

Research Article**A Brief Look at Flooding and Its Impacts on Nigeria's Health Sector**

Benjamin Anabaraonye ¹, Chioma Ajator ², Victor Otti ³, Beatrice. O. Ewa ⁴,
Charles Anukwonke⁵

1. Institute of Climate Change Studies, University of Nigeria, Nsukka, Nigeria.
2. Department of Community Medicine, NAUTH Nnewi, Anambra State, Nigeria.
3. Department of Civil Engineering [Water Resources & Environmental], Federal Polytechnic, Oko, Anambra State, Nigeria.
4. Institute of Climate Change Studies, University of Nigeria, Nsukka, Nigeria.
5. Department of Environmental Management, Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria.

***Corresponding Author: Benjamin Anabaraonye**, Institute of Climate Change Studies, University of Nigeria, Nsukka, Nigeria.

Received Date: May 08, 2021

Publication Date: June 01, 2021

Abstract

Flooding is one of the major disasters affecting many countries of the world annually. Over the years, Nigeria has witnessed unprecedented flooding in many states of the country. These incessant cases of flooding in States like Lagos, Anambra, Enugu, Rivers, Taraba, Kogi, Benue, Katsina, Niger, Kano and Nasarrawa States in Nigeria have affected the environment, caused outbreak of diseases, damaged properties and endangered the lives of humans and animals. The issues of flooding demand an urgent attention from the Nigerian Government at all levels in order to salvage many lives and properties affected as a result of flooding. This study vividly examines the causes of flooding and the impacts of flooding on Nigeria's health sector and the innovative solutions for sustainable development. It further outlines the need to educate communities on how to mitigate the impacts of flooding and flood disaster risk reduction for sustainable development in Nigeria. It also explores innovative tools such as poetry, educational blogs, etc. which can be used to educate communities and institutions on the impacts of flooding on Nigeria's health sector and how to adapt and mitigate effectively for sustainable development.

Keywords: Adaptation, Climate Change, Flooding, Mitigation, Nigeria.



Introduction

Flooding is one of the direct impacts of climate change and has a profound effect on Nigeria's health sector. The impacts of flooding which is as a result of climate change are felt profoundly on Nigeria's health sector which imply that due considerations to health issues as part of climate change mitigation and adaptation efforts has become a pressing issue. Flooding which is a result of climate change has been described as an existential threat to human well-being. Globally, it affects the social and environmental determinants of health: clean air, safe drinking water, sufficient food and secure shelter. The effects of flooding are far-reaching and include severe weather, deteriorated air quality, displacement and migration of vectors resulting in increase of a range of diseases related to water and ecological factors. Increasing incidences of mental health issues are being recorded and identified as a consequence of environmental change (Lu, 2016; PAHO, 2013). Flooding has posed as a serious threat to soil fertility in Nigeria which in turn affects crop yield and the health of the populace. Nwadinigwe(2018) attributed flooding as one of the major causes of food insecurity, soil infertility, erosion and destruction of farmlands in Nigeria . Soil remain the most critical factor in human lives that is essential in food production required for the sustenance of human civilizations and is threatened in recent times by the forces of environmental threats. These threats are climate change and global warming escalated by the forces of diverse erosions and floods disasters. Nwadinigwe(2018) asserted that flooding events can be aggravated from the overflowing of seas and rivers caused by the melting of glaciers as a result of high temperatures of global warming.

In the globalizing world today, Nigeria inclusive, the visible impacts of climate change and global warming on soil fertility and prospects for agricultural productivity occasioned particularly, by the prevailing challenges of flooding, erosion and excessive rainfalls, remains an increasing challenge not just only to governments (state actors) with their various multi-lateral organizations but to numerous non-state actors including non-governmental organizations (NGOs) around the world (Anabaraonye.B., Okafor.J.C; & Eriobu.C., 2019). Nwadinigwe(2018) affirmed that flooding affected production and transportation from affected areas to other places in Nigeria including Nsukka environs. Dr. Margaret Chan, the World Health Organization(WHO) Director-General on the World Health Day 2008 affirmed that Climate change is one of the greatest challenges of our time.It affects in profound ways, some of the most fundamental determinants of health: food, air, water. In the face of this challenge, we need champions throughout the world who will work to put protecting human health at the center of the climate change agenda(Chan 2008)".

