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Environmental Hazard Effects: Critical Issue relating to Agricultural Production of Rural Households in Imo State, Nigeria

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----------ABSTRACT----------
This study evaluated environmental hazard effects as a critical issue relating to agricultural production of rural households in Imo State, Nigeria. Multi- staged purposive and random sampling techniques were used to choose the samples. The study determined the farming activities of the respondents, ascertained the respondents knowledge of the effects of environmental hazard on agricultural production among respondents and analysed the relationship between environmental hazard and agricultural production of respondents. Primary data collected from 116 respondents were used for the study. Data analysis was carried out with the use of descriptive statistics and multiple regression analysis. Results from the study show that majority (76.54%) of the respondents were engaged in cassava production as their major cash crop. A mean score of 2.18 on a three point likert-liked scale showed that majority of the respondents were aware of the effects of environmental hazard on their agricultural production. Flood, oil pollution, erosion and wind storm were significant and negatively related to the agricultural production. Oil explorations that go on in the rural areas should be adequately monitored to reduce its negative effect on the rural environment. It was therefore recommended that more efforts should be made to mitigate the effects of environmental hazard on agricultural production of rural dwellers. This could be achieved by providing agricultural insurance schemes for farmers, paying compensation to farmers over losses arising from environmental hazards.

Key Words: *Environmental Hazard. Rural Households, Agricultural Production*

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I. INTRODUCTION

Human beings began to alter the earth's environment thousands of years ago. First, it was through the use of simple tools for hunting and gathering, and then later with more complex tools as land was cultivated for planting purposes and animals were reared. All over the world, evidence exists of human intervention in environmental issues. Although environmental variability is a natural phenomenon, the increasing frequency and severity of extreme climatic events can in part be attributed to human activities such as deforestation and inappropriate management of land and water resources (Edwin and Tuga, 2010).

Human-caused hazards may be intentional, such as the illegal discharge of oil, or accidental such as toxic spills or nuclear meltdown (Kirkhorn, 2010). The distinction between natural and human-made hazards is becoming blurred. Human-made hazards, such as technological and chemical accidents, air and water pollution and desertification, degrade the environment and can lead to disaster (Morton, 2007). Hazards once considered natural and unavoidable are now thought to be partly due to human-induced environmental change. For example, research shows that in many parts of the world, an increase in flooding is linked to the escalating rate of deforestation in those areas.

Climate models predict that climate change will lead to, among other things, an increase in unpredictability of rainfall, warmer temperatures, and an increase in the severity and frequency of extreme weather events. These changes are expected to decrease agricultural productivity in the developing world by 10% to 20% over the next 40 years. Subsistence farmers in the developing world find it particularly difficult to cope with such climate-related hazards, as they do not have the capital to invest in new adaptive practices with which to protect their homes and families. Especially sensitive to climatic changes are those households that rely almost entirely on rain-fed agriculture for their livelihoods. There has been a recent focus in the international development community and literature on strategies to help subsistence farmers reduce their vulnerability to climate change (Thorlackson and Neufelt, 2012).

Environmental education increases public awareness and knowledge about environmental issues or problems. In doing so, it provides the public with the necessary skills to make informed decisions and take responsible action. Studying the environment involves two basic approaches. The first approach, based on the fact that humans share this planet with other living creatures, focuses on the interactions among living systems. The second broader approach looks at the total environment, and emphasizes that all the planet's resources, both living and non-living, are ultimately limited. With both approaches, however, the human species is the central player, because human welfare and activities are foremost in our attention (UNDP, 1995).

It will be difficult to leave a liveable world to future generations if governmental organizations; non-governmental organizations established at local, regional, national and the international levels; the private sector, and people do not pay enough attention to environmental issues (Ifenkwe and Izuogu, 2015)

II. Prospect theory

A theory is set of assumptions, propositions, or accepted facts that attempts to provide a plausible or rational explanation of cause-and-effect (causal) relationships among a group of observed phenomenon. The word's origin (from the Greek *thorós*, a spectator), stresses the fact that all theories are mental models of the perceived reality.

