

Economic Effect of Flood Disaster and its Management among Smallholder Farmers in Kebbi State

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ABSTRACT

Increased frequency and intensity of natural hazards coupled with heavy reliance on rain fed agriculture has continue to have negative effect on the socioeconomic livelihood of smallholder farmers across the globe. Hence, this demonstrated the importance of governments' policy responses in terms of mitigation and recovery to help in reducing flood damage and its social consequences. This study therefore assess the economic effect of flood disaster among smallholder farmer and their perception on flood disaster management in Kebbi state. Data were obtained from 110 affected smallholder farmers using multistage sampling technique and was analyzed through the use of descriptive and paired sample t-test. Findings of this research indicated that flood has a negative economic effect on smallholder farmers' crop production and income, and flood disaster management strategies were perceived to moderately effective. Hence, this study recommends governments, and other stakeholders to facilitate cost-effective integrated flood management to avoid/reduce future economic losses

Keywords: Flood, disaster, smallholder farmers, management, economic effect

INTRODUCTION

Flood has become the most common and frequent natural disaster in most part of the world, constituting the largest economic and social effect. Smallholder farmers living along the coastal areas and who solely depend on agriculture for their livelihoods are the major vulnerable group to its cascading negative effect in terms of loss of crops, livestock, farm assets and infrastructures (FAO, 2015a; Manzoor et al., 2022; Okafor, 2021). According to GNDAR (2021) report, a total of 313 major natural disasters occurred worldwide in 2020, affecting 123 countries and regions, out of which 193 were caused by flood as shown in the Figure 1 below.

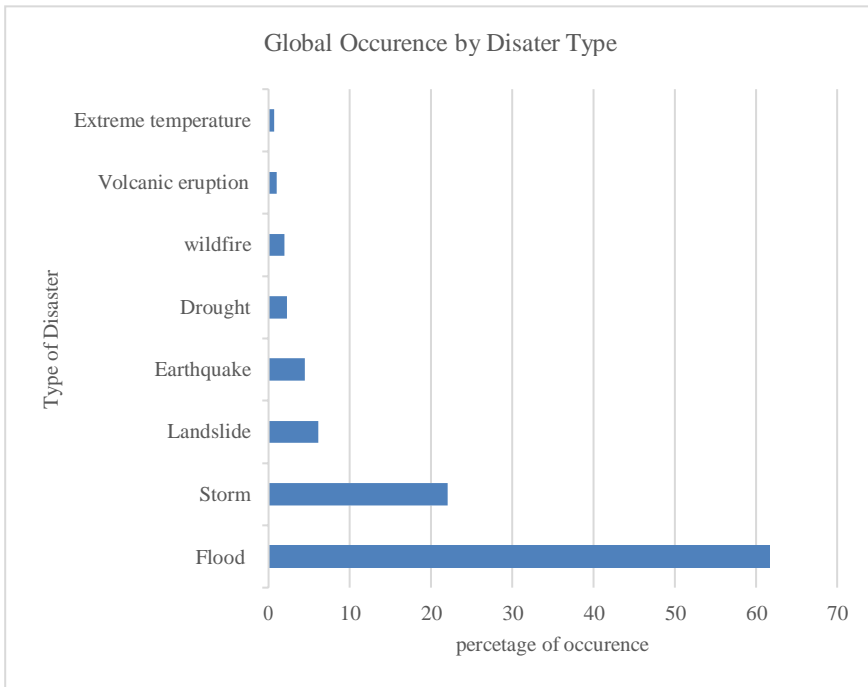


Figure 1. The frequency of natural disasters worldwide in 2020

Source: 2020 Global Natural Disaster Assessment Report.

In terms of economic losses flood was termed to be the second most devastating disaster causing significant economic losses around the globe as also indicated in the figure 2 below. This in agreement with the work of Kron (2005), who reported that, several studies have revealed that the flood disaster effect/damage are unmatched among the all other natural disaster happening in the world.

