

Flood Disaster Preparedness and Capacity Assessment Among Crop Farmers in Edo State, Nigeria.

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Abstract

Flood occurs when there is an overflow of any area which is not normally covered with water. It has claimed many lives, displaced millions, and destroyed crops and farmlands. It is more pronounced in developing nations where the level of preparedness and coping capacity are low in comparison with developed ones. It is against this background that this study evaluated flood disaster preparedness and capacity assessment among crop farmers in Edo State Nigeria. The sample size was determined using the Taro Yammane formula. A total of 400 crop farmers were drawn as the sample size. The study used survey research techniques where questionnaires designed on a Likert scale were distributed to the crop farmers obtained using a multistage sample technique. Key informant interview was also carried out with the staff of the Edo State Agricultural Development Programme. The data obtained were analyzed using mean and standard deviation. The result obtained revealed that most of the crop farmers were in their economically productive age, literate, and had poor coping capacity. The findings also revealed that though they applied some forms of preparedness measures but were still not better prepared for the disaster. They were also faced with challenges concerning coping and preparedness to flood disasters. Therefore, crop farmers in Edo State have poor coping capacity and are not effectively prepared against flooding. Government at all levels should intensify flood control measures and provide poverty alleviation programs that will be beneficial to crop farmers.

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Keywords: Flooding, Crop, Farmers, Preparedness, Coping, Challenges

1. Introduction

Flooding is expressed as the surplus of water in a place that is naturally dry (Stephen, 2011). It might be seen as a relative spill of water over the banks of surface water bodies like rivers. Flooding can also be considered as an outpouring of water that comes from a river, reservoirs, lakes, etc, and bring about destruction to lives and properties. (Ojo, 2007). It is a condition of partial or whole submergence of an area due to spillover from the sporadic and speedy buildup of runoff (Onuigbo *et al.*, 2017). It is probably the most damaging, common, and frequent natural hazard in the world (Al Azzam and Al Kuisi, 2021). A flood happens as soon as the water in a river or any water body flows out of its boundaries and submerges nearby areas (Stephen, 2011). Some of the factors resulting in flood disasters include the throwing away of solid wastes in drains and on the floodplain (Sarah 2007) cited in Okeleye (2016). James (2000) reported that uncontrolled urbanization such as building along flood plains, and unrestrained advancement of structures into flood plains alongside massive road construction with large-scale land recovery result in flood disaster. Ajayi (2012) cited in Okeleye (2016) stated that raising infrastructures along the riverway caused major flooding in Oyo State. Farmers are usually challenged and ascertaining the damage caused to farmers may not be easy but it is believed to be a problem to their livelihood (Alade and Ademola 2013). In Nigeria, flooding has brought about an increase in the prices of food

crops, leading to an inflation upsurge of 2% (Onwuka *et al.*, 2015). There is therefore the need for preparedness and coping.

World Health Organisation (2007), opined that preparedness is activities carried out by individuals or communities to enable them to take better actions in the case of emergency and disaster conditions. Preparedness is seen as actions geared towards enhancing coping potentials. Disaster preparedness is a vital constituent of any disaster management because it reduces detrimental outcomes (Odunola and Balogun, 2015). Capacity assessment on the other hand is the way the capacity of a group or individual is evaluated against anticipated goals, where prevailing capacities are known for maintenance and capacity gaps are set apart for further action (UNDRR, 2017). Coping capacity can be influenced by a high incidence of urban poverty. Poverty is a major militating factor in Nigeria (Lame and Yosoff, 2015; Ike and Uzokwe 2015). It is against this background that this study was carried out to evaluate the preparedness and coping capacity of crop farmers in Edo State, Nigeria.

2. Methodology

This study was carried out in Edo State Nigeria as shown in Figure 1, comprising Edo South, Central, and North Senatorial Districts. Edo state which was created in 1991 out of the old Bendel state is one of the Niger Delta States. It

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has a population of 3218332 comprising 1640461 males and 1577871 females based on the 2006 census. The state covers a land mass of about 19638SqKm. Common food crops grown in the State include cassava, yam, maize, rice, and plantain. The State is divided into three (3) agro-ecological

zones namely Edo North, Edo Central, and Edo South to Edo State Agricultural Development Programme (ADP) delineation (Edo State government, 2013; Erie, 2007) cited in Alufohai et al (2015).

