Received:10th August, 2024 Revised: 30the August, 2024 Accepted: 3rd September, 2024

CARITAS UNIVERSITY AMORJI-NIKE, EMENE, ENUGU STATE

CARITAS INTERNATIONAL JOURNAL OF POLITICAL STUDIES AND INTERNATIONAL RELATIONS

CIJPSIR, Volume 1, Issue 1 (2024)

Flooding and Food Security in Anambra State Nigeria: A Study of the 2022 Cases of Ogbaru Local Government Area

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Keywords:
Agriculture,
Anambra
Climate Change,
Food Security,
Flooding,

ABSTRACT

Food is connected to sustainable development goals in numerous ways, as food security is key to achieving sustainable development. The world is currently not on track to achieve the set sustainable development goals (SDGs). In Nigeria, flooding is a recurrent disaster and constitutes a setback to success with the SDGs and sustainable development. Flooding disasters are a threat to food security due to their impact on the food system. The contemporary food security concept has been broadened to encompass issues such as natural disasters that include floods, drought and diseases because of their impact on human survival in comparison to effects of war, genocide, and terrorism. The topic flooding and food security in Anambra state Nigeria: A study the 2022 cases of Akili Ogidi and Akili Ozizo in Ogbaru Local Government. The research is quantitative in nature and the survey research design was adopted, primary source of data collection was used through the instrument of questionnaires. While Eco-violence theory was utilized as analytic framework. The study found that there is a significant effect of flood on the lives and properties of the populace of Ogbaru Local Government Area and that there is a significant effect of climate change on food production which in turn has a devastating impact on the security of the area understudy. The study recommends a need for repair and construction of new drainages and construction of flood diversion channel, building of dams to harvest the rain water, relocation to higher ground as a necessary condition.

Introduction

It is an established fact that every nation relies on security for good development and growth. To this fact, flood has become a necessity to thoroughly look into; especially in its prone areas as regard environs in Anambra State Nigeria. Globally, riverine areas are naturally prone to flooding; in the year 2012, flooding for the first time became a natural disaster in Nigeria and Anambra State was identified as one of the most affected states.

The Nigeria's National Emergency Management Agency (NEMA) reported that in 2012, flood disaster claimed 363 lives, displaced 2.3 million and affected Seven million people in different parts of the country with properties worth billions of naira destroyed. Among the 36 states of the federation, Anambra state was among the 34 states that had the bitter flood experience. Out of its 21 local government area, 8 were affected; houses and other public and private properties, infrastructures and facilities were submerged and destroyed while many residents were displaced (National Emergency Management Agency 2012, Anambra State Emergency Management Agency 2012, Nigeria Hydrological Service Agency 2012). In 2018 flood submerged over 300 houses in Anambra state and sacked over 2000 residents and in 2019 it has been recorded that no fewer than 375,142 persons has been affected by flood disaster across 10 Local Government Area in Anambra National Emergency Management Agency 2018, 2019).

Floods have been reported as one of the most recurrent and disastrous global natural hazards (UNWater, 2011; Odufuwa et al., 2012; Akukwe and Ogbodo, 2015). The worldwide rise in flood circumstances has caused displacement of people, loss of properties and human lives, stream pollution, destruction of roads and other infrastructure etc (Klijn, 2009; Speranza, 2010; Etuonovbe, 2011; Nzeadibe et al., 2011; Olorunfemi, 2011; Xiao et al., 2013; Adewuyi and Olofin, 2014; Ajaero and Mozie, 2014; Mallakpour and Villarini, 2015).

Nigeria is not an exception as several devastating floods had been recorded (Adeloye and Rustum, 2011; Olajuyigbe, et al., 2012; Akukwe and Ogbodo, 2015) with that of the year 2012 reported as the most devastating in the last forty (40) years (UN-OCHA, 2012; Ojigi et al., 2013). The August-October 2012 floods in Nigeria pushed rivers over their banks and submerged hundreds of kilometres of urban and rural lands (Ojigi et al., 2013) with an estimate of over 7,705,378 Nigerians affected by the floods leaving 2,157,419 persons internally displaced (IDPs). Additionally, over 90% of the 36 States of the country were affected between July and October, 2012 with 363 deaths and more than 618,000 damaged houses (UN-OCHA, 2012).

