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Effects of Flooding on Small-Scale Rice Growers' Welfare in Kwara State, Nigeria

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Abstract

This study was carried out to assess the prevalence of flooding in the study area and its impact on small-scale rice growers' per capita expenditure, being proxy for welfare, in Kwara State, Nigeria. Primary and secondary data used for the study. The survey instrument was a structured questionnaire which was administered to a total number of 200 respondents that were randomly selected in a three-stage sampling procedure. The analytical tools employed in the study is the OLS regression technique, using the four functional forms and the exponential model selected as the lead equation being the best fit, with coefficient of determination R^2 of 0.66. It was found that factors that significantly impact on household expenditure in the study area include household size, Access to extension services, amount of credit accessed and proximity to river which were significant at 1% while educational level was significant at 5%. It is recommended that farmers should be granted access to welfare loans whilst there is also the strengthening of cooperative structures to enable farmers leverage. Proper welfare scheme and prompt intervention fund for victims of flooding by the Government at Local, State and Federal levels should also be institutionalized.

Keywords: Flood, Impact, Nigeria, Rice growers, Welfare

INTRODUCTION

As a result of global warming, the climate in Africa and Asia is predicted to become more variable, and extreme weather events are expected to be more frequent and severe, with increasing risk to health and life. This includes increasing risk of drought and flooding in new areas (Kolawole, Olayemi and Ajayi, 2011). Agricultural production and food security in Africa are often severely compromised by extreme climate and weather events (Setshwaelo, 2013). Climate change will affect the agricultural sectors of different countries differently. However, it is clear that climate change will bring about substantial welfare losses especially for smallholders whose main source of livelihood derives from agriculture (Komba and Muchapondwa, 2012). Extreme weather events such as thunderstorms, heavy winds, and flood devastate farmlands and can lead to crop failure (Ajao and Ogunniyi, 2011). Across the globe, floods have posed tremendous danger to people's lives and properties. Floods cause about one third of all deaths, one third of all injuries and one third of all damage from natural disasters

(Oruonye, 2012). Every year, floods cause enormous damage all over the world. In the last decade of the 20th century floods killed about 100,000 persons and affected over 1.4 billion people. The statistics show that floods have a large impact on human well-being on a global scale. As a direct consequence floods may lead to economic damage and damages to ecosystems, historical and cultural values. Furthermore floods can lead to the loss of human life and other (non-lethal) human health effects (Ezemonye and Emeribe, 2011).

Floods are among the most devastating natural disasters in the world, claiming more lives and causing more property damage than any other natural phenomena (Etuonovbe 2013). Globally, the economic cost of extreme weather and flood catastrophes is severe, and if it rises owing to climate change, it will hit poorest nations the hardest (Kolawole et al, 2011). Sustainable development in the country is largely dependent on the climate sensitive sectors of economic activities such as agriculture and transportation (Maryah, 2013). Agriculture in Nigeria is a major economic sector contributing about 30 – 40 percent of the nations GDP. More than 70 percent of the population of the country depends on agricultural sector for their livelihood. Despite its high contribution to the overall economy, this sector is challenged by many factors of which climate – related disasters like drought and flood are the major ones (Ajao and Ogunniyi, 2011). In rain-fed agricultural systems, erratic rainfall can have comprehensive and devastating impacts on affected livelihoods and local economies (Devereux, 2007). Flooding has significant impacts on global and regional food production particularly the common staple food crops performance in tropical sub-humid climatic zone (Eni, 2011). Droughts and floods undermine farm yields and the national harvest, reducing household and national food availability, and agricultural income derived from crop sales (Stephen, 2013).

