

## Chapter

# Climate-Driven Temporary Displacement of Women and Children in Anambra State, Nigeria: The Causes and Consequences

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## Abstract

With increasing periods of extreme wet seasons, low lying geographic position, with socioeconomic, and political factors; some communities in Anambra State, Nigeria experience heightened floods annually resulting in loss of shelter, displacement of people with breakdown of livelihoods, particularly in rural communities worsening their risks and vulnerabilities. In 2012, a major flood event in the state temporarily displaced about 2 million people. In this chapter, we used a community-based adaptation approach to investigate the causes and consequences of climate-related temporary displacement on community members in Ogbaru LGA, Anambra State following flood events. We used global positioning system to obtain the community's ground control points and gathered our data *via* field observation, transects walks, focus group discussions, photography, and in-depth interviews. Our findings reveal a heightened magnitude of flood related disasters with decreased socio-economic activities, affecting their health and well-being. Also, the community members have a practice of returning to their land, after flood events, as a local mitigating risk management strategy. For multilevel humanitarian responses at the temporary shelter camps, it becomes imperative to meaningfully engage the community members on the challenging risks and vulnerabilities they experience following climate-driven temporary displacement to inform adaptation and resilience research, policy change and advocacy.

**Keywords:** climate-driven temporary displacement, women, children, flood reoccurrence, CBA and Anambra State

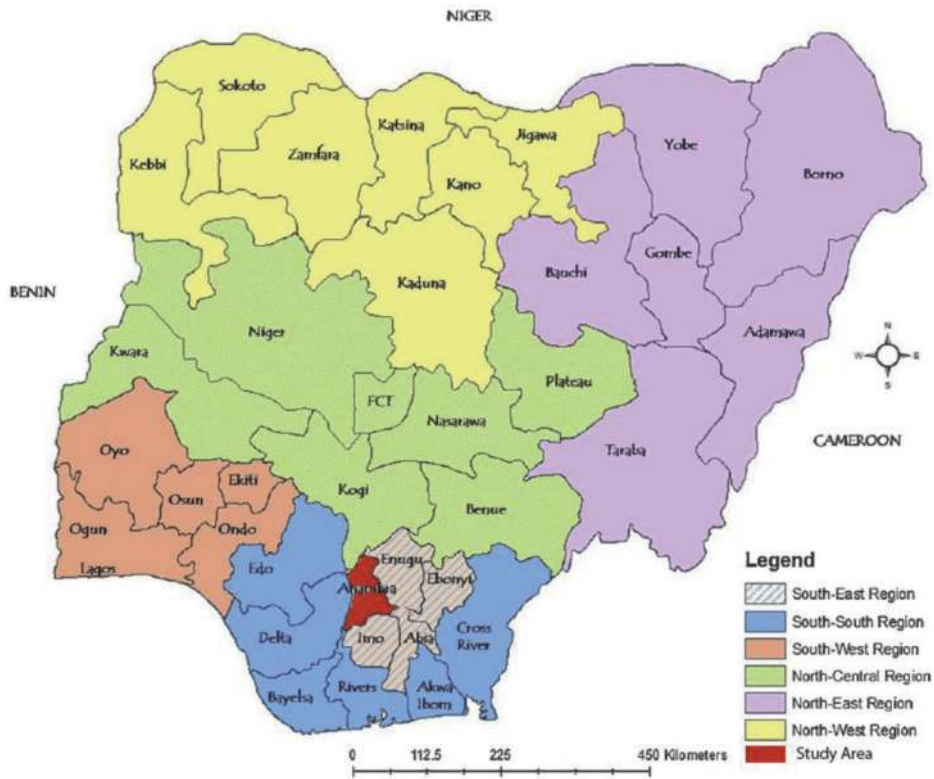
## 1. Introduction

Over the years in Africa, changes in climate worsened by disasters and fragility are becoming increasingly common, particularly in some vulnerable Nigerian weather-impacted communities threatening disprivileged populations. With accompanying periods of extreme wet seasons and their effects on heightening flood events, there have been *climate-related temporary displacements* from excess water coursing through the lands [1]. Climate-related temporary displacement is events impacted the anthropomorphic aspect of climate change, such as loss of shelter, movement of people, and breakdown of livelihoods of rural and urban communities with added risks and vulnerabilities, besides other socio-economic factors that are affected [2]. Due to the need to continue to protect community biological diversity, health, and natural resources [3], the community members resort to community-based climate risk management options, such as climate-related temporary displacement. This temporary displacement involves going back to the affected community after flooding events to manage and reduce impacts of climate change and local pressures [4]. As defined by [4], *community-based adaptation* is a local mitigating risk management strategy that involves the process of migrating back to their community periodically after an environmental stressor, such as flooding. Community-based adaptation (CBA), a process led by the community, is aimed to meet and prioritize the needs of communities, leveraging on their built capacities and the knowledge they hold, and empowering members with the required information and activities for favorable climate change outcomes.

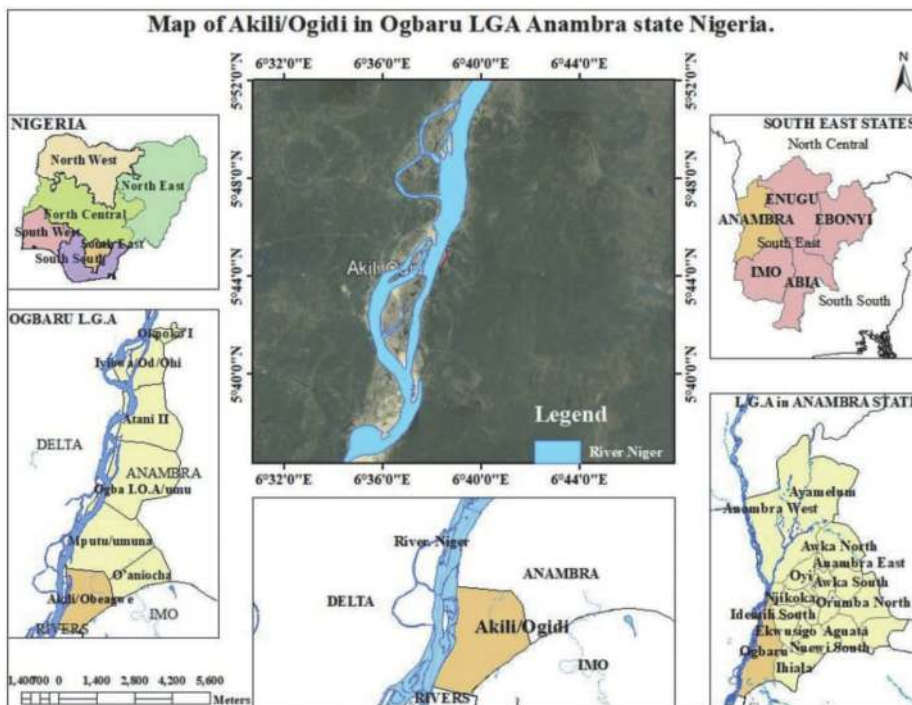
Community-based approach (CBA) utilizes a solution-oriented lens to confront challenging complex issues associated with human displacement, internal displacement, and relocation, as well as addressing the present climate-fueled flood reoccurrence events in affected communities. With its beneficial approach, CBA has been shown to increase and respond to comprehensive climate change threat(s) and its impacts on disprivileged populations [5]. Notably, CBA exhibits a partnering relational procedure between groups, such as community and institutional stakeholders, and not activities that were decided on, and imposed on the locals [6]. This procedure can build, strengthen, and bridge on existing adaptive capacities, relational values, and skills, while holding on prevailing local knowledge and technologies to encourage the communities on their community-led goals [7, 8].