Farmlands were immensely destroyed resulting to food insecurity in parts of the country (FEWS NET, 2020; FEWS NET, 2022) including Anambra and Imo States (in south eastern region) which have comparative advantage in the production of cassava, sweet potatoes and yam. Empirical studies suggest that flooding affects food security negatively (FAO, 2008; Sidi, 2012; Ismail and Mustaquim, 2013; Muriadi and Wljaya, 2014; Ramakrishna et al., 2014; Zakari et al., 2014; Otomofa et al., 2015; Ikani, 2016; Ajaero, 2017; Akukwe et al., 2018). Flooding affects food security by decreasing food production (Xiao et al., 2013; Ejikeme et al., 2015; Mallakpour and Villarini, 2015; Ikani, 2016); destroying roads used to transport food (Ajaero and Mozie, 2014; Otomofa et al., 2015); affecting quantity and quality of food eaten as well as number of times food is eaten (Akukwe et al., 2018). In flood prone areas of Anambra state, flooding occurs almost every raining season. Ajaero & Mozie(2017) found that flood comes yearly in about 36% and comes after a long spell of safety in about 64% in Ogbaru LGA.

Literature Review

Flooding and Food Security Re-examined

According to Rustum (2011), Flooding is the temporary inundation of all or part of the floodplain or temporary localized inundation occurring when surface water runoff moves via surface flow, gutters and sewers. It also may be referred to as a comparatively high flow of water that overtops the natural or artificial banks in any reach of stream. Flooding is also regarded as an overflow or inundation that comes from a river or other body of water and causes or threatens to damage. its occurrence is usually due to the increase in volume within a water body which causes it to exceed drainage channel capacity and Overflow its bounds (Brook, 2007).

On the other hand, food security is the concept of 'food security' is contested –even among its supporters –although some broad observations are possible. Human security suggests that security policy and security analysis, if they are to be effective and legitimate, must focus on the individual as the referent and primary beneficiary. In broad terms, human security is "freedom from want" and "freedom from fear": positive and

negative rights as they relate to threats to core individual needs. Human security is normative; it argues that there is an ethical responsibility to (re)orient security around the individual in line with internationally recognized standards of human rights and governance. Much human security scholarship is, therefore, explicitly or implicitly underpinned by solidarity commitment to moral obligation, and some is cosmopolitan in ethical orientation (Newman, 2007).

Flooding and the security of lives and properties

Regular floods are part of people's lives in various regions of the world, recurring with varying magnitudes and frequencies to which people have adapted for centuries. These floods are generally expected and welcomed in many parts of the world, since they enrich the soil and provide both water and livelihoods. Usually a flood is an overflow of water that submerges land, low-lying villages and towns or an unusual condition affected by inflow of the tide. Flooding may also occur as an overflow of water from water bodies, such as a river or lake, or sea or large natural water basins, or it may occur due to an accumulation of rainwater on saturated ground in an aerial flood. In disparity, flooding resulting from extreme hydro and meteorological events and taking place in unexpected magnitudes and frequencies can cause loss of lives, livelihoods and infrastructure. They can also damage the environment (Integrated flood management tools series flood forecasting and early warning, 2013).

In general, it was analyzed that worldwide flood is the most destructive natural hazards causing extensive damage to the built and natural environment, and devastation to human settlements. Economic losses due to the effects of damaging floods have increased significantly around the world (Integrated Flood Risk Management in Asia, 2005). People all over the world often have many factors to contend with in their socio-economic Livelihood, among which are natural disasters. The occurrence of natural disasters like flooding has been increasing over the years, resulting in loss of life, damage to property and destruction of the Environment. The number of people at risk has been growing each year and the majorities are in developing countries with high poverty levels making them more vulnerable to disasters. (Living-with-Risk, 2006).

Flood menace has become a perennial occurrence in Anambra state and the battle seems endless (Eleweke,2019). Still fresh in the mind is the 2012 flood crisis which ravaged almost all parts of Nigeria including Anambra State, especially areas like Ogbaru Local Government Area. According to The Child Protection Network of Anambra State (CPNAS, 2013), in the later part of 2012 between the months of July and September, the nation faced an unprecedented flood disaster which resulted to loss of lives and property running into billions of Naira. Several states were affected of which Anambra was one of the most affected States. The disaster affected eight local government areas, with Anambra West and Ogbaru LGAs worst hit.

