



THE RELATIONSHIP BETWEEN FLOODING AND FOOD SECURITY IN KOGI STATE

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ABSTRACT: *Climate change had contributed negatively to food security and posed high threats to the human survival in Kogi State, Nigerian. This paper investigated relationship between flood and food security as well as response mechanism adopted by different stakeholders. A case study survey design was utilized using stratified sampling technique among 4,170 respondents from eight local government areas in Kogi State: findings revealed that causes of flooding in the state were heavy rainfall, water released from Lagdo dam in the Republic of Cameroon, soil excavation, lack of drainage and indiscriminate waste disposal. Meanwhile, the overall impact of flood on farming communities was highly disastrous. It was concluded that flood disaster remains a huge challenge to food security in Kogi State and government should relocate the flood impacted communities to areas that are less disaster prone and promote sensitization programmes.*

KEYWORDS: Flood Disaster, Food Security, Kogi State, Nigeria

INTRODUCTION

Flooding has become a major issue of global concern threatening human security especially sustainable food production. In its recent report, the United Nations Office for Disaster Risk Reduction (UNISDR, 2015) compiled natural disasters across the globe from 1980 to 2011, and estimated a staggering figure of flood disasters at 3,455 with 2,689 storms, 470 droughts and 395 extreme temps. The report evidently depicts that floods has become one of the major cause of deaths associated with weather elements. Flood is increasingly becoming a threat to food security. Half of all flood related deaths across the world have been found to occur in Asia (Doocy *et al.*, 2013).

Despite the overwhelming challenges in the past half century, Asia has made commendable progress in attaining food security (Gill, Farrington, Anderson, Luttrell, Conway, Saxena, Later, 2003:1). During the 1950s, the food shortage challenges resulting from flooding situations in Asia seemed insurmountable, as the continent with almost half of human population, the pressure on available food was quite significant. In recent time, the phenomenon has also ravaged parts of Africa with its attendant food shortages due to production failures. Against this background, environmental issues have challenged human security and initiated forms of poverty.

Floods are the most prevalent natural calamities confronting nations regardless of their state of development. The threat by floods is gradually growing the world over. Floods have a devastating effect on lifestyle as well as critical assets. Moreover, the relationship existing between flooding and food security took the centre stage of global environmental and socio-economic discourses. Floods are most important and the most significant of natural all



disasters leading to fatalities globally. Doocy *et al.* (2013) averred that the danger of terrible losses experienced at the wake of flood can be huge. Due to unmitigated deforestation coupled with unregulated human actions around coastal regions, river beds/basins, and lake areas.

The effect of deluge events on human population is assessed based on mortality rates, injury, displacement, hunger and other material losses (Pingali, 2005). Also, after a considerable amount of time, increased mortality could also be recorded as a result of infectious diseases, which follows flood experience. Factors and conditions that lead to flooding are varied, complicated, and interconnected. These include weather and human factors. In terms of weather, the elements such as torrential rainfall, massive hurricane, whirlwinds, whereas human factors include structural and infrastructural failures of levees and dams, modification of landscape which negatively prevent run-offs with waterproof surfaces as well as poor drain structures.

Scholars have warned that locations with high water levels are prone to storms and other inclement that generate high winds. Climate change has led to ocean rise; so are extreme monsoon with destructive storms. Floods often take place over varying timelines which can range from the very quick like flash floods - with little warning, to the type which builds up over days or even weeks (Okoruwa, 2014). Developed countries experience flash floods and overflows with high-velocity surge giving very short duration to prepare. Such types of flood are accountable for majority of deaths. Quite distinctively, floods events around riverine sites gradually accumulating during heavy rainfall provides ample time for caution and flight from areas likely to be submerged. Occasionally floods can also lead to secondary hazards such as mudslides in hilly spots (UNISDR, 2015).

The rapid growth in population and dynamics in farming and other land-use patterns have exposed human lives and property to flood problems. Death and incapacitation as well as indirect widespread submerged farmland, destruction of valuable infrastructure connote the harmful impacts of flood. Human and geophysical factors are both responsible for floods. Geo-physical characteristics of river-bed zones make them more vulnerable to flood disaster than people living in the hinterland. In the past three decades, billions of people have direct or indirectly suffered floods with several million rendered homeless, thousands of deaths and injuries, as well as the enormous victims that remained undocumented (UNISDR, 2015).

At any rate, a scientific consensus exist that the global climatic change is caused by human activities. World Meteorological Organisation (WMO) and United Nations Environment Programme (UNEP) under the auspices of Intergovernmental Panel on Climate Change (IPCC) in September 2013 had a consensus confirming this fact in *The Physical Science Basis* volume of the *Fifth Assessment Report (AR5)*. "With a certainty level of over 95% human activities has been the major driving force behind the gradual warming since the 20th Century (Mitiku, 2012).

