Incidence of Disasters and Coping Mechanism among Farming Households in South West Nigeria

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Abstract—Farming households faces lots of disaster which contribute to endemic poverty. Anticipated increases in extreme weather events will exacerbate this. Primary data was administered to farming household using multi-stage random sampling technique. The result of the analysis shows that majority of the respondents (69.9%) are male, have mean household size, years of formal education and age of 5±1.14, 6±3.41, and 51.06±10.43 respectively. The major (48.9%) type of disaster experienced is flooding. Major coping mechanism adopted is sourcing for support from family and friends. Age, education, experience, access to extension agent, and mitigation control method contribute significantly to vulnerability to disaster. The major adaptation method (62.3%) is construction of drainage.

The study revealed that the coping mechanisms employed may become less effective as increasingly fragile livelihood systems struggle to withstand disaster shocks. Thus there is need for training of the farmers on measures to adapt to mitigate the shock from disasters

Keywords— Adaptation, Disasters, Flooding, Vulnerability.

I. INTRODUCTION

DISASTER risk is an intrinsic characteristic of human society, arising from the combination of natural and human factors and subject to exacerbation or reduction by human agency [1]. Following [2], disasters can be classified into three major groups. The first type is the natural disaster, which includes hydrological disaster (flood), a meteorological disaster (storm or typhoon), a climatologically disaster (drought), a geophysical disaster (earthquake, tsunami and volcanic eruptions), or biological disaster (epidemic and insect infestation). The second type of disaster comprises technological disasters, i.e., industrial accidents (chemical spills, collapses of industrial infrastructures) and transport accidents (by air, rail, road or water). The final group of disasters is manmade, and includes economic crises (hyperinflation, banking or currency crisis) and violence (terrorism, civil strife, riots, and war). Climate-related natural disasters such as drought, flooding, storms and tropical cyclones are the principal sources of risk and uncertainty in agriculture. Hence, they represent some of the greatest challenges to humankind in this century. Extreme weather events often have severe impacts on lives and livelihoods in the developing world and climate change is predicted, with varying degrees of confidence, to increase the frequency and intensity of extreme weather in the future [3]. The pattern of risks faced by poor and vulnerable people in rural areas, particularly those involved in agriculture and other ecosystem-dependent livelihoods, is becoming a major cause of chronic poverty [4].

Climate change – and the likely increase in disasters – threatens to block pathways out of poverty in developing countries especially those in Africa [5]. While the adverse impacts of climate change on society may increase disaster risk, disasters themselves erode environmental and social resilience, and thus increase vulnerability to climate change [6], [7]. Any increase in disasters, whether large or small, will threaten development gains and hinder the implementation of the Millennium Development Goals [8].

Dependency on subsistence agriculture, in particular for the rural poor in Nigeria, accumulates the impact of stresses and shocks (such as droughts or floods). This has profound implications for the security of their livelihoods and for their welfare. Such stresses and shocks, on the other hand, will not necessarily always lead to negative impacts, as risks and uncertainties that are often associated with seasonality are embedded in the practice of agriculture, and there is considerable experience of coping and risk management strategies among people working in this sector. However, in the face of climate change, the magnitude and frequency of stresses and shocks is changing and, therefore, approaches such as social protection, disaster risk management and climate change adaptation will be needed to bolster local resilience and supplement people's experience.

In the coming decades, climate change is expected to exacerbate the risks of disasters, not only from more frequent and intense hazard events but also through greater vulnerability to the existing hazards [8]. Approaches toward the management of climate change impacts have to consider the reduction of human vulnerability under changing levels of risk. A key challenge and opportunity therefore lies in building a bridge between current disaster risk management efforts aimed at reducing vulnerabilities to extreme events and efforts to promote climate change adaptation [9], [10].

Thus, for the country to attain the Millennium Development Goal in order to become food self-reliance and self-food sufficient there is the need to ensure that the level of disaster experienced by farming households is controlled and that farming households are trained on measures to be adopted to mitigate and cope with such disasters by proffering solutions to the following pertinent questions

What are the types of disasters that the farming households

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have experienced?

What is the extent of severity of the disaster experienced?

What are the factors that determine vulnerability to disasters among farming households.

What are the mitigation measures and coping mechanism adopted by farming households.