Donohue and Pamgreen summarized the roles of theory in designing research in agricultural extension by their definition (Izuogu and Atasie, 2015). They defined a theory as a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena. This definition clearly highlights the two major purposes of any theory i.e. explanation and prediction.

As a descriptive technique, prospect theory explains how individuals choose among alternatives when outcomes associated with those alternatives are probabilistic or uncertain in nature. By investigating anomalies and contradictions in human behaviour, Kahneman and Tverskey (1992) concluded that psychological factors influence choices under uncertainty and were often able to capture departures from rational model. They challenged the explicit rules of rational decision making theory by noting that choices that individuals make under situations of risk and uncertainty exhibit several characteristics that are inconsistent with the fundamental. They argued that, for example, individuals underweight probable outcomes in comparison with outcomes that are certain (Ifenkwe and Izuogu, 2015). They called this phenomenon the certainty effect. They also pointed out that the certainty effect brings about risk-aversion in choices involving certain gains and risk-seeking in choices involving certain losses (Kahneman and Tversky, 1979). This means that people weigh losses heavier than gains and because of that they prefer status quo. They also found that individuals facing a choice among different prospects disregard components that are common to all prospects under consideration. They termed this commonality the framing effect. The framing effect, they argued, will cause the framing of a prospect to change the choice that the individual decision-maker makes. A third element of the decision-making process that they discovered was the reference point effect, which is whether decision outcomes are viewed as gains or losses relative to a psychologically neutral reference point. Decision outcomes that are perceived to fall below the reference point are viewed as potential losses and conversely, outcomes that are perceived to exceed the reference point are seemed as gains. Accordingly, it is argued that choice depends on the reference point and changes in the reference point may cause preference reversals.

This theory is of essential effect in understudying the relationship between environmental hazards and agricultural production. Farming communities make different choices under uncertainty caused by environmental hazards. These choices may include seeking for alternative farm land, change in farm practice and system of production, reclaiming lost cultivable areas. Decisions are made after under weighing probable outcomes in comparison with outcomes that are certain. After passing through these psychological influences, decisions made usually affects agricultural production.

Evaluating this in line with agricultural production and environmental hazard, it is possible to evaluate the effect of hazards on productivity, farm labour supply and overall farmers' income (Izuogu and Ekumankama, 2015). This would involve incorporating the hazard variables into the utility function and then introducing an explicit production technology for hazards. Hazard can either improve or reduce a rural community productive ability (Asgary and Levy, 2009) Increased environmental hazards will result in a loss of days worked, cultivable farm area, increased cost of production and reduced worker capacity. For example, prolonged exposure to pesticides could cause cardiovascular problems, neurological and haematological symptoms, and adverse dermal effects which could significantly hamper farmers' work capacity in the field and reduce their management and supervision abilities (Spear, 1991).

III. OBJECTIVES OF THE STUDY

The broad objective of the study was to evaluate environmental hazard effects as a critical issue relating to agricultural production of rural households in Imo State, Nigeria. Specifically, the study

1. Determined the farming activities of the respondents
2. Ascertained the respondents knowledge of the effects of environmental hazard on agricultural production among respondents
3. Analysed the relationship between environmental hazard and agricultural production of respondents.

IV. METHODOLOGY

This study was carried out in Imo State. Imo state has a population of 3,934,899. With a total area of 5,530km^2, the State has a population density of 710 persons per square kilometre (National Population Commission (NPC), 2007) and the population is predominantly rural.

The population for this study comprised of all rural households in Imo State. The sampling frame comprised of rural households in some selected rural communities within the three agricultural zones of the state. A multistage sampling procedure involving purposive and random sampling techniques were used for the study. A sample size of 116 respondents selected from across the three (3) geo-political zones of the state was used for the study.

V. DATA COLLECTION AND ANALYSIS

Data were generated from both primary and secondary sources. The primary data were collected with questionnaire, and interview schedule administered on the 116 respondents. Field observation was also employed. Secondary data were obtained from literature in form of textbooks, journal, annual reviews, internet, and electronic libraries.