In its 2015 Annual Flood Outlook, (flood disaster forecast), the Nigeria Hydrological Services Agency (NHSA) stated that nothing lesser than 10 states in the country were very susceptible to flooding. The NHSA has statutory mandate to predict flood occurrence and to make available necessary information to the Nigerian populace particularly residents of vulnerable areas to enhance their preparedness towards mitigating flood and its effects. Therefore, recent researches have shown that flooding is recurrent problem in most of



Nigeria. Climatic zones found across Nigeria are many, such climates range from tropical maritime which are peculiar to the rainforest and coastal areas and other southern geographical zones to climate found in the Sahel and the tropical hinterlands of the northern regions of the country. Many villages, farms communities, cities and towns in Nigeria have experienced flood disaster at some point, due to heavy rain falls. National flood disaster of September 2017 in Kogi State is the most recent. In 2012 for instance, flood waters resulted from the release of water from Lagdo Dam by the Cameroonian government. Water, therefore, entered Nigeria from Lagdo and coursed its path into the sea via River Benue and River Niger. The opening of Lagdo by Cameroon which took place between July 2 and September 17, 2012 led to flood events in Nigeria. The flooding that resulted caused an extensive damage to farmlands, homes and displacement of citizens.

The attendant flood entered Nigeria hinterland through the Benue River affected many states such as Kwara, Niger, Kogi, Nassarawa, Taraba, Adamawa, Edo, Delta, Bayelsa, Rivers and Imo. These states have all experienced significant death of residents, devastation of key assets as well as food and livestock stocks while increasing the number of displaced and vulnerable persons across all the affected states. The flooding therefore, not only affected food stores, it also submerged several hectares of farm lands. The secondary effects were by far more protracted especially when the affected communities' preparedness and response were poor and inadequate. As a matter of fact, in the Niger Delta communities, waters remained in homes and farms up till November 2012 (NEMA Report, 2012).

Agriculture is an essential source of livelihood among several Nigerians. However, based on flood events around the globe, crop production and animal husbandry are severely impacted (Gill *et al.*, 2003). In most cases, after the flood disasters, federal and some state governments have alleviated the sufferings of farmers and other victims through the distribution of fertilizers and improved seedling as a form of rehabilitation and resuscitating their farms. For instance, Nigeria's Federal Ministry of Agriculture and Rural Development made available to victims of flood disaster a total of 40, 000 metric tons of food items taken from silos across the country (NHSA, 2015). In addition, after the 2012 event in Nigeria, the country's Red Cross Society, embarked on a cash transfer programme to help farmers revive their work as soon as possible. The intervention, according to Nigeria Hydrological Service Agency (NHSA, 2015) helped to provide money to the most affected communities as it helped them to buy seeds and assets necessary to improve their livelihoods. Essentially, the effect of flood on agriculture and food security is not only huge but also challenging (NHSA, 2015).

Furthermore, the damage caused by floods is aggravated by low level of awareness of the consequential effects of human activities on drainage systems; for instance, refuse dumping, erecting structures on flood plains as well as other indiscriminate actions that obstruct the free flow of water. Basically, these hydrological trends are attributable to global warming and climate change occasioned by anthropogenic activities which can be tackled by using both structural and non-structural measures. Kogi is a river-bed state and is basically a flood-prone community (NEMA Report, 2007). This study, therefore focused on the relationship between flooding and food security in Kogi State, Nigeria.

Factors promoting food insecurity in Nigeria cannot be understood without discussing the impact of flooding in some states and communities where agricultural produce have been their major contribution to the national economy and food security. In fact, there is a paucity of literature drawing a relationship between human security and flooding (Davies, 2009).



This is in spite of the fact that flooding events in Kogi State have negatively affected food security and severely threatened human security. It was established that studies on flooding and food security have been preoccupied with understanding the concepts and neglecting their connections (Gillet *et al.*, 2003; Kwak and Kondoh, 2008; Jeb and Aggarwal, 2008; Adeoye *et al.*, 2009; Armah, 2010).

Furthermore, other studies have highlighted the impacts of climate change on food security at regional and global scales (Homer-Dixon, 1994; Fischer *et al.*, 2002, 2005; Gill *et al.*, 2003; Parry *et al.*, 2004, 2005; Tubiello and Fischer, 2006; Armah, 2010; Audu, 2014; Anthony, 2015). Yet, these studies say very little about a particular aspect of climate change -flooding, in a specific location - Kogi, on food security. There are few attempts at understanding the details of the connections between flooding and food security especially in Nigerian context. Thus, a case study of Kogi State is of interest to many researchers. Thus, the study examined the connection between flood disaster and food security in Kogi State, Nigeria and identified the causes of flooding in Kogi State.

