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Effects of Flood on Food Crop Production and the Adaptive Measures among Smallholder Farmers in Chikun Local Government Area of Kaduna State, Nigeria

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ABSTRACT

The analysis of the effects of flood on food crop production and the adaptive measures among smallholder farmers was carried out in Chikun Local Government Area of Kaduna State. In order to achieve the set objectives, purposive sampling technique was employed in selecting 380 food crop farmers for the study. The instrument for data collection is structured questionnaire. Data were analysed using descriptive statistics and Chi square. Results show that majority (73.1%) of respondents were male, while 67% were between the age of 21-40 years. The level of education of the respondents indicates that about (58%) had at least primary school education. Majority of the respondents (93%) were prone to flood, while 96% normally experience flood in at least every five years. The study also shows that, above 50% of respondents were affected by loss of soil nutrients; erosion, damage to road and other infrastructures, food insecurity, and poverty, while 96% of the respondent agreed that planting of vegetation, proper drainage, prevention of soil erosion and building dams, water ways and canals were adopted by the smallholder farmers as adaptation and control measures. It recommended that, the extension agents should disseminate information and also make available improved varieties of plant and animal species which the farmer could use in combating flood effects.

Keywords: *Flooding, Adaptive Measures, Food crop, Production*

INTRODUCTION

Flooding is when a dry area overflows with water and is not able to absorb it into the ground. The hazard of flooding is an annual phenomenon that has displaced millions every year worldwide and claimed lives and properties (Bronstert, 2003). According to Etuonovbe (2011); Bariweni, Tawari and Abowei, 2012), Nigeria

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experiences floods every year especially flash floods and dam related floods during the raining season.

Flood hazards occur naturally, but the level of impact, damage and losses are as a result of human activities (Action Aid, 2006). The threat to lives and property by flood is now becoming an annual event in many urban and rural areas in Nigeria (Olanrewaju and Fadiro 2003). Flood occurs when surface water covers land that is normally dry or when water overflows normal confinements. The most widespread of any hazard, floods can arise from abnormally high precipitation, storm surges from tropical storms, dam bursts, and rapid snow melts or even burst water mains. The majorities of floods are harmful to humans (Etuonovbe 2011); however, floods can provide benefits without creating disaster and are necessary to maintain most river ecosystems. Floods replenish soil fertility, provide water for crop irrigation and fisheries and contribute seasonal water supplies to support life in arid lands. Flooding is basically a natural phenomenon, which can be caused or even intensified in most cases by human activities. Flooding has been identified as one of the major factors that prevents Africa's growing population of city dwellers from escaping poverty and stands in the way of United Nations 2020 goal of achieving significant improvement in the lives of urban slum dwellers (Action Aid, 2006).

Flooding is a worldwide trend and should be treated with urgency as many regions are getting to a stage that is considered unfit for human survival due to land degradation. This has resulted in conflicts over extreme depletion of natural resources, increase in population and poverty causing severe risk to political, economic, and social stability (Schwartz and Randall, 2003). Way before crude oil was discovered in commercial quantity in Nigeria, agriculture was the major trade and source of livelihood and economic growth. Agriculture is still rich in the country's growth and plays a vital role in economic growth so it has to be protected (Bello *et al*., 2012).

The declining agricultural productivity in Nigeria is worrisome and a real challenge for Government with a population of approximately 150 million people to feed. Adaptation of agronomic techniques and farm strategies is already happening (CEC, 2009). The modification of agricultural practices and production in order to cope with flooding will be imperative in order to meet and continue meeting the growing food demands of Nigerians. Evidence shows that farming systems and farming technologies within the region have been changing in response to the effects of flooding (Adebayo *et al.,* 2011). In their study conducted in Southwest Nigeria, Adebayo *et al*. (2011) showed that the farmers agreed that the main flooding effect is on reduction of their personal productivity. Adapting to flood at the farm-level by the farmers especially through the modification of agricultural practices and farming

systems has been recognized as the main coping strategies. It is believed that these strategies are supposed to help the farmers improve their personal productivity and efficiency in food crop production and also raise their returns to farming as a business. Previous studies (Ajibefun, 2006; Ajibefun, Ajibefun, Daramola & Falusi, 2006; Ogundari, 2006; Otitoju, 2008; Otitoju & Arene, 2010) conducted on efficiency (technical and profit) of farmers only used socioeconomic, farmers' and farm-specific characteristics to determine the efficiency level of their production.