For our study area: Anambra State is made of 21 Local Government Areas (LGA), and Ogbaru LGA is one of them, with Akili Ogidi as one of its main towns in this LGA. Ogbaru LGA is in the Southwest of Anambra State in Nigeria (see **Figures 1** and **2**). And with a population of about 221,879 [9], Ogbaru LGA occupies an area of 388 km<sup>2</sup> and density of about 762.3/km<sup>2</sup> [10] (see **Figure 2**). To the North, Akili Ogidi is bounded by Onitsha South Local Government Area, on the South by Rivers state and Imo state, while on the Western side, it is bounded by Delta state and on the East by Idemili South, Ekwusigo and Ihiala Local Government Areas. (<https://en.wikipedia.org/wiki/Ogbaru?msclkid=737721afcf3911ec90c5d2cabc0b2eb2>).

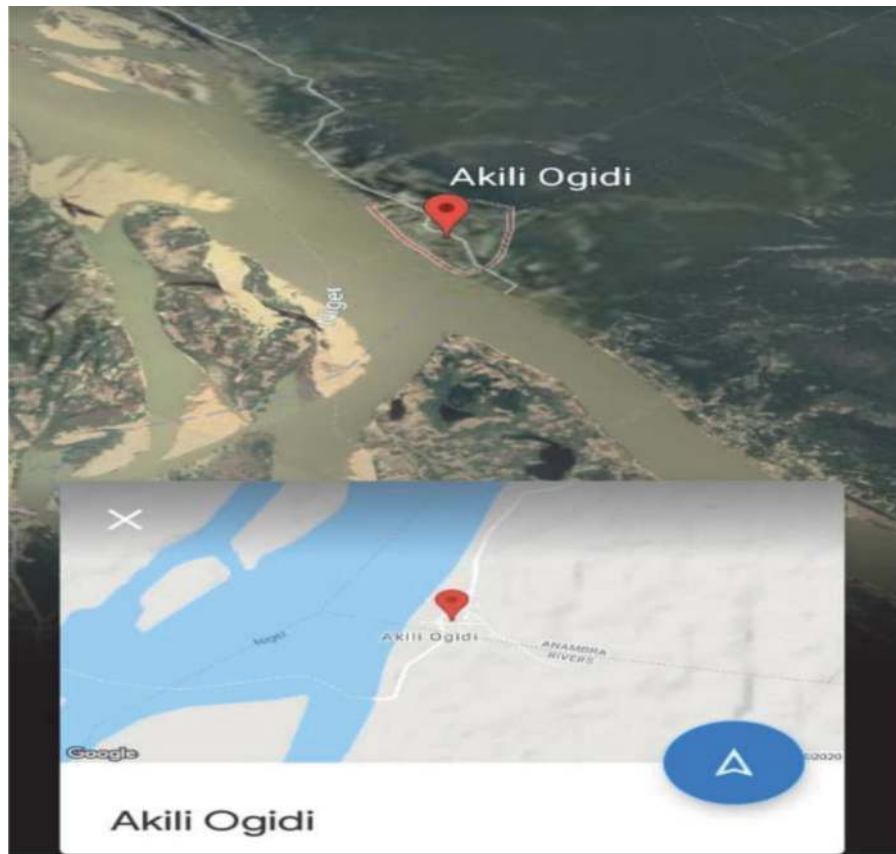
Lying on the latitudes 5°42'N to 6°10'N and longitudes 6°41'E to 6°50'E, respectively, Akili Ogidi is noted for its agricultural activities [11]. The flood/alluvial plains of the Niger River are shown to form the major parts of our study site (see **Figures 2** and **3**). The vegetation is characterized by modified green areas and grasslands in remote areas [12]. With an elevation of 25 m above sea level, the area is dominated by shallow aquifers, while the climate is tropically characterized by high precipitation averaging between about 1800 and 2300 mm [13]. For the relative humidity in our study area, which is within an average of about 60–70% in July, the average daily annual temperature of this area is in the range of 24–28°C with a



**Figure 1.**  
 Map of Nigeria showing Anambra State. Source: Department of Environment Management, COOU (2021).



**Figure 2.**  
 Maps showing Southeast States, Anambra State and Ogbaru Local Government Area and Akili Ogidi—study area surrounded by River Niger. Source: Department of Environment Management, COOU (2021).



**Figure 3.**  
Satellite image showing Akili Ogidi. Source: Google Map (2021).

night temperature of 16–18°C [14]. Averagely from March to October, there are wet climatic conditions with dry seasonal conditions from November to February [15]. The longer wet seasons are prevalent with intense storms that cause floods displacing the residents during the entire wet season.

For coastal cities in Nigeria, they are continually being displaced, dislocated, and relocated temporarily due to continual events of floods resulting in large population of temporary migrants, further threatening the life of the communities and individuals. In 2018, over 1.9 million persons were internally displaced by the floods across 12 States in Nigeria and over 500,000 were homeless. Unfortunately, marginalized groups, such as rural women and children majorly, have been hard hit leading to their reduction in income levels, pressure on food security, health, poor nutrition worsening health status of children, besides other impacts on the environment.