LITERATURE/THEORETICAL UNDERPINNING

Previous studies have shown that citing flooding as the most rampant hazard will not be wrong especially in Africa (Adegoke, 2015). It is easily blamed for the deaths of tens of thousands, while adversely affecting millions of other people world-wide in terms of livelihood and well-being (Smith, 1996). Natural tragedy such as quake, floods, typhoon, and hurricanes inflict serious damage and so seem to be bad for the economy. For firms, natural calamity destroys tangible asset such as building and equipment – as well as human capital thereby making nonsense of production capabilities and projections. International organisations have deployed the use of data and statistics to estimate the economic cost and effects of floods and other disasters (Smith, 1996). The systematic collation of data has not only helped to determine the impact of flood and other natural disasters across the globe, especially in Third World countries. UNISDR has been at the fore front of assisting poor countries especially in Africa to develop databases for the losses incurred economically and otherwise to natural disasters.

Recently, Nigeria has continued to experience myriad challenges ranging from economic recession, political strives, and social conflicts. In the face of all these challenges is the silent problem of climate change which has tilted the nation towards hunger, and volatility (El-Lada, 2014). According to Etuonovbe (2011), despite the fact that flood and other natural disasters are not the leading claimer of lives; it affects and displaces more people than other emergencies. He further claimed not less than 20% of the total population of the country are exposed and at the mercy of a form of flood or another. Flood which has been experienced in Ogun and Lagos States have destroyed homes, affected business activities, and exposed the people to communicable diseases such as cholera, diarrhoea, and other water-borne epidemics. The pattern of flooding in Nigeria is similar with that experienced in other parts of the world. Thousands of acres of cultivated arable lands have been washed off, dam bursts are rampant causing deaths and destruction of property in both urban and rural settlements.

Etuonovbe (2011) cited Kagara Village in the Northern state of Sokoto suffered an immerse loss as the entire village including their homes, crops in the field, and all in their storage were



completely flooded. A report put the death toll at about 50 in about 50 villages, while about 150, 000 persons were internally displaced. Apart from the hardship often experienced in Nigeria due to flood, especially by women, school children, Awosika (2001) reviewed essential services such as communication, transportation, and hospital services and stated that they are usually interrupted while businesses are also paralysed.

The problem of over dependence on rain-fed systems of agriculture in Kogi state erratic precipitations often result in devastating impacts on provision of food on Kogi residents,' individuals, economies and livelihoods. According to Devereux, (2007) food insecurity in contemporary societies can be attributed to "New famine". He described it as thinking which reallocate the tasks of clarifying production failures as well as entitlement failures so as to comprehending response failures.

Floods triggered by weather situations culminate in harvest failures as well as to shocks on the economies of local communities. Also, intervention which could have mitigated the upset by safeguarding production shocks from escalating into full-blown food insecurity. However, the region continues to rely mostly on unreliable early-warning mechanism and emergency response systems. A farmer whose production fails is forced to resort to other casual sources of income to augment families' welfare and increase food shortage which lead to food insecurity stating from the immediate community (Devereux, 2007). Devereux (2007) indicated off-farm jobs, to generate income or food that will cover part or the entire gap between the household's crop production and household food needs. It was concluded that food production rate determines probability of food security.

Three main points have been advanced for why Sahara, sub-Saharan Africa, and other tropical countries abound to be significantly affected by fluctuations in precipitation and temperature patterns. In the Southern Africa as a case study, warmer and drier environments have been predicted through various climatic assessments (Hulme *et al.*, 2001, Scholes and Biggs, 2004). IPCC (2001) and Tyson *et al.*, (2002b) also indicated extreme events such as droughts and inundations will be more frequent and intense. Secondly, due to the over-reliance on agriculture and natural mineral resources by Third World economies, the impact of climate change will be more profound with poverty levels worsened as well as exposing their fragile ecosystems (Stern, 2006). Thirdly, crop productivity will be hampered just as its supply will be negatively impacted because people of poorer countries lack the coping mechanism to sustain their farming methods and their primary food sources.

Due to the seriousness of the crisis which flood can result into; stakeholders' especially political leaders take drastic political measures. The Kogi State Assembly will soon amend the state's environmental and town planning laws to adequately address flood issue. The flood of 2012 that devastated some states including Kogi State became a blessing in disguise as it served as a springboard for possibility thinking, involving the inputs of local and international experts assembled by the Minister of Agriculture to think through on how to produce massively to make up for whatever food shortage was occasioned by the flood.