The broad objective of this study is to analyze the effects of flood on food crop production and the adaptive measures among smallholder farmers in Chikun Local Government Area of Kaduna State, Nigeria. The specific objectives are to: (i) describe the socio-economic characteristics of farmers in the study area; (ii) determine the flood rate in the study area; (iii) identify the effect of flood on crop production in the study area, and (iv) investigate the adaptation measures adopted by small land crop farmers in the study area.

The present inability of food crop production sector to meet the foods demand of Nigerians and the challenge posed by floods emphasized the need for the improvement of food crop farmers. Failure to know the present food crop production efficiency (technical and profit) and the influence of flood coping strategies on efficiency level of food crop production will inhibit designing and formulating appropriate policies to meet food crop production demands of the country. Developing economies can benefit much from inefficiency studies especially a type like this that incorporates farmers' adaptation strategies to flood hazards to explain efficiencies. The results of this study are expected to give direction for policy makers in designing appropriate public policies to increase agricultural productivity and mitigating effects of flood on food crop production in Nigeria especially in the Northern zone. It will provide a useful guide to international and local donor agencies interested in flood mitigation and adaptation in their provision of grants and funds for environmental and resource management studies. The results of this study will also help agricultural planners in the Agricultural Development Programmes (ADPs) and Ministries of Agriculture, Science and Technology; and Environment in the northern region and Nigeria as a whole and those states in the zone with Agro-climatological and Ecological zone study Units in their planning activities and providing useful weather data that will guide in planning public (or planned) adaptations to complement the farm-level (or autonomous) adaptation strategies. Researchers are going to have a good resource base to look at flood for further work. Farmers are also going to benefit by knowing those adaptation measures to flood that are more productive and efficiency-enhancing.

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MATERIALS AND METHOD

The study was carried out in Chikun Local Government Area (LGA) of Kaduna State. Chikun LGA covers an area of about 445,659km with a projected population of 502,500 people (NPC, 2016). The jurisdiction of royal chief covers parts of Kaduna south local government area of television village village and Romi new extension. Chikun drives it name from Gbagyi village in the south eastern part of Kujama.

Chikun LGA is situated in Northern Guinea Savanna Zone, and shares boundaries with Igabi and Kaduna South LGA to the North and with Kajuru to the East, Birnin Gwari and Giwa LGA to the West and Kachia LGA to the South. Their main occupation is farming and they plant rice, yam, maize, guinea corn, millet and cassava, they also reared animals such as goat, sheep and cow, they practice traditional and modern agro-forestry system in the area and they are also civil servants and traders (Signh, 2001).

Data were collected from the respondents through the use of well-structured questionnaire which was administered to the respondents to achieve the set objectives. Chikun LGA is made up of thirteen districts; eight (Ungwanromi, Kamazo, Nassarawa, kakau, Sabogayar, Kudenda, Gonin-gora and umgwanmaigero) of flood prone districts were purposively selected for the collection of data. Twenty respondents were randomly selected from each district which gives a total number of one hundred and sixty (160) respondents.

Frequency distribution tables, Likert scale, simple percentage and Chi-square were used to analyse data for the study. The Chi-square was used to establish the effects of flood on food crop production and the adaptation measures adopted by the smallholder farmers in the study area.

RESULT AND DISCUSSION

Socio-economic characteristics of the respondents

Table 1 describes the socio-economic characteristic of the respondent using the following induces: sex, age, marital status, level of education, house hold size, religion, monthly income, membership in organization, source of capital, source of labour. The study shows that majority (73.1%) of the respondents are male while 26.9% are females. This shows more participation of men in farming than women in the study area. The table 1 shows that majority of the respondents are in the age range of 21- 40 years. This was followed by with the age range of 41 – 60 years, with age range of below 20 years, while least are in the age range of 60 years and above. The age distribution of the respondents indicates that about 95% of the farmers

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were in their working age groups which make them more active. Age is an important factor in an agricultural activity, according to Agbo (2006), it is inversely related to performance.