Though rural communities of these regions located around the river banks are usually the worse hit by these flood events, most Nigerian coastal cities and communities in Nigeria particularly Southeast region have experienced continual sea-level rise, from increasing rainfall. In Nigeria, all the communities within the bank of River Niger and Benue, in Anambra, Kogi, Edo, Delta, Nassarawa, Taraba, and Adamawa states, continue to be flooded almost like an annual event. These states are located along the two main Nigerian rivers: the Niger and Benue rivers. These flooding events further implicate the rising water levels of these two rivers as the primary causes behind the flooding experienced in Nigeria. Further, the ecosystem-dependent livelihoods, such as rainfed agriculture, are breaking down due to the changing temperatures and associated erratic high-volume patterns of rains

impacting agricultural procedures [16, 17]. Of note, these floods threaten agricultural production levels and food security [18] aggravated by increased inter-annual variability of precipitation, which may heighten temporary displacement out of the lower rural land production areas to the urban regions.

The 2063 agenda for the African Union's (AU) agenda is a call to strengthen humanitarian activities and to transform the continent within 10 years. IPCC Fourth Assessment Report [19] in its summary of climate change projections and impacts for Africa reported that Africa is a vulnerable continent. Africa's vulnerability to climate change may be hinged on the wicked problems, such as extreme poverty, unregulated emissions from fossil fuel combustion, poor physical planning, governance failures, corruption, violence extremism, inequalities, food insecurity, unemployment [20], and uncontrolled population rise with an imbalanced demographics that characterize the continent. These multiple intractable problems are worsened by lifestyles, such as indiscriminate waste disposal, uncensored felling of trees, and deforestation that aggravate anthropogenic emissions leading to extensive influence on population and natural ecosystems.

Globally, World Health Organization (WHO) has estimated that in the next 30 years (by the year 2030 and 2050), climate variability may result to increasing environmental disaster-related annual deaths (about 250,000 additional deaths). In these contexts, declaring 2019 as the "Year of Refugees, Returnees and IDPs" by AU is aimed to promote lasting solutions, particularly to forced displacement witnessed in Africa. Of note, the launching of the African Climate Mobility Initiative (ACMI) will continue to assist the works of the African Union member states in addressing the complex issues of climate-related forced internal and external migration and leverage on possibilities that come with the African climate-induced migration. Notably, climate changes will escalate diverse impacts, such as rising sea level and extreme weather in the West African region, particularly Nigeria [21] in addition to the worsening socioeconomic milieu. However, in recent times, modern sophisticated modeling technologies coupled with improved research studies have provided atmospheric scientists the ability to determine and comprehend the causes of the majority of weather events, particularly the events influenced and heightened by climate change.

In light of the aforesaid discourse, the goal of our chapter is to investigate the causes and consequences of climate-driven floods and temporary displacement prevalent among community members, particularly women and children in Ogbaru LGA, Anambra State. This study provides information needs shared by affected community to reduce the risks of climate variability by involving them in planning of adaptational practices, activities, and planning.

## **2. Materials and methods**

A qualitative case study approach was employed in this study to provide a holistic and in-depth explanation of the community-based flood problem and its implications for temporary displacement on the people of the Ogbaru community, particularly women and children. Our primary data were key informant interviews, observations, semi-structured interviews, photographs, focus group discussions, and informal interactive dialogs with indigenes that were recorded. We also used secondary sources of information. For our reviews, we also included an analysis of our operational environment, livelihood sources, challenging vulnerabilities and hazards, and the dynamics of the socioeconomic milieu. Also, we used the purposive sampling technique (convenient and snowball methods) to select our informants to ensure that their core views and voices of women and the

participating male informants of problems under study were appropriately represented. Forty community members were randomly interviewed using unstructured questions.

Our interview and discussion groups were carried out using the Igbo and English languages. Effective interpretation back to the English language was done by our research assistants. We included different variables from our target relative to educational background, marital status, occupation, and socioeconomic data of the perceptions of the interviewees on the effects of river flooding. We also employed the focus group discussion (FGD) to interact with 60 women using unstructured questions. There were separated into six women groups (10 in each group) namely single, married, and aged/with disabilities. Forty persons were randomly interviewed using semi-structured interviews, while eight (8) persons (5 women and 3 men) were recruited to be involved in our key in-depth interviews (see **Figures 4–7**).



**Figure 4.** The community chairman Mr. Uche Ijomah (red arrow) who came to receive the researchers at bank of River Niger to the study area (blue arrow).



**Figure 5.** Different FGD sessions of Akili Ogidi women.



**Figure 6.**  
*A photo session of the researchers with the community women after the focus group discussion.*



**Figure 7.**  
*A photo session of some of the women researchers with the community chairman (red), community chief (blue), elders, and women leader (red).*

Each session of the three women groups lasted for about an hour. The FGD provided the researchers with the primary information about the community women's daily activities and how their roles intersected with their coping mechanisms and pressure from flooding. We, manually, analyzed our qualitative data, and for our photographs and the field observations, the images gave a vivid description of flood activity. The GPS obtained ground control points. We used other sources of data to confirm the results reflecting unique findings from our study area.

### 3. Results and discussion

#### 3.1 Sample characteristics

In Nigeria, temporary-displaced migrants from communities are majorly affected by climate-related flooding, and they move out of their indigenous lands to places of refuge making them high-risk and a vulnerable group [22]. For a qualitative study, our sample size ( $n = 100$ ) was a large one, ensuring that a greater number of community members were included. Moreover, most of the participants were eager to be part of the study. Demographic variables, such as sex, age, income, and occupation, were asked, with a summary of some social data (economic, environment, gender roles, and health data).

**Table 1** shows the summary of core characteristics of our participants. The highest age group was in the 30 to 40 years category, while those in the 50 to 60 years had the lowest proportion of 18%. Most of our respondents were between the ages of 18–60 years, with lived experience of flood activities. A total of 72% of the participants were females and 18% were males. For their educational levels, all the participants had completed their basic primary education, but there were no

Variables	Frequency
Age	
18–30 years	22
30–40 years	36
40–50 years	24
50–60 years	18
Gender	
Male	27
Female	73
Education level	
FSLC	53
WAEC/WASC	27
NCE/OND	00
BSC/HND	00
NONE	20
Marital status	
Single	28
Married	35
Widowed	17
Divorced	08
Separated	12
Household size	
1–4	20
5–9	42
10–14	38
Years of living in the community	
1–2	00
2–5	08
5–10	20
10 years and above	72
Income level (monthly)	
₦1000–10,000	32
₦11,000–₦20,000	28
₦21,000–₦30,000	15
₦31,000–₦40,000	10
₦41,000–50,000	07



Variables	Frequency
₦50,000 and above	08
Internal migration of respondents	
Gender	
Male	33
Female	67
Total respondent	100

*Source: Researchers' Analysis (2020).*

**Table 1.**  
*The socio-economic characteristics of participants in Akili Ogidi.*

participants with complete or some level of completion of graduate-level education. More than 30% of our participants were married. A large number of the interviewed men had married several wives with large households ranging from 1 to 12 persons. For the household size, 38% of the participants had more than 10 persons within their household, while 20% had between one and four persons. Majority of the community have lived in the affected community for over 10 years or more. For their income level, more than 90% had very low income \$1USD/day. From our discussions and interviews, a large number of community members were internal migrants, and women were in the majority (67%), and they migrated with their children particularly the young ones. Although we were targeting women, men wanted to be part of the study and we had to randomly select the men who consented to be part of the key in-depth interviews.