Nigerian farmers are in most cases involved in agriculture on a subsistence level with majority of them being small-scale holders and it is even more interesting to note that majority of these farmers do not actively take up insurance policies which would have given some sort of safety net in the event of adverse and unforeseen circumstances. The implication of this is far reaching as it means the levels of losses the farmers are likely to experience are drastically increased without some buffer in place to fall back on. In the past decades, there have been incidences of recurrent flooding in various parts of Nigeria, hence the livelihood of the rural farm household is held to ransom; their asset, income, production activities, transport and health are variables exposed to its extreme impacts. In view of the serious damages from flooding incidences and the vulnerability of rural small holder farmers due to low capital, their welfare becomes critical. Their ability to employ diverse adaptation techniques, and mitigate subsequent events is usually left to the government. In a largely agrarian country like Nigeria and also where the agricultural sector is mostly dominated by resource poor farmers, it becomes pertinent to note that the welfare of these farmers is highly subject to climatic variability and associated disasters and as such a concern for research. In view of the foregoing, this study was designed to assess the effect of flooding on rice growers in Kwara state, Nigeria. Specifically, the study assessed the impact of flooding on small-scale rice growers' per capita expenditure in Kwara State, Nigeria.

MATERIALS AND METHODS

This study area is Kwara State, Nigeria. Kwara State was created in May 1967, as one of the first of 12 states to replace the nation's four regions. Originally the state was known as West Central State but the name was changed to Kwara, a local name for the Niger River. Kwara state, lies on Latitude $8^{\circ} 30'$ and longitude $5^{\circ} 00'$ of the equator and is situated in the transition zone between the forest savanna region of Nigeria, having Ilorin as the capital. Kwara State and had an estimated population of about 2,371,089 (2006 Estimate) as at 2007.

Kwara State of Nigeria consists of sixteen Local Government Areas (LGAs) and a total landmass is about 32,500 square kilometres while Figure 1 shows the map of Nigeria, highlighting Kwara state.



Figure 1: Map of Nigeria Highlighting Kwara StateSource: https://commons.wikimedia.org/wiki/File:Nigeria_Kwara_State_map.png

Kwara State is known as 'The State of Harmony' on account of the peaceful relations that exist among its multicultural and diverse population of about 2.5 million people. Kwara State comprises rainforest in the southern parts with wooded savannah covering the larger part of the state. The soil is fertile and the state is well watered by the various tributaries of the Niger River which run through hills and valleys, none of which rise to any great height. The western section of the state is at a slightly higher altitude than the eastern. This is a summer rainfall area, with an annual rainfall range of 1000mm to 1500mm. The months of December and January coincide with the cold and dry harmattan period. Average maxi-mum temperatures vary between 30°C and 35°C . The state has a history of flooding events with recent floodings being massive especially the floods of 2012. Kwara has had a host of communities inundated with flood of recent.

Data used for this study were sourced both primarily and secondarily. The primary data were sourced through the use of a set of structured questionnaire; while secondary data were sourced from journals, bulletins and reports of relevant agencies such as The Nigerian Meteorological

Agency (NIMET), Kwara State Environmental Protection Agency (KWEPA), Nigerian Emergency Management Agency (NEMA) and Kwara State Agricultural Development Programme (KWADP).

A three stage sampling technique was used in the selection of the sample size for this study. The first stage involved the random selection of a local government out of 5 identified Local Government Areas heavily affected by flooding in Kwara state. This was in view of areas reported by Nigerian dailies and as documented by some literatures as having been greatly affected adversely by recent flood. The sampling frame includes: Kaiama, Moro, Edu, Patigi and Ilorin South. The selected Local Government Area was Patigi. The second stage involved random selection of 20 affected villages using the Kwara ADP village listing which comprises 663 villages. The randomly selected villages include Pkada, Bobagi, Emiworogi, Guluka, Gokpan, Ebu, Babogi, Jida, Duro, Kpevun, Wako, Gila, Kajika, Rokovi, Vabi, Chikangi, Dgakagi, Edogi, Gbaradogi, Guluka. The third stage involved the Random sampling of ten (10) households from each of the twenty (20) randomly selected villages to give a total number of 200 farmers.