Table 1 further shows that majority (65.7%) of the respondents are married, 14.3% are single, 11.9% are divorced while 8.1% are widowed. According to the results, a very large proportion of the farmers are married. The status of a married farmer is very important, as spouses contribute significantly in the study area. Table 1 also shows about 77.3% of the respondents have some forms of education while 22.7% do not have any form of education. Farmers' level of education is very important as it helps the farmer in adopting new ideas, strategies, and knowledge to know how to tackle problems if it arises. The high number of their level of education can determine the rate of adoption of improved technique due to their knowledge of enlightenment and information through education. Okpukpura (2005) states that education enhances level of understanding of saving. Attendance to formal education is a prerequisite for getting a secure or a regular employment which lead a more stable income from which marginal propensity of save increase (Nasiru, Haruna, Abdurahman & Dauda, 2005).

Table 1 further shows that the household size with the highest frequency falls within the range of 6-10 persons. It shows that majority of the farmers had their household size within 6-10 persons. In view of the size of the household, agricultural activities are labour intensive and large household can provide family labour at least cost (Ojemade, Edeh and Onemolease, 2008). In addition, the table shows that 4.3% of the respondents earn a monthly income below ₦ 10,000. It also shows that 9.3% of the respondents earn a monthly income between ₦ 11,000 – ₦ 20,000, it also show that 12.6% of the respondent earn a monthly income between ₦ 21,000 – ₦ 30,000, it also shows that 25% of the respondent earn a monthly income ₦ 31,000 – ₦ 40,000, and also shows that 46.9% of the respondent earn a monthly income between ₦ 41,000 – ₦ 50,000, while 1.9% of the respondent earn a monthly income of ₦ 51,000 and above. The result in table 1 shows that 30% of the respondents use hired labour, 16.2% use family labour, 13.1% use mechanical labour, 15% make use of animal labour, while 25.7% go with family members and hired people on their farm land.

Flood Rate in the Study Area

The result of the study showed the distribution of the respondents based on the flood rate, effect of flood and adaptive measures on small land crop farmers. The

indices addressed include; experienced flood/ farm water logging, types of flood experienced on the farm, and the time taken the flood to drain from the farm land, proximity to the river stream in their farm, frequency of experiencing flood in their farm land. Figure 2 shows that 93% of the farmers land are prune to flood, while 7% of the respondents have no disturbance of flood/farm water logging in their land.

Effects of Flood on Food Crop Production in the Study Area

The table 2 shows that majority (65%) of the respondent agree that flood lead to erosion and damage of infrastructure. Others agree that flood leads to bad road, food insecurity, livestock destruction, increase poverty lead to loss of soil nutrient, loss of farmland, loss of property and loss of life. This result shows that majority of the respondent agree that flood lead to erosion and damage to infrastructure. This implies that flood leads to erosion in farmland where food crops and farmland are being wiped out, building submerged. This is in line with the finding of Tribune (2012). While majority (66.9%) of the respondent disagree that flood leads to loss of life, loss of properties and loss of farmland. However, 49.3% of the respondents have divergent views that flood does not lead to loss of soil nutrient, livestock and destruction.

Adaptation Measures adopted by Small Land Crop Farmers

The table 3 shows the various adaptation measures adopted by small land crop farmers. The table according to likert scale reveals that all adaptation measures adopted by the respondents, are agreed to control and prevent all the effects of flood in the study area.

Table 1: Socio-Economic Characteristics of the respondents

Variables	**Frequency**	**Percentage**
Gender		
Male	117	73.1
Female	43	26.9
Total	**160**	**100**
Age Group		
Below 20 years	6	3.8
21 – 40 Years	108	67.4
41 – 60 Years	41	25.7
Above 60 Years	5	3.1
Total	**160**	**100**
Marital Status		
Single	23	14.3
Married	105	65.7
Widower	13	8.1
Divorced	19	11.9
Total	**160**	**100**

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Educational Level		
Non Formal	36	22.7
Arabic Education	31	19.3
Primary	31	19.3
Secondary	48	30
Tertiary	14	8.7
Total	**160**	**100**
Household Size		
1- 5	45	28.1
6 -10	71	44.3
11 – 15	34	21.3
Above 15	10	6.3
Total	**160**	**100**
Monthly Income		
Less Than ₦ 10,000	7	4.3
11,000 - ₦ 20,000	15	9.3
₦ 21,000 - ₦ 30,000	20	12.6
₦ 31,000 - ₦ 40,000	40	25
₦ 41,000 - ₦ 50,000	75	46.9
Above ₦ 50,000	3	1.9
Total	**160**	**100**
Labour		
Family	26	16.2
Hired	48	30
Family and Hired	41	25.7
Mechanical	21	13.1
Animal Tractor	24	15
Total	**160**	**100**

Source: Field Survey, 2018.