Climate Change And Food Production

Flood is a global challenge in the face of a changing climatic pattern, Climate change refers to long term change in climate due to natural variability. (Abua & Atu , 2009).

A major factor that influences flood is the climatic condition of a particular geographic location manifested in the form of amount, duration and intensity of precipitation (i.e., rainfall). The combination of Precipitation and high temperature affect soil moisture content (i.e., percentage saturation), liquid limit and infiltration rates. One of the consequences of climatic variability is when humid environments increase and alter rainfall patterns. There is no doubt the effects of climate change alter the precipitation patterns of distribution, intensity and duration of extreme rainfall events and a higher frequency of strong precipitation. In the case of Nigeria, due to higher temperatures and drought, land has become more susceptible to runoff, intensifying flood events. Changes in rainfall intensity and distribution influence river morphology (i.e., erosion of banks and fast sedimentation in riverbeds) introducing augmented dynamic flood shift patterns. (Ewara , 2010).

According to Aondover (1997) the natural resources of the Nigerian wetlands are indeed major sources of livelihood activity to wetlands inhabitants, while the nutrient rich soils are excellent for agricultural purposes. Climate variability and other human activities now threaten this unique habitat. Global temperature increases and causes the rise of the sea level, destroying coastal wetlands and drying up inland wetland basins that previously sustain human socio-economic activities. The environment of inland wetland, has maintained biodiversity by providing critically important habitat to a wide range of wild life species. Flood protection is one important role which wetlands are known to play. Inland wetland

soils act as natural sponges that trap and slowly release surface water. Wetland vegetation also helps to slow the speed of floodwaters and distribute them more gradually over the floodplain. The adverse impact of climate change on the agricultural and human activities of the wetland areas of the country need to be ameliorated through adaptive measures.

According to Ezirim & Onuoha (2012), Climate change is caused by increasing concentration of greenhouse gases (GHG) in the atmosphere. Greenhouse gases include any gas in the atmosphere that is capable, as a result of its particular molecular structure, of absorbing infrared radiation or heat. They a sic called greenhouse gases because they display effects similar to that in a "greenhouse". The glass in a "greenhouse" allows the sunlight to pass through but trapping the heat formed and preventing it from escaping, thereby causing a rise in temperature.

One reason it is urgent to address climate change is the potentially devastating impact on food security worldwide (Leisner, 2020). Declining food production and yields from agriculture, aquaculture, and fisheries are the likely results of climate change. Food security has gained increasing prominence over the last few decades, due to projected climate change impacts based on evidence of future and current greenhouse emissions. Information provided by the Intergovernmental Panel on Climate Change (IPCC) suggests that temperatures will rise between 1.1 to 6.4 degrees Celsius by 2100, based on various scenarios. The IPCC (2007) report highlights that these estimates are based on a hierarchy of models that includes a simple climate model, Earth System Models of Intermediate Complexity, and numerous Atmosphere-Ocean General Circulation Models (AOGCMs). Two main factors driving detrimental impacts on agricultural productivity include increases in temperatures and changes in precipitation patterns.

Changing weather patterns can bring about lowered food and agricultural production, as temperature changes indirectly affect habitat structure, food supply, and resource availability. One key dimension of climate change is the projected increase in sea levels, which will cause inundation of agricultural lands. (Ezenwaji,2010)

Empirical review

There is no known documented research on flooding and human security in Anambra state Nigeria, with particular emphasis on Ogbaru LGA. However, some research similar to that undertaken by this Paper includes, For example;

Efobi & Anierobi, (2013) examined the impact of flooding in Omambala and other riverine communities with a view to determining its nature so as to evolve measures that can enhance the living condition of the people. Data was analyzed and the result revealed that flooding greatly impacted the economic life of the people; their social, cultural and religious aspects of their lives. There were issues of loss of human and animal lives; destruction of agricultural products; housing, educational, transportation commercial and other infrastructural facilities worth billions of naira.

Family and social ties and activities were also hampered while daily livelihood activities were disrupted, good sources of water were polluted and the environment degraded. Hunger, high cost of living, infestation of snakes, flies and other disease vectors and general deplorable living conditions were identified as some of the negative impacts of flooding in the area.

