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PERCEIVED EFFECTS OF FLOOD ON FOOD AVAILABILITY AND ACCESSIBILITY OF RICE FARMERS IN YOBE STATE, NIGERIA

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Abstract
The study examined the perceived effect of flood on food availability and accessibility of the rice farmers in Yobe State, Nigeria. Multistage sampling procedure was used to select 425 respondents for the study. Data were collected using structure questionnaire. Descriptive statistic was employed to analyze the data. The result indicated that about13% were food secured and 41% were severely food insecured, both moderate and mildly food insecured happened to be 23% each. Moreover, findings further revealed that flood had a high effect on food availability $\bar{x}$ = 3.62, while food accessibility was moderately affected $\bar{x}$ = 3.07. However, the major constraints to food security were low crop yield, inadequate capital and poor post-harvest processing and storage technologies which ranked 1, 2 and 3 respectively. The study concluded that majority of rice farmers are severely food insecure, while only a small proportion are food secure and flooding significantly disrupts both food availability and food accessibility of rice farmers. It was recommended that stakeholders and cooperative societies should provide access to improved inputs, flood-resilient farming techniques, strategic food reserves, emergency response systems, strengthening nutrition-sensitive interventions, food distribution networks, and public awareness on food preservation will enhance food security in the study area.
Key Words: Flood, Food Availability, Food Accessibility, Rice, Farmers

Introduction

A flood is a natural disaster that occurs when an area experiences an overflow of water onto normally dry land, causing significant damage to the environment, infrastructure, and sometimes loss of life. Floods can be the result of various factors, including heavy rainfall, rapid snowmelt, dam failures, or coastal storms. The severity of a flood is determined by the amount and intensity of the water, as well as the vulnerability of the affected area United Nations Office for Disaster Risk Reduction (UNDRR, 2019). However, floods are outcomes of immoderate weather conditions such as rainfall (e.g., prolonged rainstorm and melting snow from snowfall), which are influenced by the geographical region and human induced activities of a particular location (Atu & Okon, 2018).

According Rentschler and Salhab (2020), about 1.47 billion people, or 19% of the world population, are directly exposed to substantial risks during 1-in-100 year flood events. Likewise, in 2012, Nigeria experienced its worst flooding in over 40 years, because of heavy rainfall across the country, for many days, and the Lagdo Dam in northern Cameroon east of Nigeria, used for electricity generation, and irrigation, releasing its excess water. The incidence affected 32 states, 24 severely. The floods occurred from July to October that year, affecting more than 7 million people (Abdulrahim, Gulumbe & Liman, 2022).

Yobe State has witnessed so many devastating flood incidents since the beginning of the 21st century. Floods are natural occurring processes that are difficult to prevent but can be managed in order to reduce its social and economic

impacts. Floods interfere with the local economy and destroy infrastructure, resulting in disruption of livelihoods and made majority food insecured, normal social services and health care. However, in the 17 local government areas (LGAs) of Yobe State that were assessed, the joint assessment team identified 88,901 individuals in 21,180 households affected by the floods. These individuals included 50,304 non-displaced individuals impacted by the floods but remained in their communities. The affected population included 20,212 displaced individuals. Thirty-one per cent (31%) of the affected houses were habitable but need repair, twenty-five per cent of the houses were partially damaged and twenty per cent were completely destroyed. In all of the locations assessed, crop/vegetable farming was among the primary sources of income (Government of Nigeria & IOM, 2025).

While floods are increasingly recognized as critical disruptors of food security across northern Nigeria, there remains a stark lack of empirical insight into how rice farmers in Yobe perceive the specific effects of flooding on food availability and accessibility. For instance, smallholder rice farmers in Kwara State report that floods compel them to adopt early-maturing varieties, suggesting reactive strategies to avoid production losses but offering little about perceived access constraints (Ajibade, Babatunde, Ajibade, & Akinsola, 2019). In Niger State, flooding is shown to affect the socio-economic characteristics and likely livelihoods of rice growers, yet these findings do not unpack how farmers interpret availability versus accessibility impacts (Apuyor, Mohammad, & Ojo, 2023). A recent information-needs study among rice growers in Yobe highlighted that while farmers urgently seek guidance on inputs like seeds and irrigation, their access to such critical support is undermined by infrastructural shortfalls hinting at underlying accessibility challenges not explicitly linked to flood-related disruptions (Mal, 2023). Another study examined flood incidences in Damaturu, Yobe State, found that frequent flooding damages to both farmland and homes, yet stopped short of exploring how these losses translate into farmers' own perceptions of food access or availability (Maina, Abba, & Isa, 2022). Finally, in Kebbi State, smallholder farmers perceive significant economic losses due to floods, yet again lacking separation between availability and accessibility effects (Jega, Umar, & Hassan, 2024). This study, therefore, is critically needed to fill this void by capturing rice farmers' perceived differential impacts on food availability versus accessibility in Yobe State. The study therefore, sought to identify and address the followings specifics objectives:

i. examine the food security status of the rice farmers in the study area
ii. assess the perceived effects of flood on food availability and accessibility of the rice farmers in the study area;
iii. describe the constraints to food security of the rice farmers in the study area

Based on the specific objectives of this study the following null hypothesis was proposed for the study:

H_O: There is no significant effect of flood on food security status of the rice farmers.