Table 2: Distribution to determine the effect of flood in the study area Impacts

	Yes		**No**		**Total**
	Freq	**%**	**Freq**	**%**	
Loss Of Lives	53	33.1	107	66.9	160
Loss of Properties	71	44.3	89	55.7	160
Loss of Farmland	74	46.2	86	53.8	160
Loss of Soil Nutrient	81	50.7	79	49.3	160
Caused Erosion	104	65	56	35	160
Lead to Bad Road	103	64.3	57	35.7	160
Damage to Infrastructure	104	65	56	35	160
Food Insecurity	98	61.2	62	38.8	160
Livestock Destruction	90	56.2	70	43.8	160
Increased Poverty	92	57.5	68	42.5	160

Source: Field Survey, 2018.

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Table 3: Adaptation measures adopted by small land crop farmers

Adaptation Measures	Likert Scale	Remarks
Planting vegetation	2.96	Agreed
Proper drainage	2.96	Agreed
Prevention of soil erosion	2.94	Agreed
Flood Control Programmes	2.90	Agreed
Proper Waste Disposal	2.88	Agreed
Building Dams, Water Ways and Canals	2.85	Agreed
Construction of building above flood level	2.66	Agreed

Source: Field survey, 2018.

Hypothesis Testing

Among the effect of flooding the Chi square analysis reveals that poor road network and erosion are significant effect of flooding, while loss of life and loss of property are not significant,. Therefore the null hypothesis that there is no significant effect of flooding in the study area is rejected. This implies that poor road network, erosion and infrastructural damage have been perceived to be a great impact as a result of flood in the study area.

Table 4: Chi-square analysis of respondent on effect of flood in the study area

Variable	X^2	DF	P - Value	Remark
Loss Of Lives	5.433	3	0.219	NS
Loss of Properties	2.519	1	0.601	NS
Loss of Farmland	2.901	3	0.593	NS
Loss of Soil Nutrient	2.900	2	0.563	NS
Food Insecurity	18.024	4	0.061	NS
Lead to Bad Road	9.250	6	0.001	S
Livestock Destruction	17.839	5	0.160	NS
Caused Erosion	9.839	4	0.043	S
Damage to Infrastructure	10.009	4	0.040	S
Increased Poverty	1.818	4	0.769	NS

Source: Field survey, 2018.

CONCLUSION AND RECOMMENDATIONS

This study was conducted to assess the effect of flood and adaptive measures on small land crop farmers in Chikun Local Government Area of Kaduna State, Nigeria. It was observed that the high level of education and majority of youth age bracket make very important factors that helped the farmers in the study area to adopt new ideas, strategies and proper knowledge as well as control and prevent flood from

causing a great havoc like loss of life, property and farmland. The result also shows that more men participate in farming than women in the study area. Educated household heads chose livestock production as their major livelihood choices. Lastly the study suggested to the households to use cover cropping, planting of vegetation, use of dams and canals, flood and erosion control measures, proper drainage and waste disposal strategy as responses to flooding. Weather forecasting, resistance varieties of plant/animal species, education and skill upgrade, emergency relief strategies and forest regulations were not the strategies used by the farmers.

Based on the findings, the following recommendations have been made:

(i) Government at all levels should make more land available for crop production, since larger land sizes encouraged crop production as a major livelihood choice in the study area. This is because crop farmers could diversify their crops to spread the risk of loss associated with flood;

(ii) Government should make policies and strategic investment plans that will improve access to climate forecasting and information so that farmers will know the appropriate farm level adaptation technology to employ in combating flood and its effect, and

(iii) Extension agents should disseminate information and make available improved varieties of plant and species which the farmers could use in combating flood.

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