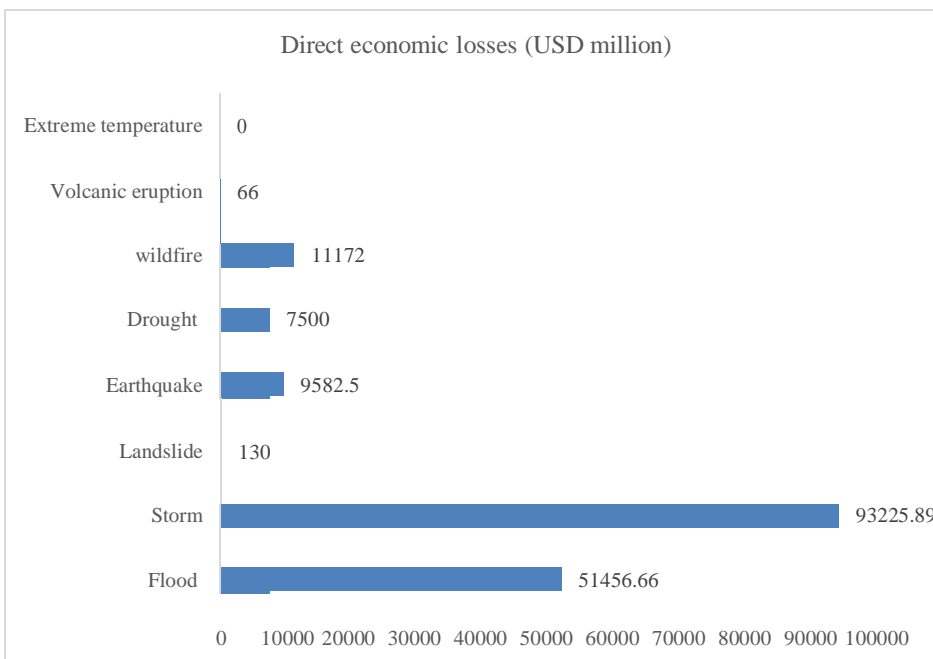


Figure 2. Direct economic losses by disaster types worldwide in 2020

Source: 2020 Global Natural Disaster Assessment Report.

In addition, flood stands out to affect agriculture sector the most than all other natural disasters with about 59.6% (percentage share of damage and loss to crops) based on post-disaster needs assessments reported by FAO (2015).