The results from qualitative case study approach provided comprehensive discussions on reoccurring flood activity, social consequences of flooding, as well as the effect of climate-related internal migration on women and children from the study area.

#### **4. Causes of persistent flood activity in Akili Ogidi community**

Unarguably, flooding events are aggravated by changing climate and it requires emergency rescue and rehabilitation of affected population and communities, because of the high level of accompanying morbidity. For example, the Nigeria Displacement Report of 2013 reported that about 4,189,650 people suffered from food insecurity, 3,883,215 people were targeted for malnutrition challenges, and 194,859 were harbored in IDPS from floods. Clearly, climate change is fast becoming in Nigeria a major driver of human displacement. According to International Red Cross [23], more people will be displaced from weather-related and climatic events than war (<http://www.icrc.org/en/document/internally-displaced-people>). Climate-driven displacement, environmental migrants, or climate migrants come with adverse effects from climate persecution and violence to temporary displacements sequel to flooding, which has been prevalent for over 10 years in Anambra state. Climate-driven temporary displacement is a previous situation in Anambra-riverine communities annually as people flee from flood disasters to become displaced and can be stranded inside their own communities. Here, the floods have been extreme, particularly the flood events of 2012, 2013, 2018, 2019, and 2020 [24–29].

Key informant interviews reveal important insights on the major causes that contribute to the (re)occurring floods in the study area, and our findings are

consistent with the past flooding events. Firstly, the community occupies a vast wet area that lies in the SouthWest part of Anambra state, at the bank of River Niger, which is a fragile and flood prone area with heavy rainfalls during the wet season. The flooding leads to a rise in water levels of River Niger, adjoining creeks, and ponds overflowing into the community. The leader for the women group described the anxiety and despair they face as the wet season ensues:

*... The rainy season come with heavy storms and floods that threaten our lives, we are left with no choice than to face the harsh conditions it bring. You know that our community is facing the River Niger. We have accepted our fate that our problems are locational. This is worse because we have little help and assistance.*

One of the male interviewees who emphasized that, apart from the floods of 2012, it was majorly influenced by the mismanagement of dams and water reservoirs in Nigeria and our neighboring countries. Undoubtedly, subsequent floods have been sourced from the overflow of the banks of River Niger. According to the elder (male):

*... this makes our community vulnerable to flood occurrences annually during the wet season, and to flood and disaster. our people will always migrate within the state in search of safe locations and the experience brings diverse devastating consequences.*

Ajaero and Mozie [30] reported that Ogbaru LGA is continually impacted by the floods due to the low and flat nature of the area. Ogbaru LGA slopes at angle of 1°–3°. The relative low disposition of Ogbaru land makes the area to be continually flooded for longer than 6 months, and our study site is situated where the River Niger has its highest discharge rates. The overflowing river bank affects the superimposed plain land, which is one of the main geographic characteristics of Ogbaru, particularly Akili Ogidi. The people of Akili Ogidi live in the “hotspot” flood region facing limited resources and support to adapt to an increasingly hostile environment. Notably, in 2012 and 2018, NEMA [31] declared Anambra state a flood disaster region twice [32].

Additionally, the community Chief informed us that there have been elongated noticeable changes in the weather pattern indicating rising rainfall intensity, frequency, and increased destruction occurring in the past 10 years in the community:

*... there are clear changes in the weather. We have noticed this over time, especially as the onset as our wet season now come early, stays longer. sometimes it is irregular and the rains are heavy making us to be inactive as our community is flooded.*

Clearly, the location of the state and its changing climate have added to the reoccurring and increased flood status of the state. Mgbenu and Egbueri [13] confirmed in their study that Ogbaru LGA is dominated by shallow aquifers of about 25 m above sea level with a tropical climate that is characterized by high precipitation averaging between about 1800 and 2300 mm. Notably, Akanwa and Ezeomodo [17] affirmed that additionally unpredictable weather conditions have aggravated the high precipitation levels in the area resulting in increased flooding and erosional problems traceable to variable timing and intensity of rainfall from the changing climate in Anambra State. Further, Nzoiwu et al. [33] also reported about noticeable

changes in climate causing a gradual shift in the rainy seasons such that the rainfall season has extended beyond June to September to the months of October and November. For the dry seasons, the months have extended from December to March. Unfortunately, these changes were proven by the report provided by NEMA [31] that Anambra state is affected by a vast range of hydro-meteorological and climatological hazardous changes, such as storms and temperatures as the State is situated by the river Niger making it flood prone.

## 5. Consequences of climate-related floods

### 5.1 Destruction of houses and limited movement/access to residents

Results indicated that about 70% of the Akili Ogidi residents' economy, social life, and health were affected by the 2020 floods. Residential houses were totally abandoned and streets deserted as the floods made movement impossible except with the use of local canoe (see **Figures 8** and **9**). During the discussion session, we found that the majority of the displaced community members have nowhere to go, and within the onset of dry seasons that begin in late November and December periods when the flood has receded, they usually return back to their homes and lands but to a devastated community. In 2012, all 16 communities in Ogbaru LGA were submerged by the flood destroying more than 100 buildings and displacing hundreds of people [24]. Similarly, in 2013, Ogbaru LGA was flooded between the months of June and August causing a displacement of about 124, 859 people [25]. In 2018, about 9000 people from 1500 household were internally displaced from their homes in Ogabru LGA, and in 2020, about 5000 persons are displaced (homeless) in September during heavy storms and flooding in Ogabru LGA [33]. People could only access their homes using canoe, though movement to closer bigger cities, such as Onitsha town, can also be accessed *via* speed boats. However, using speed boats is expensive, costing about 1500 naira per person (\$3.64 based on <http://exchangerate.guru> on January 3, 2022). The residents complained that it was expensive, and their income is affected by poor source of livelihood negatively affected by the flood. The situation was worsened by the fact that it was the only source of transportation during the 8-month flood season.



