock and flash floods in many areas. By September 29, the floods had affected 134,371 people, displaced 64,473, injured 202 and killed 148. By the end of October, more than 7.7 million people had been affected by the floods, and more than 2.1 registered as Internally Displaced People (IDP). About 363 people were reported dead; almost 600,000 houses had been damaged or destroyed. Out of Nigeria's 36 states, 32 have been affected by the floods (OCHA, 2008).

The significance of the year 2012 flood disasters in Nigeria lies in the fact that they were unprecedented in the past forty years (Ojigi et al, 2008). Most parts of the states of Nigeria along the rivers Niger and Benue were devastated by these floods, causing huge destruction to the rural and urban infrastructures (farmlands/crops, roads, buildings, drainages, bridges, power lines, etc) and socio-economic lives of the areas (Ojigi et al, 2013). This is against the backdrop that current post flood disaster assessment efforts aim to determine community needs of the affected population for purposes of rehabilitation and reconstruction, while it were instructive to develop strategies aimed at strengthening both institutional and community capacity to mitigate the effect of flooding. Several studies on floods have revealed the effects of flood on the residents of the place and the extent of flood in a particular area at a given time. These include Ayoade (1981), Ologunorisa and Adeyemo (2005), Mmom et al (2008), James et al (2013), Ojigi et al (2013) and so on. These studies were based on flood for a region or a city in Nigeria.. Some of the studies investigated the socio-economic impacts of flood but not in Yenagoa LGA. The 2012 flood events brought untold hardship on the residents of these areas hence a

comprehensive study on the impacts of the flood in this emergent city is highly required in the recent time.
It is against this backdrop that this paper explores the impacts of the 2012 Nigeria flood in Yenagoa city. The paper is presented in five sub-sections. Section one is the general introduction that gives a background to the study. Section two discusses major conceptual issues relating to flood disaster risk and impacts while section three focused on the methodology for the study. Section four highlights the findings of the study while section five is the conclusion.

Conceptual Issues

Flood risk and its reduction Model is propounded by Associated Programme on Flood Management (APFM) in 2006. Crichton (1999) described risk as 'the probability of a loss and this depends on three elements: hazard, vulnerability, and exposure. If any of these three elements increases or decreases, then the risk increases or decreases respectively'. Flood risk is therefore, a product of flood hazard, exposure and vulnerability. While exposure to floods refers to whether people or assets are physically on the path of flood waters or not, vulnerability may be described as "the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (UN/ISDR, 2004; UNDP, 2004). The ability to measure vulnerability is increasingly being seen as a key step towards effective risk reduction and the promotion of a culture of disaster resilience (Birkmann, 2006).
Learning from the disaster management continuum which is a cyclic multi-stage concept, beginning with risk analysis followed by mitigation effort and rounded off by response and recovery (Cutter, 2003; Wettegama, 2007), the overlapping phases featuring spatial and temporally variable component can further be un-rolled and moved to an infinite disaster management spiral (Aubrecht et al, 2011). Succumbing to this position, therefore, it becomes imperative to analyze the 2012 Nigeria flood that would explain the severity (or otherwise) of the impact across Yenagoa Local Government Areas of Bayelsa State.
The impact of disasters is usually measured in quantifiable ways, such as adding up the number of the dead and injured, and estimating the physical damage to housing, land, livestock, agriculture, stores and infrastructure. But attention is not necessarily paid to how disasters impact on different categories of people, men, women, children, aged people, etc. Disasters affect men and women differently because of the different roles they occupy and the different responsibilities given to them in life and because of the differences in their capacities, needs and vulnerabilities. Family size may change at household level due to disasters. For example, in Chitwan district, Nepal, during the floods, the extended family system collapsed, leaving the women and elderly without support (Ariyabandu and Wickramasighe, 2005). The floods that occurred in Sarlahi district in Nepal left a lot of houses damaged, washed away and uninhabitable. Floods constitute a "hazard" only where human encroachment into flood prone areas has occurred. Mwape (2009) explained that the cumulative impact of human activities without regard for nature has turned the recent floods from a natural phenomenon into a man-made disaster of epic proportions. When severe floods occur in areas occupied by humans, they can create natural disasters which involve the loss of human life and property plus serious disruption to the on-going activities of large urban and rural communities. Flood losses are therefore essentially human interpretations of the negative economic and social consequences of natural events. The impact of the flood hazard will, in part be determined by the magnitude of the events and the duration of the event. But the true significance of the flood disaster will depend primarily on the vulnerability for the local community.
Smith and Ward (1998) and Mwape (2009) argued that direct losses to floods occur immediately after the event as a result of the physical contact of the flood waters with humans and with damageable property. However, indirect losses which are less easily connected to the flood disaster and often operate on-long time scales, may be equally, or even more important. Depending on whether or not losses are capable of assessment in monetary values, they are termed tangible and intangible. Some of the most important direct consequences of flooding such as loss of human life or the consequent ill health of the survivors are intangible. Indirect and intangible consequences of flooding are probably greatest in Least Developed Countries (LDCs), especially where frequent and devastating floods create special impacts for the survivors. In addition to economic loss and loss of life and injury, there may be irreversible loss of land, of historical and cultural valuables and loss of nature or ecological valuables.
Similarly, Ninno, *et al*. (2003) stated that the 1998 floods in Bangladesh caused severe damage to the rice crop and threatened the food security of tens of millions of households. Government food transfers to the affected people helped limit the impact of the flood on household access to food. This means that flood led to major crop losses, losses of other assets and lower employment opportunities and thus affected household income as well as market prices (Ninno, *et al,* 2003).
The African continent has not been spared by the floods. According to UNEP (2006), the continent, home to approximately one (1) billion people is more vulnerable than any other continent to climate change. Almost two (2) billion people were affected by disasters in the last decade of the 20th century. Eighty-six percent (86%) of these were floods and droughts. Heavy rains destroyed homes and crops, leaving whole communities vulnerable.