Methodology

The Study Area

The study was conducted in Yobe State, located in the North-East, Nigeria. The State lies on latitude 10.00' to 13.00'N and longitude 10.50' to 13.50'E. It is located in the Sudano-Sahelian vegetation zone, which is characterized by a hot and dry climate for most of the year (FAO & IITA, 2019). The annual average rainfall and temperature range between 423.3 mm and 34 °C respectively, while the hottest months in the state are March to May, with temperatures ranging between 39 °C and 44 °C (Ambrose, Miles, & Gordon, 2018; Agro-Climatic Resilience in Semi-Arid Landscapes, 2023). Yobe State has a total landmass of 47,153 square kilometers, of which about 70% (33,007.1 square kilometers) is arable land. The population of the state according to the 2006 census was approximately 2.6 million and is projected to reach 3.8 million in 2024. The major languages spoken in the state include Hausa, Kanuri, Fulfulde, Ngizim, and Bade, which reflect its multi-ethnic composition. The dominant soil types consist of sandy soils, loamy sands, and

light-textured soils, typical of the semi-arid environment and suitable for dryland farming. Yobe State is predominantly inhabited by the Kanuri, Fulani, Ngizim, Bolewa, Bade, and Kare-Kare ethnic groups, who share a rich cultural heritage expressed in traditional festivals, crafts, and communal lifestyles. Islam is the dominant religion practiced by the majority of the population, shaping their cultural values, social interactions, and livelihood practices. Millet, sorghum, cowpea, and maize are the major food crops cultivated in the area.

Sampling Procedure and Sample Size

The study adopted a multi-stage sampling procedure to select respondents from five Local Government Areas (LGAs) and five villages within each LGA, resulting in a total of **25** villages. The LGAs were purposively selected based on their susceptibility to flooding and significance in rice farming activities. Within each selected LGA, five villages were also purposively chosen due to their engagement in rice production and exposure to recurrent floods. The sampling frame, obtained from the Yobe State Agricultural Development Programme (YOSADP), comprised 6,833 registered rice farmers across the selected villages. To determine the appropriate sample size, the Taro Yamane (1967) formula was employed. In the final stage, a total of 425 rice farmers were selected randomly and proportionately (5%) as presented in Table 1. The procedure was adopted from Onyemma, Onyemauwa, Uwandu,. and Nwafor (2020) as stated below:

$n = N / (1 + N e^2)$

where,

n= sample size

N= population size

e= margin error (0.05)

$n = 6,833/1 + 6,833 (0.05)^2$

$n = 6,833/ 1 + 6,833 (0.0025)$

$n = 6,833/1+12.325$

$n=6,833/13.325 = 425$

Table 1: Sampling Procedure of the Respondents (n=425)

LGAs	Villages	Sampling frame	Sample Size
Bade	Azam	362	23
	Azbak	434	27
	Alagarno	314	20
	Paga	290	18
	Usur	290	18
Bursari	Illala	338	21
	Masaba	386	24
	Jawa	289	18
	Daskum	314	20
	Dumburi	241	15
Jakusko	Karage	289	18
	Dachia	265	16
	Kazir	241	15
	Tajuwa	314	20
	Amshi	289	18
Nguru	Kakori	241	15
	Dumsai	289	18
	Garin mallan	217	14
	Yandago	241	15
	Garbi	217	14
Karasuwa	Wachakal	193	12
	WachakalNgurodi	217	14
	DabarGiwa	193	12
	DogonJeje	181	11
	Gasma	188	11
Total	**25**	**6,833**	**425**

Source: Field Survey (2024)

Method of Data Collection

Data for this study were collected through the use of structured questionnaire and administered with help of trained enumerators.

Method of Data Analysis

Data obtained through the structured questionnaire were analyzed using descriptive statistical tools**.** Descriptive statistic such as frequency counts, percentages and mean scores were employed to summarize the respondents' perceptions. The Likert scale responses, measured on a 5-point scale ranging from very low effect (1.00–1.49), low effect (1.50–2.49), moderate effect (2.50–3.49), high effect (3.50–4.49), and very high effect (4.50–5.00) were used to determine the average response (mean) to each item. Descriptive statistics were used to achieved objectives i, ii and iii, of the study.