Nigeria faces numerous challenges as it struggles to achieve the Sustainable Development Goals (SDGs) with flooding being one of the most serious natural disaster with wide-reaching impacts. It is a known



fact that climate change is altering the weather and climate globally, which invariably affects human life. It is therefore important to remark that anything that affects our lives on earth will be of great concern to us (Okeke.F.N, Okoro.C.E.& Josephine.O.U,2018). Health is equally affected by flooding particularly in transmission of diseases in Nigeria.e.g. Malaria epidemic that is related to high relative humidity and rainfall that assists in increasing breeding sites(Okeke.F.N, Okoro.C.E. & Josephine.O.U,2018).Climate change is one of several concurrent global environmental challenges that simultaneously affect human health – often interactively. A good example is the transmission of vector-borne infectious diseases, which is jointly affected by climatic conditions, population movement, forest clearance and land-use patterns, biodiversity losses (e.g, natural predators of mosquitoes), freshwater surface configurations, and human population density. Climatic influences on health are often modulated by interactions with other ecological processes, social conditions and adaptive policies. In seeking explanations, a balance must be sought between complexity and simplicity. The high number of dams in Nigeria has impeded the free flow of waters above river banks thereby flooding the riverine communities and neighboring towns. Displacement of people away from their community's infrastructure leads to poor sanitation, water-borne diseases and an increased risk of communicable diseases. Climate change with the resultant warming of environment is caused both by natural and human force multipliers, however, human actions on the environment account for the majority of the impacts (Anabaraonye. B., Okafor. J. C, & Hope.J.,2018).

Flooding is now an existential threat and one of the greatest challenges facing this generation. In Africa, flood impacts are felt across various sectors of the economy, including education, agriculture, livestock, transport, housing, public health, industrial processing, and tourism which have severe socio-economic and political implications (Dida et al, 2013). These disasters affect not only individuals, but can also tear the fabric of social life in larger communities, even whole countries. One prominent feature about flooding is that it does not discriminate but marginalizes whosoever refuses to prepare for its occurrence (Etuonovbe, 2011). This calls for preparedness for both great and small with regards to the devastating impacts of climate change. Flood affects more people on an annual basis than any other form of natural disaster. A variety of climatic and non-climatic processes influence flood processes resulting in different types of floods (Collins and Simpson, 2007). Increasing flood risk is now being recognized as the most important threat from climate change in many parts of the World (Dyson, 2002). Several studies have adduced extreme rainfall to be the major cause of flood worldwide including Nigeria (Ologunorisa and Tersoo, 2006). These studies included Gobo (1988), McEwen (1989), Oriola (1994), Babatolu (1996), FMWRD (1998), Odekunle (2001), Fowler and Kilsby (2003) as well as Ologunorisa (2004). But other authors have identified the characteristics of extreme rainfall that are associated with flood frequency in Nigeria to include duration, intensity, frequency, seasonality, variability, trend and fluctuation



(Olaniran, 1983; Ologunorisa, 2001; Ologunorisa and Diagi, 2005).

The International Federation of the Red Cross (IFRC) (2012) reported that children from the marginalized sector of society dwelling in flood prone, slum areas are among the most affected. This is a major humanitarian concern and poses a threat to the achievement of Sustainable Development Goals. Education is well accepted as the most important factor for achieving sustainable development and used as an important means for changing attitudes and behaviour (Turnbull and Street, 2013). The Hyogo Framework for Action recognizes this and encourages governments and civil society to use education which facilitates knowledge and innovation in order to build a culture of safety and resilience at all levels of the nation. The most vulnerable, yet understudied group, when disasters occur are school children (Masese et al., 2012). The flooding and its attendant effects have a profound effect on the health of school children in Nigeria. The effects of flooding to the socio-economic and psychological well-being of children need to be well documented for present and futuristic use in Nigeria. The destruction of schools is one way in which floods can inhibit educational attainment (Achoka and Maiyo, 2008).

