

Flooding and Its Perceived Effects on the Health of the People of Ahoada East Local Government Area of Rivers State

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Abstract

This study investigated flood and its perceived effects on the health of the people of Ahoada East Local Government Area of Rivers State. A descriptive survey Design was adopted for the study. The population of the study comprised of all the people in Ahoada Local Government Area. A simple random sampling technique was used to select four hundred and twenty-four participants. Data was collected using a structured questionnaire and analyzed using simple percentage, mean, standard deviation and ANOVA at 0.05 alpha level the mean age of respondents as 28.27 ± 4.02 years. 50.2% were females. 49.8% were males, 42.7% were married, 40.6% had tertiary level of education and 44.3% were working with pay. The finding of this study showed that flooding was low. The major source of flood found was heavy rainfall (34.9%). Majority (81.6%) indicated that flood had ever affected their health. The perceived physical health effects were fever (92.2%), malaria (88.2%), cholera (78.3%), typhoid (77.8%), foot sores (70.8%), spontaneous abortion (miscarriage) (68.4%), dermatitis (67.0%) diarrhea (66.7%), and conjunctivitis (60.6%). The perceived mental health effects include; suicide ideation (77.8%), forgetfulness and soliloquizing (74.3%), post-traumatic stress disorder (73.6%), and mental disorder (60.4%). The perceived emotional health effects of flooding were anxiety and disappointment (94.1%) followed by emotional stress and sadness 381(89.9%). Depression and illusion 349(82.3%), and insomnia and headache 297(70.0%). The result of the tested hypotheses showed that statistically there is a significant difference between flood and perceived mental health ($p < 0.05$), emotional health ($p < 0.05$) and physical health consequences which can affect physical, mental and emotional well-being. It was recommended therefore, house management agencies and town planners should ensure that building of houses and structures are supervised and well planned in such a way that will not precipitate flooding.

Key Words: Flood, Health effect, Prevalence, Ahoada East

Introduction

Flooding stands out from some other types of disasters. According to Johnman (2005), flooding is the presence of water in areas that are usually dry. The Center for Research on the Epidemiology of Disasters (CRED) (2009) described flood as a significant rise of water level in a stream, lake, reservoir or coastal region. The types of flood as hinted by Ahern, Kovats, Wilkinson, Few. And Matthie (2005) are, flash floods from the overflow of hilly rivers, rain floods due to poor drainage, monsoon floods in the flood plains of major rivers and coastal floods following storm surge. Several factors were found to contribute to flooding. The World Health Organization (2011) specified that factors that precipitate flood events include climate change, sea level rise, meteorological conditions, continuous rainfall, cloud outbursts and constrained drainage of rainwater. However, Queensland Government (2014) asserted that flood is usually associated with some health, economic and emotional effects. According to Usman (2012), though flood is not the leading cause of death in Nigeria, but it affects and displaces more people than any other natural disaster. However, Gray (2016) noted that, dealing with the effects of flooding is likely to be a key public health challenge for the 21st Century.

The emotional effects of flooding include: anxiety and depression, post-traumatic stress disorder (PTSD) and suicide (Ahern, Kovats, Wilkinson, Few and Mathie, (2004). Accounts of the emotional effects of flood events suggest that they can have significant effects on people's wellbeing, relationships and mental health. Gray (2016) posited that flooding have made many suffer depression, anxiety, loss of a sense of home, with loss of social contact and strain on personal relationships. In addition, flooding has made many suffer economic hardship and substantial welfare problems such as negotiating with insurance companies and mortgage companies while their houses are rebuilt. Despite of numerous effects of flooding recorded by researchers, its prevalence is still evident.

According to Inyama, Muanya and Adepetun (2011), Nigeria has been one of the worst hit by flooding in African continent, as in 2010 for instance; there was outbreak of flood which affected the homes and crops of the people concerned. In a report released by the National Emergency Management Agency (NEMA) (2012), it was shown that many Nigerian coastal and inland cities experienced heavy rain and were gasping for breath due to flooding. However, Rahman (2011) stated that, due to unplanned urbanization, the towns and cities are most vulnerable to floods especially during the non-stop rainfall even if it is for a small period. The case of Ahoada East in Rivers State is not exempted in this respect.