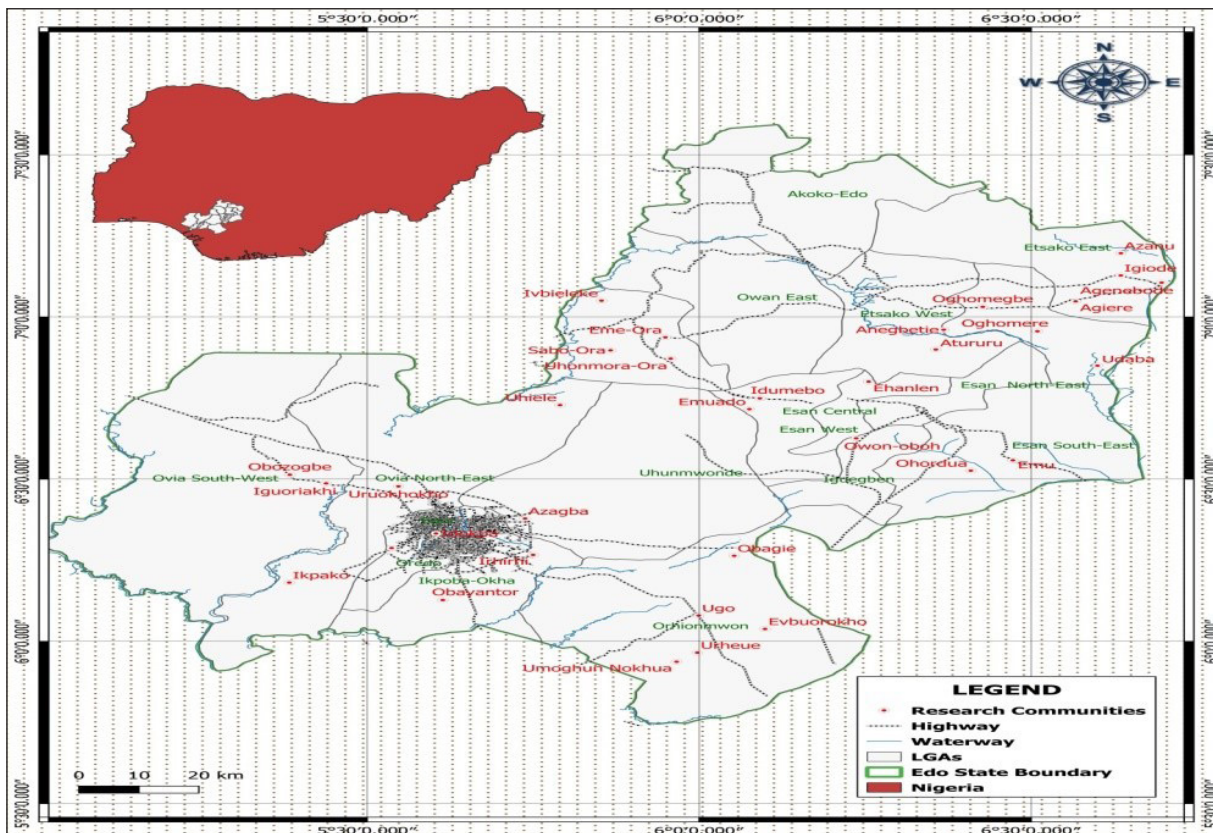


Figure 1. Map of Edo State showing the farming communities studied

2.1 Sample Size Determination

The study drew a sample size of 400 from a total of 91000 crop farmers in Edo State. The sample size was determined using the formula for sample size determination as given by Yamane (1967) as

$$n = \frac{N}{1 + N(e)^2}$$

Where

n = sample size

N = population size (number of crop farmers in Edo State)

e = acceptable sampling error margin ie 0.05

1 = constant

2.2 Sampling Techniques

A multistage sampling technique was used to select four hundred (400) crop farmers for this study. Firstly, ten (10) agricultural blocks were randomly selected. In each agricultural block and with the assistance of the Extension Services Department, farming communities/cells were identified, from which four (4) communities/cells were randomly selected making a total of forty (40) communities/cells for the study. In each selected community/cell, with the assistance of Extension Agents, ten (10) crop farmers were randomly selected, bringing the total sampled respondents to four hundred (400) for the study.