Protecting the health of students and teachers of various educational institutions in Nigeria during natural hazards like flooding is paramount in the 21st Century. In Zambia, the students were unable to cross rivers due to collapsed bridges and culverts and the most affected districts reported 40 to 50 per cent reduction in school attendance (Zambia Vulnerability Assessment Committee, 2007). Education in emergencies is a necessity that can be both life-sustaining and life-saving; providing physical, psychological and cognitive protection (Richardson, 2011). It is obviously clear that business as usual is no longer good enough and will not ameliorate the impending crises. Responsive, deep and transformative action is needed throughout Nigeria and beyond not only to reduce emissions and stabilize global temperatures, but to build a safer, healthier and more resilient health sector for the future. Flooding is not only an environmental issue but a serious threat to the health sector since its adverse effects disproportionately affect educational institutions, and health centers, leaving patients in hopelessness. Changing rainfall has brought inundation and changed coastal ecosystem which exacerbated existing humanitarian stress and affect distribution of drugs to the inner communities in Nigeria. The question that still confronts us is how to tackle the incessant cases of flooding in Nigeria. These questions have engaged the imaginations of many and a variety of solutions have been offered.

In pursuance of these goals, the chapter considers the following specific objectives:

- a) To investigate and summarize evidence of flooding in Nigeria and to critically review efforts towards addressing its threats in the country especially the health sector.



- b) To identify knowledge gaps relevant to the reduction of flood risk in the country.
- c) To make supported recommendations towards building flood resilient communities.

Understanding Flooding and Its Impacts on Nigeria's Health Sector

A flood is an overflow of water that submerges land that is usually dry. Flooding may occur as an overflow of water from water bodies, such as a river, lake, or ocean, in which the water overtops or breaks levees, resulting in some of that water escaping its usual boundaries or it may occur due to an accumulation of rainwater on saturated ground in an areal flood. The primary effects of flooding include loss of life, damage to buildings and other structures, including bridges, sewerage systems, roadways, and canals. In Nigeria, flooding has become dangerous to human health in most urban and rural areas because of overcrowded slums, where drainage is poor or does not exist at all (Olajoke, Akeem & Ikotun, 2103). Floods are major disasters affecting many countries of the world including Nigeria. Following the year 2012, floods disaster in many Nigerian states christened as unprecedented in the history of Nigeria in the past 40 years. The loss of many lives and properties worth millions of naira were recorded (Action aid, 2012).

Apart from the health of Nigerians affected by the recent floods that affected 12 states out of the 36 states according to National Emergency Management Agency (NEMA,2013), 176,300 people has been displaced, 150,000 hectares of farmland and 17,800 houses submerged and 321 roads and bridges destroyed as a result. Flooding has far reaching impacts on people's health both physical, emotional and mental and its consequences include: crisis of not having good drinking water, shelter, sanitation problems which spread deadly communicable disease like cholera, malaria, diarrhea, skin and soft-tissue infections with other air-borne infections. Similarly, when health facilities are submerged by heavy flooding, access to healthcare and drugs becomes an issue of concern to the victims of flooding and the government. Flooding or floods apparently are known with water borne diseases. Thus, many wells and boreholes are contaminated by continuing overflowing sewage and refuse dumps. Again, public water supplies are disrupted by floods which destroy electricity supply and affects water pipes. All these collectively and considerably have impacts on people's health. Specifically in Nigeria, numerous factors but not limited to the following, heavy rainfall, oceans storms and tidal waves usually along the coast, silting, burst water from main pipes, dam failures, population pressure, deforestation, trespassing on water storm drains, unplanned urbanization, poor sewerage management, neglecting warnings from hydrological system data are major causes of 2012 flooding in Nigeria.



Floods also frequently damage power transmission and sometimes power generation which then has knock-on effects caused by the loss of power. This includes loss of drinking water treatment and water supply, which may result in loss of drinking water or severe water contamination. It may also cause the loss of sewage disposal facilities. Lack of clean water combined with human sewage in the flood waters raises the risk of waterborne diseases, which can include typhoid, cryptosporidium, cholera and many other diseases depending upon the location of the flood. Damage to roads and transport infrastructure may make it difficult to mobilize aid to those affected or to provide emergency health treatment. Flood waters typically inundate farm land, making the land unworkable and preventing crops from being planted or harvested which can lead to shortages of food both for humans and farm animals.

Entire harvests for a country can be lost in extreme flood circumstances. Some tree species may not survive prolonged flooding of their root systems. Folorunsho and Awosika (2001) as well as Ologunorisa (2004) reported that floods do occur in Nigeria in three main ways; coastal flooding, river flooding and urban flooding. Coastal flooding occurs in the low lying belt of mangrove and fresh water swamps along the coast. River flooding occurs in the flood plains of the larger rivers, while sudden, short-lived flash floods are associated with rivers in the inland areas where sudden heavy rains can change them into destructive torrents within a short period. And urban flooding on the other hand occurs in towns, on flat or low-lying terrain especially where little or no provision has been made for surface drainage, or where existing drainage has been blocked with municipal waste, refuses and eroded soil sediments (Folorunsho and Awosika 2001; Ologunorisa, 2004).