II. METHODOLOGY

A. Study Area

The geographical location of South West Nigeria covers about 114, 271 kilometer square that is, approximately 12 percent of Nigeria's total land mass. The total population is 27,581,992 and predominantly agrarian. The South west of Nigeria falls on Latitude 60 to the North and Latitude 40 to the South. It is marked by Longitude 40 to the West and 60 to the East. The vegetation is typically rainforest; however climatic changes over the years have turned some parts of the rain forest to derived savannah. The cultivation systems mostly practiced are mixed farming and mixed cropping. Depending on the prevailing vegetation, soil and weather conditions, notable food crops cultivated include cassava, maize, yam, cowpea while cash crops include cocoa, kolanut, coffee, and oil palm [11]. Non-farm activities of the households include trading, carpentry, bricklaying as well as government employment.

B. Sampling Technique and Sample Size

This study was conducted in South West Nigeria. Multi-stage random sampling technique was used in the selection of the respondents. Stage one was the purposive selection of Oyo state because the state is known as the food basket of the zone because of the presence of lots of favorable climatic condition which aids lots of farming activities in the zone and also because of some recent flooding and other disasters recorded in the state. Stage two was the stratification of the thirty three Local Governments in the state into rural and urban areas. Three local Governments that belong to the rural areas where randomly selected from the 25 Local Governments that belongs to the rural areas of the state and a total of 250 respondents were selected proportionately to size from the list of registered with the Local Governments. A total of 219 completed questionnaires that were retrieved which served as the sample size.

C. Analytical Technique

Descriptive statistics and Ordinary Least Square regression analysis was used to analyze the data elicited from the households. Descriptive statistics such as charts, tables, frequency, mean, percentages among others was used to analyze the socio-economic characteristics of the respondents, type of disaster experienced, mitigation measure and coping strategy adopted.

A logit regression was used to determine the factors influencing the farmers' decision to adapt to climate change [12] provide an excellent theoretical exposition of the model that can be estimated as a probability. The specification of the empirical model or reduced form that was estimated is as follows

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} \qquad (1)$$

where Y_i is a dichotomous dependent variable (farmer using experiences disaster or not, specified as yes=1, 0=otherwise). β_0 is the Y- intercept whereas $\beta_1 - \beta_{10}$ is a set of coefficients to be estimated. $X_1 - X_{10}$ are explanatory variables hypothesized, based on theory and related empirical work, to influence adaptation to climate change.

The independent variables X is are

X_1 = Gender (1= Male, 0 otherwise)

X_2 = Age of the respondents (in years)

X_3 = Educational status (Years of formal education)

X_4 = Household size (Actual number)

X_5 = Years of experience (in years)

X_6 = Mitigation measures (1= Relocation, 2= Change livelihood pattern, 3= Improve canal, 4= other)

X_7 = Cultivation techniques (1= Sole cropping, 2= Mixed cropping, 3= Mixed farming 4= others)

X_8 = Farm size (in hectares)

X_9 = Access to extension agents (Number of contacts with extension agents in a year)

III. RESULTS AND DISCUSSIONS

A. Household Socio-Economic Characteristics

The result of the socio-economic characteristics of the respondents is presented in Table I. The outcome of the descriptive characteristics indicates that more than two-third (69.9%) of the respondents is male. This is expected due to the egalitarian structure of the African setting where males are the household head which is as a result of socio-cultural and religious factors. Majority (40.2%) of the respondents are between 31-60 years with a mean age of 51.06±10.43. This is not surprising as most of the inhabitants in the rural areas are old people. This is likely to have effect on their ability to adopt innovation. The mean household size is 5±1.14 has most of the households comprise of less than 6 members. This is also expected as most of the inhabitants of the rural areas are gradually migrating to urban centers. Table I further shows that about 65.3% of the respondents did not have more 6 years of formal education (primary school). This is likely to have negative impact on their level of technical-know-how. With respect to farm size, most of the respondents cultivate small land size has about 58.9% of the respondents cultivate less than two acres of land. This is not surprising has most of the lands have been fragmented due to the fact that the major source of land acquisition especially in the rural area is through inheritance. In terms of access to credit facilities, most of the respondents (61.6%) have access to credit facilities and the major source of the credit is through the informal sector (36.1%) such as family and friends. Table I clearly indicates that most of the respondents belongs to cooperative societies. The reason for this could be due to the fact that the respondents are aware of the benefits that could be derived

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from been members of such societies. It is clear from the result presented in table one that there is still a weak relationship between extension agents and farmers has only 3.7% of the respondents have contacts with the extension agents on a weekly basis.