Rising flood waters across Africa are intensifying health risks for millions of people.

Methodology

This study employed the use of both primary and secondary data. The primary data included the use of questionnaire and personal interview to acquire information on the impacts of the 2012 flood from the residents of the affected communities in Yenagoa city, Bayelsa State.

The questionnaires were administered to sampled households in Yenagoa. For the household, in each community, houses were numbered with odd and even numbers. The households in the houses numbered with odd numbers were used for the questionnaire administration using random sampling technique and the head of each household was made the respondent. In the absence of the head of household, the next in rank was requested to complete the questionnaire. From our preliminary investigation, the total number of communities in the study area was found to be fifty seven. Simple random sampling technique was used to select six communities in the local government. Thus the six sampled communities are Ovom, Opolo, Akenfa, Ikibiri, Okolobiri and Ikarama. Ovom community has a total number of 985 households, Opolo community has 1225 households, Akenfa community has 1351 households, Ikibiri community has 553 households, Okolobiri community has 481 households while Ikarama community has 672 households. Ten percent of the household was finally used for the household questionnaire administration. Thus, 99, 123, 136, 55, 48 and 67 questionnaires were administered to respondents in Ovom, Opolo, Akenfa, Ikibiri, Okolobiri and Ikarama respectively. The total number of questionnaire administered for the households was 528 while 465 were retrieved.

Results and Discussion

Table 1: Impacts of flood on housing

House collapse		
Response	Frequency	Percentage (%)
Yes	249	53.5
No	204	43.9
No response	12	2.6
Total	465	100.0
Relocation due to House Collapse		
Response	Frequency	Percentage
Yes	234	50.3
No	128	27.5
No response	103	22.2
Total	465	100.0

Source: Authors Field Survey, 2014

Table 1 above presents the analysis on the impacts of 2012 flood on housing in which it was revealed that 53.5% of total respondents agreed that their houses were collapsed due to the flood while 43.9% disagreed. Similarly, it was gathered also that 50.3% agreed that the collapsing of the house forced them to relocate to another area.

Table 2 below shows the impacts of 2012 flood on property and asset of individuals in Yenagoa LGA . It is revealed that 78.7% of respondents agreed that chairs at homes were affected, 64.1% agreed on bed, 56.8% agreed on the fishing net while 55.1% agreed on radio. Nevertheless, 17.2% of respondents agreed that the flood affected the bicycles, 39.4% agreed that boat/canoe was affected, 53.3% believed that hoe were affected while 50.8% agreed that television was affected. In all, it shows that chairs, bed, fishing net, radio and television were greatly affected by the flood.