**Figure 8.**  
*Flooded streets and abandoned houses where residents have migrated.*



**Figure 9.**  
*More flooded houses and streets that have become uninhabitable and temporarily abandoned.*

The community members fled their homes to find sanctuary with relatives and friends living on higher grounds. Some of them had to stay in public facilities such as schools and churches, designated as IDP camps though majority were stranded in their houses having nowhere to go, because of COVID-19 restrictions. The youth (female) leader reported that ...

*... our situation was pathetic since majority of our people were forced to leave our homes and our properties to find shelter in public buildings used as IDP camps to stay safe from the floods.*

A woman elder said this:

*... the effect of flood was worse, because of the COVID-19. most of our relatives were nonchalant about receiving flood victims into their home, so many of our people were forced to stay and face the harsh conditions of the flood.*

Additionally, the secretary of the women group reported that for other flood episodes she relocated with her three children to nearby town—Onitsha to stay with relatives until the floods were over. However, the case was different because of the heightened awareness of spread of COVID-19 virus. She said:

*... we have experienced heavy rainfall every year, and this year, 2020 was intense. The water filled my house unlike other times the flood hardly gets into my house. I decided to remain in my house because I can't leave the only place, I have called my home. I, husband and three children battled the floods due to the COVID restrictions. We had nowhere to go”.*

For our observations during field surveys, the flooding impacts were aggravated by the poor-quality houses constructed with low materials that have become weak over time (see **Figures 10** and **11**). Also, inadequate infrastructure and the absence of physical planning aided the rapid destruction of buildings during floods (see **Figure 10**). Further, the situation in the study area was worsened by the absence of drainage systems to check the flood problem.

Although the government of Anambra State provided communal shelters that were recognized as IDP camps to accommodate most of the stranded people, most



**Figure 10.**  
*A collapsed fence and an abandoned house with the roof destroyed by the heavy storms.*



**Figure 11.**  
*Poorly developed houses, inadequate facilities, and poor living conditions of the residents.*

of them refused to relocate to these (IDPs) camps. One of the interviewees admitted that the IDP camps were over populated having inadequate mattresses, insufficient mosquito nets and food items for their upkeep, and the affected residents to remain in their flooded houses. The temporary shelters were characterized with discomfort and pain worsening their vulnerability. This was confirmed by one of community women ...

*... I and most of the people had to leave the camp because there was little space, too many mosquitoes, inadequate sleeping mats and the food provisions were too little to take care of the large number of stranded people. More people keep arriving daily, many were looking tired, disappointed and exhausted from the flooded condition of their homes’.*

According to Punch [29], it confirmed that those who were accommodated in IDP camps experienced shortages of essential items, such as food, limited medical personnel, insecticide-treated bed nets needed for their daily survival, despite the increased numbers of women, pregnant mothers, and injured children.

## 6. Destruction of infrastructural resources with human dislocation and loss of lives

Findings from discussion groups and interviewees reported that the floods submerged infrastructures, such as shops, roads and footpaths, market, schools, churches, healthcare center, electricity poles were destroyed by the flood, although the use of low-building materials has not helped the impact of the consistent flooding in the community. Following the flooding, the schools were shut down once again after the initial three (3) months COVID-19 pandemic lockdown. This was a source of worry to community members, who were not only grieved by the disruption of their academic pursuit, but by the deaths of their infants during the floods. Notably, the low standards of the learning environment and the schools built with poor-quality structures can easily give way to intense storms and floods (see **Figure 12**).

The pupils and teachers have been studying under a collapsing wooden building because there are no classrooms to learn as past floods have submerged the buildings. The learning environment is not conducive and may affect the teaching and learning process, in addition to the long periods of flood intervention where the schools are closed annually. Due to the absence of electricity (floods submerged poles), there are no technological structures to facilitate Internet learning.

Obviously, the early childhood educational development in the area has been consistently affected. Early childhood education is a critical time of learning and foundation to leverage other levels of education. One of the elders during the course of interview on the schools added that ...

*... our people suffer from flood problem all the time. The state government have tried to help the situation, but it is still persistent. Our children education is suffering because we have shut down the schools during the floods to avoid our children from death, drowning or sustaining injuries. On several occasions the school have lost all their chairs, desks, office furniture to the flood. We are begging the state government to bring a permanent solution to the flood.*



**Figure 12.** Poorly developed school structures and learning environment in the study area.

Also, the community Chief added

*... we found that our building were going under the water and our people were trapped, displaced, many injured and cases of deaths, especially children drowning during the flood.*

The closure of all socioeconomic, religious and educational activities in the community was for over 6 months for the floods to recede. Also, the flood affected infrastructure, the quality of water polluting the rivers in Ogbaru LGA, and affecting economic activities [34]. Again, the flood caused the influx of snakes and other dangerous reptiles into homes-seeking refuge from the flood placing the life of people at greater risk of attack [35].

## 7. Destruction of family bonds and social/community ties

The menace from the flooding continues to tear families and individuals apart as they seek for temporary spots or relief camps to stay alive from the flood. One of the representatives of the women group reported thus:

*... majority of the women were separated from their families for 8 months adding up to the entire flood season and this affected our family relationship.*

Generally, the close knitted and family culture of Akili Ogidi people is heavily threatened by the annual flooding [36]. Indigenous communities in Anambra State are characterized by shared learning, beliefs, and shared bonds of fellowship that set their standards or patterns of behavior [37]. A common culture such as language, livelihoods, and administration with close bond to biodiverse natural resources is threatened yearly. It is unfortunate that these underlying commitments within families, social groups and customs are threatened annually. Worse still, most families experience the fragmentation of their social family unit and ties. Similar published studies affirmed that climate-induced floods affect fragile communities forcing internal dislocation of the marginalized populations [38–44].