Economic empowerments of poor riverine dwellers through cooperative societies coupled with Public participation in flood control activities among other mitigation measures were recommended.

Sarafina (2014) conducted an extensive research on floods and human security of Oshoopala informal settlement, the study revealed that the flooding had devastating effects on the lives and livelihoods of the inhabitants of the Oshoopala informal settlement. The major cause of the flooding was attributed to the location of the Oshoopala informal settlement in a low-lying area where water collects. Notable in the study is that no life was lost as a direct result of floods. However, people had limited basic needs such as food, education, shelter and good sanitary facilities. This study concluded that the floods had an adverse impact on the human security needs of the inhabitants of the Oshoopala informal settlement. The study recommends a plan of action involving the Oshakati Town Council, the Government, the Disaster and Risk Management Department and the affected community to find a lasting solution to flood-related human insecurities in the Oshoopala informal settlements and other places.

Peter (2015) focused on the Building development practices in flood prone area, with emphasis on Ogbaru Council Area of Anambra State Nigeria and how it has contributed to the menace of flooding.

The study found that siting of buildings on waterways, flood channels/plains, inadequate/lack of drains in the compounds, lack of planning restriction/developmental control, size of the building/area occupied by the building among others contribute greatly to the incessant flood menace in the study area. The study therefore deduced that some building practices such as those identified above have the ability of exacerbating the velocity and rate of flooding in the area which turned into natural disaster, and thus, recommended strict enforcement of building and urban development laws and control in the state to reduce indiscriminate erecting of building structures on Waterways, including improper planning of our emerging urban centre's.

Ezenwaji & Orji (2014), in another study investigated the Effect of Climate Change on the Communities of Ogbaru Wetland of South West Anambra State, Nigeria. The aim of this study was to examine the effects of climate change on the livelihood of the inhabitants of the communities in Ogbaru wetland of Anambra State, Nigeria. Data were analyzed with the use of Multiple Regression Technique to ascertain the collective contributions of the meteorological elements to climate change in the area. Furthermore, cluster analysis was employed to agglomerate the 16 communities into defined groups. Result shows that the three meteorological elements namely Temperature, Rainfall and Relative Humidity, altogether contributed 43% to the overall variation in climate change of the wetland while cluster analysis grouped the 16 communities into three, according to the degree of the impact of climate change on them. Measures aimed at adapting to the adverse impact of the change such as creation of earth dams around the farms, use of markings on walls to gauge the flood height of previous years, employing adequate construction techniques in road construction in the area etc. were discussed.

Oruonye, Ahmed, Yakubu & Ejati (2017) investigated on the Effects of flood disaster on rural livelihood and coping mechanism in Lau Local Government Area, Taraba State, Nigeria. This study appraised the effects of flood on the livelihood of the rural dwellers and the coping mechanism to flood effects in the area. The finding of the study reveals that the low lying nature of the area and proximity to the river bank makes it vulnerable to seasonal flood some of the floods particularly the 2012 floods have been very devastating. These resulted in loss of crops and livestock which is the main source of livelihood of the people. The findings show that although the people have not recovered from the effects of past floods, they have become resilient to the flood hazard. Some of the coping mechanism includes; relocation from the flood plain, reconstruction of houses with reinforced materials (that is with bricks and blocks as against the predominant mud/thatch houses), raising of houses above Annual flood levels, erection of temporary houses along river banks, creation of water channels for easy evacuation of floods, frequent dredging of drainage outlets, construction of dykes using sand bags and fumigation of stagnant flood water against mosquito parasites. The study recommends public enlightenment campaign, early warning system especially before release of water from Lagdo dam upstream in Republic of Cameroon, development of safety nets among others.

In a related study, Jimoh &Hafiz (2019) conducted an investigation on the Perceived effects of flood on lives and properties of the residents of Lokoja, Kogi State Nigeria. The theory of resilience and concept of vulnerability provided the anchor while cross sectional survey research design was adopted for the study Flooding was discovered to cause damages to household properties (30.8%), household vehicles(3.5%), buildings collapse (0.5%), farmlands (7%) and death (0.4%). Although, more than 77.2% of the respondents were discovered to have been prepared for past flood events, but the nature of their preparedness were poor. The research also revealed significant relationship between level of preparedness and the effect of severe flooding (0.246). Therefore, early warning system should be provided for the residents coupled with flood resilience buildings.