Table 2: Impacts of flood on property and asset

Property/Asset	Yes		No		No response		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Bed	298	64.1	110	23.7	57	12.3	465	100.0
Fishing Net	264	56.8	75	16.1	126	27.1	465	100.0
Boat/Canoe	183	39.4	124	26.7	158	34.0	465	100.0
Bicycle	80	17.2	167	35.9	218	46.9	465	100.0
Radio	256	55.1	104	22.4	105	22.6	465	100.0
Axe	226	48.6	101	21.7	138	29.7	465	100.0
Hoe	248	53.3	89	19.1	128	27.5	465	100.0
Television	236	50.8	111	23.9	118	25.4	465	100.0
Chairs	366	78.7	48	10.3	51	11.0	465	100.0
Others	138	29.7	12	2.6	315	67.7	465	100.0

Source: Authors Field Survey, 2014

Table 3 below presents the crop damage due to 2012 flood in Yeangoa LGA. Concerning the experience on crop damage, 92.2% of respondents agreed that crops were damaged during the flood while 5.4% disagreed and 2.4% had no response. It is also observed that 86.2% agreed that staple crops were damaged during the flood and 88.4% of total respondents believed that there was a loss of crop produce during the flood while 9.2% disagreed with the statement. This result clearly indicates that the 2012 flood had considerable impact on crops.

Table 3: Crop damage due to flood

Crop damage		
Response	Frequency	Percentage
Yes	429	92.2
No	25	5.4
No response	11	2.4
Total	465	100.0
Main staple crop damaged		
Response	Frequency	Percentage
Yes	401	86.2
No	-	-
No response	64	13.8
Total	465	100.0
Loss of crop produce during the flood		
Response	Frequency	Percentage
Yes	411	88.4
No	43	9.2
No response	11	2.4
Total	465	100.0

Source: Authors Field Survey, 2014

Table 4: Effects of flood on educational facilities and disruption

Presence of educational facilities		
Response	Frequency	Percentage
Yes	432	92.9
No	33	7.1
No response	-	-
Total	465	100.0
Damage to school infrastructure due to flood		
Response	Frequency	Percentage
Yes	401	86.2
No	60	12.9
No response	4	0.9
Total	465	100.0
Disruption of school going children due to flood		
Response	Frequency	Percentage
Yes	449	96.6
No	16	3.4
No response	0	0.0
Total	465	100.0

Source: Authors Field Survey, 2014

Table 4 above shows the effects of flood on educational facilities and disruption as perceived by the residents of the study area. It was perceived by 92.9% of respondents that educational facilities were available in the area while 7.1% disagreed. Of the total respondents, 86.2% agreed that there was a damage to school infrastructure due to flood while 96.6% believed that school-going children experienced disruption due to flood in the area.

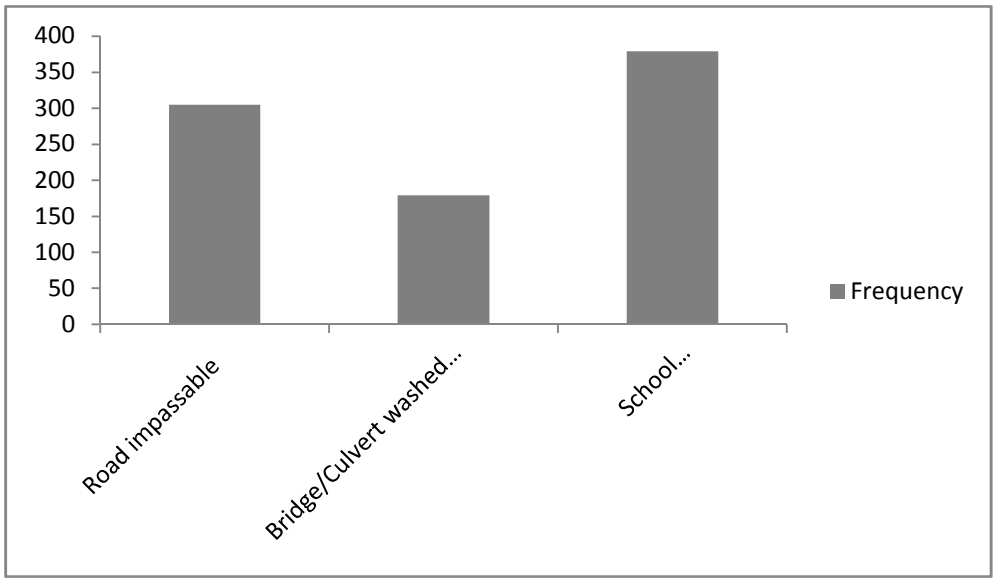

Figure 1: Types of disruption experienced by school-going children

Figure 1 above presents the types of disruption experienced by school-going children during the flood in Yenagoa LGA. It is shown that 65.6% of respondents agreed that the road was impassable, 38.5% agreed that bridge and culvert had been washed away and/or submerged while 81.5% agreed that the entire school had been submerged and/or surrounded by water.