Statement to the Problem

Flood is the most common natural disaster in both developed and developing countries, and it is occasionally of devastating impact (Ahern, Kovats, Wilkinson, Few and Matthie, 2005). According to NEMA (2012), in Nigeria, 2010 marked the worst hit of flooding as it rendered millions homeless and cost both individuals, families and the Nigerian government billions of Naira (NEMA, 2012). With respect to health, the effects of flooding on health vary between population for reasons relating to population vulnerability and type of flood event (Hajat, Ebi and Kovats, 2003). In flood conditions, there is potential for increased outbreak of infectious disease, especially in areas where the population does not have access to clean water and sanitation. Data from Intergovernmental Panel on Climate Change (2008) found that 70% of those who had been flooded and moved out of their homes reported health problems. Of those affected by floods overall, 64% said that their health had been adversely affected, most commonly with a range of conditions, including dermatitis, worsening asthma, arthritis and chest infections. According to the World Health Organization (2012), during flood, there is an increased risk of infection of water-borne diseases contracted through direct contact with

polluted waters, such as wound infections, dermatitis, and conjunctivitis, and ear, nose and throat infections.

Flood affected most coastal areas such as Bayelsa, Rivers State and Sokoto amongst other. In Rivers State even recently, Local Government Areas such as Ahoada East, Ahoada West, Ogba Egbema Ndoni, Akulga, and Obio/Akpor were the worst hit and many lives were negatively affected largely to flood and flooding. Many were rendered homeless and were made to live in shanties. Jakubicka, Vos, Phalkey and Marx (2010) reported that every year floods take thousands of lives, leave millions homeless and cause significant loss to properties and infrastructures all over the world. Doocy, Daniels, Murray and Kirsch (2013) stated that risk of catastrophic losses due to flooding is significant given deforestation and the increasing proximity of large populations to coastal areas, rivers basins and lakeshores; and acceleration in population growth. Living in flooded environment without social amenities poses health threat such as dermatitis, asthma, arthritis, cholera, diarrhea, typhoid, malaria gastrointestinal illness and chest infections.

It was observed by the researcher that the incessant rate of flooding has been prevalent and panacea should be provided, hence was motivated to investigate the prevalence of flooding and its perceived health effects on the people of Ahoada East Local Government Area of Rivers State.

Research Questions

The study aim to answer the following research questions;

1. What is the prevalence of flooding in Ahoada East Local Government Area of Rivers?
2. What are the perceived effects of flooding on the health of the people in Ahoada East Local Government Area of Rivers?
3. What are the perceived effects of flooding on the physical health of the people in Ahoada East Local Government Area of Rivers?

Concept of Flooding

According to Jonkman and Kelman (2005) flooding is the 'presence of water in areas that are usually dry. The Center for Research on the Epidemiology of Disasters (CRED) (2009) defined a flood as a significant rise of water level in a stream, lake, reservoir or coastal region. According to Geoscience Australia (2013), flooding can be conceptualized as a situation that results when a part of the earth surface that is usually dry is inundated and covered with water due to high amount of rainfall or the overflowing of a water body. Furthermore, flooding was expounded by Pagasa (2013) as a natural hydrological phenomenon which occurrence is usually the aftermath of metrological events such as seismic activities. Astronomically influenced phenomena (high tides coinciding with occurrence of high rainfall), construction of temporary dams, as well as the failure of hydraulic and other control structures.

The common types of floods are stated by Jonkman (2005); and Ashley and Ashley (2008) are flash floods, characterized by high-velocity flows and short warning times and riverine floods which are caused by gradual accumulation of heavy rainfall sufficient warning time. However, Ahern, Kovats, Wilkinson, Few and Matthies (2005) posited that, foods are classifiable according to cause (high rainfall, tidal extremes, structural failure) and nature (e.g. regularity, speed of onset, velocity and depth of water, spatial and temporal scale). Also, as stated by Dewan, Rahman and Miah (2014), different types of flood include, flash floods

from overflowing hilly rivers, rain floods due to poor drainage, monsoon floods in the flood plains of major rivers and coastal floods following storm surge. Consequently, Usman (2012) stated that, river flooding, though not the leading cause of death, but it affects and displaces more people than any other natural disaster.