Data were analysed using descriptive and inferential statistics such as frequency distribution, percentage, mean, analysis of variance and regression.

VI. RESULTS AND DISCUSSION

1. Farming activities involved in by respondents

Table 1 shows that of the respondents, 76.54% were engaged in cassava production as their major food and cash crop. Above 63 per cent of the respondents were engaged in maize production while forty three per cent were engaged in yam production. The Table reveals that 35.8% and 29% of respondents cultivated melon and cocoyam respectively The increase in cassava production could be attributed to the effort of the Nigerian government in facilitating the development of new disease-resistant cassava varieties by the joint efforts of IITA, National Root Crops Research Institute (NRCRI), Root and Tuber Expansion Program (RTEP) which has brought about an increase in farmer's income thereby making it more attractive. (Sanni *et al, 2009*). Also, Echebiri and Edaba (2008) opined that the production of cassava is concentrated in the hands of numerous smallholder farmers located primarily in the south and central regions of Nigeria.

Table 1 Major crops grown by respondents (N=116)

Crop	Frequency	Percentage
Cassava	124*	76.54
Cocoyam	47*	29.01
Maize	103*	63.58
Melon	58*	35.80
Yam	69*	29.01
Animal		
Sheep/Goat	34*	20.98
Fishery	12*	7.40
Poultry	87*	53.70
Rabbitry	4*	2.46

Source: Field Survey, 2013
*Multiple Responses

From Table 1, it is seen that some of the respondents were engaged in different forms of animal production.53% of the respondents were engaged in poultry production, 20.98% were engaged in sheep and goat production, while 7.40% engaged in fishery production. Mixed farming offers highest return on farm business, as the by-products of farm are properly utilized. It provides for efficient utilization of land, labour, equipment and other resources.

2. Effect of environmental hazards agricultural production

Table 2 shows the respondent's responses on the perceived effect of environmental hazard on their agricultural production. The grand mean score of 2.18 shows that respondents were aware of the perceived effects of environmental hazard on their crop and livestock production

This entails that majority of the respondents are aware of the effects of environmental hazard on their farm activities. This is in agreement with *a priori* expectation as some of the victims were still having fresh memories of the losses they encountered from the devastating flood that affected many parts of the state in 2012.

Table 2 Respondent's knowledge of the perceived effect of environmental hazard on their agricultural resources (N=116)

	Item	Agreed	Undecided	Disagreed	X
1.	Loss in weight of livestock	123* (76.88)	1* (0.62)	36* (22.50)	2.54
2.	It reduces your farm output	122* (77.22)	8* (5.06)	28* (17.72)	2.59
3.	Leads to washing away of soil nutrient	104* (71.72)	1* (0.70)	40* (27.58)	2.44
4	Decreases farm income	21* (14.79)	28* (19.66)	93* (65.55)	1.49
5.	Increases cost of production	2* (1.40)	51* (35.93)	89* (62.67)	1.38
6.	Reduction in crop growth	117* (78)	30* (20)	3* (2)	2.76
7.	Hazards lead to death of livestock	60* (46.87)	26* (20.32)	42* (32.81)	2.14
8.	Reduction in value of farm output	107* (75.35)	28* (19.72)	7* (4.93)	2.70
9	Increases pest infestation	9* (5.56)	66* (40.74)	87* (53.70)	1.59
	Total Mean				19.63
	Grand Mean				2.18

Source: Field Survey, 2013

* Multiple responses

Figures in parenthesis are percentages

3. Analysis on the perceived effect of environmental hazard on agricultural output

Linear log functional form was chosen as the lead equations for effects of environmental hazard on agricultural production among respondents in the study area. This was based on the number of significant variables, magnitude of the coefficient of multiple determinants (R^2) and the signs of the significant variables conforming to *aprior* theoretical expectations. The linear log function had five significant variables with R^2 value of 0.715 which shows that 71.5% of the total variation observed in the dependent variable (agricultural production) for respondents in the study area is accounted for by the independent variables included in the model. The F- value of 17.209 indicated that the model is significant for respondents in the study area.

