

Effect of Flooding on the Livelihood and Consumption of Households in Oyo State, Nigeria

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ABSTRACT This paper examined the effect of flooding on the livelihood and consumption of households in Oyo State, Nigeria. Primary data and secondary data were collected on consumption expenditures of households and weather parameters in the study area before and after the flood incident of 2011. Two Local Government Areas (LGAs) were purposively selected because of intensity of the impact in the area. A total of seventy-eight (78) households were randomly selected from these two LGAs. Analytical methods employed in data analysis include descriptive statistics, correlation and covariance analysis. The result of descriptive analysis of socio-economic characteristics reveal that average age of those surveyed was 45 years, with more males (61.5%) affected than females (38.5%). Most of those affected by the flood incident were artisans constituting about 41 percent of those surveyed. This was closely followed by those engaged in trading activities (33.3%). The result of the correlation analysis performed to ascertain whether there is any relationship between the flood incident and consumption expenditure of respondents showed a correlation coefficient (r) of 0.591 with a significant level of one percent. However, the result of the covariance analysis also alluded to the fact that the flood incident significantly impacted on the consumption expenditure of the households with a value of 0.5210 ($p < 0.10$). Based on the findings, it is recommended that effort should be geared by government at creating awareness on the negative impact of the climate change. Also, there is the need to dredge or expand river channels to allow free flow of water so as to prevent flooding. Indiscriminate disposal of refuse through dumping in river channels, water ways and drainages should be discouraged.

INTRODUCTION

Weather shocks are the self-reported most important risk faced by households in developing countries (Adetunji and Oyeleye 2013). Extreme weather events are projected to become more frequent in a warming climate. Vulnerability to shocks is a dominant feature of household livelihoods in developing economies. A fundamental problem facing rural households in many developing countries is how to maintain satisfactory levels of consumption in the face of adverse income shocks (Vicarelli 2010). In economics, a shock is an unexpected or unpredictable event that affects an economy, either positively or negatively (WEF 2015). Technically, it refers to an unpredictable change in exogenous factors that is, factors unexplained by economics which may have an impact on endogenous economic variables. These shocks can affect a household's welfare by negatively impacting on household income, existing household wealth and the health of household members (Krueger and Perri 2010). The literature typ-

ically distinguishes individual (idiosyncratic) shocks from common (spatially covariant) shocks whereby the former affect an individual household or income earner only (for example, injury, illness, death, divorce, etcetera.), while the latter may have regional or even country-wide effects (for example, natural disasters and price shocks). In many cases the former type of shock can be insurable in formal financial markets, while the latter are generally non-insurable in a formal way due to supply-side constraints (Wainwright and Newmann 2011; Baez et al. 2015).

In developing countries, exposure to risk remains a significant cause of poverty for poor with no formal or informal insurance mechanisms (Fafchamps 2011). The nature of the shock will have implications for a household's ability to cope and its consequences (Dercon 2002; Baez et al. 2015). For example, spatially covariant shocks, and in particular, weather related events such as rainfall can have negative impact on human welfare. There is also much evidence to support the detrimental effect that the occur-

rence of idiosyncratic income shocks can have on a household (Morduch 2004; Townsend 1994; Udry 1994). In addition to having an impact on a household's ability to cope, the nature of the shock is also important for understanding the strategies households use to cope (Azomahou and Yitbarek 2015). Idiosyncratic shocks can be insured informally at a community level by environmental sanitation, taking some health cautions, or, if available, via formal insurance contracts with a third-party insurer. Spatially covariant shocks are more difficult to insure collectively and formal insurance contracts are extremely rare because no one can predict it or pray for it. Consequently, households living in risky environments must develop alternative strategies to reduce the impact of shocks on their livelihoods (Dercon 2002) and (Alderman 1998) finds the consumption smoothing to reduce the impact on the household.