- i) Flood Risk maps can be developed to enable the users to clearly identify the flood risk areas. The advantage of such comprehensive flood risk assessments is that it is possible to compare the components of risk in quantitative terms.

The Role of Climate Change in Flooding on Nigeria's Health Sector

For each potential impact of flooding, health sectors are particularly adversely affected by it leaving the patients vulnerable to disease and injury. The level of vulnerability to flooding of those communities depends on factors such as population density, level of economic development, food availability, income level and distribution, local environmental conditions, pre-existing health status, and the quality and availability of public health care. For instance, those most at risk of being harmed by flooding include socially isolated city dwellers, vulnerable children, the elderly and the poor. Populations living at the present margins of cough, malaria and dengue, without availability of primary health care will be the most susceptible if these diseases expand their geographic range in a warmer environment.



Flooding has a major health effect on both individuals and communities in Nigeria at large which include the following:

- i) Flood water is usually unclean and can contaminate a cities' source of clean water hence enhancing the spread of waterborne diseases like malaria, cholera, typhoid fever, yellow fever, etc.
- ii) Flood water can cover pits, drainages and waste dumps which may result to injuries, fractures, drowning or near drowning to victims who fall into the traps and snares of flood waters unawares.
- iii) Flood water can also lead to skin diseases like dermatitis, trench foot, etc.
- iv) Flood can make people to lose their properties and sources of livelihood which can adversely affect their mental health leading to depression, post-traumatic stress disorder and suicide in extreme cases.
- v) Flood can result in the displacement of people from their homes to a temporary accommodation. This temporary accommodation is very prone to food shortage, kidnapping and armed robbery. This food shortage can lead to malnutrition and is a common cause of death especially among under five children in Nigeria.
- vi) Over population which can occur as a result of relocation of many displaced persons to temporary accommodation can cause respiratory diseases like Tuberculosis and other communicable diseases.
- vii) Social vices such as rape, sexual assault, verbal abuse, drug abuse, stealing and smoking, etc are usually intensified in the relief camps where victims of flood disaster are temporarily accommodated.
- viii) Flooding affects the health education of school children which can prevent them from getting the required knowledge and care needed for their good health and well-being.

The Benjy Poetry and Music Global Concepts

The Benjy Poetry and Music Global Concepts is one of the new companies in Nigeria which among other things is very passionate about climate change education, adaptation and mitigation for global sustainability. This passion to see the environment kept clean and green has led to a lot of study and research work on climate change education, adaptation and mitigation. This has also engineered the writing of climate change poems to help promote the right attitudes and behaviors needed to safe-guard our environment. According to Victor Pinchuk, a Ukrainian businessman and philanthropist, "Art, freedom and creativity will change society faster than politics". Through the Project Green educational blog: www.projectgreeninitiative.wordpress.com which features articles and poems on climate change adaptation and mitigation for global sustainability, the company seeks to educate communities and institutions on strategies for climate change adaptation and mitigation for global sustainability. Poetry has been discovered as a valuable tool which has therapeutic benefits and can be used to educate communities in Nigeria on the impacts of flooding and ways to adapt and mitigate for sustainability



(Anabaraonye.B, Nji.A.I, Hope.J.,2018).

Below is one of the recent climate change poems advanced by the Benjy Poetry And Music Global Concepts and the case study which further helps to illustrate how poetry can be used to educate communities and institutions on the impacts of flooding on the health sector in Nigeria:

POEM: THINK BEYOND, LIVE WITHIN

Think beyond the demise and debris
Think beyond the plight and blight
Live within the joy of a promise
The joy of a sustainable future bright.

Think beyond the doom and gloom
Think beyond the thirst and waste
Create in your mind a beautiful room
Live within the quest for the best.

Think beyond the pollution and degradation
Think beyond and see limitless possibilities
Live within climate adaptation and mitigation
Using waste recycling and renewable energy.

Think beyond the erosion and deforestation
Think beyond the hurricane and floods
Create a sustainable environment with afforestation
Live within a greener and cleaner world (Anabaraonye.B, 2019).