This statement was made during a visit to flash flood disaster areas in Lokoja to assess the level of devastation in the town. The speaker identified building of structures on waterways as one of the major causes of flooding in the area. According to him, there is dire need to enforce town planning and environmental laws to address the perennial flooding. He said



there was also need to reposition the town planning sub-sector for better and efficient service delivery (*Premium Times* Tuesday, June 26, 2018).

NEMA (2012) approximated loss of arable crops ranging from yam, sweet potato, cassava to rice, maize and sorghum to be around a third of total expected outputs with losses significantly affecting the family income of the farm households and might result in food insecurity in Nigeria in general, Shoddy coordination of relieve efforts when disasters have already struck also lead to poor identification and rehabilitation effort of the victims of disaster may cause distribution of the reparation materials to become counter-productive as the most vulnerable may not benefit as much as the affluent during sharing.

According to Harmer *et al.*, (2012), the most damaging impact of corruption is the diversion of basic resources from the poor. Humanitarian assistance aims to save lives and alleviate the suffering of people in times of crisis, yet these noble objectives do not immunize it from corruption. Closely related to the issue of corruption is the role of political factors in administration of compensation. Targeting of assistance for the people creates incentives for political leaders, local elites and local relief committees charged with distribution of beneficiary lists for assistance through cronyism, nepotism or tribalism (Harvey and Bailey, 2011).

In 2012 alone, 30 out of 36 states suffered devastating floods. Six years later, the effect of food production and security continues to reverberate across the federation as the scamper for more stable land for agricultural and other allied uses intensified by farmers, processors, and marketers. However, the Nigerian Meteorological Agency (NIMET) had warned of imminent heavy rainfall as well as its attendant flooding but the warnings were ignored and not acted upon. If such attitude persist since there is no research to confirm if there has been change of attitude by farmers and other stakeholders. Food insecurity is bound to persist for a long time to come. Publicity and other enlightenment programmes have continued to be inadequate so as to reduce damages and risks of losses especially in areas close to river banks.

According to food security and vulnerability survey conducted between 2012 and 2016 in Northern states of Nigeria such as Zamfara, Yobe, Sokoto, Taraba, Kaduna, Borno, Bauchi and others such as Kano, Kebbi, Katsina, Plateau, Adamawa, Gombe, Jigawa, among others, with the aim of providing estimates using food security indicators as a determinant of status of livelihoods. The survey revealed livelihoods vulnerabilities and threats to food security remain significant across all the sixteen states sampled in the survey albeit at different level from one state to another. When these data are put into perspective, it becomes evident that food insecurity remains a challenge to the well-being of Nigerians (FAO, 2016). Flash flooding has also been predicted even when normal rainfall is experienced across the northern states. This indicates more proactive measures and better coordination of disaster and emergency efforts (*Vanguard*, 2012).

For centuries, man has settled within and around valleys to take advantage of its agricultural potentials while establishing settlements on higher and flat grounds. The valley also provides access to water (Pavel, 2003). Despite the frequent inundations and other inconveniences, populations over the years have adapted and made the maximum use possible from it as described in the ancient Egypt. The damage potentials of flooding have become enhanced as humans continue to encroach on the flood plains without adequate plans for the flood waters as done in ancient Egypt.



A report by IPCC (2007) foretells that intense rainfall which is expected to increase in occurrence will enhance the risk to flooding. The lifestyle of poor members of communities affected by flood is often the hardest hit. The vulnerable population despite been affected by other natural calamities live incurable affliction like HIV/AIDS, famines, and cycles of conflicts are often forced to inhabit hazard prone environments such as flood plains. Du *et al* (2010) averred the implications of flood can be far reaching as they are wide ranging, depending on certain factors (health impacts of floods).

Tom Dailey and Beth Cole in 2008 monitored impact of extreme flooding on wildlife in Missouri. Birds such as turkey, quail, pheasant and other avian populations were negatively affected. He further explained how the nest and young birds drowned and suffered chill for weeks after hatching till matured enough to grow natural insulation. Fossorial animals living and storing food materials under the ground suffered- as a result of ground saturation and depletion of needed oxygen from rock cracks and soil pores.

Chronic ailments, loss of body parts, depression due to loss of loved ones and property, as well as poverty can result in the long-term health challenges of flood victims (Tocker and Stanford, 2002). Health and well-being cited drowning, hypothermia, injuries and attack by animals that might have been flooded out of their natural habitats. Risks associated with the health of patients forcefully moved from where they are convalescing, workers health (WHO, 2010). Infected injuries, complication of simple health issues, poisoning, mental health crises, diseases, and malnutrition are medium term flooding effect. Chronic ailments, loss of body parts, depression due to loss of loved ones and property, as well as poverty can result in the long-term health challenges of flood victims.