Many other related literature reviews on flooding and human security have been carried out in some States in Nigeria and other countries like (Aondover 1997, Ezenwaji 2010, Nnaji 2011, Adejuwon 2006, SEI 2008, Abatam, 2007; Ugwuanyi & Anekeje, 2009, Uyigue & Agbo,2007). Actually tremendous results were achieved as a result of their in-depth studies, but no research has been conducted on flooding and human security in Ogbaru LGA. There have been several studies on the issues of flooding and human security cities of Nigeria, but much have not been done concerning the activities of flooding and human security in Ogbaru LGA of Anambra State Nigeria. It is this lacuna that the researcher filled.

Theoretical framework

This work is anchored on Eco-violence theory developed by Homer-dixon (1999).

Homer-Dixon (1999) asserts that large populations in many developing countries are highly dependent on four key environmental resources that are fundamental to their livelihood: fresh water, cropland, forests, and fish. Scarcity or shrinking of these resources as a result of misuse, over-use or degradation, population growth, climate change and resource access leads to competition over the scarce ecological resources among groups, and may under some certain circumstances trigger off conflicts (Homer-Dixon, 1999).

Homer-Dixon synthesizes work from a wide range of international research projects to develop a detailed model of the sources of environmental scarcity. He refers to water shortages in China, population growth in sub-Saharan Africa and land distribution in Mexico. Scarcities stem from the degradation and depletion of renewable resources, the increased demand for these resources, and/or their unequal distribution. He shows that these scarcities can lead to deepened poverty, large-scale migrations, sharpened social cleavages, and weakened institutions. Homer-Dixon describes the kinds of violence that can result from these social effects, arguing that conflicts in Chiapas, Mexico and ongoing turmoil in many African and Asian countries, for instance, are already partly a consequence of resource scarcity.

Homer- Dixon (1999) argued that resource scarcity is the product of an insufficient supply, too much demand or an unequal distribution of a resource due to political economic, social and environmental factors. This situation triggers unhealthy competition and violence among groups within the society due to conditions of deprivation and limited resources. In effect, resource scarcity raises the competitive stakes and premium that the various societal groups place on available resources, which may engender violent conflicts among groups. (Dixon, 1999). He, however, acknowledges that human ingenuity can reduce the likelihood of conflict resulting from the resource scarcities, particularly in countries with efficient markets, capable states, and an educated populace.

This theory holds that, decreases in quantity and quality of renewable resources, population growth and unequal resource access act singly or in various combinations to increase the scarcity, for certain population groups of cropland, water, forest and fishes. This can reduce economic productivity and in turn endanger human security, both for local groups experiencing the scarcity and for the larger regional and national economies. The affected people may migrate or be expelled to new lands; Migrating groups often trigger different kind of problems, when they move to new areas, while decreases in wealth can cause deprivation (Homer-Dixon 1999). From the theory, the key environmental resources necessary for food production especially in developing countries are crop land, fresh water, forest and fish. Natural disaster such as floods, tend to attack all of the above listed environmental resources, the world will consequently face growing scarcity of such vital renewable resources as crop land, fresh water, and forests.

Methodology

This study adopted survey research design whose purpose according to Ezeani (1998) is to collect detailed and factual information that describes an existing phenomenon.

The study area covers the Ogbaru Local Government Area of Anambra State, Nigeria. Towns that make up the local government are Atani, Akili-Ogidi, Akili-Ozizor, Amiyi, Mputu, Obeagwe, Ohita, Odekpe, Ogbakugba, OchucheUmuodu, Osomala, Ogwu-aniocha,Umunankwo, Umuzu, Okpoko, OgwuIkpele. Ogbaru has its headquarters at Atani.

The population of this study constitutes all the households in the area. According to the 2006 National Population and Housing Census, the population of persons in Ogbaru LGA of Anambra State was 223,317. We sample because it would be virtually impossible to study the entire population due to constraints of time and cost. The sample size for the study is 400. This was determined through the Yaro Yamine's formula.

Data for the research was collected through the instrumentality of questionnaire. The investigator personally distributed the copies of questionnaire to the respondents to ensure prompt response from them. Distributed questionnaires were personally retrieved by the researcher after completion. The data collected from the respondents were analyzed using statistics such as percentage, frequencies and tables were also put to use in the analysis of Research questions while research hypothesis were tested using chi-square (X2) and Pearson correlation.