2.3 Methods of Data Collection and Analysis

Questionnaires designed on the Likert scale as well as interviews with Staff of the Edo State Agricultural Development Programme were used to obtain information for this study. The data collected were subjected to descriptive statistics such as mean and standard deviation. Other descriptive statistical methods that were employed were simple frequency, percentages, charts, and graphs where necessary.

3. Results

3.1 Demographic Characteristics of the Crop Farmers

The gender, age, marital status and educational level of the crop farmers are shown in Table 1 below. There were 71.3% male and 28.8% female which means that most of the crop farmers were male. In terms of age, 10.5% were less than 30 years, 35.3% were between 31-40 years, 34.8% were between 41-50 years 19.5% were over 50 years. This showed that most of the crop farmers were in their economically productive age. This is beneficial because young age farmers could have higher tendencies to cope and prepare for flooding than the much-aged ones. As shown in the table, 84.3% were married, 11.5% were single, 2.8% were widows/widowers and others made up 1.5% indicating that they were mostly married persons. This could enhance their preparedness as married farmers would have immediate family members that can render some needed assistance. The result also revealed

that 33.5% had only primary school education, 49.0% had secondary education, 11.5% had tertiary education and 6.0% had no formal education signifying that most of the crop farmers were literate. Being mostly literate connotes that accepting innovations that could help in improving their capacity and preparedness for flooding would not be difficult.

Table 1. Demographic characteristics of the crop farmers

Characteristics	Components	Frequency	Percentage (%)
Gender	Male	285	71.2
	Female	115	28.8
	Total	400	100.0
Age	30 or less	42	10.5
	31-40	141	35.3
	41-50	139	34.8
	50 and above	78	19.5
	Total	400	100.0
Marital Status	Married	337	84.3
	Single	46	11.5
	Widow or widower	11	2.8
	Others	6	1.5
	Total	400	100.0
Educational Level	Primary	134	33.5
	Secondary	196	49.0
	Tertiary	46	11.5
	No formal education	24	6.0
	Total	400	100.0

Source: Researcher's computation, 2021

3.2 Coping Capacity of Crop Farmers to Flood Hazard

The mean of the result on the coping capacity of crop farmers to flooding, as shown in Table 2 below, revealed that the crop farmers agreed to only one item analyzed. That is, people living with you have one another's contacts to call should a flood disaster occur. They were however in disagreement with other items. Therefore, from the result, it can be deduced that the crop farmers had poor coping capacity to flood disasters.

Table 2. Coping capacity of crop farmers to flood hazard

	N	Sum	Mean	SD
having a different savings food is being practiced by you	400	771	1.93	.827
Planning for flood disasters is being practiced by you	400	887	2.22	1.041
There is a place where people are to meet should flooding occur	400	857	2.14	.911
Ways of how to search for any missing person should flooding occur are put in place	400	882	2.20	.797
People living with you have one another's contacts to call should a flood disaster occur.	400	1144	2.86	.760

Source: Field survey, 2021

3.3 Crop Farmers' Preparedness Measures for Flood Disaster

The mean of the result on preparedness measures of crop farmers for flood disasters as shown in Figure 2

below indicated that the crop farmers agreed with the items analyzed. Therefore, it can be inferred that the crop farmers applied flood preparedness strategies to ameliorate the effects of flooding.

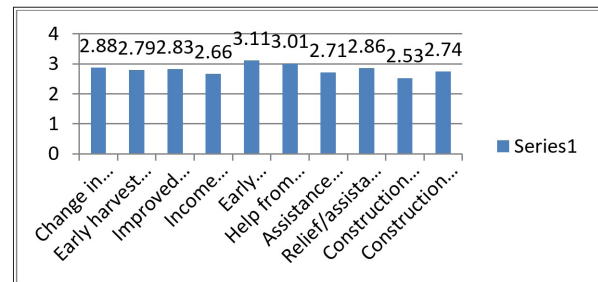


Figure 2. Crop farmers' preparedness measures to flood disaster

3.4 Effectiveness of Preparedness Strategies for Flood Disaster

The mean of the result on how effective the preparedness measures applied by the crop farmers as shown in Figure 3 below revealed that the preparedness measures were slightly effective.