According to Hunt (2005), weather factors such as heavy or sustained precipitation, snowmelt, or storm surges from cyclones or important human factors such as structural failures of dams and levees, alteration of absorptive land cover with impervious surfaces and inadequate drainage systems can increase the intensity of flood. However, the effects of floods are always debilitating, though their intensity and scope vary depending on terrain, intensity of human activities, quantum of water and the level of preparedness by the stakeholders (Dalil, Mohammad, Yamman, Husaini and Mohammed, 2015)

Causes of Flooding

The factors that cause flood are diverse, multifaceted, and interrelated. The Intergovernmental Panel on Climate Change (2001) asserted that, future climate change, altered patterns of precipitation and sea level rise are likely to increase the frequency of intensity of floods in many regions of the world. Also, the factors that are associated with the occurrence of flooding can either be attributed to human activities or nature. Weather factors which are natural include heavy or sustained precipitation, snowmelts, or storm surges from cyclones whereas important human factors include structural failures of dams and levees., alteration of absorptive land cover with impervious surfaces and inadequate drainage system (Hunt, 2005).

The report of Tarhule (2005) on a review of newspaper accounts of rain-induced flooding indicated that, the respondents attributed floods to five major causes; hydrologic, extreme/unseasonal rainfall, location of affected area, inadequate drainage, poor construction; and cumulative rainfall in the days preceding a heavy rain event are important predictors of flooding. Recent accelerations in population growth and changes in land use patterns have increased human vulnerability to floods (Jonkman and Kelman, 2005). As posited by Kan (2005), the occurrence of flood events are significant given population growth, proximities of populations to coastlines, expanded development of coastal areas and flood plains, environmental degradation and climate change. Nevertheless, Dixit (2007) pointed out that the major cause of flooding is constrained drainage of rainwater.

In the same vein, WHO (2011) stated that, the occurrence of flooding are likely to be impacted by climate change. However, Raman (2011) specified non-stop rainfall in unplanned settlements as the major cause of flooding. Other factors stated are meteorological conditions, continuous rainfall and cloud outbursts, (Ghatak, Kamal and Mishra 2012). Furthermore, Stanke Amlot, Nurse and Williams (2012) reported from a review of literature on flooding outcomes and recommendations that, projected climate-related increase in precipitation are likely to make floods more frequent and severe.

Flooding

Flooding is now the most frequent type of major disaster. Over the last 10 years floods have killed more than 1,000 people and affected over 3-4 million others (Jakubicka, Vos, Phalkey and Marx, 2010). In a historical review of flood events conducted by Doocy, Daniels, Murray and Kirsch (2013) on 'the human impact of floods; a historical review of events 1980-2009

and systematic literature review', using data analysis which included descriptive statistics, bivariate tests and multinomial logistic regression using State 11.0. The result revealed that, overall, an average of 131 (range 35-287) floods events occur annually with the majority (81%) occurring during or after the 1990s. The frequency of flood events in different regions was given by the authors as thus; American (24%), Western Pacific (23%), South East Asia (16%), Africa (15%), Europe (13%), and Eastern Mediterranean (9%).

Werritty, Houston, Ball, Tavendale, and Black (2007) on Exploring the social impacts of flood risk and flooding in Scotland with a sample of 2, 085 households in seven location, using the descriptive survey design and a semi-structured questionnaire for data a collection and simple percentages used to analyze the collected data, the result showed that, 633 respondents were from households which had been flooded and 590 from households not flooded but located within areas that had been flooded over the period 1993-2005. Also, the Center for Research on the Epidemiology of Disaster (2009) stated that, China is one of the countries where flood is prevalent. In Nigeria, Tarhule (2005) showed in a review on damaging flooding events that, fifty here (53) articles reported 79 damaging rainfall and flood events in 47 communities in Niger during the study period.