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land by water and presents a risk only when people, their property and/or environmental assets are present in the area which floods (Adetunji and Oyeleye 2013). Different types of flooding present different forms and degrees of danger to people, property and the environment, due to varying depth, velocity, duration, rate of onset and other hazards associated with flooding (Tawari-Fufeyin 2015). With climate change, the frequency, pattern and severity of flooding are expected to change, becoming more uncertain and more damaging (Odjugo 2011; Saul 2015). Flooding can also arise from the failure of infrastructure designed to store or carry water (for instance, the breach of a dam, a leaking canal, or a burst water main), or to protect an area against flooding (for example, breach of a flood defense, failure of a flap valve or pumping station or blockage of a pipe or culvert) (Aderogba 2012; Adetunji and Oyeleye 2013). This is as a result of the sudden onset, the impacts of this form of flooding can be severe and where appropriate should be assessed (Gormerly 2009).

Review of Empirical Studies

Aderogba (2012) carried out a qualitative study of recent floods and sustainable growth and development of cities and towns in Nigeria.

They interviewed 2000 urban dwellers, 20 local government chairmen and 20 professionals and data were analysed using descriptive statistics. They found increasing run offs in terms of volume and area covered were consequences of adverse living habits of urban dwellers and inadequate drainage channels. They reported significant welfare losses such as loss of lives, farmlands, livelihoods and properties were the aftermath of flood in the study area.

Tawari-Fufeyin et al. (2015) investigated some aspects of a historic flooding in Nigeria and its effect on some Niger-Delta communities. The study was carried out in selected towns of Bayelsa and Delta States. They reported loss of houses, ponds, farmlands, traditional grounds and livelihood sources, destruction of herbs and vegetation and invasion of wild animals as the consequence of the flood that occurred between 2nd July and 17th September, 2012. They reported the flood incident has led to social cooperation within the surveyed communities. Tawari-Fufeyin et al. (2015) also found donor agencies and philanthropists came to the rescue of the affected households through donation of relief materials and establishment of skill acquisition centres.

Onwuka et al. (2015) assessed the environmental effects of 2012 floods in Umuleri, Anambra East Local Government Area of Anambra State, Nigeria. They interviewed 179 respondents and analysed data using Independent Samples t-test and Mann-Whitney U-test statistical technique. They reported the 2012 flood in the study area was due to heavy rainfall and human destructive activities to the environment such as construction on flood plains. The study also revealed the untold hardships faced by the inhabitants ranging from displacement from homes, scarcity of food, and destruction of infrastructure to spread of communicable diseases.

Adetunji and Oyeleye (2013) evaluated the cause and effects of flood in Apete, Ido Local Government Area, Oyo State, Nigeria. They selected 156 respondents in Apete area and analysed the data using descriptive statistics. According to the study, the indiscriminate duping of refuse consequently blocking the inadequate drainage available and the prevalence of building constructions along water channels jointly account for flood in the study area. Adetunji and Oyeleye (2013) further stated flood has re-

sulted in disease outbreak, building collapse and injury in Apete.

Flooding and its Trend in Oyo State, Nigeria

Flood has been an incessant problem in Oyo State. Ibadan is drained by three major rivers. These are River Ogunpa, River Ona and River Ogbera, and each has numerous tributaries. Flooding problems in Ibadan have been attributed mainly to land use factors. Notable among these is the indiscriminate and relentless construction of buildings on flood plains. There were over 26,553 buildings found within the statutory set-back of various streams and rivers in Ibadan (Task Force 2011). Deforestation has been identified as another contributory factor to the flooding problem in Ibadan. The destruction of natural forests (as in the Eleyele – Apete axis where the teak plantation buffering the R.Ona has been totally depleted) has aided flooding in Ibadan to the reduction of the infiltration and retention capacity of these areas.

The indiscriminate dumping of solid waste in streams and rivers is a common practice in Ibadan metropolis. These hinder the free flow of water downstream. The resultant blockage of the river beds and drainage channels with refuse and solid waste is the most important cause of aggravated flooding along the channels of R. Ogunpa and R. Kudeti, and indeed most areas in Ibadan Metropolis. There are urban design features that have also contributed to the flooding problems such as reduction in urban green space, increase density of development and increase barriers to flood flows, such as road embankments, narrow bridges and culverts.