In order to examine the effect of flooding on small scale rice growers' welfare in Kwara State, the simple ordinary least square (OLS) model of regression estimation was employed. The dependent variable used to capture rice farm household welfare was per capita expenditure. This is in tandem with literature as postulated by Temesgen et al (2013), Magrabi et al (1975), Hentschel and Lanjouw, (2012) and Ligon and Schechter, (2003). In addition Adeoti et al (2010) empirically measured this by aggregating expenditure on food and non-food items for each household and divided by household size to obtain the per capita expenditure for each household. The implicit functions for the four functional forms used for regression analysis are stated thus:

$$\text{Linear :} \quad Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, \mu)$$

$$\text{Semi log:} \quad Y = f(\ln X_1, \ln X_2, \ln X_3, \ln X_4, \ln X_5, \ln X_6, \ln X_7, \ln X_8, \mu)$$

$$\text{Double log:} \quad \ln Y = f(\ln X_1, \ln X_2, \ln X_3, \ln X_4, \ln X_5, \ln X_6, \ln X_7, \ln X_8, \mu)$$

$$\text{Exponential:} \quad \ln Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, \mu)$$

Where, Y = Per capita expenditure (Total household expenditure/ household size), X_1 = Age of farmer in years, X_2 = Education in years, X_3 = Farm household size, X_4 = Received Extension service (1=Yes, 0 = otherwise), X_5 = Value of credit accessed (in Naira), X_6 = Value of output loss in naira (in the farming season) due to flood, X_7 = Income from activities other than farming (in naira)(income diversification), X_8 = Located close to a river (1=Yes, 0=No), μ = Random error term.

RESULTS AND DISCUSSION

Prevalence of Flooding During Year 2011, 2012, 2013 Farming Seasons

Figure 2 shows a graphical representation of the smallholder rice growers based on flood experience over a three-year period. From the survey data, in the year 2011, 22% of the rice farmers sampled were affected by flood while 78% were not affected. Majority of the farmers affected had their farms close to the basin of the Niger River. Flooding was even more prominent in the year 2012 as about 98.5% of the farmers reported various degrees of losses of their farm lands and crops due to flooding incidences. This is in tandem with the work of Dumnamene (2013) who stated that The Nigeria Meteorological Agency was reported to have sounded warning in earlier 2012 that there was going to be heavy rains that year that may lead to flooding. However, the government did not take precautionary majors to avert the effects of the resultant flooding that was predicted from affecting agricultural produce, air travel, land travel and flooding. In 2013, only 2 percent of the rice growers sampled were affected by the flood. The farmers agreed 2012 flooding had the greatest impact in recent years, even though flooding is not strange to them. However they have not yet accepted it as a part of eventualities such as to make such associated losses less impactful on their livelihood. This is because farmers in the study area do not yet have strong enough resilience or ability to nullify those dreaded loss events.