According to the report of the women leader during an interview session, she indicated that the severity of the floods keeps increasing and has become an annual event that the community has to deal with. She further informed us thus:

*... families face the pain of not only leaving the comfort of their homes, but also, the disintegration of the members of the family to other locations due to the harsh consequences of the floods that sweeps through our homes. Women, children and husbands are separated from one another. The social disconnection is usually unbearable that most mothers risk being with their young children in IDP camps or other locations in order to avoid social disconnection.*

Clearly, flood in the study area was responsible for unexpected deaths, inflicting injuries on family members and also the separation of families creating societal vulnerabilities for vulnerable persons. Evidently, the displacement from the normal patterns of life creates unrest, tension, and violence ([www.absradiotv.com](http://www.absradiotv.com)). The flooding events have been shown to create strains on family knitting and commitment heightening intimate partner- and gender-related violence when marginalized groups, such as women, children, and the disabled, are left in relief camps exacerbating their vulnerability levels. According to a Pacific study involving six

Pacific island nations, they reported that for all the women surveyed, more than 75% of participants experienced some types of violence, either the physical or the sexual form from their close partners and significant others around them (UN Women, n.d).

The findings further showed that these women experienced major forms of violence, such as assault and violence, implicating intimate partners and family members as perpetrators. Also, according to Wan [45] separating children from their parents come with complex devastating issues. This may be as a result of effect on critical bonds in human life. Floods can traumatize its victims for a long time, and often times, survivors are left with diminishing social determinants of health. Worse still, on such occasions of flood crisis, minors are given new roles as principal care givers, earners, and heads of households that can destabilize their mental and emotional health [46].

One of the affected community women reported:

*... we have these floods every year, but the magnitude of this year's flood, 2020 was high almost similar to 2012.*

*The flood damaged our house, crops such as rice, maize and cassava. I had to separate my four children in different places, so I and my husband can gather our lives and little belongings left from the flood. I miss my children all the time. I can hardly see them because we have little money left with me to fix our damaged house.*

It is forecasted that there may be greater flood impacts on in Ogburu LGA, threatening community ideology, values, and belief systems as climate changes has remained unpredictable ([www.channelstv.com//ag](http://www.channelstv.com//ag)). Indeed, climatic extremes and uncertainties have become the norm where the community have to face prolonged flood crisis.

## **8. Destruction of farmlands: a threat to local income and livelihoods of women**

As reported by Ugwu and Ugwu [47] one of the sectors impacted by flood is the agriculture, particularly in the global South nations. The Nigerian Hydrological Service Agency (NIHSA) and Nigerian Meteorological Agency [48] predicted the year 2020 will be characterized by a wetter season with thunderstorms and heavy rainfall, worsening the rising of water levels of rivers, intensifying longer lasting and more intense flash floods in Nigerian coastal cities than the previous year. Undoubtedly, agriculture in Nigeria is a huge industry that contributes to a substantial amount of about 26.09% of the national GDP, besides employing about 36% of the total Nigerian labor force and the largest direct employer of labor [49]. The Akili Ogidi community operates an agrarian economy that is dependent on rain-fed agriculture and the (in)direct impact on sustaining livelihoods. Notably, agriculture has played prominent roles in supplying food products, giving employment to community members. Akili Ogidi supplies food items and serves as food baskets to other urban markets and locations. Egbueri [14] mentioned that the community is majorly involved in fishing and farming activities due to the presence of River Niger. Clearly, the location of the study area by the River Niger, its high dependency levels on rain-fed agriculture and its high rurality index, climate change, and poor accessibility during floods are factors that place the community at high risk of flooding annually, where the poor conditions of the inhabitants are even a much bigger challenge to deal with providing no other option than for them to migrate internally.



Flooding negatively affects plants by uprooting their stem and roots thereby limiting its growth, when runoffs from heavy storms sweep the entire farm surface. It has led to widespread damage to crops, reducing quality and quantity of livestock and farm products being transported to larger markets. NEMA [25] reported in 2013, that about 2, 217 farmlands were destroyed by flood in Ogbaru LGA. The impact of floods was also felt on soil deposits and quality from heightened erosion challenges and associated fluvial deposits worsening the deep-layered mottled Ogbaru soils making the soils unfavorable to plant growth (see **Figure 11**). Several households have experienced financial loss, hardship resulting from loss of farmlands, food insecurity, and hunger. Generally, this is a setback on local innovation, productivity, and development in of community.

Findings from this study confirmed the predictions of intense and last-longing floods of 2020 in Anambra state caused havoc on local farmlands, crops, and seedlings, bringing all farming activities to a halt. The inferences from interviews and discussions revealed that the community is hugely involved in the farming products such as cassava, citrus fruits, rice, and oil palm products. Also, rice cultivation is prevalent in the area, and particularly, the swamp rice cultivation and cassava farming were affected [50]. Drawing from the results of this study, about 72% of women report that their household income was from agriculture-related activities especially subsistence farming, fishing, and animal rearing. Findings from discussions revealed that women farmers were usually the worse hit during flood disaster where their farmlands are totally submerged destroying their farms and food products, economic/fruit trees, and farm animals (see **Figures 9 and 10**).

Generally, men and women continue to suffer from persistent floods-associated setbacks, yet women are impacted differentially as their livelihoods and general well-being are grossly depleted as they get more involved in gender roles, such as family care and nursing sick children. Women are found majorly in the agricultural sector, and invariably, the changing climate continues to impact women relative to accessibility to the resource opportunities they need to be more efficient. If the acclaimed unequal access to the resources and opportunities persists, then it will be difficult to combat food insecurity, hunger, malnutrition, and poverty that have become dire consequences. There is need for emphasis and actions that would promote gender equality while empowering women in agriculture to maximize their capacities in mitigating food insecurity, hunger, and extreme poverty. In the interview session, one of the community women leaders complained that their crops were either washed away by the floods or get rotten in the affected farmlands. She further informed that ...

*... we are usually afraid at the onset of the wet season because we experience huge destruction of our farmlands and our root crops are destroyed and over the years the situation has worsened knowing that we are riverine and our occupation is agriculture.”*

Majorly in Akili Ogidi, women are involved in the entire agricultural value chain, such as farm managers, suppliers of labor, harvesters, processors, and selling of farm products, making them vital and strategic in food security and agricultural production. Also, most women-headed households are all disproportionately affected by the reoccurring flood in the community. As confirmed by one of the women leaders in our group discussion, who has lost her husband, she said,

*“Women suffer the consequences of the flood especially the huge loss of income, major source of employment, livelihoods and food security for their family members. The*

*prices of food products are high and transportation is equally high since the floods block the only access route in the community.*

However, the women interviewees informed us that the community farmers have improvised local adaptation strategies where they farm twice in the year. The first planting season comes early in the year about late January/early February before the onset of wet season in March-April. This enables the farmers to harvest their farm products before their farms are submerged in the flood by May/June. The second planting season starts after the floods recede in late October/November, so that harvest can take place on or before January to prepare for another planting season to commence (see **Figure 11**). However, the floods of 2020 shattered their strategy, because the wet seasons extended longer than usual causing the floods to last longer as well. It is unfortunate that climate variability has remained unstable in recent times. One of the women interviewees responded saying ...