Data Presentation and Analysis

This section is dedicated to the presentation, analysis and interpretation of data obtained by the researcher in the conduct of this research. Primary data was obtained from questionnaire administered to a total of four hundred respondents. Information was presented using tables to aid easy understanding. Section 4.1.1 presents the bio-social information of the respondents; Section 4.2 presents the descriptive statistics of the questionnaire; presents the hypotheses test results and finally, 4.4 presents the discussion on findings.

Demographic Data of Respondents

Table 1: Sex of the Respondents

Sex	Frequency	Percentage (%)
Male	75	46.9
Female	85	53.1
Total	**160**	**100**

Source: Field Survey, 2024.

From the above, the table clearly indicates that 85 respondents representing 53.1% are females while 75 respondents representing 46.9% are male. This implies that there are more females than the male.

Table 2: Age of the Respondents

Age	Frequency	Percentage (%)
20-40	70	43.75
4 1 and above	90	56.25
Total	**160**	**100**

Source: Field Survey, 2024

The table above shows that 70 respondents representing 43.75% fall between the age of 20-40 bracket while 90 respondents representing 56.25% falls between the age bracket of 41 and above.

Table 3: Distribution of respondents by marital Status

Marital Status	Frequency	Percentage (%)
Single	69	43.1
Married	91	56.9
Total	**160**	**100**

Source: Field Survey, 2024.

The above table revealed that 69 respondents representing 43.1% are single, 91 respondents representing 56.9% are married.

Data on Variables of Subject of Investigation

Table 4: How has flooding affected security of lives and properties of the populace in Ogbaru Local Government Area?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5

Agree	30	18.75
Undecided	30	18.75
Disagree	20	12.5
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

The above table revealed that 90 respondents representing 56.25% agreed and strongly agreed that flooding affect food security, while 40 respondents representing 25% disagreed and strongly disagreed.

Table 5: How has climate change affected agricultural production in Ogbaru Local Government Area Anambra state?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	30	18.75
Disagree	15	9.8
Strongly Disagree	25	15.62
Total	**160**	**100**

Source: Field Survey, 2024.

From the table above, 90 respondents representing 56.25% agreed and strongly agreed. While 40 respondents representing 25.42% disagreed and strongly disagreed. This implies that climate change affects agricultural production.

Table 6:Flooding affects food production in Ogbaru Local Government Area?

Response	Frequency	Percentage (%)
Strongly Agree	70	43.75
Agree	30	18.75
Undecided	20	12.5
Disagree	30	18.75
Strongly Disagree	10	12.5
Total	**160**	**100**

Source: Field Survey, 2024

The above table revealed that 90 respondents representing 62.5% agreed and strongly agreed. While 40 respondents representing 31.2% disagreed and strongly disagreed. Flooding affects food production in Ogbaru Local Government Area.

Table 7: Flooding exposes farmers to danger and diseases?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	20	12.5
Disagree	30	18.75
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

The above table revealed that 90 respondents representing 56.25% agreed and strongly agreed. While 50 respondents representing 31.25% disagreed and strongly disagreed. This therefore indicates that flooding exposes farmers to danger and diseases.

Table 8: There is increase in mortality rate of crops and seedlings due to excessive water?

Response	Frequency	Percentage (%)
Strongly Agree	71	44.3
Agree	29	18.12
Undecided	30	18.75
Disagree	20	12.5
Strongly Disagree	10	6.25
Total	**160**	**100**

Source: Field Survey, 2024.

The table indicates that 100 respondents representing 62.42% agreed and strongly agreed. While 30 respondents representing 18.75% disagreed and strongly disagreed. This implies that there is increase in mortality rate of crops and seedlings due to excessive water.

Table 9: The major drainages in the State are littered and blocked by dumps from inhabitants?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	30	18.75
Disagree	20	12.5
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

From the above table, it implies that 90 respondents representing 56.25% agreed and strongly agreed. While 40 respondents representing 25% disagreed and strongly disagreed. This indicates that the major drainages in the State are littered and blocked by dumps from inhabitants.

Table 10: Dirty and stagnant water is seen on most of the roads and streets?