Recommendations

The following innovative strategies could be deployed in educating communities and institutions towards adaptation and mitigation to the impacts of flooding in Nigeria's health sector:

A. **Engagement of village town crier:** Engaging village town criers through the collaboration of various community authorities in our local government could be one of the fastest avenues of reaching individuals in rural areas in Nigeria. The village town criers can vividly disseminate information about



impending flood disasters and ways to adapt and mitigate flooding in their communities and institutions to ensure our sustainable future.

B.Non-governmental organizations (NGOs): Non-governmental organizations(NGOs) that are climate change professionals and educators can be used as valuable tools in reaching and educating the students and teachers in various educational institutions through their respective union in local governments and states in Nigeria. These NGOs can conduct seminars, symposiums, and workshops on adaptation and mitigation strategies to flooding impacts in Nigeria’s health sector.

C.Religious institutions: These religious institutions can act as a crucial platform for reaching individuals in their various churches, mosques, and other traditional religious centers. This is because majority of Nigerians are religious. This avenue can also be used to educate the people about the impacts of flooding and the flood management strategies to ensure sustainability in Nigeria’s health sector.

D.Use of radio and television jingles: This is a valuable tool which can be used in reaching many individuals, both young and old, in Nigeria through radio and television programs, jingles, adverts, etc. Through this platform, the effects of flooding on various institutions in Nigeria are show-cased and ways to adapt and mitigate flooding for our sustainable development in Nigeria’s health sector are also highlighted.

E.Educational blogs: This is a tool which can be used to inform, enlighten, and educate students and teachers in various educational institutions in Nigeria about the impacts of flooding and ways to adapt effectively for sustainable development. These blogs which are meant to be highly interactive also allow the teachers and students, farmers and fishermen, etc. to also contribute their ideas, suggestions, and feedback to the climate change educators and bloggers for sustainability.

Conclusion

We can adapt and mitigate the impacts of flooding on the health sector in Nigeria through the following ways:

- (a)Effective town planning and avoiding the building of residences especially hospitals in flood plains.
- (b)Government policy on urbanization in Nigeria should be revisited to discontinue the construction of houses, roads, bridges haphazardly.



- (c) Construction of roads culvert and drainages should be expansive to accommodate the flow of water.
- (d) Indiscriminate dumping of refuse, faeces in culvert and drainages should be stopped because infectious diseases are contacted and transmitted to people from one state to the other.
- (e) Early warning signs and information about flooding should be communicated to Nigerians through radio, television, internet and numerous social media platforms in order to avoid casualties in the future.
- (f) Indiscriminate falling of trees should be avoided and planting of trees should be encouraged both by the government, health professionals and individuals.
- (g) Keep drainages free of debris to enhance free flow of water of run-off water.
- (h) In the event of flooding, the government and other donor agencies should come up with emergency relief measures and materials including adequate medical care and security outfits to alleviate the suffering of families affected by flooding.
- (i) Poetry with its therapeutic benefits should be used as a valuable tool to educate communities and institutions in Nigeria on the impact of flooding on Nigeria's health sector and ways to adapt and mitigate for global sustainability.

References

1. Achoka J. & Maiyo J. (2008). Horrifying Disasters in Western Kenya: Impact on Education and National Development. *Educational Research and Review* Vol. 3 (33) pp, 154-161
2. Action aid (2012). Flood in Nigeria: Re-visiting States Accountability on Emergency Response/Preparedness and Disaster Risk Reduction in Nigeria. October Policy brief.
3. Adekola, O. , and J.Lamond . 2018. "A Media Framing Analysis of Urban Flooding in Nigeria: Current Narratives and Implications for Policy." *Regional Environmental Change* 18 (4): 1145–1159. doi:10.1007/s10113-017-1253-y.
4. Adelekan I., 2010, 'Vulnerability of poor urban coastal communities to flooding in Lagos, Nigeria', *Environment and Urbanization* 22, 433–450. 10.1177/0956247810380141