Table 5 below presents the impacts of flood on health facilities and accessing hospital services. It is revealed that 86.2% of total respondents agreed that there were health facilities in the area while 18.9% disagreed. Concerning the damage to health facilities due to flood, 69.5% of respondents agreed that there were damages done to health facilities due to flood while 20.6% disagreed. In terms of accessing the hospital services during the flood, 80.6% agreed that there was a disruption in accessing hospital services due to flood while 6.5% disagreed and 12.9% gave no response. Of the total respondents, 72.5% agreed that household members got sick during the flood, 18.9% disagreed while 8.8% had no response.

Table 5: Impacts of flood on health facilities and accessing hospital services

Are there any health facilities in your area?		
Response	Frequency	Percentage
Yes	401	86.2
No	54	11.6
No response	10	2.2
Total	465	100.0
Was there any damage to health facilities due to flood?		
Response	Frequency	Percentage
Yes	323	69.5
No	96	20.6
No response	46	9.9
Total	465	100.0
Was there any disruption in accessing hospital services due to flood?		
Response	Frequency	Percentage
Yes	375	80.6
No	30	6.5
No response	60	12.9
Total	465	100.0
Did any of the household members get sick during the flood?		
Response	Frequency	Percentage
Yes	337	72.5
No	88	18.9
No response	40	8.8

Figure 2 below depicts the kinds of sickness encountered during the flood in Yenagoa LGA in 2012 whereby 40.2% of total respondents agreed that diarrhoea attacked the resident, 31.2% agreed on cough, 66.2% perceived that the sickness encountered during the flood was malaria while 22.6% agreed that measles was the sickness.

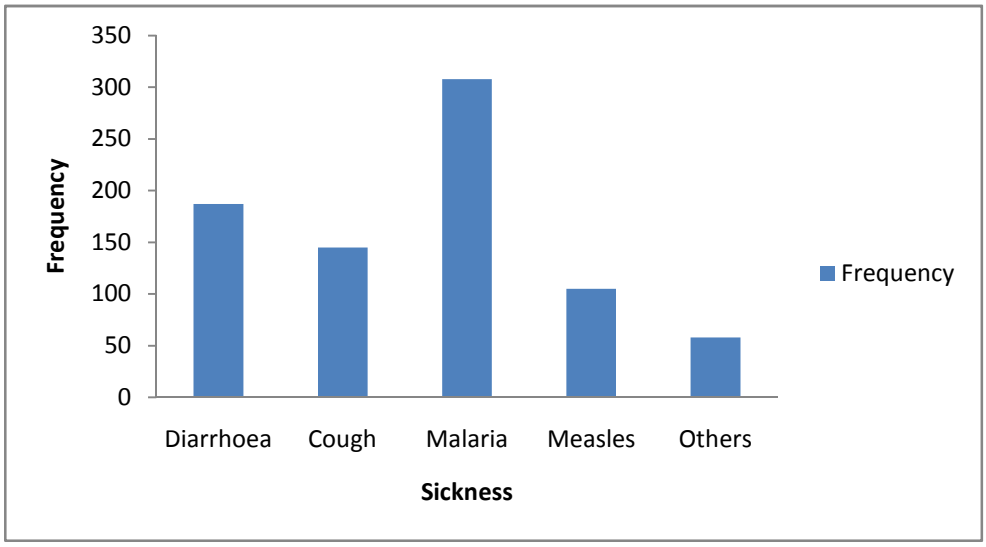

Figure 2: Sickness encountered during the flood in Yenagoa LGA

Table 6: Common sources of drinking water in the area

Sources	Yes		No		No response		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Borehole	293	63.0	-	-	172	37.0	465	100.0
Protected well	-	-	-	-	465	100.0	465	100.0
Unprotected well	50	10.8	-	-	415	89.2	465	100.0
River	197	42.4	-	-	268	57.6	465	100.0
Spring	40	8.6	-	-	425	91.4	465	100.0
Others	23	4.9	-	-	442	95.1	465	100.0

Source: Authors Field Survey, 2014

Table 6 above presents the common sources of drinking water in Yenagoa LGA and it is observed that 63.0% of total respondents agreed that borehole was a common source of drinking water in the area, 10.8% agreed that the common source of drinking water was unprotected well, 42.4% agreed that the source was river while 8.6% agreed that the common source of drinking water was spring.

