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Adoption of Cause and Effect Theory in Combating Food Insecurity in Kogi State, Nigeria

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***Abstract*— The study examined the adoption of cause and effect theory in combating food insecurity in kogi state, Nigeria. A case study design was utilized. A stratified sample size of 4,170 participants was obtained from eight local government areas in Kogi State.The instrument for data collection includes in-depth interview, key informant interview and focus group discussion. Findings showed that the impact of flood disaster on food security have been devastating and contributed to greater losses in the history of food shortage across various areas of Kogi State. Meanwhile, the available disaster management agencies and policies developed were not effectively implemented. There are evidences of several causes of flood management policies and strategies. Government should provide alternative settlements to perennial flood disasters by way of relocating the flood impacted communities to areas that are less disaster prone and using electronic and print media sensitization.**

***Index Terms*— Flood, Disaster, Response Mechanism, Kogi State, Nigeria.**

I. INTRODUCTION

Flood is the most common type of disaster causing serious economic losses in various part of the world (Ramakrishna et al. 2014; Toubes et al. 2017). The immediate effect of natural disasters and other climatic change variability on farmers include loss of lives, destruction of crops and farmlands, loss of livestock, damage to properties and infrastructure and food security problem among the affected communities (Alam et al. 2010; Islam & Wong 2017; Okeleye et al. 2016). Therefore and any reduction to agricultural productivity can ultimately have significant effect on farmers food security, income, and general well-being (Hertel&Rosch 2010; Mcdowell& Hess 2012). The links between natural disasters and food insecurity have largely been connected to the effects on crop productivity and hence, food production (Gregory et al. 2005; Islam & Wong 2017).However, increasing flooding in coastal and riverine areas have continued to affect food production and food security.

Existing studies on flooding and food security have been preoccupied with understanding theconcepts (Gill, et al., 2003; Dixit, 2003; and Bariweni et al., 2012). These studies have contributed in positioning the phenomena at the centre stage of global academic discourse. While the conceptual rigour is established in these studies, the connections of the phenomena aremissing. Food security is seen as the availability of adequate supply of basic food-stuffs at alltime (United Nations, 1975). The World Bank's view of the phenomenon according to Burchi(1991) remains relevant and has widened the scope of food security from mere availability to

access while lessen the focal point to households and individuals rather than global and national

perspective: "Access by all people at all times to enough food for an active, healthy life" (World Bank, 1986).

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). Flooding has become a major issue of global concern threatening human security especially sustainable food production as the 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.

Therefore, recent researches have shown that flooding is recurrent problem in 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. The flooding not only affected food stores, it also submerged several hectares of farm lands making it difficult for farming activities.

This study is guided by the following research questions:

1. To what extent will flood disaster contribute to food insecurity in Kogi State, Nigeria?

2. What are the effective strategies for managing flood disaster outcomes in Nigeria?

II. REVIEW OF RELATED LITERATURE

In this segment, conceptual framework and relevant literature that guided the study were presented. A review on the previous literatures has showed that, flood disaster research in recent decades receive an increasing trend in the world, due

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to the prevailing discussion and debate on climate change disturbance among scholars. Some of the areas studied includes, natural disasters and their impacts on economic growth following the cause and effect explanations (Cavallo et al 2013; Hallegatte and Przyluski, 2010; Hochrainer, 2000; Sardar et al 2016; Sawada and Sothea, 2011; Shabnam, 2014; Syaheera and Shaari, 2017; Toya and Skidmore, 2005).

The impact of natural disasters on agriculture and food security and/or livelihoods, in which it was highlighted that, natural disaster impacts on agriculture are negative especially in a large number of farmers living in a low income societies (Afshin, 2015; Chapagain and Raizada, 2017; developing nations as cited in FAO, 2016, 2015; Israel and Briones, 2013; Sauer, 2011; Sivakumar et al., 2005; Siwar et al 2009; Zhong et al 2014),. Most of these studies assessed both direct and indirect effects of natural disasters on economic growth using time series data sourced mostly from EM-DAT (Emergency Events Database) maintained by CRED (Centre for Research on the Epidemiology of Disasters) and few on panel and cross sectional data. In addition some of the literatures has traditionally concentrated on management and adaptation of natural disasters using qualitative data rather than social impact on the society.