Loss of life is usually higher in emergencies caused by flash floods due to short period or zero warning and preparation time for those inhabiting the affected area. The figure of large-scale flood emergencies since 1990s exceeds total occurrences from 1950-80s combined, a period of three decades. Over 1,000 deaths were recorded due to less than two dozen floods in the 90s and the economic losses well exceeded a billion Dollars. Kundzewicz *et al*, (2002) estimated the total annual economic loss as a result of destructions has increased 2.9% per annum since then especially when vital economic parameters are duly considered. Caution must be exercised when inspecting losses due to disaster so as not use statistics based mere value recorded. Climatological data like number of rainy days and 2-day precipitation have all increased considerably a phenomenon, partially blamed for the rise in flood destruction impact and losses. Pielke and Downton (2000) reported that societal and human factors are largely attributed.

At present, human beings are predisposed to flood risk due to their encroaching on flood plains as well as inadequate flood response plan. Flood events are complex and they occur due to diverse individual vulnerabilities, unsuitable development plan and unpredictable climate. To a considerable extent, flooding can be predicted, excluding flash floods whose magnitude and nature are not predictable (ADPC, 2005). When considering disaster magnitude, it is not determined by only floodwater but the vulnerability pattern as well needs to be considered. Flood not only has an impact on peoples' lives but the sources of revenue of the less privileged are equally affected. These individuals who are already susceptible to disasters and health challenges, including famine, cyclones, food insecurity, ethno-religious conflicts, unwillingly reside in risky places and cultivate food on floodplains.



METHODOLOGY

The study adopted phenomenological, case study and survey design methods. Phenomenological method is an appropriate qualitative method that combines methods, such as conducting interviews, reading documents, watching videos, or visiting places and events using observational method, to understand the meaning participants place on whatever is being examined. In this study, phenomenological method was used to understand the food security implications of the flood disaster of 2012 as it affected farming communities in Kogi State. The case study research design that was adopted followed Bamigboye *et al.*, (2007) case study design description. Also, the survey research design was used to quantify the effects of a phenomenon. In this study, the survey design was used to interrogate the extent to which flooding or flood disaster has affected food security in farming communities in Kogi State.

The study was carried out in Kogi State of North Central Nigeria. The study covered eight Local Government Areas (LGAs) in the state. Kogi State has a population of about 3, 278,487 in the 2006 census. It is popularly called the confluence state because the confluence of River Niger and River Benue is at its capital, Lokoja. It has coordinates 7° 30'N and 6°42'E. Agriculture is the mainstay of the economy of Kogi State. Given the proximity of the state in the river belt of Nigeria and having agriculture as the primary economy, increased and constant volume of rain has in the past resulted in flooding and has affected the farming communities. Therefore, the choice of the State is informed by the severity of the flood in the area, as it is situated close to the bank of Rivers Niger and Benue. In Kogi State, the farming communities selected for the study include Kabawa, Egah, Edeha, Iyano, Adogo, Oguma, Ugwolawo, and Ajaka located in Lokoja, Idah, Kogi, Ibaji, Ajaokuta, Bassa, Ofu, and Igalamela/Odolu local government areas respectively.

The study population comprised farming communities in eight local governments in Kogi State.

In Kogi, the study population comprised Kabawa community in Lokoja LGA, with a population of 900; Egah community in Idah LGA with a population of 250; Edeha community in Koton-Karfe in Kogi LGA with a population of 750; Iyano community in Onyedega in Ibaji LGA with an estimated population of 700; Adogo community in Ajaokuta LGA with a population of 450; Oguma community in Bassa LGA with a population of 120; Ugwolawo community in Ofu LGA with a population of 600; and Ajaka community in Igalamela/Odolu LGA with a population of 400. This brings the total number of the study population to 4, 170 people. The above communities were selected because the victims suffered more casualties than the other communities during the flood incidents.

A total of four thousand, one hundred and seventy (4, 170) respondents were sampled using various instruments in the study. This is imperative because the whole population could not be reached; therefore, this enabled the researcher to study a relatively small part of the population and yet obtained data that are representative of the whole.

The study utilized the stratified sampling technique to select the respondents from the study population. This method of sampling is very apt because the population is divided into groups (strata) consisting of market women, farmers, transport workers and landlords in eight local governments in Kogi State. According to Yusuf (2003), given a sampling frame, the



population is divided into groups (strata) according to an important selected characteristic of location, occupation or gender of the units to be sampled.

This study used both primary and secondary sources of data. The primary sources of data included focus group discussions (FGDs), in-depth interviews (IDIs), key informant interview (KIIs) and researcher's observation. On the other hand, secondary sources of data included published and unpublished reports from the Ministry of Agriculture and Water Resources, National Bureau of Statistics, Ministry of Environment, and National Emergency Management Agency.