5. Anabaraonye.B., Okafor, J. C. & Eriobu.C.M. (2019). Green Entrepreneurial Opportunities in Climate Change Adaptation And Mitigation For Sustainable Development In Nigeria. *Journal of Environmental Pollution and Management* 2(102), 1-6.
6. Anabaraonye.B, Okafor, J.C & Hope.J. (2018). Educating Farmers In Rural Areas On Climate Change Adaptation For Sustainability In Nigeria. In: W. Leal Filho (Eds.), *Handbook of Climate Change Resilience*, Springer Nature Switzerland Ag. https://doi.org/10.1007/978-3-319-71025-9_184-1
7. Anabaraonye.B.(2019).Think beyond , Live Within. <https://projectgreeninitiative.wordpress.com/2019/08/02/think-beyond-live-within/>
8. Anabaraonye.B,Nji.A.I,Hope.J.(2018) Poetry as a valuable tool for climate change education for global sustainability. *International Journal of Scientific & Engineering Research*.Volume 9, Issue 9,September 2018.ISSN 2229-5518,81-85.
9. Anabaraonye.B,(2017) Climate change education for sustainable development in Nigeria. *Review of Education, Institute of Education Journal, University of Nigeria, Nsukka*. Volume 28:403-414
10. Ayoade, J.O. (2003). *Climate Change: A Synopsis of its Nature, Causes Effects and Management*, Ibadan: Vintage Publishers
11. Babatolu, J. S (1996): *Recent Changes in Rainfall Patterns and its Implication for Flood Occurrence in Ondo, Nigeria*. Ondo J
12. Bassey N,(2012) “To Cook A Continent: Destructive Extraction and the Climate Crisis in Africa.” Pp 101
13. Bebbington, J.and J. Unerman . 2018. “Achieving the United Nations Sustainable Development Goals.” *Accounting, Auditing & Accountability Journal* 31: 2–24. doi:10.1108/AAAJ-05-2017-2929
14. BNRCC, (2006).*Building Nigeria’s Response to Climate Change, Backgrounder*. Friends of the Earth International Nigeria. Accessed at: <http://www.foei.org/en/campaigns/climate/impacts/nigeria.html>
15. BNRCC, (2011).*Building Nigeria’s Response to Climate (2011). Towards a National Adaptation Strategy and Plan of Action (NASPA) A Consultative Document for Stakeholders Review and discussion* NEST.
16. Chan Margaret(2008)Message from WHO Director General .http://www.who.int/world-health-day/dg_message/en/



17. Chima, G. N., Nwagbara, M. O. and C. E. Ogbonna (2010), 'Climate Change: Building and Urban Design' In Chima, G. N. and Kalu, A. I. (eds) Contemporary Issues in Environmental Science, Uturu: ABSU Press
18. Collins, E. and Simpson, L. (2007): The Impact of Climate Change on insuring flood risk. Institute of Actuaries of Australia, New Zealand, Pp.1-38
19. Crimmins A,J. & Etail(2016) Impact of Climate Change on Health in the United States; A Scientific assessment. US Global Change Research Program Washington D.C p. 312
20. DFID- Department for International Development (2009), Impact of Climate Change on Nigeria's Economy. Final Report. February 2009.
21. Dida, G., Gichere, S., Olado, G., Anyona, D., Matano, A., Abuom, P., Amany J &Offulla, A. (2013).Effects of Drought and Floods on Crop and Animal losses and Socio Economic Status of Household in the Lake Victoria basinof Kenya; Journal of Emerging Trends in Economics and Management Science (JETEMS) 4(1):3141.www.jetems.scholarlinkresearch.org
22. Doswell III, C. A. (2014), 'Flooding' Article MS-151 for Encyclopedia of Atmospheric Sciences.Retrieved from : www.flame.org/~cdoswell/publications/Flooding_EncycHolton.pdf
23. Durotoye, B., (1999), Human Occupation of Hazard Areas in Nigeria, in: Oshuntokun, A. (Ed.) Environmental Problems of Nigeria. Lagos: Friedrich Ebert Foundation.
24. Dyson, L L (2002): The Heavy Rainfall and Flood of February 2000: A Synoptic Overview of Southern Africa Floods of February 2000. Department of Civil Engineering, Pretoria: University of Pretoria.
25. Echendu.J.A(2020) The impact of flooding on Nigeria's sustainable development goals(Sdgs). <https://doi.org/10.1080/20964129.2020.1791735>
26. Etuonovbe, A.K. (2011): The Devastating Effect of Flooding in Nigeria. Hydrography and the Environment Innocent Chirisa, Zimbabwe Inclusive Cities and Housing: Analysis of stewardship instruments in Epworth, Zimbabwe FIG Working Week.
27. FMWRRD (1998): Managing Flood Problems in Nigeria. Federal Ministry of Water Resources and Rural Development (FMWRRD) October, 1998