The institutional level focuses generally on organisational performance and management capabilities and includes an organisation that has the mandate to manage flood, while the systemic level centres on creating an enabling environment for individuals and organisations to operate, and should include the regulatory, general policy, accountability and financial frameworks (Akanbi, 2015). In addition, Olowu (2010) and Adedeji*et al.*,(2012) emphasised that in many Third World nations, particularly in Africa, failed state infrastructures, lack of suitable legal and policy frameworks, and insufficient funds make them more susceptible to the violent effects of significant disasters.

Although different empirical studies that have studied the impact/effect of natural disasters, however, there has been little discussion that both engages specific type of natural disaster assessment and with the specific community, like smallholder farmers in the literature (Morton, 2007), considering the influence of flood disaster characteristics, flood agricultural losses, socio economic/demographic factors and recovery resources onfood security.

In Nigeria, disaster or crisis management is at the budding stage in spite of the fact that in 1906, for instance, there was the initial effort manage disasters in the country through the creation of the Police Fire Brigade, but now referred to as the Federal Fire Services with diverse functions ranging fire fighting roles to safeguarding lives and property of the populace, in addition to providing humanitarian services in cases of disasters (Adedeji*et al*., 2012). In 1999, through Act 12 as amended by Act 50, the National Emergency Management Agency (NEMA) was created with the responsibility of managing disasters in the country (Adedeji*et al*., 2012). The organisation has put in place measures to educate the general public to raise their awareness level and lessen the impacts of hazards in the country.

Findings revealed that NEMA has established structures for detecting, responding and combating disasters quickly. It is better to prevent disaster because in the case of any eventuality, if there are no adequate measures to contain it, the resources of the affected country will bear the consequences to contain it. In Nigeria, for instance, state governments are mandated to create their SEMAs so as to harmonise the role of FEMAs (Adedeji et al., 2012). Akanbi (2015) submitted that through the activities of SEMAs, many states in the federation would be viewed as keenly involved in management of disaster and preparing in advance to the untoward incidents. Currently, very few states have taken the initiative, while some other states have not empowered their SEMAs appropriately to be functionally self-regulating and proactive in the discharge of their duties. It should be noted that having an understanding of the spatial aspect of flood disaster and initiating disaster preparedness measures to alleviate people's distress cannot be overemphasised.

III. 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, to understand the causes of flooding and the response mechanisms put in place by different stakeholders during flood disaster in Kogi State, Nigeria (Bamigboye*et al.*,2007).The methodological framework for this analysis on flood disaster effect on food insecurity was developed based on Lindell& Prater (2003) disaster impact model, which was later modified by Israel and Briones (2013) as shown in the Figure 1 below.

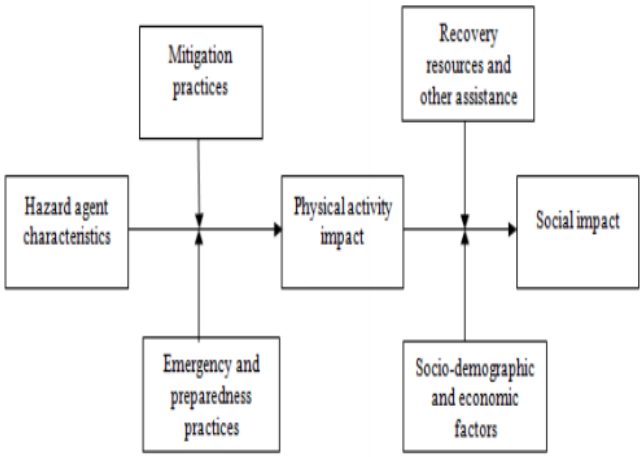

Figure 1: Disaster Impact Model by Lindell &Prater (2003)

The study was carried out in Kogi State of North Central Nigeria. The study covered eight Local Government Areas (LGAs) in the state. 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. 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; andAjaka community in Igalamela/Odolu LGA with a population of 400.