Biswas, Rahman and Maskreky (2010) on unintentional injuries and parental violence against children during flood; a study in rural Bangladesh using cross-sectional rural household survey, with a sample of 638 randomly selected married women of reproductive age with at least one child at home been interviewed face-to-face using pre-tested structured questionnaires with chi-test and logistic regression been used for data analysis, the result revealed that, majority families (90%) were affected by the flood.

Perceived effects of flooding on health

The relationship between flooding and ill health is complex. Many important infections are transmitted by mosquitoes, which breed in, or close to, stagnant or slow-moving water. According to El-Sayed, Arnot and Mukhtar, (2000), the collection of stagnant water due to the blocking of drains by floods, can be associated with increases in mosquito-borne transmission.

Flooding has taken its toll on health. In a case-control studies, by Sur, Dutta and Nair (2000) on Severe cholera outbreak following floods, it was reported that, post flood increased the outbreak of cholera among the study population. In a surveillance carried out by Ogden, Gibbs-Scharf and Koh (2001) on Emergency health surveillance after severe flooding in Louisiana, Pre-hospital and Disaster Medicine with a total of 124 households sampled randomly using the descriptive survey design with descriptive statistics to analyze the data, it was shown that, musculoskeletal, lacerations, motor vehicle injuries and falls were reported by respondents.

Perceived effects of flooding on physical health

The effect of flooding on physical health can lead to some water-borne diseases such as typhoid fever, cholera, leptospirosis amongst others and vector-borne diseases, such as malaria, dengue and dengue hemorrhagic fever.

Water-borne diseases

Waterborne diseases are diseases caused as a result of the consumption of contaminated water. Floodwater is generally contaminated by various pollutants; sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, and rusting building materials amongst others (Public Health Laboratory Service, 2000). Water-borne diseases are diseases caused as a result of the consumption of contaminated water. Examples are typhoid fever, cholera, diarrhea, dermatitis, conjunctivitis and wound infection amongst others. In a case control study by Sur, Dutta and Nair (2000) on severe cholera outbreak following floods. It was reported that, post flood increased the outbreak of cholera among the study population. In an analysis of routine data by Vollaard. Ali and Van-Asten (2004) on Risk factors for typhoid and paratyphoid fever, it was indicated that, flooding caused an increase in the outbreak of typhoid and paratyphoid among respondents.

Flooding impairs clean water sources with pollutants and devastates sanitary toilets. Direct and indirect contact with the contaminants whether through direct food intakes, vector insects such as flies, unclean hands, or dirty plates and utensils result in waterborne illnesses and life-threatening infection disease. The pollutants also saturate into the ground water and/or can infiltrate into sanitary sewer lines through the ground. In addition, wastewater treatment plants, if flooded and malfunctioned, can be overloaded with polluted runoff waters and sewage beyond their disposal capacity, resulting, into backflows o raw sewage to homes and low lying grounds. Private wells can be also contaminated or damaged severely by floodwaters, while private sewage disposal systems also become a cause of infection and illnesses when they are broken or overflowed (Center for Disease Control and Prevention, 2005). In this manner, unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to diseases outbreaks. e.g. life-threatening cholera, typhoid, and dysentery. The key to preventing a health catastrophe is therefore a basic hygiene; i.e. clean and safe water and toilets.

- **Vector-borne diseases**

Floods may indirectly lead to an increase in vector-borne diseases through the expansion in the number and range of vector habitats. Standing water caused by heavy rainfall or overflow of rivers can act as breeding sites for mosquitoes, and therefore enhance the potential for exposure of the disaster-affected population and emergency workers to infections such as dengue, and malaria. Flooding may initially flush out mosquito breeding, but it comes back when the waters recede. The lag time is usually around 6-8 weeks before the onset of a malaria epidemic (El-Sayed, Arnot and Mukhtar, 2000). Malaria epidemics in the wake of flooding are a well-known phenomenon in malaria-endemic areas worldwide. For instance flooding on the Dominican Republic in 2004 led to malaria outbreaks. The risk of outbreaks is greatly increased by complicating factors, such as changes in human behavior (increased exposure to mosquitoes while sleeping outside, a temporary pause in disease control activities, overcrowding), or changes in the habitat which promote mosquito breeding (landslide, deforestation, river damming, and rerouting) (WHO, 2010).