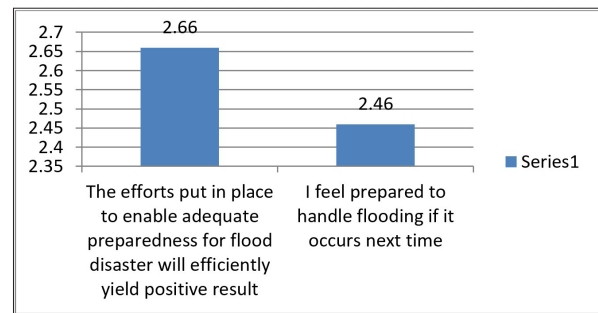


Figure 3. Effectiveness of preparedness strategies to flood disaster

3.5 Constraints to Flood Disaster Preparedness

The mean of the result on constraints to flood disaster preparedness faced by the crop farmers as shown in Figure 4 below indicated that the crop farmers expressed disagreement only to the size of farmland as a constraint to flood preparedness. They were however in agreement with other items. Therefore, it can be deduced that the crop farmers had some challenges in preparing and coping with the flood disaster.

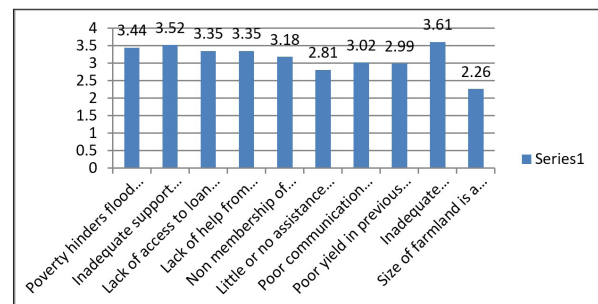


Figure 4. Constraints to flood disaster preparedness

4. Discussion

4.1 Demographic Characteristics of the Crop Farmers

The result revealed that most of the farmers in the study area were males which attests to the fact that there are more males in farming in Nigeria (Kasali et al., 2009). This could be attributable to the fact that women have smaller plots of land, less access to physical inputs such as fertilizer and herbicide, and low labor (Oseni et al., 2013). Women are also

mostly not opportune to own farms due to cultural biases (Fasina, 2013). The finding obtained in this study is coherent with those stated by Okeleye *et al.*, (2016); Umar and Muazu, (2017). This result showed that most of the crop farmers were in their economically productive age of fewer than 50 years of age which corroborates with the findings of Oronye (2012); Oyatayo *et al.* (2016) Umar and Muazu (2017); Salami *et al.*, (2017). Having the majority of the crop farmers at an age of less than 50 can be ascribed to farmers' productivity being decreased as they age. Similarly, their level of physical involvement and consequentially their agricultural productivity would have been detrimentally affected as they age (Fasina, 2013). It is worth noting that older farmers are more vulnerable to the outcome of disasters like flooding as a result of challenges they may have in preparedness and recovery. This agrees with the work of Maltais (2019) who reported that throughout the world, floods have sadly disturbed many people over the age of 65. Some had serious injuries, others died, and sadly, many could not bear the menace.

Most of the crop farmers were married. This is in line with Owolabi (2013); Okeleye (2016). Married farmers could benefit from the support they get from their spouses. This is in agreement with Fasina (2013) who reported that the fact that the majority of their respondents are married could infer that couples are involved in cooperative efforts in farming activities. Those married could also have persons that could assist if a disaster like flooding occurs thereby enhancing their preparedness and coping capacity. This is consistent with the report of Owolabi (2013). Most of the crop farmers were literate which corroborates with Ahile and Andityavyar (2014); Oyatayo *et al.*, (2016). Their level of education is encouraging as it will help in embracing innovations and developments geared towards enhancing their preparedness and coping capacity to flood disasters. This is in line with Muttarak and Pothisiri (2013), which stated that the educational level of residents could influence their level of preparedness for disaster.