TABLE I
SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

Socio-economic variables	Frequency	Percentage
Gender		
Male	153	69.9
Female	66	30.1
Age		
< 31 years	56	25.6
31 -60 years	88	40.2
> 60 years	75	34.2
Household size		
< 6	101	46.1
6-10	88	40.2
> 10	30	13.7
Years of Formal Education		
< 7 years	143	65.3
7-12	54	24.7
> 12 years	22	10.0
Farm Size		
< 2	129	58.9
2-5	68	31.1
>5	22	10.0
Access to Credit Facilities		
Yes	135	61.6
No	84	38.4
Source of Credit facilities		
None	84	38.4
Formal	56	25.5
Informal	79	36.1
Membership of Cooperative Society		
Members	143	65.3
Non-members	76	34.7
Number of Contacts with Extension Agent		
None	18	8.2
Weekly	8	3.7
Bi-weekly	14	6.4
Monthly	26	11.9
Bi-monthly	31	14.1
Quarterly	43	19.6
Annually	79	36.1

Source: Field survey 2013

B. Types of Disaster Experienced by Households

This section presents the different types of disaster experienced by the respondents. Fig. 1 shows that about 16% of the respondents did not encounter any form of disaster at all. The most prominent form of disaster encountered by the respondent is solely flooding (31%). The reason for this may be because of the recent change in the climatic conditions. Only just a few (5%) of the respondents suffered from the effect of storms
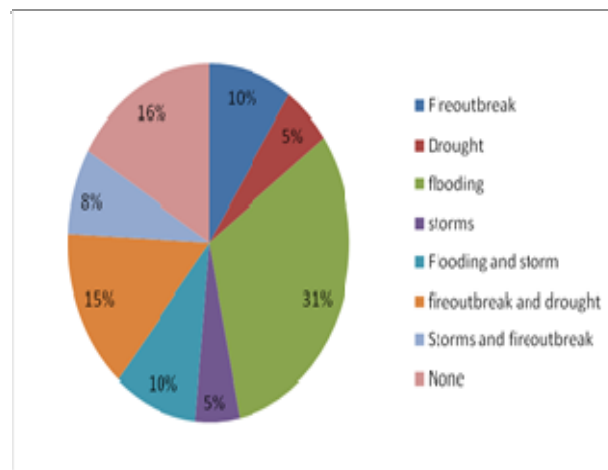

Fig. 1 Types of Disaster Experienced Source: Field Survey 2013

C. Effect of Disaster Experienced by Households

The incidence of disaster leaves various aftermath on households. The effect of the disaster experienced by majority (35.2%) of household as presented in Fig. 2 is the combined loss of crops and properties. This is closely followed by loss the sole loss of crops as indicated by the about 15.9% of the respondents. This loss is likely to increase the level of economic hardship faced by households thus making them more vulnerable to poverty.
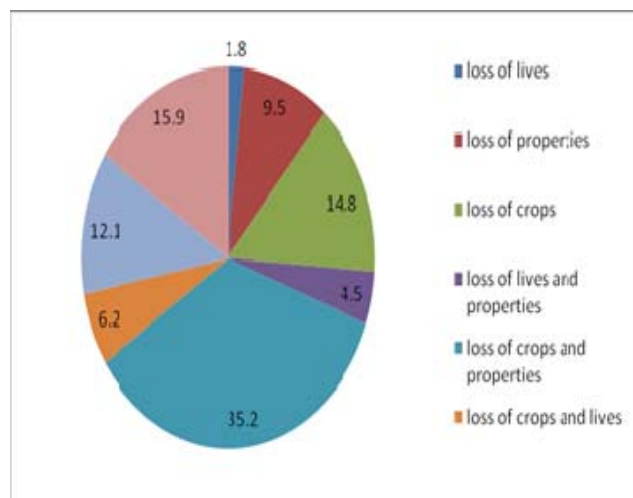

Fig. 2 Effect of Disaster Experienced by Households Source: Field Survey 2013

D. Mitigation Measure Taken against Disaster

Households employ diverse methods to guard against disasters. Improvement of canal (expanding drainage) as indicated in Fig. 3 is the major mitigation measure. It is adopted by over one-third of the respondents (35.2%). The other mechanism adopted to avert disaster is the changing of the purpose for which the land is currently used for to be suitable for the presented purpose. Only 4.1% of the respondents have to relocate in order to avert the occurrence of disaster.
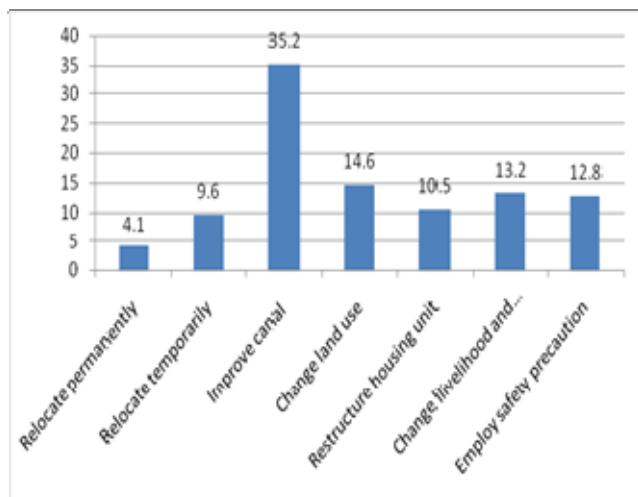
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Fig. 3 Mitigation measure taken against disaster Source: Field Survey 2013