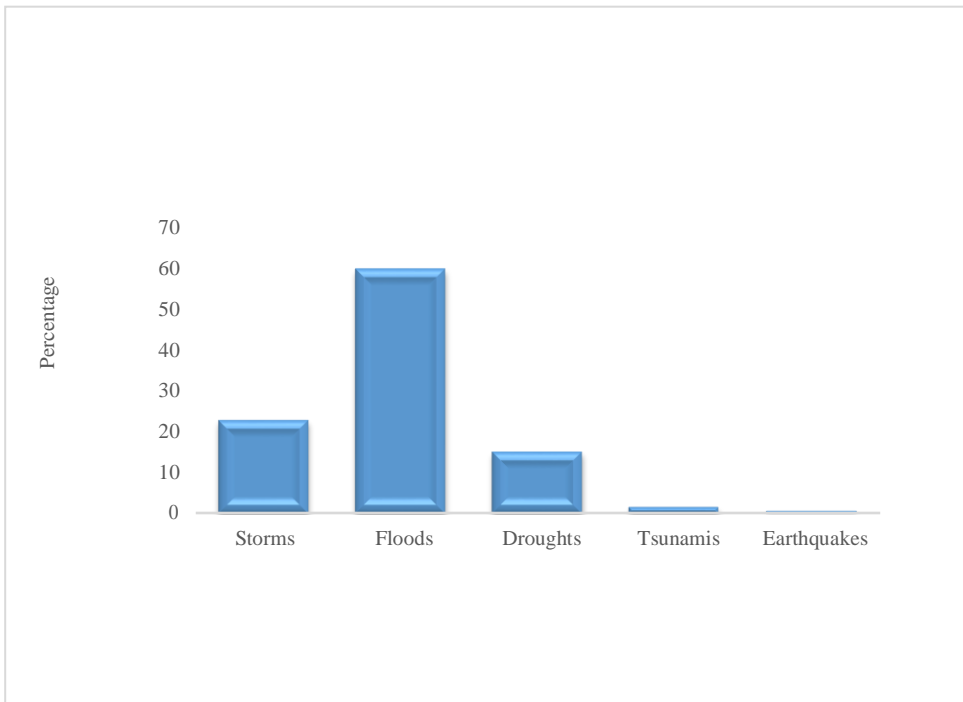


Figure 1.3: Damage to Crops Types of Disasters (2006-2016)

Source: FAO data on Post-Disaster Need Assessments

Nigeria’s climate has been changing, evident in: increases in temperature; variable rainfall; rise in sea level and flooding; The durations and intensities of rainfall have increased, producing large runoffs and flooding in many places in Nigeria (Elisha et al., 2017; Ebele and Emodi, 2016; Olaniyi et al., 2013). Nigeria’s agriculture sector continue to be adversely affected by climate change in recent decades, the country is experiencing more severe floods and increased occurrence and intensity of storm surges and coastal erosion(FAO, 2021). Flooding reduces farmlands, lowers agricultural productivity and affects crop yields (Ogbuabor and Egwuchukwu, 2017). Given the importance of the agricultural sector to livelihoods and the economy in Nigeria, problems with crop yields and productivity can have an adverse effect on gross domestic product (Anabaraonye et al., 2019).

The 2020 flood disaster which was termed the most significant and largest recorded flood in the history of Kebbi State, had affected about 70% of the villages with mostly smallholder farming communities. The resulting losses, in the agricultural production sector would have negative effects on the livelihood outcomes of the victims, especially in rural communities, where a majority of households still depend on smallholder agriculture for survival. Kebbi as the country’s biggest rice-producing state, the effect was especially dire, as vast farmlands are completely submerged due to the most recent rains (IFRCS, 2021). Although there are numerous studies on disaster effect, few were carried out on flood in terms of its economic effects on agriculture and livelihood outcomes of smallholder farmers in Nigeria and Kebbi state in particular. Therefore, assessing and understanding the economic effect of a flood disaster on farmers’ livelihood is important and necessary for the enhancement and holistic implementation of flood management policies in the best interest of all. Hence, this study quite important as it will serve as a blueprint for local, state, national government and non-governmental organizations in designing policies and action plans to address

the flood disaster effect in the study area. In terms academic contribution, the study will help to develop a framework that depicts relationship between flood disaster effects, its management strategies (policy responses) among smallholder farmers.

REVIEW ON FLOOD DISASTER EFFECT AND ITS MANAGEMENT

Flood disaster is a natural event which over flowing of a body of water beyond its normal limit resulting in its spilling of excess water an area of land that is usually dry gets submerged causing substantial damage (Doswell, 2003; Messner and Meyer, 2006) it is also described as a sudden overflowing of body of water that cause a great damage, destruction and inflict human sufferings (Campbell et al., 2011). It is typically a short term events that that has a life cycle of hours to weeks depending on its magnitude, form, size, and types (Cooley, 2007). Ashley and Ashley (2008) posited that, flood disasters can occur in various forms like, flash, coastal and river floods.

In Nigeria floods are becoming increasingly a common and recurring disaster annually, it occurs with devastating impacts on the poor and vulnerable populations who live along the river banks and other flood prone areas, with different severity of damages to crops, livestock, cultured fish, social and farm infrastructures and human lives (FGN, 2010; Oladokun & Proverbs, 2016). IFRC (2021) also opined that, Nigeria is experiencing the worst flooding in at least a decade. The 2020 floods have damaged homes, infrastructure and large areas of farmland across the country. More than 600 people have died and an estimated 2.8 million people have been affected, many of whom have been displaced from their communities, farmers are counting their losses from ravaged farmlands.