Climate Change is another factor often touted as responsible for the devastating floods arising from heavy rainfall (Saul 2015). The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in 2007 stated unequivocally that the frequency, magnitude and scale of destruction of flooding, landslides and other disasters will continue to rise in most parts of the world. It was observed that the laws and regulations governing development in Ibadan Metropolis, as far as the recognition of flood hazards are generally inadequate to protect the populace from floods. The existing statutory set-backs to the major streams and rivers are inadequate in the face of increased urbanization in the city. The seven and half hours of

rainfall witnessed in Ibadan on the 27th of August, 2011 caused serious flooding that devastated most parts of the city and its environs. The incident was reminiscent of the Ogunpa flood disaster that occurred in the city in 1980, but on a larger scale and with more devastation.

As shown in the foregoing, the negative effect of flooding can be multi-dimensional, and inflicting long term injuries on lives and properties in affected areas. Typical effects include loss of lives, property and means of livelihoods, severe social dislocations, as well as the destruction of the environment, including wild life sanctuary. Flooding also precipitates environmental health hazards, such as the outbreak of diseases arising from drinking surface water and well water which have been polluted as a result of flooding (Onwuka et al. 2015). In the absence of timely intervention by the government and relief agencies, the effects of flooding can be very traumatic for the victims (Onwuka et al. 2015). This study therefore examines exogenous income shock and consumption smoothening among households in Oyo State Nigeria.

Objectives of the Study

The broad objective of the study is to examine the Effect of Flooding on the Livelihood and Consumption of Households in Oyo State, Nigeria.

The specific objectives of the paper are to:

- ♦ Profile exposure to flooding based on socio-economic characteristics of the respondents.
- ♦ Identify welfare losses resulting from floods in the study area.
- ♦ Identify the relationship between flood incident and respondents' consumption expenditure.

METHODOLOGY

This paper focuses on effect of extreme rainfall on the livelihood and consumption of the vulnerables in Oyo state. Primary data on household consumption before and after the flood on food and non food items; Secondary Information from metrological department of Forestry Research institute of Nigeria with the report from the Oyo State Task Force Committee on August 26, 2011 were used. The flood affected eleven Local Government Areas (LGAs) around Ibadan, out of which two LGAs were purposive-

ly selected based on the severity of flooding in the area. Forty respondents were randomly selected from Ido and Southwest Local.

There was a great flood in Oyo State on 26th of August 2011, which washed away 2,105 buildings, hundreds of lives were claimed and billions of naira of property were lost. Twenty five bridges were broken with the flood that ran through 11 local government areas of the state (Wahaab 2011). Oyo State, which bears the sobriquet the "Pace Setter State", came into existence consequent upon States creation exercises embarked upon since Nigeria's Independence in 1960. The State now covers a total of 27,249 square kilometers of land mass and it is bounded in the south by Ogun State (Gateway State) and in the north by Kwara State. To the west, it is bounded partly by Ogun State and partly by the Republic of Benin, while in the east, it is bounded by Osun State (land of virtue). The State is homogeneous comprising in the main, people of the Yoruba ethnic group who speak the Yoruba Language.

Like all other Yorubas, they claim descent from Oduduwa. They are rich in culture and believe in strong kinship ties as a means of holding the society together. This is revealed in the extended family system. This notwithstanding, there is a substantial number of people from other parts of the country who settle, live and trade in the State, mostly in the urban centers. Non-Nigerians from West Africa and those of Asian, European and American stocks can also be identified. The State is one of the most urbanized in the whole Federation. Besides Ibadan, there are four big towns with large population. They are Ogbomosho, Oyo, Iseyin and Saki. Other fairly big towns in the State are Igboho, Kisi, Igbo-Ora, Okeho, Lalupon, Ilero, Eruwa and Igbeti.

Analytical Techniques

In analyzing the data obtained for the study, the analytical methods used include; descriptive statistics, correlation coefficient and covariance.

Descriptive Statistics

Descriptive statistics (such as means, tables, frequencies, percentages) were used to analyze, summarize and describe the socioeconomic characteristics of the respondents.

Correlation Coefficient

Correlation Analysis attempt to find out the degree or extent to which variables tend to move together. Any two variables X and Y may be correlated for many reasons. It may be because X affects Y; because Y affects X; neither X nor Y affects each other but they are under the influence of a third common factor which affects both of them; and finally it may be that X and Y are correlated by chance. Correlation is a measure of the relationship between two or more variables. The measurement scales used should be at least interval scales,

$$\text{Let } y_i = (Y_i - \bar{y}) \\ X_i = (X_i - \bar{x})$$

Correlation Coefficient,

$$r_{xy} = \frac{n \sum y_i x_i - (\sum x_i)(\sum y_i)}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}}$$

Where,

r_{xy} = Correlation Coefficient

\bar{X} = Expenditures before the flood - both food and non-food.