28. Folorunsho, R. and L. Awosika, (2001), Flood Mitigation in Lagos, Nigeria Through Wise Management of Solid Waste: a case of Ikoyi and Victoria Islands; Nigerian, Paper
29. presented at the UNESCO-CSI workshop, Maputo 19-23 November 2001.
30. Fowler, H J; Kilsby, C.G. (2003): Implications of Changes in Seasonal and Annual Extreme Rainfall. *Geophysical Research Letters* 30(13):17– 20.
31. Gobo, A. E. (1988): Relationship Between Rainfall Trends and Flooding in the Niger–Benue River Basin. *The Journal of Meteorology* 13(132).318–324
32. International Federation of the Red Cross(2012). Emergency appeal Philippines: Floods. Retrieved from <http://www.ifrc.org>. Accessed: November 12, 2008.
33. IPCC- Intergovernmental Panel on Climate Change (2007a), *Climate change 2007: the physical science basis*, Cambridge University Press, Cambridge.
34. IPCC- Intergovernmental Panel on Climate Change (2007b), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Fourth Assessment Report*. Cambridge University Press, Cambridge.
35. IPCC(2001)*Climate change 2001: the scientific basis. Contribution of working group 1 to the third assessment report of the intergovernmental panel on climate change*. Published by the press syndicate of the University of Cambridge, The Pitt
36. Keith, C. (1999). *Getting started with Geographic Information System*. Upper Saddle River, New Jersey, USA: Prentice-Hall Inc
37. Ludwig, F. , C. T. Van Scheltinga, J. Verhagen, B. Kruijt, E. van Ierland, R. Dellink, ... P. Kabat . 2007. *Climate Change Impacts on Developing countries-EU Accountability* . Wageningen University and Research Centre.
38. Magami, I.M; Yahaya, S & Mohammed, K. (2014). Causes and Consequences of Flooding in Nigeria: A Review, *Biological and Environmental Sciences Journal for the Tropics*, 11(2), 154-162.
39. Masese, A., Opiyo R., Okayo, J. & Ombui, N.M., (2012): Impact of floods on attainment of education for all (EFA) and vision 2030 in Nyando Basin', *Kisumu County International Journal of Disaster Management and Risk Reduction* 4(2), 19–31.
40. National Adaptation Strategy and Plan of action on Climate Change for Nigeria (NASPA-CCN) (2011), Federal Ministry of Environment, Climate change Department.



41. NDMF , 2010, Nigeria: National Disaster Framework, Government of Nigeria, Abuja, Nigeria.
42. NEMA(2013) 2012 flood disaster cost Nigeria N2.6tn -NEMA. <https://www.thenigerianvoice.com/movie/114732/2012-flood-disaster-cost-nigeria-n26tn-nema.html>
43. Nigeria's First National Communication under the United Nations Framework Convention on Climatic Change (UNFCCC). Federal Republic of Nigeria; The Ministry of Environment, Abuja. 2003.
44. Nkwunonwo, U.C. (2016). A Review of Flooding and Flood Risk Reduction in Nigeria. *Global Journal of Human-Social Science: B- Geography, Geo-Sciences, Environmental Science & Disaster Management*, 16(2), 23-42.
45. Nwadinigwe.A(2018) Climate change adaptation, food security and gender issues.
46. *International Journal of Climate Change Studies*, University of Nigeria, Nsukka. Vol. 1(38-53)
47. Nyéléni-Declaration (2007), Declaration of the Forum for Food Sovereignty. Sélingué: Nyéléni.
48. Available at: www.nyeleni2007.org/spip.php?article290(Access: 3 May, 2013)
49. Obeta, C. M. (2014). Institutional Approach to Flood Disaster Management in Nigeria: Need for a Preparedness Plan. *British Journal of Applied Science & Technology*, 4(33), 4575-4590.
50. OCHA (UN office for the Coordination of Humanitarian Affairs). (2012). Nigeria: floods, emergency situation report no 2. Available at: www.ochaonline.un.org/rowca
51. Odekunle, T. O (2001): The magnitude and Frequency Characteristic of Rainfall in Ondo, South-western Nigeria. *Ife Research Publications in Geography* 8:36–41.
52. Okeke.F.N, Okoro.C.E.& Josephine.O.U(2018) Survey on climate change and possible causes. *International Journal of Climate Change Studies*, University of Nigeria, Nsukka. Vol. 1(63-69)
53. Olajoke, A; Akeem, B.M & Ikotun, S.A (2013). Impacts of flood disaster in Agege local government area Lagos, Nigeria. *International Journal of Development and Sustainability*, 2(4), 2354-2367
54. Olaniran, O. J. (1983): Flood Generating Mechanism at Ilorin, Nigeria. *GeoJournal* 7(3):271–27