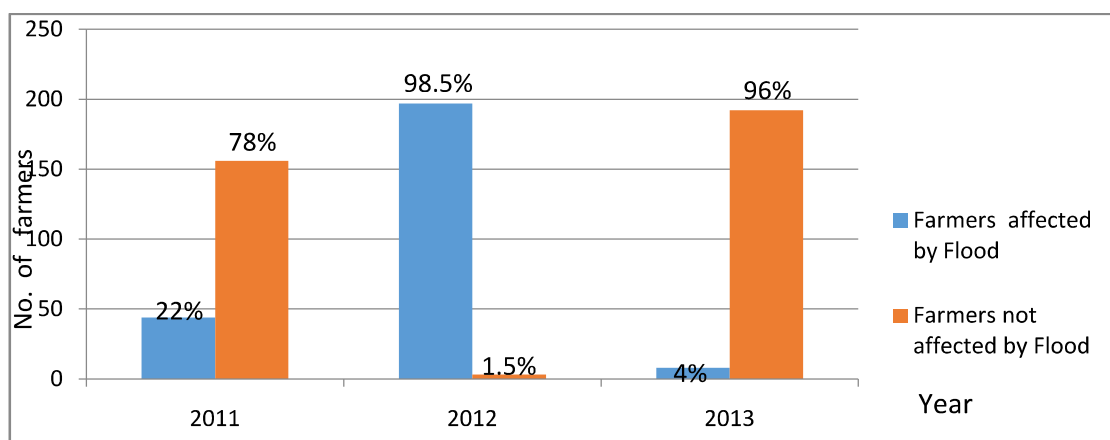


Figure 2 Smallholder Rice Farmers Affected by Flood in the Years 2011, 2012, 2013. Source: Field survey, 2014



Figure 3 :A Farm Land Inundated by Flood in Gapkon, Kwara State

In the year 2012, 98.5% of the respondents were affected by the flood that ravaged through communities even kilometres away from the Niger River. Some farms reportedly were abandoned in this period. A sample of such taken during field survey is shown in Figure 4:



Figure 4: A submerged Rice Farm in Pkada, Kwara State

In order to examine the effect of flooding on the per capita expenditure of rice growers, the OLS regression was engaged. Of all the four functional forms of the regression analysis on Table 1, the lead equation is the Exponential.

The value of the coefficient of determination R^2 of the result is 0.66. This implies that about 66% of the Per capita expenditure is explained by the explanatory variables included in the model. The model F-value of 35.877 indicates that the overall model is significant at 1% level. Variables significant at 1% level include the household size, access to extension services, credit amount accessed and the proximity of the farmland to river while the educational level of the rice grower was significant at 5% level.

The results from the table 1 revealed that the size of farming household is negatively significant at 1% level which implies that increase in the household size will lead to a decrease

in the per capita expenditure. This is in tangent with *a priori* expectation as the larger number of individuals in a household, the more competition there is in terms of income distribution especially in a place where resources are scarce. However, this may be put in perspective with the findings of research such as one carried out by Nwalieji & Uzuegbunam (2012) in which large farm household size was observed and the opinion was formed that large household sizes maybe due to the need for farm labour required in the production activities.

Table 1: OLS Results showing Parameter Estimates for effects of flood on rural farm household Welfare amongst rice growers using the four functional forms

VARIABLES	LINEAR		SEMI LOG		DOUBLE LOG		EXPONENTIAL ⁺	
	Coef.	t value	Coef.	t value	Coef.	t value	Coef.	t value
Constant	18584.049 (2257.409)	8.232	45229.061 (252370.9)	1.792	41.559 (18.638)	2.23	10.076 (0.25)	40.337
X ₁ (Age)	-4.289 (30.91)	-0.139	-	-	-	-	0.004 (0.003)	1.044
X ₂ (Education)	1044.32** * (289.649)	3.605	22102.521 (40191.74)	0.55	2.896 (2.968)	0.976	0.113** (0.032)	3.536
X ₃ (Household size)	-978.37*** (101.752)	-9.615	-44533.352 (37392.05)	-1.191	-4.618 (2.761)	-1.67	-0.118*** (0.011)	-10.487
X ₄ (Extension access)	-6123.4*** (1657.589)	-3.694	-	-	-	-	-0.791*** (0.183)	-4.312
X ₅ (Credit access)	0.069*** (0.011)	6.231	-80221.665 (58962.41)	-1.361	-5.805 (4.354)	-1.33	8.687E-006*** (0)	7.107
X ₆ (Loss)	0.000 (0.001)	0.254	38782.202 (33769.98)	1.148	2.864 (2.494)	1.148	-2.00E-07 (0)	-1.373
X ₇ (Income diversification)	-550.211 (1441.582)	-0.382	-	-	-	-	-0.003 (0.16)	-0.019
X ₈ (Proximity to river)	-1387.93** (640.165)	-2.168	-	-	-	-	-0.299*** (0.071)	-4.219
R ²	0.56		0.537		0.459		0.66	
F	30.447***		3.195		2.331		35.877	