Table 7: Main source of drinking water affected by flood

Response	Frequency	Percentage
Yes	360	77.4
No	45	9.7
No response	60	12.9
Total	465	100.0

Source: Authors Field Survey, 2014

Table 7 presents the perception of residents to know if the main source of drinking water was affected by flood and it is shown that 77.4% of respondents agreed that the main source of drinking water was affected while 9.7% of respondents disagreed and 12.9% gave no response.

Table 8: Types of sanitary facilities used

Sanitary facilities	Yes		No		No response		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
VIP Toilet/Water System	45	9.7	-	-	420	90.3	465	100.0
Reticulated sewerage	143	30.8	-	-	322	69.2	465	100.0
Traditional pit latrine	256	55.1	-	-	209	44.9	465	100.0
Others	37	8.0	-	-	428	92.0	465	100.0

Source: Authors Field Survey, 2014

Table 9: Sanitary facility affected by the flood water

Response	Frequency	Percentage
Yes	396	85.2
No	55	11.8
No response	14	3.0
Total	465	100.0

Source: Authors Field Survey, 2014

Table 8 presents the types of sanitary facilities used in Yenagoa LGA and it is revealed that 9.7% of respondents agreed that VIP/Water system was a type of sanitary facilities, 30.8% agreed on reticulated sewerage while 55.1% agreed on traditional pit latrine. Table 9 presents the perception of residents on the effect of flood water on sanitary facilities and it is observed that 85.2% of respondents agreed that the sanitary facilities in their homes were affected by flood water while 11.8% disagreed.

Conclusion

The impacts of flooding on housing, crop production, livestock, infrastructures, educational facilities, health facilities, sanitary facilities and properties/asset were generally severe. The flood led to the relocation of majority from their homes to another place. In terms of property, the flood severely affected the bed, fishing net, radio,

hoes, television, and chairs while among the staple crop production; plantain, cassava, yam, and cocoyam were highly affected. The damage caused on crop production led to the increase in the price of these agricultural products in the markets. The impact on educational facilities was confirmed as majority of respondents agreed that there was damages done to school infrastructure due to flood and more so, the school-going children were disrupted from going to their various schools due to flood. The kinds of disruption included impassable road, submergence of bridges and the entire school and thus schools were closed down as claimed by majority of respondents.

Health services and facilities were also affected by the 2012 flood disaster. Majority of the respondents agreed that there were damages of health facilities, staff of health centres were displaced and health centres were submerged which led to the destruction of equipment and other health facility in the study area. Evidence from the research further revealed that majority fell sick during the flood and the disease outbreak included malaria, cholera, diarrhoea, skin diseases, dysentery, measles and cough. Among these diseases, cholera, malaria and diarrhoea were found more prevalent during the flood. Sources of drinking water in the study area included borehole, well, river, spring, tap water pond/lake, rain water and sachet water but boreholes and river were the commonest sources for drinking water and majority agreed that these sources were affected by flood, thus there were accessibility problems of drinking water. Among the sanitary facilities found in Yenagoa LGA, pit latrine was discovered to be the most highly used by the residents and it is also observed that majority among the residents agreed that the sanitary facilities were affected by flood and the percentage of commonly used sanitary facilities affected by flood was between 61% and 70%.

Roads, culvert bridges and walkway were infrastructures identified in the study area. Majority of respondents agreed that roads and culvert were eroded and bridges collapsed and were submerged. Effects of flood on crop and livestock included submergence of farmlands, drowning and death of livestock, loss of fish and infection of livestock with diseases. Impacts of flood on housing included the displacement of people from their homes, destruction of mud houses, submergence of houses and turning of houses to habitat for snakes.

It is generally recommended that flood hazard and risk mapping should be encouraged and adequately carried out periodically to reduce flood damages in the flooded areas of Yenagoa LGA, dams and reservoirs should be constructed across the major rivers to regulate the volume of water, government should play a better role to assist the flood affected people medically and financially; and tree planting should be encouraged and adequately practiced especially in the built up area to reduce the degree of impacts of urban flood.

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