55. Ologunorisa, E. T. (2004): Rainfall Flood Prediction in the Niger Delta, Nigeria (Abstract), International Conference in Hydrology: Science and Practice for the 21st Century, London, U.K.
56. Ologunorisa, E T; Diagi, P N (2005): Extreme Rainfall and its Implication for Flood Frequency in the Western Niger Delta A Case Study of Warri. *Nigerian Journal of Tropical Geography* 1:57–62.
57. Ologunorisa, T.E. and Tersoo, T. (2006): The Changing Rainfall Pattern and Its Implication for Flood Frequency in Makurdi, northern Nigeria. *Journal Appl. Sci. Environ. Mgt.* 10(3):97– 102.
58. Oriola, E. O. (1994): Strategies for Combating Urban Flooding in a Developing Nation: A Case Study of Ondo, Nigeria. *The Environmentalist* 14: 57–62
59. Paehler, K. (2007), Nigeria in the Dilemma of Climate Change. 19th July. Retrieved from:
60. http://www.kas.de/proj/home/pub/33/2/dokument_id-11468/index.html. Accessed on 22nd April 2013
61. Patz, J.A. et al. (2000), The potential health impacts of climate variability and change for the United States: executive summary of the report of the health sector of the U.S. National Assessment. *Environmental Health Perspectives*, 108(4): 367-76
62. Penning-Rowsell, E., Floyd, P., Ramsbottom, D., & Surendran, S. (2005). Estimating injury and loss of life in floods: a deterministic framework. *Natural Hazards*, 36(1-2), 43-64
63. Pezzey, J. (1992). Sustainable development concepts: An Economic Analysis, Environmental Paper No. 2, Washington D.C.: World Bank.
64. Richardson, P. (2011). A Proposal for Improving Access to Secondary Education Through Innovative Self Study Access System. *Africa Policy Watch Issue No.7*. Centre for African Affairs and Global Peace January to March 2011.
65. Smith, K. and Ward, R. (1998). *Floods: Physical Processes and Human Impacts*. Chichester: John Wiley and Sons Ltd.
66. Stephen Bratkovich, Lisa Burban, et al., "Flooding and its Effects on Trees", USDA Forest Service, Northeastern Area State and Private Forestry, St. Paul, MN, September 1993
67. Turnbull, M, Sterrett, C. & Hilleboe, A (2013). *Towards Resilience: A guide to Disaster Risk Reduction and Climate Change Adaptation*. Practical Action Publishing Ltd. www.practicalactionpublishing.org(Accessed 10/5/2013)
68. UN(1998) "Indicators of Poverty & Hunger"(PDF). United Nations. Retrieved 27 May



2011.https://www.un.org/esa/socdev/unyin/documents/ydiDavidGordon_poverty.pdf

69. UNISDR(2008). Towards National Resilience. Good Practices of National Platforms for Disaster Risk Reduction, United Nations Secretariat of the International Strategy for Disaster Reduction. Geneva, Switzerland. www.unisdr.org/ (Accessed 25/6/2013) (Accessed 13/6/2019).
70. UNDP-United Nations Development Programme(2007). Human Development Report 2007/2008, Fighting climate change: human solidarity in a divided world, Nairobi:
71. Watson, R.T. et al. (1998) The Regional Impacts of Climate Change. An assessment of vulnerability: A Special Report of IPCC Working Group II .pp 517 Cambridge, U.K: Cambridge University Press.
72. WCED – World Commission on Environment and Development (Ed.). (1987). Our Common Future: ‘The Brundtland Report’. Oxford: Oxford University Press.
73. Woodward AJ, et al. (2000) Protecting human health in a changing world: the role of social and economic development Bulletin of the World Health Organization. 78: 1148-1155.
74. Zambia Vulnerability Assessment Committee, 2007).RAPID FLOOD IMPACT ASSESSMENT REPORT in Zambia by The Zambia Vulnerability Assessment Committee (ZVAC) Lusaka

Volume 2 Issue 6 June 2021

©All rights reserved by Dr. Benjamin Anabaraonye