Leptospirosis, or Weil's disease – a zoonotic bacterial disease associated predominantly with rats- often accompanies floods in developing countries (Leptospirosis Information Center, 2017). The leptospirosis risk is however very low in the industrialized regions unless any cuts or wounds have direct contact with the disease contaminated floodwaters animals.

Perceived effect of flooding on mental health

The mental health symptoms of flooding include insomnia, anxiety, depression, stress, post-traumatic stress disorder, and suicide ideation. Flooding and its consequences can have wide ranging effects on the mental health of individuals. A case-control study done by Reacher, McKenzie and Lane (2004) on Health impacts of flooding: a comparison of reported gastrointestinal and other illness and mental health in flooded and non-flooded households through telephone interview of 227 cases (house flooded and 240 controls (non-matched) using interview guide for data collection and analysis done using descriptive statistics found a fourfold increase in mental distress among adults whose homes were flooded compared with those whose homes were not. The World Health Organization (WHO) recognizes that the psychosocial consequences of floods have not been fully addressed by those in the field of disaster preparedness or services delivery however, the main evident relates to common mental disorder, posttraumatic stress syndrome, and suicide ideation (WHO, 2011).

Perceived effect of flooding on emotional health

Correspondingly, Stanke, Amlot, Nurse and Williams (2012) added that, flooding is very stressful and that the stress continues for a long time after the water has receded. In review by Ahern, Kovats, Wilkinson, Few and Matthies (2005), it was reported that a number of epidemiological studies showed that flooding can result in common mental disorders (including anxiety and depression), post-traumatic stress disorder (PTSD) and suicide. Also the Pitt Review (2007) found that, flood is associated most commonly with stress, anxiety and depression. The study of Gray (2016) on the long-term effects of flooding experience reported ongoing anxiety, a lack of security, anxiety and loss of a sense of home, loss of social contact and strain on personal relationships as the major effects of flooding among participants.

Research Design

The research design adopted for this study is a descriptive survey design. In this design, questionnaires will be constructed, administered to respondents and analyzed against the research questions in chapter one. Wali (2002) asserted that, this designed is used when the researcher is interested in unraveling the present situation of certain features and events in the population. Similarly, Elendu (2010) described this research design as one that generates data from a selected population, studying and describing events as they occur in their natural setting at a particular time. This design was successfully used by Kofo (2012) in a study on the challenges of floods in Lagos state. Hence, it is considered appropriate for this study.

Population of the Study

The study population comprised of all the 233,700 persons Ahoada East Local Government Area of Rivers State (National Population Commission, 2016).

Sample and Sampling Technique

From the population, a sample of 424 people was selected for the study using the following Cochran formula for calculating sample size given as:

$$n = \frac{z^2 pq}{d^2}$$

Where;

n = sample size, Z = confidence level 95% $(1.96)^2$, p = 50% = 0.5.

q = 1-p = 0.5, d^2 = confidence interval = 5% = 0.05^2 = 0.0025

Adjusting for a non-compliance rate of 10%. The total = 424

From the population, a sample random sampling technique was used to select the 424 participants for the study. Simple random sampling technique was used to select 8 wards. Then non-proportionate stratified random sampling technique was used to select the respondents from each ward as shown below:

Sample size allocation table

Wards	Distribution
Ward 1	53 respondents
Ward 2	53 respondents
Ward 3	53 respondents
Ward 4	53 respondents
Ward 5	53 respondents
Ward 6	53 respondents
Ward 7	53 respondents
Ward 8	53 respondents
Total	424

Method of Data Analyses

The data collected will be analyzed using statistical package for social sciences (SPSS) version 20.0. Data analysis will be by both descriptive and inferential statistics at 95% confidence level using the SPSS software. Frequency table will be generated for relevant variables. Hypotheses 1 and 2 will be tested with Analysis of Variance (ANOVA) at 0.05 significant levels.