4.2 Coping Capacity of Crop Farmers to Flood Hazard

The farmers in this study were in the affirmative that they had poor coping capacity which is coherent with the outcome of Okeleye *et al.*, (2016) in their study on the impact assessment of flood disasters on the livelihoods of farmers in selected farming communities in Oke-Ogun region of Oyo State, Nigeria. The outcome of the interview also confirms that the farmers are faced with poor coping capacity. This relatively low coping capacity of the farmers makes them vulnerable to the effects of flooding. Better coping capacity would have made them to be resilient thereby not discouraged with farming. Their discouragement could affect food security and aggravate hunger and poverty. Attaining better coping capacity in the study area would not have been a difficult task to achieve because of their literacy level as the majority had secondary education and above. Boakye *et al.* (2018) opined that one key factor that influences the adaptive capacity of any society is the literacy level appraised by the level of educational attainment. According to Brooks *et al.* (2004), one's adaptive capacity is largely determined by one's level of education. This is because; high literacy enhances

the spreading and assimilation of information. During an assessment of the adaptive capacity of Nigeria, Adejuwom (2005) observed that education was a major determinant of adaptive capacity. Accordingly, the study concluded that people with lower levels of education have lesser adaptive capacity.

The farmers in this study were aware of flooding and the danger it could cause. Yet their coping capacity was poor which infers that though their awareness of flooding is sufficient enough they lack adequate capacity in other relevant areas to effectively cope with flooding. This proposition agrees with Boakye *et al.*, (2018). It can be inferred from the study that the farmers react to the outcomes of flood disaster when it occurs, but cannot cope adequately to ameliorate the challenges posed by it thereby affecting crop production and their livelihood. This has serious consequences on food security in the long run.

4.3 Crop Farmers' Preparedness Measures for Flood Disaster

The outcome of this study revealed that the crop farmers applied flood preparedness strategies to ameliorate the menace of flooding in the study area but how effective are they is another point of concern. This finding conforms with Odunlola and Balogun (2015); Okeleye *et al.*, (2016); Akukwe (2019). However, it was contrary to that of Salami *et al.*, (2017) who reported that most of their respondents never practiced any preparedness measures. Ezemonye and Emeribe (2014) affirm that a flood preparedness plan is about putting in place a set of appropriate arrangements in advance for an effective response to floods. The need for preparedness is important because sometimes natural hazards like flooding may not be prevented but can be managed through preparedness. This conforms to the proposition of Tierney, Lindell, and Perry, (2001). Change in planting season and early harvest are among the preparedness strategies that the crop farmers were affirmative to. These strategies buttressed by interview of staff of Edo State ADP enables the farmers to have some harvest at the end of the farming season. This is because a change in planting season will enable the farmers to either plant early or late as the case may be to manage the effects associated with flood disasters. Likewise in early harvest, the farmers can reap before the flood comes. This however may not be free from harvesting crops that are not adequately matured. These strategies depend on weather variability and the use of improved crop varieties that mature quickly. To some extent, the application of these strategies is based on intuition concerning the observation of weather and prediction of flood disasters by the farmers. This is in agreement with Akukwe (2019). The use of improved varieties to enhance preparedness for flooding was agreed upon by the farmers in this study which is similar to the findings of Ajibade *et al.*, (2019). This however depends on the education level of the farmers. According to Okeleye *et al.* (2016), education enhances the translation of information into meaningful usage and it is very essential in taking any informed decision.

Early warning is also helping the farmers in this study to prepare ahead of flood disasters as affirmed by the crop farmers which corroborates with that of Okeleye *et al.*,(2016).

Early warning enables the farmers to have information about impending disasters like flooding. The proper application of early warning signs will help the farmer to manage the flooding should it occur thereby avoiding or minimizing its effects. This agrees with Ashraf *et al.* (2013), which argue that effective communication systems and accessibility to early warning systems lessen vulnerability as they make people respond and prepare for disaster.