Result and Discussion

Food Security Status of the Rice Farmer

Table 2 revealed that only 13% of households were food-secure, indicating that a minority of households were able to access and maintain an adequate food supply without any significant challenges. A divergence is noted when compared with (Falola, 2020), who reported 33.6% of food-secure households in southwestern Nigeria. In contrast, a more substantial percentage, 41%**,** were severely food-insecure, pointing to a high vulnerability among a large portion of the population. The current evidence is reinforced by the earlier findings of (Otekunrin *et al.,* 2021), which suggested that about 54% of the respondents were severely food insecured in Oyo state. These households likely faced extreme challenges, including not having enough food or the right kinds of food to meet basic dietary needs, even before the flooding event.

Furthermore, about 23% of households were moderately food insecure, which suggests that these households experienced periodic or significant food shortages, affecting their ability to meet their food needs regularly. The 23% of mildly food-insecure households experienced occasional difficulties but could generally access food, though likely at reduced quality or quantity. The findings resonate with prior research by (Nsabuwera, 2018), highlighting that about 15.6% were mildly food insecure, while (34.7%) were moderately food insecure. This implies that a substantial proportion of households were already struggling to access sufficient, nutritious food, and many were vulnerable to any additional stressors, such as flooding, that could further exacerbate their food insecurity.

Table 2: Distribution Based on the Food Security Status of the Rice Farmers (n=425)

Variables	Frequency	Percentage
Food secured	54	13
Mild food insecured	99	23
Moderately food insured	98	23
Severely food insecured	174	41
Total	**425**	**100**

Source: **Field Survey, (2024)**

Effect of Flood on Food availability of the Rice Farmers

According to the findings in Table 3, the decrease in the fresh produce visibility amidst flood with a mean response being x=3.25. This is contrary to the finding of (Atu and Okon, 2018) which reported that food staple most affected are the root or tuber species with 77.5 % annual destruction, vegetable species were also at high risk, and some economic crops plantain were also at high risks of destruction. In addition, when it comes to an effect of flooding on food price increases, mean score obtained was (x=4.07). Such observations are in line (Iortyer & Yio, 2023) who pointed out that prices of agricultural products increased by almost 200% and household income declined significantly during the flood disaster years. The findings imply that flooding significantly disrupts food access and affordability,

exacerbating food insecurity and economic hardship among vulnerable households in the affected communities.

In Table 3, the stand of food supply disruptions which when weighted scored a x=3.97. Similar findings are presented by Iortyer and Yio (2023), who pointed out that a pronounced inadequacy in food supply during years of severe flooding compared to periods of normal rainfall. The effect of floods on the food variety was seen to have reduced and this was confirmed with mean score x=3.88. This finding corroborates with work of (Week and Wizor 2020), who observed that 69.9% of respondents noted that the growth and development of different varieties of crops were significantly affected due to farmland loss caused by flooding.

Furthermore, respondents affirmed that floods do influence scarcity of staple foods and food qualitatively. Concerning flood-created conditions: respondents agreed that floods cause shortage of staples x = 3.38, at the same time food quality was noted as having moderate effect (x = 3.17). This finding collaborate with Week and Wizor (2020) findings which revealed that (75.3%) of respondents reported a scarcity of basic food items following flood incidents, while 78.3% agreed that flooding exacerbates unavailability of staple foods, and malnutrition.

Table 3: Distribution Based on the Effect of Flood on Food Availability of Rice Farmers

Variables	Mean	Decision
Flooding significantly reduces the availability of fresh produce	3.25	Moderate Effect
Floods lead to a noticeable increase in food prices	4.07	High Effect
Flooding disrupts the supply chain of essential food items	3.97	High Effect
There is a decrease in the variety of food available after a flood	3.88	High Effect
Floods cause a shortage of staple foods in local markets	3.38	Moderate Effect
Food quality deteriorates due to floods	3.17	Moderate Effect
Grand Mean	**3.62**	**High Effect**

Source: Field Survey (2024)