Response	Frequency	Percentage (%)
Strongly Agree	63	39.4
Agree	27	16.9
Undecided	10	6.25
Disagree	36	22.5
Strongly Disagree	24	15
Total	**160**	**100**

Source: Field Survey, 2024.

Table 10 shows that 90 respondents representing 56.3% agreed and strongly agreed. While 40 respondents representing 37.5% disagreed and strongly disagreed. This implies that dirty and stagnant water is seen on most of the roads and streets.

Table 11: The inhabitants are displaced and can no longer have access to their farmlands?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	30	18.75
Disagree	20	12.5
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

From the above table, it implies that 90 respondents representing 56.25% agreed and strongly agreed. While 40 respondents representing 25% disagreed and strongly disagreed. This implies that the inhabitants are displaced and can no longer have access to their farmlands.

Table 12: Due to flooding the cost of food in the market goes up?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	35	21.9
Undecided	25	15.6
Disagree	22	13.75
Strongly Disagree	18	11.25
Total	**160**	**100**

Source: Field Survey, 2024.

From the above table, it implies that 95 respondents representing 59.4% agreed and strongly agreed. While 40 respondents representing 25% disagreed and strongly disagreed. This implies that due to flooding the cost of food in the market goes up.

Table 13: The emergency management bodies workers delay for a long time before coming?

Response	Frequency	Percentage (%)
Strongly Agree	65	40.62
Agree	30	18.75
Undecided	20	12.5
Disagree	25	15.62
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

From the above table, it implies that 95 respondents representing 59.37% agreed and strongly agreed. While 45 respondents representing 28.12% disagreed and strongly disagreed. This implies that the waste management workers delay for a long time before coming.

Table 14: Aqua creatures become scarce as a result of excessive flooding?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	30	18.75
Disagree	15	9.8
Strongly Disagree	25	15.62
Total	**160**	**100**

Source: Field Survey, 2024.

From the table above, 90 respondents representing 56.25% agreed and strongly agreed. While 40 respondents representing 25.42% disagreed and strongly disagreed. This implies that sometimes, aqua creatures become scarce as a result of excessive flooding.

Table 15: The waste management workers pour decayed faeces into the major water bodies?

Response	Frequency	Percentage (%)
Strongly Agree	70	43.75
Agree	30	18.75
Undecided	20	12.5
Disagree	30	18.75
Strongly Disagree	10	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

The above table revealed that 90 respondents representing 62.5% agreed and strongly agreed. While 40 respondents representing 31.2% disagreed and strongly disagreed. This implies that the waste management workers pour decayed feaces into the major water bodies.

Table 16: There are often little or no efforts on the part of government to help control flooding?

Response	Frequency	Percentage (%)
Strongly Agree	60	37.5
Agree	30	18.75
Undecided	20	12.5
Disagree	30	18.75
Strongly Disagree	20	12.5
Total	**160**	**100**

Source: Field Survey, 2024.

The above table revealed that 90 respondents representing 56.25% agreed and strongly agreed. While 50 respondents representing 31.25% disagreed and strongly disagreed. This therefore indicates that there are often little or no efforts on the part of government to help control flooding.

Test of Hypotheses

The hypotheses' testing involves a set of rules that leads to a decision in the acceptance or rejection of a given phenomenon. The tool that is used here is Chi-square (x^2). Chi-square is a method that measures the discrepancies existing between the observed and expected frequencies.

Hypotheses One

There is no significant effect of flooding on live and properties of the populace in Ogbaru Local Government Area.

Using the information gotten from question 1,2,3,4 and 5 the hypothesis will be tested.

The corresponding expected frequency for each of the observed frequency in table 5 above was calculated using the formula:

$$\frac{\text{Row total x column total}}{\text{Grand total}}$$

The level of significance used by the researcher is 5% = 0.05

The observed and expected frequency were combined and represented in a chi-square contingency table below.

Table 19: 2×5 chi-square contingency table 1

Options	O	E	O-E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
Agree	60	60.9	-0.9	0.81	0.0107734
Strongly Agree	30	29.99	0.01	0.0001	0
Disagree	30	29.99	0.01	0.0001	0
Strongly Disagree	20	19.44	0.56	0.3136	0.0050589
Undecided	20	19.44	0.56	0.3136	0.0050589
Total	**160**	160			0.208912

df =(r-l)(c-l)=(2-1)(5-l)

= 1x4 = 4

Therefore df = 4

Level of significance is 5% = 0.05

X^2 calculated = 208912

Critical value = 9.49

Since the calculated chi-square (208912) is more than the critical value (9.49), the alternate hypothesis is accepted and the null hypothesis is rejected. This implies that There is no significant effect of flooding on live and properties of the populace in Ogbaru Local Government Area.