In response to these devastating effect of flood a very holistic approach from policy makers and governance perspective to integrate all relevant policy fields and institutions to strategize on flood disaster management. Disaster Risk Management (DRM) is a concept and practice of reducing disaster risk through a systematic application of policies and strategies so as to analyze and reduce the causal factors of disasters (IPCC, 2001; UN, 2013). Immediate measures are undertaken with the priority to lessen the effect of the disaster through mitigation, preparedness, response and recovery activities (Thieken et al., 2007). Although the negative effects emanated from a natural disaster can be counteracted and/or eliminated, effective disaster management can be made before, during and after disaster through adequate mitigation, preparation, response and recovery measures (Alexander, 2000; Paul, 2011). Danhassan et al., (2023) stated that, there is no single flood policy in Nigeria that deals with flood governance, prevention, control, and management, and no synergy and coordination among institutions for flood governance in the country, and further stated that most of flood disasters were handled by State and/or local governments with Federal assistance provided only when flood disasters exceed their capacities.

METHODOLOGY

Sampling Procedure and Data Analysis

A systematic sampling technique was employed to determine the sample population of the study which involves the selection of the respondents in eight (8) worst flood-hit local government areas (Jega, Argungu, and Yauri) of Kebbi State. The researchers were only able to randomly select Forty (40) respondents from Jega being the worst hit and thirty five (35) from Argungu and Yauri respectively making a total sample of 110. The sample was intended to be more, but it was constrained due some of the affected individual's reluctance to provide information. To achieve the objective of this study, descriptive Statistics and paired sample t-test, were used in analysing the data through SPSS and EXCEL. Descriptive statistic was used in order to describe the socio economic background of the respondents, flood disaster characteristics, perceived flood disaster effect and flood management strategies. Paired sample t-test was also used to compare and

determine whether there is statistical significant difference between the value of crops, livestock and income of the respondents before and after flood.

RESULTS AND DISCUSSION.

Table 1 below describe the socioeconomic characteristics of the respondents where 44.51% of the second age group who are neither young nor old (41-59) constitute the highest percentage shows significant commitment and participation of youth to agriculture and its investment in the study area. Sex indicated that majority 106 (96.4%) were males and showing that farming activities are predominantly males business which could be due the culture of male’s responsibility of providing the food and other basic necessities to the family as the majority of the females are house wives as observed by (Hua, 2015). For marital status, the majority of the respondents 89 (80.9%) were married as indicated in the table.

TABLE 1: SOCIOECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Variables	Freq	%	Mean	S.D
Age group				
21-40 years	44	40	45.51	13.52
41-59 years	49	44.5		
60 and above	17	15.5		
TOTAL	110	100		
Sex				
Male	106	96.4		
Female	4	3.6		
TOTAL	110	100		
Marital Status				
Single	15	13.6		
Married	89	80.9		
Widowed	4	3.6		
Divorced	2	1.8		
	110	100		
Level of Education				
Islamic education alone	30	27.3		
Primary	27	24.5		
Secondary	33	30		
Tertiary	20	18.2		
	110	100		
Household Size				
1-5 family members	29	26.4	11	7.56
6-10	23	20.9		
>10	58	52.7		
	110	100		

Farming Experience				
1-15 years	47	42.7	18.86	12.88
16-30 years	44	40		
> 31 years and above	19	17.3		
TOTAL	110	100		

The results further revealed that majority of the respondents attended primary (30%) secondary (24.5%) and Islamic (27.3) education respectively. Household size indicates that, the category of above 10 family members constitute (52.7%) which was found to be the highest with the overall mean 11 of all categories. For farming experience, it was found the respondents has an average mean of 18.86 years of farming experience this shows to a large extent their reasonable experience in farming and with an understanding of weather conditions and their effect on their production activities.