Data was collected using in-depth interviews (IDIs), focus group discussions (FGDs) and key informant interviews (KIIs). Data collected from IDIs, FGDs and KIIs were used to complement the researcher's personal observation. Both quantitative and qualitative methods were used. Quantitative method utilised the administration of questionnaire while the qualitative method used in-depth interviews (IDIs), focus group discussions (FGDs) and key informant interviews (KIIs).

In-Depth-Interviews were conducted with executives of relevant associations in the selected communities. In each community, two members each were interviewed from the following associations/unions: Community farmers association, Market women association, National Union of Road Transport Workers. Furthermore, interviews were conducted with either the chairman or secretary of the selected local governments. At the state level, either the commissioner or permanent secretary in the Ministry of Agriculture of the State was interviewed. One Focus Group Discussion carried out in each of the communities comprised of members of the communities who were knowledgeable about how the interaction of flooding and food security has affected human security. A total of twenty-four FGDs were carried out. Each focus group comprised twelve (12) members drawn from the affected farmers. Twenty-four In-depth interviews and twenty-four key informants' interviews were conducted. People who are critical stakeholders in the issues relating to flood and food security were engaged. They were drawn from local, state and Federal Government and its agencies including; Ministry of Environment, Nigeria Metrological Agency (NIMET), and Federal Bureau of Statistics, local emergency management authorities, state ministry of agriculture and water resources. Three of the key informants were community leaders.

Four different instruments were used in carrying out this study. They are structured questionnaire, in-depth interview guide (IDI), focus group discussion (FGD) guide and key informant interview (KII) guide. The interview schedule was in the form of semi-structured and open-ended questions designed to cover all the objectives of the study. One interview guide containing four major issues with at least three main questions addressed in each of the four issues was used for FGDs, IDIs and KIIs and was complemented by the researcher's personal observations.

Data gathered from the interviews and discussions were transcribed, pooled together and categorized into themes based on the objectives of the study. They were then content analyzed and interpreted thematically using narrative and descriptive styles, while the outcome of the questionnaire was subjected to simple statistical methods of tables and bar charts.



Data collected through questionnaire were analyzed using simple percentages, frequency tables and charts. The essence of the data collected through questionnaire for this study is to corroborate or refute assertions observed or arrived at during interviews and focus group discussions. In the process of carrying out this research work, care was taken to ensure that the various rights and freedom of individual respondents were adequately respected and protected according to the provisions of research ethics.

RESULTS/FINDINGS

This study investigated the relationship between flooding and food security in Kogi State, Nigeria. This section of the field report detailed the analysis of data collected and examined the causes of flooding in general, and flooding in Kogi State, as well as the response mechanisms put in place by different stakeholders ranging from local to the Federal Government and its agencies. Based on the research questions that were raised, and answers provided, the data gathered were discussed in relation to the specific research objectives.

Research Objective One: Relationship between flooding and food security in terms of food availability, accessibility, affordability and utilization in the study area

Findings revealed that:

“Food security requires that the entire population should have adequate financial and non-financial resources to sufficient food quality and quantity, and not only to availability of food. Flooding affects every aspect of food security, as food security not only depends on flood, but indirectly depends on other variables such as socio-economic status. This section of the study analyses the result of the nexus between flooding and food security measured in four variables namely, availability, accessibility, affordability and utilization”.

Relationship between Flooding and Food Security in terms of Food Availability

Findings revealed that there was an inverse relationship between flood and food availability. This implies that as flooding rate increases, food availability decreases. One of the respondents noted that,

“Foods are no more available in the community; we often eat what we see as against what we want” (Interview at Lokoja market, January 15, 2017). It was implied that flood led to non-availability of food. As a result of the flood in Kogi State, it was established that people did not have access to their farm due to the flood.

Those engaged in farming were displaced from their farms and transporting what was available became impossible as well. There was, however, access to food donated by some NGOs to those who were severely affected.



Fig 1: A Farm Destroyed by Flood at Iyano (Ibaji LGA), Kogi State, 2012

Source: Kogi State Ministry of Agriculture

One of the farmers explained that:

Flood has reduced my yield and made life very difficult for my family. I cannot access my farm because water is everywhere. I have nothing to sell in the market. (Interview at Ofu, Kogi State on December 14, 2016).

Evidences gathered shown that flood has negative influence on food security as it impedes food availability, accessibility as well as utilization. Food security entails individuals at every point in time having social, physical, and economic access to adequate, harmless, and healthy food which supplies the needed nutritional requirements as well as food preferences so as to live happily and healthily (FAO, 1996).