Hypotheses Two

There is no significant effect of climate change on Agricultural and food production in Ogbaru Local Government Area.

Using the information gotten from questions 6,7,8,9 and 10 in the questionnaire, the hypotheses will be tested.

Table 20:5×5 chi-square contingency table 2

Options	**O**	**E**	**O-E**	**$(O-E)^2$**	**$\frac{(O-E)^2}{E}$**
Agree	30	29.99	0.01	0.0001	0
Strongly Agree	30	29.99	0.01	0.0001	0
Disagree	60	60.9	-0.9	0.81	0.0107734
Strongly Disagree	20	19.44	0.56	0.3136	0.0050589
Undecided	20	19.44	0.56	0.3136	0.0050589
Total	**160**	160			0.208912

df =(r-l)(c-l)=(5-1)(5-l)

= 4x4 = 16

There df = 16

Level of significance is 5% = 0.05

X^2 calculated = 208912

Critical value = 26.30

Since the calculated chi-square (208912) is more than the critical value (26.30), the alternate hypothesis is accepted and the null hypothesis is rejected. This implies that there is no significant effect of climate change on Agricultural and food production in Ogbaru Local Government Area.

Using the information gotten from questions 11,12,13,14 and 15 in the questionnaire, the hypotheses will be tested.

Table 20:5×5 chi-square contingency table 3

Options	**O**	**E**	**O-E**	**$(O-E)^2$**	**$\frac{(O-E)^2}{E}$**
Agree	65	29.99	35.1	1225.7	34.9202
Strongly Agree	30	29.99	0.01	0.0001	0
Disagree	20	60.9	-0.9	60	-0.9
Strongly Disagree	25	19.44	0.56	5.54	0.2216
Undecided	20	19.44	0.56	0.3136	0.0050589
Total	**160**	160			34.2469

df =(r-l)(c-l)=(5-1)(5-l)

= 4x4 = 16

There df = 16

Level of significance is 5% = 0.05

X^2 calculated = 34.2469

Critical value = 26.30

Since the calculated chi-square (34.2469) is more than the critical value (26.30), the alternate hypothesis is accepted and the null hypothesis is rejected. This implies that there is no significant effect of climate change on Agricultural and food production in Ogbaru Local Government Area.

Discussion of Findings

1. Respondents perceived that there is no significant effect of flooding on live and properties of the populace in Ogbaru Local Government Area. According to Adewole (2009) flooding affects food production. Consequent upon this, respondents favored question 9 in the questionnaire, thus, appropriate collection and disposal of waste prevents diseases.
2. There is no significant effect of climate change on Agricultural and food production in Ogbaru Local Government Area. This depicts that the whole essence of managing climate is to ensure environmental protection by mitigating its negative effects on the environment. This is in tandem with Adewole's {2009} perception of waste management as the collection, keeping, treatment and disposal of wastes in such a way as to render it harmless to human and animal lives, the ecology in particular and the environment in general.

Conclusion

Flooding a critical issue confronting practically every state in Nigeria because of its human and environmental sustainability implications. As human beings naturally depend on the environment to sustain their lives, proactive measures have to be taken into cognizance towards managing flood in order to achieve economic, social and environmental protection which form the basic components of sustainability development.

Flooding encompasses the whole process of generating, keeping; treatment; handling and disposal of wastes in such a way as render it harmless to humans, animals, ecology and the environment. This calls for timely and effective management of waste which highlights one of the most critical challenges of sustainable development which demands meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Recommendations

Based on the findings, the following recommendations are made:

1. This research therefore recommends that workshop on climate change should be organized frequently for farmers in the study area as to enable them being acquainted with a proper knowledge on climate change and mitigation.
2. Farmers should be encouraged and educated on issuance policy that would give them some sorts of protection in the case of adverse and unforeseen circumstances. Government on the other way round should compensate and give a source of financial aids to the victims of climate change.

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