Further, the model presented in fig.1 depicts that hazard agent characteristics (disaster characteristics) triggered physical and environmental impact on an economic activity which consequently results in social impact at the household level in terms of its negative effect on food security and income. The physical impact / environmental is expected to be reduced by mitigation strategies and emergency responses including preparedness practices while social impact can be alleviated by recovery resources, other extra assistance and socio-demographic and economic factors.

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. Agencies explored for data 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.Data collected using in-depth interviews (IDIs), focus group discussions (FGDs) and key informant interviews (KIIs)were used to complement the researcher's personal observation. Both quantitative and qualitative methods were used.

IV. Results/Findings

This study examined the causes and effects of flood disaster in Kogi State and identified effective strategies for managing the effects of flooding on food security in Kogi State, Nigeria by different stakeholders. Based on the research questions that were raised, and answers provided, the data gathered were discussed in relation to the specific research objectives. Inferences were deduced from the data generated on each research question following a content analysis of responses.

Research objective one: Causes of flooding in Kogi States

One of the community leaders indicated that intense rainfall was responsible for the flood experienced in Lokoja in 2012.

> In his words, "First of all, when we have much rainfall and our dams like Kanji Dam become over-flooded, so by the time it is released, it causes flood" (Interview at Kabawa Market, December 17, 2016).

It was 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. 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.

Flooding linked to rivers occur when the discharge from rivers increase leading to saturation of the flood plain. When this occurs, such river overflow 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. 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. When such location being an urban centre is constrained by block drainages, inappropriate sewage disposal, flooding is always imminent.

Urban flooding as a phenomenon is a regular occurrence in Nigeria especially in cities such as Lagos, Warri, Ibadan, Aba and Maiduguri, among others. Raining seasons in Nigeria are characterized by gusts of wind as a result of tropical storms leading to torrential rains with its attendant flash floods. The Nigerian State is vulnerable to both artificial and natural disasters especially floods with several hectares of arable lands being submerged, dams destroyed and overflowing of drainages which endangers the populace lives and property while leading to economic losses to the government. 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. Flooding is as a result of urbanisation where the upper part of

> the river is converted into housing units thereby shrinking the water ways that usually would be available for runoffs (Interview at Lokoja, December 28, 2016).

Further findings revealed that waste generation and management are challenges to both governments and urban dwellers. (Oyebande, 2005; Aderogba, 2012). Potable water is also a challenge. These thus call for bottles and sachet of which are indiscriminately disposed in quantities by households, recreation centers, parks, public places and other. The quantities and spreads in every community are good indications of the extent of deity habits of the urbanities. (Mabogunye, 2017; Oyebande, 2005). According to them, these have adverse environmental consequences at both urban and rural areas. The drainage channels, erosion passages and canals have been most affected.

Causes of flooding in Nigeria

Generally, causes of flood in Nigeria could be as a result of natural cause or human cause. Natural cause may include: inform of heavy or torrential rains/rainstorm, Oceans storms and tidal waves usually along the coast or human causes : Burst water main pipes, Dam burst leave failure, Dam spills Flooding occurs throughout Nigeria in following forms: Coastal flooding, River flooding, Flash floods, Urban flooding, Dam burst leave failures, Dam spills.

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 flash floods are associated with rivers in the inland areas where sudden heavy rains can change them into destructive torrents within a short period. Urban flooding occur in towns located 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, refuse and eroded soil sediments, extensive urban flooding is a phenomenon of every rainy session in Lagos, Maiduguri, Aba, Warri, Benin and Ibadan. Virtually every Nigerian is vulnerable to disasters, natural or man-made. Every rainy season, wind gusts arising from tropical storms claim lives and property worth million of naira across the country. Flash floods from torrential rains wash away thousands of hectares of farm land. Dam bursts are common following such flood. In August 1988 for instance, 142 people died, 18,000 houses were destroyed and 14,000 farms were swept away. When the Baguada Dam collapsed following a large flood. Urban flooding such as the Ogunpa disaster which claimed over 200 lives and damaged property worth millions of naira in Ibadan, are common occurrence. Floods paralyze economic activities in many towns and cities in the country. Major roads, some linking states are flooded causing hardship to motion sits. When these roads were constructed, the flooding problems were not there, and the companies that constructed the roads probably did not anticipate the problem.