Table 1: Differences in the Yield of Farm Produce in Kogi State

S/N	Areas	Standard (100) %	Before the flood (%)	After the flood (%)	Percentage of Depression in the Yield. (%)
1.	Lokoja	100	85	30	25.5
2.	Kogi	100	80	40	32
3.	Ibaji	100	70	35	24.5
4.	Idah	100	75	40	30
5.	Ofu	100	80	40	32
6.	Ajaokuta	100	75	55	41.25
7.	Bassa	100	72	48	34.56
8.	Igalamela	100	82	45	36.90



Research Objective Two: Causes of Flooding in Kogi States

Causes of Flooding in Kogi State

Findings revealed that indiscriminate waste disposal, act of God, heavy or torrential rains cause flooding in Kogi State which was the trend across the globe. Similarly, it was emphasized among respondents that the causes of flooding can be traced to the physical structural failures such as dams, ponds, levees, and weather elements such as high tides, intense rainfall. Also, further investigation among some of the community leaders in Kogi State indicated that intense rainfall was responsible for the flood experienced in Lokoja in 2012 (Interview at Kabawa Market, December 17, 2016).

Moreover, the outcomes affirmed that heavy rainfall was responsible for flooding in Lokoja. Heavy rainfall is a derivative of global warming, thunder storm and sea tidal surges. The chief security officer at Kabawa; Lokoja Local Government stated that: “Global warming was the major cause of flooding” (Interview at Kabawa, December 17, 2016).

The interviewee confirmed that climate change caused flooding in Kogi State. UNISDR (2015) studied the causes of flooding in the United States using data on climate and field observation and noted that flood can be caused by excess moisture resulting from continuous rainfall or snowmelts which exceeds natural river channel capacity. Flooding linked to rivers occur when the discharge from rivers increase leading to saturation of the flood plain. When this occurs, such river overflows their banks leading to flood at a stage referred to as bank full stage. When this combines with heavy rains, such flows turn torrential quickly. As a result, Urban area flooding has a lot to do about geographical features of a location such as being on a relatively flat terrain or a valley with inadequate drainage structure to prevent retention of moisture. And when such location being an urban centre is constrained by block drainages, inappropriate sewage disposal, flooding is always imminent. A total of 46 communities were impacted in Kogi Local Government Area (Anugwara *et al.*, 2013). From the above and analysis of quantitative data from the survey, the causes of flooding in the period under the purview of this study are generalised as lack of flora and forest due to the fact that surface runoffs are hindered by trees and vegetation types, as roots of trees take up water from the soil.

DISCUSSION

Findings on the causes of flooding in Kogi State including the connection between flooding and food security in the State are in line with Schmidhuber and Tubiello (2007) emphasis that flood has a direct effect on availability of food through varying agro-ecological situations and an indirect effect through growth and income distribution. In semi-arid and sub-humid areas in sub-Saharan Africa of which Kogi State falls within, flooding is prominent and will probably bring about reduction in yields as well as livestock reduction and productivity. Clay (2002) and Barrett (2005) studied the relationships between flood and food availability and found that a much larger group will be at risk in the future with climate change likely to result in non-availability of food, higher winter rainfall, more intense summer storms and rising sea level. According to Barrett (2005), there are several effects of flood which makes it difficult to manage flood events, among which are the expected rises in sea levels which can affect flood risks in coastal cities. Similarly, Bariweni, Tawari and Abowei (2012) documented that



flooding causes food insecurity and climate change causes flood. Food security entails individuals at every point in time having social, physical, and economic access to adequate, harmless, and healthy food which supplies the needed nutritional requirements as well as food preferences so as to live happily and healthily (FAO, 1996).

Discussing the causes of flooding in Kogi States; findings revealed that indiscriminate waste disposal, act of God, heavy or torrential rains cause flooding in Kogi State which was the trend across the globe (Sinclair and Pegram, 2003). Similarly, Theron (2007) studied the causes of flooding in New Brunswick, Canada using field observation and analysis of climate data and concluded that physical structural failures such as dams, ponds, levees, and weather elements such as tsunamis, high tides, snowmelts, intense rainfall often lead to flood in addition, “Global warming was the major cause of flooding” (Interview at Kabawa, December 17, 2016). According to Green *et al.*, (2006), rainfall and other climatic elements are generally responsible for flood with rainfall being the primary and the most important causative agent. Parry *et al.*, (2004) also stated that floods are often secondary events of a climatic hazard such as tsunami or hurricanes.