Flood Characteristics

Flood disaster characteristics are important components used in evaluating and understanding flood disaster effects (Messner et al., 2007a; Mojtahedi, 2015). They are triggering factors that that influence the extent of the damage and also define the nature and magnitude of the flood event (Dunja, 2016). Information on these characteristics was obtained from the interviewed smallholder farmers in the study area, since it was established that local farmers especially those living in coastal areas are well experienced with regards to flood events and they know every detail of flood characteristics

TABLE 2: INFORMATION ON FLOOD CHARACTERISTICS

Flood frequency of Occurrence per year	Frequency	Percentage
Once	37	33.6
Twice	49	44.5
Thrice	24	21.8
Daytime of Occurrence*		
Morning	12	10.9
Afternoon	17	15.5
Evening	8	7.3
Night	73	66.4
Flood Duration		
1 – 3 Days	8	7.3
4 – 7 Days	25	22.7
8 – 11 Days	31	28.2
Above 11 Days	46	41.9
Flood Inundation Depth		
1 – 2 Meters	29	26.3
2 – 3 Meters	37	33.6
4 – 5 Meters	32	29.1
Above 5 Meters	12	10.9
Causes of Flood*		
Heavy rainfall	83	33.6
River overflowing	74	30

Dam break	58	23.5
In adequate drainage	32	13

As indicated in Table 2 above, majority of the respondents (44.5%) reported that flood disaster occur averagely twice every year, and 66.4% stated that it occurs mostly in the night hours, this shows that there is relationship between flood occurrence and its impact on smallholder livelihood as revealed by the work of Ali Khan, Ashikin Shaari, Bahar, & Baten (2014) that there is an association between flood occurrence and economic variables of the affected persons. Majority (41.9%) also reported that the duration of the flood exceeds eleven (11) days before subsiding to the lowest level and 33.6% hinted that it's about 2- 3 meters in depth. The major cause of the flood was also found to heavy rainfall (33.6%) and overflowing of river (23.5%).

Results of the perceived flood disaster effect among smallholder farmers

Table 3 below indicated how the respondents perceived the level of flood disaster effect on the stated parameters. 68 (61.8%) and 70 (63.6%) of the respondents believed that flood has negatively affected their crop production and income respectively. These findings are consistent with the work of Mwape (2009) and Twining (2014) whose findings revealed that, over a half of their studied smallholder farmers reported significant damage to their crops field as a result of flood which in turn reduces their income.

TABLE 3. PERCEIVED FLOOD DISASTER EFFECT AMONG SMALLHOLDER FARMERS

Variable	Low		Moderator		High		M	SD	Level
	Fq	%	Fq	%	Fq	%			
Crop loss	10	9.1	32	29.1	68	61.8	2.53	0.65	High
Livestock loss	23	20.9	48	43.6	39	35.5	2.14	0.74	Moderate
Income	10	9.1	30	27.3	70	63.6	2.54	0.69	High

Note 1 – 1.66 (low); 1.67 – 2.32 (moderate) & 2.33 – 3.00 (High)

However the effect on livestock was found to be moderate as shown in the table above as majority of the farmers do keep livestock at their residence at subsistence level.

Paired Sample T-test Analysis Results on the economic effect of flood

The Paired t-test analysis was used to determine whether there is significant effect on respondents' agricultural activities by comparing the value of crops, livestock and income before and after the flood. The results shows that, the average value of paddy (t-stat = 2.86, p = 0.004), corn (t-stat = 2.01, p = 0.05) and income (t-stat = 2.33, p = 0.021) were all found to be significant indicating that, the flood has negatively affected their livelihood and this conform with the above Table 3 where the respondents highly perceived flood disaster effect on their crops and income.