Frequency distribution showing the perceived sources of flooding

Sources of Flood	Frequency (F)	Percentage (%)
Overflow of River Niger	111	26.2
Heavy rainfall	148	34.9
Overflow of fresh sea water	98	23.1
Overflow of one way flowing water	49	11.6
Non response	18	4.2
Total	424	100

The sources of flood found in the study area as shown in table 4.8 include; overflow of salty sea water 111(26.2%), heavy rainfall 148(34.9%), overflow of fresh sea water 98(23.11%) and overflow of one way flowing water 49(11.6%).

Perceived Physical Health effect of Flooding

Items	True F(%)	False F(%)	Total F(%)
Ever had health effect due to flooding*	346(81.6)	60(14.2)	424(100)
Dermatitis (skin disease)	284(67.0)	140(33.0)	424(100)
Conjunctivitis (Apollo)	257(60.6)	167(39.4)	424(100)
Malaria	374(88.2)	50(11.8)	424(100)
Fever	391(92.2)	33(7.8)	424(100)
Diarrhea	283(66.7)	141(33.3)	424(100)
Cholera	332(78.3)	92(22.2)	424(100)
Typhoid	330(77.8)	94(22.2)	424(100)
Foot sores caused by infection	300(70.8)	124(29.2)	424(100)
Spontaneous abortion (miscarriage)	290(68.4)	134(31.6)	424(100)

Death due to the flooding	382(90.1)	42(9.9)	424(100)
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*Non response excluded

Table 4.9 revealed that 346(81.6%) of the respondents indicated that flooding had ever affected their health. The highest proportion among the physical health effects found was fever 391(92.2%), followed by malaria 374(88.2%), cholera 332(78.3%), typhoid 330(77.8%), foot sores 300(70.8%), spontaneous abortion (miscarriage) 290(68.4%), dermatitis 284(67.0%), diarrhea 283(66.7%), and conjunctivitis 257(60.6%).

Perceived Mental Health effect of Flooding

Items	True F(%)	False F(%)	Total F(%)
Mental disorder	256(60.4)	168(39.6)	424(100)
Forgetfulness and soliloquizing	315(74.3)	109(25.7)	424(100)
Post-traumatic stress disorder	312(73.6)	112(26.4)	424(100)
Suicide ideation	330(77.8)	94(22.2)	424(100)

Table 4.10 shows the mental health effects of flooding which include suicide ideation 330(77.8%), forgetfulness and soliloquizing 315(74.3%), post-traumatic stress disorder 312(73.6%) and mental disorder 256(60.4%).

Conclusion

Based on the findings of the study, it was concluded that flooding, no matter how infrequent it occurs, it carries with it health consequences which affect physical health characterized by fever, malaria, cholera, typhoid, foot sores, spontaneous abortion, dermatitis, diarrhea and conjunctivitis; mental health characterized by suicide ideation, forgetfulness and soliloquizing, post-traumatic stress disorder and mental disorder; and emotional health characterized by anxiety and disappointment, emotional stress and sadness, depression and illusion, and insomnia and headache.

Recommendations

Based on the finding of this study the following recommendations are hereby made:

1. Environmental Management Agencies should embark on some palliative measures such as dredging and re-dredging of drains, erosion passages; and construction of embankments and channelization of some routes that are prone to flooding; and direct clearing of some existing drainages.
2. House management agencies and town planners should ensure that building of houses and structures are been supervised and well planned in such a way that will not precipitate flooding.
3. The ministry of works and infrastructure should be tasked by the governments to ensure free drainage channels and erosion passages. The ministry should enforce drainage clearing through persuasive approach.
4. Residents, markets and stores, hospitals and maternity homes, schools and colleges should be compelled to ensure that their surroundings are clean, clear and free of refuse before, during and after raining seasons. That is, everyone must cultivate the habit of daily clearing of drains in his/her surroundings to avoid flooding which may be caused by blocked drainage.

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