Y = Expenditure after the flood, both food and non-food.

Covariance Analysis

This explains the relationship or association between the two variables, X and Y and how the exogenous variable affect the two. If a CV is highly related to another CV (at a correlation of 0.5 or more), then there will be multicollinearity.

$$\text{Cov} = (X, Y) = E[X - \mu_x][Y - \mu_y]$$

Or

Standard Deviation / Mean

Where,

Cov = Covariance

X = Expenditures before the flood, both food and non food.

Y = Expenditure after the flood, both food and non food

RESULTS AND DISCUSSION

Age of Respondents

Respondents' distribution by age as depicted in Table 1 showed that average age of the respondents was 45. Majority (70%) affected by flooding were still in their productive age of 21 to 50 years of age.

Table 1: Distribution of respondents by age

<i>Age</i>	<i>Frequency</i>	<i>Percentage</i>
20-29	14	17.9
30-39	30	38.5
40-49	8	10.3
50-59	16	20.5
≥60	10	12.8
Total	78	100.0

Gender of Respondents

As shown in Table 2, about 61.5 percent are males only about 38.5 percent are females. Thus, majority of the respondents are males engaging in different livelihood activities in the study area.

Table 2: Distribution of respondents by gender

<i>Gender</i>	<i>Frequency</i>	<i>Percentage</i>
Male	48	61.5
Female	30	38.5
Total	78	100.0

Marital Status of Respondents

An assessment of the result of the analysis in Table 3 indicates that over half of those surveyed (69.2%) are married. About 5.1 percent of them are single while the rest are either divorced or widowed. The distribution generally shows that there are more married respondents that were affected by the flood than the single, divorced or widowed counterparts. This finding is in line with the report of Adetunji and Oyeleye (2013).

Table 3: Respondents by marital status

<i>Marital status</i>	<i>Frequency</i>	<i>Percentage</i>
Single	4	5.1
Married	54	69.2
Divorced	10	12.8
Widowed	8	10.3
Total	78	100.0

Educational Level of Respondents

Educational distribution of respondents as revealed in Table 4 indicates that over half (61.5%) of those surveyed have primary and secondary education. This is closely followed by those with tertiary education (28.2%). Those

with secondary education constitute about 9.3 percent while those with no formal education constitute about 35.3 percent of those surveyed. The distribution reveals that a sizeable number of all the respondents do not go beyond secondary education and this could possibly affect the poverty status of the respondents. This result corroborates the findings of Adetunji and Oyeleye (2013).

Table 4: Distribution of respondents by educational level

<i>Educational status</i>	<i>Frequency</i>	<i>Percentage</i>
No formal	4	5.1
Primary	14	17.9
Secondary	34	43.6
Tertiary	22	28.2
Others	4	5.1
Total	78	100

Household Size of Respondents

The distribution of respondents by household size is shown in Table 5. From the Table, it is clear that 74.1 percent of those surveyed have 1-5 members. Those with about 6-10 members constitute 23.1 percent and, 11 and above is just 2.6. From the analysis, household size in the study area is fairly large with an average of 5 members per household and this is expected to have a multiplier effect on the poverty status of the respondents. This is because large household size is usually associated with increased poverty because of reduced income per capita and a general reduction in the level of well-being.

Table 5: Distribution of respondents by household size

<i>Household size</i>	<i>Frequency</i>	<i>Percentage</i>
1-5	58	74.3
6-10	18	23.1
≥11	2	2.6
Total	78	100

Primary Occupation of Respondents

The result of the analysis on primary occupation depicted in Table 6 shows that about 41 percent of those surveyed are Artisans who engaged in carpentry, welding, electrical work, tailoring, hairdressing and cobbling. This is

closely followed by those engaged in trading (33.3%). Those engaged in civil service, private salaried job and Students are 7.7, 2.6 and 12 percents respectively. The distribution generally reveals the relative importance of artisan work as one of the major occupation and large employer of labour in Nigeria.