In this study, income diversification was agreed by the farmers to be essential in preparedness for flooding should it occur. This strategy was also reported in Okeleye *et al.*, (2016); Akukwe (2019). The involvement of the farmers in other sources of income away from their farming activities will limit the socio-economic impact of the flood on them as it helps to cushion the outcome of flooding on the farm or crops. According to Gautam and Anderson (2016), livelihood diversification has been a commonly adopted strategy for coping with shocks in various communities. Similarly, Ashraf *et al.* (2013) argue that involvement in other non-farming activities will lessen farmers' vulnerabilities to the outcome of disasters like flooding.

The farmers were in the affirmative that assistance from cooperative society and the government will enable preparedness for flooding as they help to cushion the effects and to enhance recovery. According to Arukwe (2019), group membership has been adduced to provide social capital in terms of shock. The farmers in the study area have a cooperative group they belong to, but relief from the cooperatives and the government according to the farmers has been inadequate. Furthermore, the Construction of a drainage system was also agreed upon by the farmers to enhance their preparedness. Properly constructed and adequate drainage system aid in conveying overflowing water to safe destinations thereby reducing the potential of the flood to cause any danger to the farmers. Ibrahim, Ndatsu, and Yisa (2020) also reported the use of flood diversion trenches as a preparedness measure for flooding in their study.

4.4 Effectiveness of Preparedness Strategies for Flood Disaster

The study revealed that crop farmers were not effectively prepared against flooding should it occur. This is in agreement with the proposition of Oruonye (2013); Odunola and Balogun (2015); Oluchi *et al.* (2017). The outcome of the interview conducted revealed the high tendency of floods to cause damage. This infers that the crop farmers were not effectively prepared against flooding in the study area. It, therefore, means that farmers in this study area are vulnerable to the effects of flooding despite having one form of preparedness measures applied. This deduced danger to crops and farmers' livelihood which could affect food security and exacerbate poverty and hardship in the study area. The poor effectiveness of preparedness to flood disasters in the study area indicates inadequate flood management by the government, cooperatives, communities, and other relevant agencies. It could also infer that the farmers were not adequately proactive to avoid being affected by floods thus they wait until it is too late for them to do anything. This aligns with the findings of Oluchi *et al.*, (2017).

4.5 Constraints to Flood Disaster Preparedness

This study also revealed that the farmers in the study area were faced with some challenges in preparing and coping with flood disasters. This finding is in line with Oruonye (2013). The constraints could hinder effective preparedness and coping with the flood disaster thereby enhancing the farmers' vulnerability to it and consequently damage to crops and the general wellbeing of the crop farmers. The farmers in this study affirmed that poverty is a challenge hindering their preparedness for flood disasters. This factor was also reported in Kundzewicz (2002); Mondal (2010); Lawal *et al.* (2011); Salami *et al.*, (2017). As a result of the paucity of funds, the farmers would not be able to spend sufficiently on measures that will enable them to prepare and bear with the disaster. This agrees with the findings of Adegboye (2011) who opined that insufficient money limits the application of flood control measures. Lack of funds could also make them farm in highly flood-prone areas because of some advantages it may naturally provide which they may not be able to afford if they should go to a safer place. For instance, good farming potentials and availability of water along river banks and close to detention ponds made some of their farms in those areas in expectation of better yields. This proposition is consistent with Bariweni *et al.*, (2012); Hallagatt *et al.*, (2020). Poverty also affects the tendency of the farmers to recover from flood disasters when it hits them. They, therefore, find it difficult to recover any time flooding occurs. This agrees with Erman *et al.* (2019) and Erman *et al.* (2020).

The farmers agreed that inadequate support from the government and relevant authorities was among the challenges that affect their capacity to prepare for flooding in the study area. This is a serious factor because government at different levels has the statutory obligation to put preventive measures in place to minimize future flood risks. In a similar study in Taraba State, Oruonye (2012) argues that various disaster management stakeholders in the state have a weak capacity to respond adequately to emergency disaster situations. Also, UNDRR (2014) stated that poor involvement of the government in preparing vulnerable communities affect their preparedness. Similarly, limited inter-agency coordination, as well as the absence of political commitment and will to embolden preparedness activities, due to the political and institutional mindset of post-disaster relief instead of risk mitigation strategies, often create hurdles to preparedness capacities among the key government stakeholders Perera *et al.* (2020).