E. Coping Strategy against Disaster

The basic measure adopted by households in coping after the incidence of disaster is receiving support from both family and friends (24.7). This support is usually in the form of items such as food, clothing shelter among others. The reason for this might be because farmlands are the mostly affected. Fig. 4 also indicates that intervention from government to victim of natural disaster is not yet adequate enough. This is implies that either fund released is not enough or the disbursement of the relief programs is not getting to the intended beneficiaries.
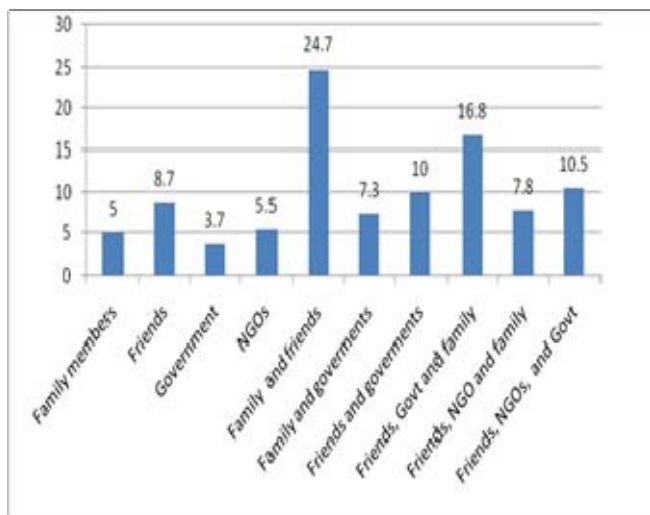

Fig. 4 Coping strategy against disaster Source: Field Survey 2013

F. Determinant of Incidence of Disaster

The results from the Logit regression analysis shows that the number of incidence of disaster encountered by household is dependent on gender of household heads, number of contacts with extension agent, farm size, mitigation measure against disaster and years of formal education of household head. The result as presented in Table II further shows that female-headed households were more likely to experience disaster at p>|0.05|. The likelihood that households will

experience disaster reduces as the number of contacts with extension agent p>|0.05| increases. This indicates that farming households that have close contact with extension agents are able trained on how to avert natural disasters on their farm. The size of the farm also has a negative relationship with the likelihood that farming households will experience disaster at p>|0.01|. This might be due to the fact that households with large farms will tend to ensure more precautions to guide their investments. Years of formal education also decreases the probability that households will experience disaster at p>|0.05| this is not surprising since educating households will be prompt in adopting measures to prevent disasters. Also they will be familiar with technical know-how to be used to ensure that they do not experience disaster and avert it quickly even if it happens.

TABLE II
DETERMINANT OF INCIDENCE OF DISASTER

Variable	Coefficient	SE of coefficient	p>|z|
Gender	2.436376	1.240582	0.050**
Age	0.1239571	0.0832019	0.136
Educational status	-1.066454	0.5170207	0.039**
Household size	0.1432402	0.0915734	0.118
Years of experience	0.9688691	0.6215418	0.119
Mitigation measures	-2.191977	0.7464539	0.003***
Cultivation technique	0.0704953	0.4722129	0.881
Farm size	0.7450301	0.3961371	0.060*
Access to extension agents	1.265501	1.38516	0.022**
Coping techniques	0.414683	1.199354	0.291
Constant	-40.177942	0.9433912	0.395
Number of observations	219		
LR Chi Square (11)	21.48		
Prob > Chi Square	0.0107**		
Pseudo R2	0.3109		

*** P<0.01, ** P<0.05, *P<0.1

IV. CONCLUSION

The study examined the extent of incidence of disaster among farming households in South-west Nigeria. The outcome of the research shows that flooding is the most prominent disaster experienced by most of the farming households. Construction of and/or expansion of canal is the major method adopted by households to militate against the incidence of disaster. The result of the analysis further shows that the main coping mechanism adopted by households after incidence of disaster is seeking support from family and friends. The study therefore concludes that there is a strong need at policy level to design social protection interventions to emphasize ex-ante instruments rather than focus the response to natural disasters as ex-post actions, concentrating on emergency measures and relief since c ash transfer programs provide direct assistance in the form of cash to the poor.

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