Table 6: Distribution of respondents by primary occupation

Primary occupation	Frequency	Percentage
Trading	26	33.3
Civil service	6	7.7
Artisans	32	41.0
Student	10	12.0
Private business	2	2.6
Others	2	2.6
Total	78	100.0

Distribution of Respondents by Household Loss

The survey analysis of the household loss showed (Table 7) that 51.3 percent of the victims lost property worth about NGN100,000, followed by 20.5 percent losing between NGN101,000 and NGN200,000. This depicts that they are low income earners with most of them being petty traders and artisans as shown in the occupational distribution. Only a few (10.3%) lost more than 500,000 Nigerian Naira (NGN), due to flooding of poultry houses, building structures and fish ponds. This finding is consistent with the findings of Onwuka et al. (2015). Table 8 shows the result of Government support distribution, 61 percent got food item, clothing material, cement and money and 39 percent could not be reached by the distribution due to political reason, Non-governmental Organisations (NGOs) support distribution is shown in Table 9, 41.5 percent got help while 58.5 did not get anything from the NGO and 56.1 percent were supported by their family members (Table 10).

Table 7: Distribution of respondents by household loss

Loss range, Naira	Frequency	Percentage
0-100,000	40	51.3
101,000-200,000	16	20.5
201,000-300,000	66	7.7
301,000-400,000	2	7.7
401,000-500,000	8	2.6
501,000-above		10.3
Total	78	100

Table 8: Distribution of government support

Govt support	Frequency	Percentage
Yes	46	61
No	32	39
Total	78	100

Table 9: Distribution of nongovernmental organization

NGO support	Frequency	Percentage
Yes	30	41.5
No	48	58.5
Total	78	100.0

Table 10: Family support

Family support	Frequency	Percentage
Yes	42	56.1
No	36	43.9
Total	78	100.0

Relationship between Flood Incident and Respondents' Consumption Expenditure

The correlation coefficient, r shown in Table 11 is 0.591 and it is significant at one percent ($p < 0.01$). The null hypothesis here is that flood did not affect the consumption expenditure of households in the survey area after the flood. Therefore the flood affected the consumption expenditure of the households in the surveyed area. The correlation coefficient is not too high because some victims have their expenditure remaining the same (28.2%) while some even spend higher after the flood. This is due to their economic base, or formal or informal insurance which they fell back on. The result also revealed that all the respondents do not have formal insurance against their properties or lives. The covariance result was 0.5210 indicating that 52

Table 11: Correlation coefficient and covariance analyses

		Before	After
Before	Correlation coefficient	1	0.591**
	Sig (2tailed)		0.000
	Sum of squared and cross product	94.000	45.000
After	Correlation Coefficient	.591	1
	Sig (2tailed)	.000	
	Sum of square and cross products	45.000	61.692

Covariance = 0.5218, **correlation Significant 0.01 level (2 tailed)

percent of the variables X, (before flood) and Y (after flood) explain the exogenous variable which is the household income shock. The covariance is significant at 10 percent level of significant. The level of significant is high one can safely conclude that flood affected the consumption expenditure.

CONCLUSION

Extreme weather shock was found to affect the developing households, with high vulnerability. It affects their source of livelihood, health and subsequently their welfare. This paper examined how flooding affected the consumption expenditure of the surveyed households in the study area, and identified the consumption smoothing strategies employed. Correlation coefficient was 0.591, and significant at 0.01. The Covariance result was 0.5210 indicating that 52 percent of the variables X, (before flood) explained the exogenous variable which is the household income shock. From the empirical survey analysis results, it is obvious that consumption expenditure was affected after the flood. Some households were helped by the government, non-governmental organizations and family members.

RECOMMENDATIONS

Based on the study findings, it is therefore recommended that;

1. Effort should be geared by government at creating awareness on the negative impact of climate change. This is because awareness' creation in the form of early warning signals will go a long way in reducing the wanton destruction of lives and properties often associated with flooding.
2. There is a need to expand river channels to allow free flow of water so as to prevent flooding.
3. Indiscriminate disposal of refuse through dumping in river channels, water ways and drainages should be discouraged by enforcing existing and appropriate legislations. This will also assist in reducing some of the health-related risk associated with decaying refuse littering the environment.

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