Source: Computer regression printout on field survey data 2014 (**)= 5% level of significance; (***) = 1% level of significance ; +Lead equation (functional form)

Surprisingly, at 1% level, access to extension services had a negative correlation with per capital expenditure. One would expect that farming households that have access to extension additional costs incurred in accessing extension services hence resulting in a decrease in the per capital expenditure. Table one revealed that credit access by small scale rice growers is positively significant at 1% level as increase in the amount of credit accessed results in an increase in the per capita expenditure. This may attract a two-fold explanation as access to credit may directly lead to increase in the per capital expenditure and on another hand, use of paying off to override the effect of such the credit accessed to increase production may ultimately lead to increased income which resultantly raise the per capita expenditure.

Likewise at 1% level, proximity to the river is negatively significant. This may be accounted for by reasons such as the fact that farms closer to the rivers are more prone to flood losses hence their willingness to expend may be lowered, consequently, they may be putting more money in savings against rainy days. Such farmers with farms closer to the rivers are also observed to have been affected more by flooding in the previous years. Such cumulative effect may also account for the reason why they currently have lower income which accounts for a decreasing per capita expenditure. Educational level of the household heads can be seen to be positively significant at 5% level. This may be attributed to the fact that educated household heads may have other means of making money which constitute part of their per capita expenditure. In another light, educated household heads may be more informed as to how to mitigate their losses better than the uneducated households hence resulting in their ability to raise their incomes and ultimately their per capita expenditure. In the perspective of consumption, it may be that educated household heads are more willing to spend on non food items that they consider as being paramount and also food items to ensure balanced diets which invariably raises their per capital expenditure. This is in tandem with the findings of Wilfred (2006), who established that knowledge, training and skills development for rice farmers was very essential as they impact on production.

CONCLUSION

The study made a bold attempt to assess the extent of flooding and evaluate the effects of flooding on rice growers' welfare taking household per capita expenditure as proxy for welfare. This research has revealed that household size, access to extension services and proximity to river are all negatively significant while access to credit is positively significant at 1%. Educational level of the household heads was also positively significant at 5% level. The rice farmers with farming as their primary occupation do in addition practice upland cropping with crops like millet, maize, guinea corn, groundnut and melon. These crops are grown considerable distance away from the river and are usually not affected by the flood. Proceeds from its sale and direct consumption usually served as buffer, during loss of rice outputs due to flooding, being alternate and adjunct income source. Rice farm households in Pategi are prone to farm loss in the event of flooding and such losses contribute to shortage of rice supply in the Nigerian market and thus expose the nation further to huge import bill and increased dependence on rice import. The crucial role played by this household in the nations rice pool is sufficient for considerable attention to be paid to the farm household's welfare since this will

impact on their production capacity over time which will further enhance the nation's rice self dependence. It is recommended that farmers should be granted access to welfare loans whilst there is also the strengthening of cooperative structures to afford farmers some leverage in their production activities. Proper welfare scheme and prompt intervention fund for victims of flooding by the Government at Local, State and Federal levels should also be institutionalized. It is also recommended that extension services should be made readily available and very affordable such as not to have too large cost implication to these end users since this will impact negatively on their income and invariably their welfare. Households should also be adequately informed on planning their family especially in this era of rapidly growing population in this part of the world. Establishing the fact that large household size has a way of impacting negatively on their per capita expenditure and invariably welfare is a pointer to the fact that household size has to be kept at reasonable numbers such as to ensure better livelihood. Education has also proved its significance in improving the welfare of the households considering it affords the farmers opportunities to get involved in other jobs to serve as buffer to their income and also may get them more easily informed on ideas that may improve their livelihood hence the recommendation to advocate education and knowledge acquisition more amidst farmers and intending farmers.

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