Lack of help from cooperatives and non-membership of any association was considered by the crop farmers as a constraint to flood preparedness in the study area. Cooperatives as recommended by Edo State ADP were established among the crop farmers to serve as a medium of reaching the government and assisting members. The farmers were supposed to be members of cooperatives available in their communities. But some farmers did not join any of the cooperatives at the time the researcher was carrying out this study. Others were members but were not financially contributing to the cooperatives. These attitudes

most times affect the effectiveness of the cooperatives to serve the purposes for which they were established. Support from cooperatives could enable the farmers to cushion the effects of flood disasters. Therefore, lack or inadequate support from cooperative or non-membership at all could pose some challenges to crop farmers in the study area to prepare and cope with the outcomes of flooding. This finding is in agreement with that of Lawal *et al.*, (2011) who stated that scanty support among other factors were major hiccups confronted by farmers in the application of flood control measures. Similarly, little or no assistance from other community members who particularly were not farmers was considered a challenge to flood preparedness among the crop farmers. When flooding occurs, crop farmers particularly those who have no other sources of income outside farming, are usually affected the most. Therefore, support from other community members is helpful to their preparedness and enhancement of their coping capacity. This is in line with Ibrahim *et al.*, (2020).

Furthermore, poor communication network was also agreed upon by the crop farmers as a factor that hinders flood preparedness in the study area which agrees with Ibrahim *et al.*, (2020). Communication is very important to crop farmers in times of flooding because they need to know what to do, the safer locations to relocate to if need be, the roads that are safe to pass, and where to get medical attention in case of injuries or food as the event last. Extension officers from Edo State ADP were on the ground in the various communities in the state to supply crop farmers with the necessary information they need to enhance their coping capacity and preparedness for flooding. The use of extension officers to communicate with farmers was also reported by Okwu and Umoru (2009); Adegboye *et al* (2013).

4. Conclusions

Flooding is one form of disaster capable of destroying lives, property, and livelihood. Crop farmers like other persons are vulnerable to the effects of flooding because it affects their crops, farmland, and general well-being. To a large extent, preventing floods, particularly in developing nations like Nigeria may be difficult to achieve. Therefore, preparedness and coping with the menace could be considered appropriate management measures.

This study concluded that the crop farmers had poor coping capacity which increases their susceptibility to the effects of flooding. A better coping capacity would mean that the crop farmers in Edo State could be able to absorb the shock should the disaster occurs. They applied preparedness measures like change in the planting season, diversification of income, construction of drainages, early warning, early harvest, etc to ameliorate the effects of flooding but were still not effectively prepared. This implied that flooding continues to be one of the problems the farmers are facing. They are however challenged with hindrances like poverty, and inadequate support from the government and relevant authorities, among others as they prepare and cope. The constraints increase the farmers' susceptibility to flooding in the study area and consequently damage crops and their general well-being. Therefore, the crop farmers in Edo State

have poor coping capacity and are not better prepared for flood disasters.

Recommendations

1. The crop farmers should be encouraged to practice some coping strategies like saving money and farm produce to sustain in case a flood occurs in subsequent years
2. The crop farmers should belong to the cooperative available in their communities and pay their dues regularly. This is to enable the cooperatives to render some assistance that could help in enhancing their coping and preparedness for flooding.
3. The crop farmers should be encouraged to take up other sources of income to complement income from farming. This is to enable them to cushion the effects of flood any time it occurs.
4. Government should provide poverty alleviation programs that will be beneficial to crop farmers. This is to enable them to overcome the challenges posed by poverty to flood disaster preparedness.
5. Support from the government and other relevant agencies should reach the farmers timely anytime a flood occurs. This is to enhance quick recovery from flood disasters by crop farmers.
6. Relevant government agencies like Nigerian Meteorological Agency and Nigerian Hydrological Service Agency should provide effective and adequate early warning signals to enhance the farmers' preparedness and coping capacity for flooding.
7. Agricultural Extension Officers should be adequately motivated to enhance frequent and effective contact with the crop farmers. This is to enable the timely passage of necessary information needed to improve the farmers coping capacity and preparedness for flooding.

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