Research objective Two:Effects of Flooding and Strategies to improve food security in Kogi State, Nigeria

In Kogi State, Nigeria in September 2010, flooding basically eroded the inhabitants of the village, their village and all their homes and all their crops and all their storage of food completely destroyed. The season that people had opened the gates on the dam had completely failed and so the consequence of that was getting flooded. The water came very rapidly demolishing houses, demolishing the building that people use to store their food, and destroying the crops. Tens of thousands of people have been displaced, roads, trees, buildings etc were submerged, tree submerged in aftermath of flood in Kogi. The flood led to the loss of thousands of houses and farmlands in 11 local government area of the state. Unconfirmed reports put the death toll at 49 while about 50 villages were submerged and more than 30,000 people displaced. Also affected were the community secondary school and the crops members lodge which were completely submerged. Checks indicated that most of the corps members sewing in the community have since abandoned their assignment and relocated to the state capital. Devastating effect of flooding In the last three decades, the impacts of flooding have increasingly assumed from significant to threatening proportions, resulting in losses sustained by the urban dwellers and flood victims, it is obvious from the available records that irreparable havocs have been sustained by the citizen of Nigeria due to what has become perennial natural disaster in our cities. Apart from houses that collapse by flooding schools buildings and bridges sometimes collapse as well. Markets places and farmlands are submerged for weeks and sometimes are washed away. The devastating effect of floods was not limited to houses and people. Many farmlands both arable and agro-foresting were swept away when schools and market places were submerged for weeks. Some animals lost their lives to flooding when many bridges collapsed and electric poles destroyed. The effects could be classified as follows: Cause, aggravate and precipitate diarrhea water borne disease, Destroy farms, food and cash crops, Make the individual, communities and nation poor through disruption of services and the degradation of agriculture land. Destroy human life, animal's life and properties, Damage and destroy buildings, bridges, dams, embankments, drains, roads, railways etc. Degrade the environment, Spread infestations; soil and water are polluted by chemicals. Cause soil infertility through leaching and erosion of rich top soil.

Additional findings revealed that there are Community-Based Flood Warning Systems (CBFWS) installed in about 12 states across the country including Kogi State. Another community leader in Kogi local government explained the commitment of the authority in response to flood disaster:

> Seriously that period of flood, the NGOs did their best through actively supporting the communities because they were able to make primary schools IDP camps and they brought relief materials for them and they were treated as expected. On the side of the government they

> made sure that they provided security to those that are staying in the IDP camp. So those two arms tried their best in those areas. They came with their medical equipment; they were checking the internally displaced people there. Then some NGOs brought relief materials. They brought mattresses, and cartons of indomie which Dangote gave. It was well distributed but the thing did not go round but we were able to achieve up to 90%, which we believe we have tried (Interview at Edeha, January 26, 2017).

Adoption and Implementation of Government policy and strategies

The government has made efforts to relocate people in regions that are prone to flood. Forty communities were relocated by government authorities to safer places. A villager explained how local authority responded:

> The State government had a plan to rehabilitate the flood affected victims. They brought relief materials, individual, philanthropists also donated relief materials: food, clothing, mattress and roofing sheets. NEMA is the agency through which the government supplied the materials (Interview at Edeha on January 26, 2017).

The Kogi State Government during the flooding introduced action-plan directed towards residents of communities along the river banks to relocate sequel to a warning that water would be released from Kainji and Jebba Dams. The government provided orientation for the people of the state to clear water channels for water to flow freely and to avoid flooding (Anugwara&Emakpe, 2013). According to an interviewee:

> The lessons learnt from the 2012 flood helped Agencies like the Red Cross to improve its emergency response. The Nigerian Red Cross trained 22,000 volunteers and stocked warehouses with relief materials. The National Environmental Management Agency urged dam management officials to lower water levels early enough and should not wait for water levels to breach the dams before releasing it in order to minimise flooding risks. Flood prone communities were trained and provided with basic equipment to aid quick evacuation (Key informant, January 26, 2017).