Further, Tubiello and Fischer (2006) found that river flooding is chiefly manifested through the shape of the watershed, the characteristics of the eventual runoff, the configuration of the terrain within watersheds, the orientation of the rivers, the conditions and properties of soil and rocks, among others. Asa river catchment was understudied by researchers for a period of seven years and they discovered that the river experiences high rate of precipitation and sediments per annum. The discovery was connected to the usual rise in water level, intensity and duration of rainfall which often leads to flooding in Ilorin basin areas (Jimoh and Alao, 2009). Improper drainage construction often results to flooding around the study area. In the opinion of the Director of Search and Rescue: Pathway of water has been blocked whether intentional or unintentionally. What I mean by intentionally is dumping of refuse, unintentionally could be natural situation which could make a river overflow its bank when it rains.

Similarly, Mordi (2011) stated that flood is also a recurring challenge in India with several millions of Indians affected within a period of fifty years. Devereux (2007) while deploying the ‘entitlement approach’ by Amartya Sen to study food scarcity in Malawi concluded that government policy and responses can be used to insulate the state from the breakdown of labour-based, trade-based, production-based, and transfer-based entitlements. Extensive rain scarcity can negatively affect optimum utilisation of hydropower infrastructures while frequent flooding events can lead to rise in investments and other expenditures of the state on the provision and rehabilitation of devastated physical infrastructures (World Bank, 2007; Garnaut, 2008).

Bateman *et al* (1991) studied flooding in Norwich using combined methodology of field survey, questionnaire survey and interviews. Their results revealed that flooding risk in the future are likely to be greater due to certain factors ranging from poorly constructed buildings, with inadequately narrow drainage system, to flood prevention structures currently in use. All these inadequacies when combined with inadequate planning of homes and other commercial structures sited on flood plains, and low-lying coastal zones. The possibility of extensive flooding around urban areas cannot be overemphasized.



Blaikie *et al.*, (1994) recommended a management system of flooding challenges encountered to be sustainable, while using data collected on climate, physical structures (drainage and other infrastructures) and policies on town planning coupled with evidences from field works as well as review of documents and discussion with stakeholders.

Implication to Research and Practice

Therefore, there is need for the Government to earmark realistic financial, human and material resources to secure areas that are prone to incessant flooding. This is to be done in a manner that such incidents are prevented across built up areas during and after rains, so as to ascertain the floatability of new suburbs. Physical and town planners as well as policy formulators understand natural disasters like floods are destructive while occurring unexpectedly, occasionally and otherwise. These points to the need for serious planning and forecast of likelihood of a disaster cannot be over-emphasized. Achieving improvement in urban planning and sustainable environmental management coupled accelerated development for sustainable growth, effort to intensify flood control and management, irrigation and climate change initiatives.

The importance of environmental sensitisation and education has never been more required underscored. This must be done on radio, newspapers, television, magazines, in every public forum and at all levels of education. Response mechanism by Government and its agencies was acknowledged. It was concluded that most of the interventions did not get to the hand of the flood victims. Although the government responded to the flood disaster in some way or the other, some agencies and individuals still believed that the government needs to do more. Also, it is recommended that the Ministry of Agriculture through the cooperative groups in the riverine communities should provide quick maturing crop and animal species, as well as other inputs to farmers, while also providing Extension Services and quick harvest and storage mechanisms and facilities so as to encourage the community members to expand, improve and cultivate more agricultural areas during the dry season so as to enhance their living condition and food security.

CONCLUSION

The study revealed that the people were not well prepared in advance on flood management and control activities and so they watched helplessly as human and animal lives were lost, their entire sources of livelihood, their homesteads, sources of good water supply, roads and other infrastructure were all destroyed by the ravaging floods and the area infested by snakes, flies and other disease vectors.

In rain dependent agricultural economy, erratic rainfall causing unexpected floods can create devastating impacts on food security of the people and their livelihoods. Also, the households were not able to feed themselves and the children sufficiently; declining wages and increasing borrowing by the households worsened the food security situation. Meanwhile, floods have impacted the social systems and food habits too. The study therefore concluded that severity of the floods and food security are negatively associated. As expected, flood and food availability, accessibility and utilization were found to be negatively associated. This clearly demonstrates the importance of wage employment in addressing the food security issue in the tribal areas.



Future Research

From the foregoing, it is suggested that future studies should note that floods are the most common natural disaster causing loss of lives and economic damage in various parts across the globe. They result in loss of property; destruction of the environment and many times lead to loss of lives. The burden of floods is often in different dimensions which could be social, economic, and environmental in nature. The negative and positive consequences of flood differ in magnitude, location as well as depending on the peculiar vulnerabilities and value of the natural and constructed environments affected. However, focusing on providing remedies to address the social, economic and environmental impacts of flooding should become the priority of the researchers. Hence, food shortages are more featuring in such situation whereby little or no maximum flood control has been put in place.

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