*“We need government to support our farming activities so we can survive the floods and have food to give to our children since the flood takes away everything from us. We need farm inputs like fertilizer, tractors, loan, good roads to assist us in accessing our farmlands”.*

Additionally, findings showed that the women and men were heavily dependent on the River Niger for their supply of large fish species during the floods. The community is traditionally surrounded by two Rivers Niger and Ulasi that provide various species of fishes and aquatic life. The participants informed during survey that they experience huge sales from large species of fishes caught and sold (see **Figure 12**). The floods provide an advantage for their fishing business because the majority of the fishes are brought to the river surface and even to their doorsteps during the flood events. During an interview session, one of the fisher women added that the supply of fishes is the only advantage of the floods ...

*“The floods bring to us large amounts of fish from the river. It drops the fishes for us at the bank of the river. It makes it easy for us to collect the fishes. This makes so many women to go into fishing business in the wet season to increase our income. We have work to do this time apart from house jobs.*

It is on record that women face high levels of discrimination such as poverty, inadequate knowledge, and low execution of human rights among others, because women are overwhelmingly burdened with the huge roles of caring for children, the elderly, and people with disabilities and this places them at higher risks during flood disasters. A study carried out by Ihaji and Aondoaver [51] confirmed that women and children were the main casualties in flood relief camps in Cross River, Nigeria. There is need to support Akili Ogidi women to prepare for climate-driven floods. Hence, women should be given more considerations in terms of food, healthcare accommodation, and social facilities.

## **9. Effect of flooding on health of women and children**

Findings from the study showed that flooding had extensive and significant effects on the health of community members—men, women, children, and people with disability. However, women and children were extensively affected by the harsh conditions provided by the flood. Alderman et al. [52] categorized health effects into short and long terms. Moreover, short-term health effects observed during the floods

include infections, drowning, mental health challenges, physical injuries, and water-borne diseases. The longer-term health effects result from physical dislocation, shortages of safe water, injuries, depression over the loss of personal property, and death of a family member though most of the deaths in Akili Ogidi are from drowning of children and women. However, globally, it has been shown that mortality rates after major flooding increase by 50%, while with a prevalence of 8.6–53%, mental and psychological distress continue beyond 2 years after the flooding events [52].

Studies have confirmed that men and women are not affected in an equal magnitude because women have disproportionate vulnerability to flood disasters, compared with men. Considering, the flood disaster in Akili Ogidi, the women and children were more vulnerable because women are often concerned over their children's safety. During the focus group, discussion session of the married women, a nursing mother related her experience during the flood. She reported that ...

“During the 2020 floods I was pregnant and I had four other children aged 6, 5, 4 and 2 years which I had to cater for. Worse still, our community health center was shut down because of the flood. I and the children suffered from exhaustion, stress, body pains, fever and physical injuries such as cuts, sprain from falls and insect bites from mosquitoes worsening my health condition”.

Understandably with the physiology of the pregnant state, such injuries may indirectly contribute to complications such as abortions, abruption placentae leading to vaginal bleeding in pregnancy (in the case of trauma or fall on the gravid abdomen), and even death from being carried away by the flood. Also, access to health facilities were further compounded by the destruction of such properties by the floods. It was noted by observation and during interactions with the women that they had restricted access to contraception, which would have been obtained as part of family planning services during postnatal care where the health facilities to function as required.

Report showed that women and children were badly affected as there were reported cases of deaths. According to Duncan [53] more women die during flooding disasters than men, which may be related partly due to less physical ability to run, and most of these women died trying to save their children. It was noted that the Anambra flood in 2019 killed four persons—a nine (9) year old boy, a (7) year girl, an (18) year boy, and a pregnant woman [28].

Flood-related or flood-prone injuries occurred as people tried to save themselves, their family, and their valuable possessions from the flood and theft. There were also reported cases of sexual violence (women and children being raped and abused), concern over missing children, and properties. Other health features seen were loss of appetite, lack of sleep, nightmares, tiredness, and irritability. All these can affect the psychological and mental health of the women and even the children whom flood has made orphans and homeless. Makwana [54] affirmed that mental and emotional/psychological trauma experienced by women and children contribute to intense impacts psychologically such as anxiety, low mood, and frustration. Even the children's mental health was badly affected by hunger and food (in) security from intense poverty in our study area. Although the devastating mental health flood impacts on women may not be comparable to men, women will need more professional assistance to recover and stabilize their mental/emotional state due to challenging patriarchal gender biases.

Further, the flood damages the conditions of the environment (water, land and air) making it vulnerable to pollutants that sponsor increased fecal oral transmission of disease [55]. Generally, there is poor state of hygiene maintenance increasing the risk of waterborne illnesses, such as hepatitis A and cholera. With the high levels of poverty, negligence and poor access to clean water supply, and sanitation strategies, women are more susceptible to infections [56]. The major source of water supply was

surrounding rivers that were polluted by the flood. Also, studies have reported post-flooding events bring an increase in cholera, nonspecific diarrhea, poliomyelitis, rotavirus, and typhoid fevers [57]. Intense precipitation influences waterborne disease outbreaks such as cholera, cryptosporidiosis, non-specific diarrhea, rotavirus, typhoid, and paratyphoid [58–60].

This is because floods can easily move (in)animate objects such as debris carrying parasites, bacteria, and viruses rapidly into the moving water systems and spread waterborne and related diseases. Also, studies showed that during the September 2012 flooding in Lagos, the flooded water came with lots of fecal pathogens and pollutants affecting major parts of Lagos. This is a challenge that pollutes drinking water, the associated poor sanitation [61], can lead to skin irritation and diseases as people wade through the polluted muddy-infested water to reach their homes.

## **10. Effect of climate-driven temporary displacement on women and children**

It is recorded that over 50 million people will be uprooted in their countries when they are affected by disasters that deteriorate living conditions [62]. Achieving the sustainable development goals will not be realized, when disprivileged persons, such as women, disabled, and LGBTQ+ continue to experience one form of violence due to climate-related stressors [63], such as flooding and consequent temporary displacement. Although sexual and global based violence (SGBV) are reported in the global North, they are worse in the global South, particularly in the rural regions. These regions have a higher propensity and impact of effect of natural disasters, which have been shown to increase the risk of domestic violence.