Flood, oil pollution, erosion and wind storm were significant and negatively related to the agricultural production of respondents in the study area.

Table 3: Regression analysis on the perceived effect of environmental hazard on agricultural output

Variable	Double log	Semi-Log	Exponential	Linear
Constant	4.074 (11.945)***	88.826 (7.036)***	4.873 (21.784)***	132.634 (13.246)***
Flood	.111 (.355)	-1.037 (-.089)	-.159 (-1.638)	-9.498 (-2.194)**
Oil Pollution	-.512 (-1.612)	-18.467 (-1.569)	-.184 (-1.933)	-8.708 (-2.049)**
Erosion	-.852 (-3.544)***	.37.944 (-4.265)***	-2.45 (-3.555)***	-11.584 (-3.775)***
Wind storm	-.437 (-1.550)	-5.613 (-.537)	-.303 (-3.971)***	-8.077 (-2.371)**
R^2	0.615	.745	.695	.715
R^{-2}	0.611	.712	.625	.711
F-RATIO	7.490***	8.272***	20.620***	17.209***

Source: Field survey, 2013
Note: *** Significant at 1%. ** Significant at 5%.***** Significant at 10%

Flood was negatively significant at 5%. This indicated that as flooding increased in the study area, the quantity of agricultural production reduced. In crop production, this could be as a result of the loss of soil nutrients due to leaching. Extreme weather conditions such as prolonged drought and excessive amount of rainfall that leads into flood may be detrimental to crop production outputs. Also, Etuonovbe (2011) opines that livestock production is negatively affected by flood due to increase in pests and diseases leading to high mortality. This effect is definitely not wholesome for agriculture because it will be a loss not only to the farmlands and livestock but also to human life and other property, and knowing the nature of the rural farmers (impoverished nature) the effect will not only drive them out of business, they will also lose almost all they have that will help them survive. Adeleye and Rustum (2011) reported torrential rains pushing rivers over their banks and washing away livestock in Lagos state.

Oil pollution was negatively significant at 5%. This entails that as incidences of oil pollution increased in the study area, agricultural production reduced. In the process of oil exploration, lands are acquired where pipeline terminals and platforms are sited. When land is cleared for the laying of pipes, for example, agricultural lands and ponds are usually destroyed. In a study of the socio-economic impact of oil pollution, Omofonmwan and Odia (2009) stated that crude oil exploitation has had adverse environmental effects on soils, forests and water bodies in host communities in the Niger Delta.

Erosion was negatively significant at 1%. This indicated that as the washing away of the soil surface increased in the study area, there was reduction in agricultural output. Abegunde *et al* (2011) in a previous research finding reported that soil erosion in the South-eastern part of Nigeria has been identified as the most threatening environmental hazards in the country Windstorm was negatively significant at 5%. Increase in windstorm in the study area led to decrease in agricultural output. This could be attributed to the damages done to pollen grains and fruits during storms. This leads to decrease in harvest of fruits and crops with appreciable market values. Also, windstorm can lead to loss in livestock and other farm damages.

VI. CONCLUSION

This paper has evaluated environmental hazard effects as a critical issue relating to agricultural production of rural households in Imo State, Nigeria. The study has brought to limelight the fact that environmental hazard affects agricultural production and that respondents were relatively aware of these effects. Flood, oil exploration activities, erosion and wind storm were significant and negatively related to the agricultural production of respondents in the study area.

Based on the findings of this study, the following recommendations are made to mitigate the effects of environmental hazards on agricultural production of rural dwellers:

Effort should be made to diversify agricultural production activities in the rural areas. This is because the rural households depend mainly on agricultural production and diversification will aid in cautioning the effects of risk arising from environmental hazards. Insurance schemes should be provided for farmers and compensations paid to them over losses arising from environmental hazards.

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