The National Space Research and Development Agency (NASRDA), produced a floodplain and vulnerability map that was used by the National Emergency Management Agency (NEMA) to rehabilitate those the 2012 flood affected (Odeh, 2012). Also, the National Emergency Management Agency (NEMA) organised a pre-flood awareness campaign for relevant stakeholders in Ilorin, Kwara State capital in North Central Nigeria. Participants were advised to heed early warning signals and desist from blocking waterways through illegal dumping of refuse while the state government was implored to clear all waste bins across the state for a cleaner and healthier environment (Akanbi, 2015).

The Kogi State government of Nigeria assisted internally displaced farmers by distributing hybrid cassava stems, farming inputs and yam seedlings and to alleviate their sufferings. Several workshops were organised in different parts of the country to brainstorm on flood management technique that would be at par with global best practices.

V. Discussion

Findings revealed the causes and effects of flood disasterwith implication for food security as pattern of significant food shortages and food scarcity while 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. Data collected have also shown that flood disaster 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). However, it was further stressed that the consequence of flooding according to Baan *et al* (2004) is such that a huge amount of water which should have been absorbed and percolated through the spaces within the soil or used up by fauna species is immediately available for surface runoff which ends up in streams and rivers, thus generating excess water for flooding.

The flood impact, control and mitigation approaches recommended include proper drainage systems, building of buffer dams in strategic areas, prevent the construction of houses along waterways and other natural drainages, prevention of siltation along creeks, and other water bodies through dredging, setting up of an effective and adequately planned preparedness mechanism, conduct sensitisation and enlightenment programmes. Such programmes must also include periodic monitoring of soil and water levels, grassroots mobilisation through weather reports, periodic rescue drills, self-help and re-orientation of communities to enhance their survival (Federal University, Otueke, 2013).

Therefore, in order to prevent the reoccurring tragedies, the government at different levels must intensify efforts in rehabilitating drainage channels along major roads and neighbourhoods such that all encumbrances are removed. In the study, it was recommended that using punitive or sanctions, persuasive approach among others can be effective to discourage flooding related activities to ensure channels and erosion passages are maintained, clear and free of debris (Odeh, 2014).

Thus, the Federal Government needto seriously embark on preventive measures through various agencies. With the intention of alerting members of the public on the dangers of flooding, the Federal Government equipped the Nigerian Meteorological Agency (NIMET) to enable it provide accurate weather forecast, plans to build more dams; hydropower project to accommodate the excessive flow of water from Cameroon; the dams will serve the purpose of mitigating flood, generate electricity, create employment, improve irrigation and boost agricultural production in Nigeria as cited in Anugwara&Emakpe, (2013).

However, the Global Facility for Disaster Reduction and Recovery (GFDRR) is saddled with the responsibility of helping Third World nations lessen being susceptible to natural hazards in addition to adapting to climate change. Though, less than 20 African nations are at present involved, excluding Nigeria. Further, nations need to create an understandable regulatory agenda which is aimed at preventing, managing and reducing disasters all over the world. Different steps implemented rightly would improve the capability to confront natural disasters, flooding inclusive. in addition to assessing the socio-cultural, political, environmental and economic factors which have an effect on being vulnerable to hazards.Akanbi (2015) submitted that through the activities of SEMAs, many states in the federation would be viewed as keenly involved in management of disaster and preparing in advance to the untoward incidents.

VI. Conclusion

The study established the multi-dimensional causes and effects of flood disaster on food security in Kogi State, Nigeria and found that the implications of discoveries are beyond Nigerian bounders. It was concluded that flooding contributed negatively to food security which implies that flood disasters lead to food shortage since flooding directly impedes agricultural activities that can increase food security. Flood disasters lead to depletion of farmlands nutrients, topography and losses of agricultural, economic and financial resources. Therefore, flood management and control activities must be prioritized by the government and its agencies for efficient and effective flood disaster reduction while enhancing food security index through creations of new policies and implementation of empirically tested strategies and innovation.

Hence, government and its agencies should be the priority of flood management agents since most of the interventions did not get to the hand of the flood victims. And government and other agencies should work on early warning mechanisms and educate households about the possible disastrous impacts of floods and other calamities and make them aware of resilient mechanisms of thwarting food insecurity. Therefore, proper flood management policy implementation, preventive measures are more likely to reduce effects of flooding on food shortages and environmental depletion.

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