This violence can be linked to psychosocial tensions relating to income loss from climate change impact on agricultural sector. UNFCCC [63] further reported that one in five women who are displaced from climate-related disasters has been violated sexually. With rising temperature and heightening of other related climate stressors, vulnerable groups and persons are often impacted disproportionately. Flooding exacerbated by climate changes put women and children at higher risks as they are displaced from their comfort zones worsening the link between gender-based violence (GBV) and climate-related flooding. Although any gender can experience any form of violence, such as domestic violence, sexual assault, and forced prostitution, the violence is worsened by deep-rooted sociocultural norms heightening the vulnerability of women and gender minorities, when they are not protected by laws. But these laws and policy can be gender unfriendly, particularly when they limit access to resource control of women due to scarce resources for the family. For example, early marriage and sexual exploitation are some examples of sociocultural tensions that women may go through to necessitate their survival. Also, women and children experience higher levels of vulnerability and natural weakness during flood emergencies and disasters. Findings from this study on 2020 flood disaster in Akili Ogidi provided the adverse effects on women and children. Some of the children were left in pitiable conditions without love and attention (see **Figure 13** and **14**). Women are forced to endure or go through issues that are not acceptable to them. During interview, one of the women reported that ...

*... our women faced difficult situations during the flood unlike men who could easily run and escape, we could not do it. Even in the camp we had no privacy to the bathroom. We had to use behind the buildings and bushes to urinate, defecate, bath and change our clothes.*



**Figure 13.**  
*A flooded cassava farm in the study area where the farmer's children tried to harvest some of the farm products.*



**Figure 14.**  
*Some of the hurriedly harvested Cassava tubers by the children from the flood.*



**Figure 15.**  
*Soil layer washed away by the flood leaving it bare and dry and the onset of the second planting season after the floods have receded to enable early harvest.*



**Figure 16.**  
*The large fish species caught and sold during the floods at the bank of the river Niger.*



**Figure 17.**  
*The conditions of some of the children displaced by flood at the government provided IDP camp most of them were left without a care giver, guardian, or parents.*

Drawing from the study, limited access to basic infrastructures worsened the events that may have led to loss of human lives (**Figures 15–17**). Worsening family bonds and community's social ties left people lonely, anxious and mentally oppressed, and diminishing source of income, employment, and livelihoods left community members more improvised, injured, hungry, sick, dead, and infected. Worse still, a large population were displaced, homeless, and helpless in their own town.

## **11. Conclusion**

The study confirmed that flood negatively affects the many aspects of the lives of marginalized people dislocating them from their safe home to become temporary displaced. It resulted in the loss of lives and damage of infrastructure, farmlands,

agricultural products, properties, and personal belongings that were worth of billions of naira. It is responsible for accidents, congestion, hunger, food insecurity, and loss of beautifying values of the environment. Also, it causes overcrowding, spreads communicable diseases, and waterborne diseases, which has become prevalent in the area. Unfortunately, predictions indicate that climate change will influence frequent intense floods across world regions [64].

Although science has proven that there is no doubt on climate change and whether it is real or a hoax. The time is now to find out what necessary actions can be taken at the community levels for a more resilient globe, and the way forward to tackle climate events and changes. Climate change is here, and we all have to do our part to lessen its detrimental impact on our communities. We must consider options for more efficient energy, renewable energy options such as solar energy and wind power, which will contribute immensely in carbon neutralization in the atmosphere and adoption of eco-relatable friendly lifestyle that is safe for the next generation.

Consequently, the behavior changes in climate protection, as an ongoing process, need not only to give tools to let people know what to do but also to provide an enabling environment and incentives. Akili Ogidi community is already an environmental hazard, and strategies must be agreed upon and with the community members on the way forward and out of these complex-wicked flooding challenges. To check and alleviate the problems of flood occurrence in Akili Ogidi, it is critical that the Federal and state governments of Nigeria set up financial aid strategies to help rural women in recovery of farmlands after the flood disaster. Further, to alleviate the situation, there should be more funding allocated to critical agencies related to disaster management and organization that support women development to enable them perform and execute their duties optimally. Also, involving the community in local environmental management has been reported as a solution for environmental problems. Hence, researchers should employ participatory methods to encourage people to change their lifestyles.

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## **Author's contributions and statement**

This is a community-based research project and all the authors collaborated in the development, writing, data analysis, review, and finalization of this manuscript.

Several authors took the lead for certain sections of the manuscript; AAO, NN, IN, and OKJ created the outline of the manuscript and developed ideas presented with the ongoing engagement and dialog with co-authors for input and feedback. AAO, NN, and EAC took the lead in writing and editing sections 4, 5, and 6. OCB AND ANI took the lead in sections 7 and 8. AAO, OCE, NTO, OCA, and UUE took the lead for sections 10, 11, and 12. OJ, EAC, and ANS focused on Section 13. OKJ, AAO, and ANI took the lead for Section 14. IIP, ANA, NN, IN, OJ, UUM, OEO, and EDT took the lead in Section 15. AAO, OFA, NN, IN, OJ, and EAC took the lead in data analysis, discussion, synthesis of findings, policy development with ongoing engagement, and dialog with co-authors for input and feedback. The content and views expressed in this study are those of the authors and do not necessarily reflect those of the Government of Nigeria.

### **Conflicts of interests**

There are no financial or other conflict of interest. None of the authors benefited as a result of this study.

### **Abbreviations**

<b>ACMI</b>	African Climate Mobility Initiative
<b>AUC</b>	African Union Commission
<b>GPS</b>	Global Positioning System
<b>IDI</b>	Internal Displacement Index
<b>IDMC</b>	Internal Displacement Monitoring Centre
<b>IFRC</b>	International Federation of the Red Cross
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LGA</b>	Local Government Area
<b>LGTBQ</b>	Lesbian, Gay, Transgender Bisexual, Queer and Plus Others
<b>NCEHR</b>	Nigerian Coalition for Eco-Health Research
<b>NAN</b>	News Agency of Nigeria
<b>NEEDS</b>	National Environmental, Economic and Development Study for Climate Change
<b>NEMA</b>	National Emergency Management System
<b>NIHSA</b>	Nigerian Hydrological Service Agency
<b>NIMET</b>	Nigerian Meteorological Agency
<b>SEMA</b>	State Emergency Management Agency
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>WHO</b>	World Health Organization
<b>SFWI</b>	Spirit Filled Women International
<b>SGBV</b>	Sexual and Gender Based Violence
<b>GBV</b>	Gender Based Violence



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