TABLE 4: PAIRED SAMPLE T-TEST ANALYSIS RESULTS

Value of Crop Outputs Before and After Flood (RM)						
Variable	Time Frame	Mean	S.D	t-stat	t- crit	P-val
Value of Paddy	Before flood	164318.2	193355.7	2.86	1.98	0.004***
	After flood	132242.4	171969.6			

Value of corn	Before flood	62709.09	174137	2.01	1.98	0.05**
	After flood	43018.18	124309.8			
Value of Livestock	Before flood	4514455	22935635	1.22	1.98	0.223
	After flood	1810436	6040730			
Income (N)	Before flood	3936000	10125136	2.33	1.98	0.021**
	After flood	1998955	4080468			

*** Significant at 1% and ** Significant at 5%

Livestock on other hand was not significantly affected (t-stat = 1.22, p = 0.223) as shown in the Table above, meaning that there is no significant difference in the average value of livestock before and after the flood disaster.

Flood Disaster Management Strategies Results

This section present and discuss how effective disaster management is before, during and after disaster in terms of mitigation and response/recovery measures as stipulated by (Alexander, 2000; Paul, 2011)

TABLE 5: RESPONDENTS PERCEIVED FLOOD DISASTER MITIGATION STRATEGIES/MEASURES

No	Statements	M	SD	Rank
1.	Construction of dams	2.26	1.29	Low
2.	Construction of drainages bridges to pave way for water during heavy and/or prolonged rainfall	2.97	1.29	Mod.
3.	Construction of embankments	2.78	1.40	Mod.
4.	Construction of reservoirs	2.30	1.24	Low
5.	Diversion canals	2.63	1.28	Mod.
6.	Prohibition of the building, land development or encroachment on flood plains	3.17	1.30	Mod.
7.	Resettlement of population or other economic activities already existing in a flood prone area.	3.00	1.31	Mod
8.	Public awareness programmes	3.11	1.30	Mod
9.	Prohibition of deforestation and indiscriminate felling of trees	3.22	1.26	Mod
10.	Improvement of the existing flood forecasting and warning systems	3.09	1.24	Mod

*Note (Low: 1 – 2.33), (Moderate: 2.34 – 3.66) and (High: 3.67 – 5.0)

Table 5 above showed how smallholder farmers perceived the extent of flood management strategies provided by government in their area. With regards to mitigation measures in terms of dams (M = 2.26, SD = 1.29) and reservoir (M = 2.30, SD = 1.24) which were revealed to be low, the respondents perceived that construction of dams and reservoirs were given less priority, and these strategies are the most important measures used in curtailing the menace of flood disasters. The remaining strategies were perceived to be moderately significant. Therefore this result shows that government mitigation measures receive less attention than nonstructural in the study area and this is in agreement with study of Coppola (2011) who reported that, government practice more response measures, as they tend to be less costly than mitigation measures.

TABLE 6: RESPONDENTS PERCEIVED FLOOD DISASTER RESPONSE/PROVISION OF RECOVERY RESOURCES

No	Statements	M	SD	Rank
1.	Provision of cash and food	2.97	1.41	Moderate
2.	Direct subsidy of production inputs to poor growers	3.01	1.42	Moderate
3.	Provision of animals and the necessary veterinary services	3.01	1.44	Moderate
4.	Immediate repair of vital infrastructures	3.04	1.42	Moderate
6.	Provision of production credit with low interest and longer repayment period	3.16	1.43	Moderate
7.	Exempting farmers affected by flood disaster from paying certain taxes for certain period	3.03	1.46	Moderate

*Note (Low: 1 – 2.33), (Moderate: 2.34 – 3.66) and (High: 3.67 – 5.0)

With regards to the provision of response/recovery need resources to the affected smallholder farmers after the flood disaster, the Table 6 above indicates that provision of food and cash to flood victims during and after the flood, provision of production inputs, immediate repair of vital infrastructures and other response/recovery needs were all perceived to be moderately effective.

CONCLUSION

In conclusion, this study findings revealed that flood has a negative economic effect on smallholder farmers' crop production and income, and government was perceived not to adequately strengthen flood disaster management strategies in terms mitigation and provision of response/recovery need resources. This study therefore recommends governments at level and other relevant stakeholders to play a significant role in facilitating an effective flood disaster management strategies to avoid and/or reduces future losses.

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