Effect of Flood on Food Accessibility of Rice Farmers

Table 4 study shows that flooding affects food access fundamentally, with mean of x=1.99 of the respondents perceiving food access to be a challenge in flooded areas. This is supported by a mean value of x=2.02, which shows a strong sign of negative impact. This finding is contrary to FEWS NET (2022), which reported that 42% rely on market purchases for food access, while (25%) relied on labor in exchange for food. However, the effect of flood on the disruption of food distribution scored x=3.41. This finding is not in line with Ahile, Okpachu & Okwanya (2024) found that 28.9% of the respondents disagreed with this assertion. Likewise, the statement that food becomes scarce in local stores as soon as floods are experienced with mean score of x = 4.24. These findings agreed with (Ahmed and Suleiman, 2024), who noted that floods mostly hinder access to food and challenge the existing food security, therefore making the affected populations vulnerable. About 68% of respondents agreed that flood compelled farmers to grow flood resistant crops that have less nutritional value. Nonetheless, the community's perception of "emergency food assistance" responses was deemed insufficient attention, whereby the mean of x=2.12 indicates a significant negative impact on addressing the needs of the affected populace in the flood crisis. These outcomes can be compared to the findings of UNICEF (2023), which revealed that limited assistance was also provided to some of the 336,900 affected flood victims which including 130,300 displaced people.

Table 4: Distribution Based on the Effect of Flood on Food Accessibility

Variables	Mean	Decision
During floods, it is easy to access enough food?	1.99	Low effect
Floods do not disrupt food distribution networks significantly?	3.41	Moderate effect
Food becomes scarcer in local stores immediately after floods?	4.24	High effect
People in flood-prone areas find it challenging to access nutritious food?	3.85	High effect
Emergency food assistance adequately meets the needs?	2.12	Low effect
Grand Mean	**3.01**	**Moderate effect**

Source: Field Survey (2024)

Constraints to Food Security of Rice Farmers

As indicated in Table 6, almost all respondents reported that low crop yields 99.8% was among the major constraints to food security. As noted by (Kshash & Oda (2022), the results support the notion that low yields are among the major constraints that hinder food security. This highlights a widespread concern regarding agricultural productivity, which could be influenced by factors such as poor soil quality, inadequate inputs, and environmental challenges. About 91.1% of respondents acknowledged the inadequacy and lack of access to improved agricultural inputs such as seeds, fertilizers, agro-chemicals, and irrigation systems. The current evidence is reinforced by the earlier findings of Oyim, Osayi, Okaforocha, & Nwokoye (2022), which suggested that majorities of the respondents accepted that inadequate farm input with mean score of 3.27. The inadequate access to agricultural inputs such as seeds, fertilizers, agro-chemicals, and irrigation systems hinders agricultural productivity, leading to food insecurity and economic instability.

The Table 6 further illustrated that problem of pest and diseases 74.6%, poor processing and storage facilities (92.5%) and inadequate of capital 94.6% were significantly recorded. The current evidence is reinforced by the earlier findings of Oloyede, Muhammad-Lawal, Amolegbe, Olaghere, & Joseph (2020), which suggested that problem of pest and diseases, poor processing and storage, and inadequate of capital were also major constraints among the rice producers that made them food insecured. This implies that pest and disease issues lead to lower agricultural productivity, exacerbating food insecurity and poverty. Poor processing and storage facilities limit income potential and hinder economic growth. Inadequate capital prevents farmers from adopting modern technologies, reducing efficiency and perpetuating poverty.

Table 6: Distribution of Respondents Based on Constraints to Food Security

Variables	Yes (Frequency)	No (Frequency)	Rank
Low crop yields	424 (99.8)	1 (0.2)	1st
Inadequate capital	402 (94.6)	23 (5.4)	2nd
Poor post-harvest processing and storage technologies	393 (92.5)	32 (7.5)	3rd
Inadequacy and lack of access to improved agricultural inputs	387 (91.1)	38 (8.9)	4th
Problem of pest and diseases	317 (74.6)	108 (25.4)	5th

Source: Field Survey (2024)

Conclusion and Recommendations

The study concludes that flooding has a significant impact on both food availability and accessibility among rice farmers in the study area. Floods disrupt the supply chain, reduce the variety of food available, and lead to noticeable increases in food prices, indicating a high overall effect on food supply. Furthermore, food accessibility is also moderately affected, as floods often result in scarcity within local stores and make it challenging for households to access nutritious food. The inadequacy of emergency food assistance and the limited ease of obtaining sufficient food during flood events reveal significant gaps in existing support mechanisms.

i. Government and relevant stakeholders should intensify support for rice farmers through targeted interventions such as access to improved inputs, extension services, and flood-resilient farming techniques. Additionally, social safety nets and food aid programs should be strengthened to assist the most vulnerable households.

ii. Governments and stakeholders should invest in resilient infrastructure, strategic food reserves, and emergency response systems, food distribution networks, and public awareness on food preservation will enhance food security in the study area.

iii. Cooperative societies and development agencies should provide timely access to subsidized agricultural inputs and improve distribution channels. Additionally, enhancing farmers' access to affordable credit facilities can help overcome capital constraints and boost food production.

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