

## EFFECTS OF CLIMATE CHANGE ON FARMERS PRODUCTION AND HOUSEHOLD WELFARE IN EDO STATE, NIGERIA.

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### ABSTRACT

*The study analyzed the effects of climate change on farmer's productivity and household welfare in Edo State, Nigeria. Specific issues examined were the socio-economic characteristics of farming households, the effect of climate change on farming activities, and the effect of climate change on the farmer's household welfare in the study area. Structured questionnaire was used to collect responses from 240 respondents selected through multi-stage sampling procedure. Data collected were analyzed using frequency, mean, percentage and mean. The result revealed that the farmers were majorly male (81.3%), married (62.5%), educated (82.0%) and had a mean household size of 9 persons. The farmers had some experience in farming (mean of 14 years) and operated a mean farm size of 6.1 hectare. Drought (long absence of rain) (mean=3.22), increased outbreak of crop diseases (mean=2.65), increased in insect infestation (mean=3.58) and damage to crop production/ yield loss (mean=2.53) were the effect of changes on farming activities found to be serious among the farmers while increase in cost of production and household spending (mean=3.50), reduction of farm income (mean=3.18), reduction of nonfarm income (mean=2.92), loss of harvest (mean= 2.70), affected household access to food (mean=2.55) and increase in pest and disease infestation in homes (mean=2.52) were climate change effect found to be serious on the household welfare of the farmers. It was concluded that the farmers have experienced the effect of climate change in their production. However, the effects of climate change on the farmers were majorly noticed in their farming activities and household welfare. It was recommended that farmers should be assisted with irrigation facilities to help reduces the effect of drought. Also agricultural extension agencies in the study should target the farmers with the view of providing solution to the incidence of pest and disease resulting from climate change and advice farmers on appropriate strategies to cope with climate change.*

*Keywords: climate change, farmers, production, household welfare.*

### INTRODUCTION

Food remains a basic need for human survival, wellbeing as well as economic productivity, with its demand going faster than the supply (Agada and Igbokwe, 2016.). In most Sub-Saharan African countries, there is a high level of dependence on agriculture for individual survival and the development of the nation's economy (Chiemela *et al.*, 2022). In Nigeria, the agricultural sector maintains the highest employer of labour, employing over 36% of the total work force of the country, with over 80% being small holder farmers who account for 90% of the country agricultural produce.

Agricultural production have generally been affected by various factors such as the activities of pests and diseases, poor extension services, poor inputs delivery system, poor irrigation system, poor capital and use of unimproved technologies. But most recently, information on climate change are becoming vital and gaining popularity as farmers and other stakeholders in agriculture are now seeking to have strategies to manage risk associated with climate change effects (Hansen, 2019). It should be noted that the bad effects of climate change are currently being felt all sphere of life but these effects are more severe in the agricultural sector (Olorunfemi *et al.*, 2020). This is so because agricultural production; whether crop or animal, is highly climate sensitive, as such if not taking into consideration by the farmers, it may affect the farmers production performance and livelihood.

No doubt, Climate variability and changes are setback to vital development such as food security, result from poor crop yield, making most farmers to diversify into other livelihood activities to the detriment of agriculture. According to Ekimini *et al.*, (2019) output from agriculture is under serious strain resulting from climate change and theses effects are anticipated to worsen with time. Accordingly, agricultural production in the study area may have been influenced by climate change, but its effects of the farmers' productivity and household welfare is still on documented in the study area. This study therefore, examined the effects of climate change on farmers' productivity and household welfare in Edo State.

## OBJECTIVES OF THE STUDY

The main objective of the study was to examine the effects of climate change on farmers' productivity and household welfare in Edo State, Nigeria. The specific objectives were to;

- i. describe the socio-economic characteristics of farming households in the study area;
- ii. examine the effects of climate change in farming activities in the study area and
- iii. examine the effects of climate change on the farmers' household welfare

## METHODOLOGY

The effects of climate change on farmer's productivity and household welfare was carried out in Edo State, Nigeria. Edo State is located in Southern-South Nigeria, commonly referred to as the Niger- Delta Area. The state is made up of 19 Local Government Areas (LGAs) and divided into three agricultural zones namely: Edo South, Edo Central and Edo North Agricultural zones. It covers a land mass of 19,639.7 square kilometers and lies between Longitude 05<sup>00</sup>4'E and Latitude 05<sup>04</sup>44N (edoworld.net).

Primary data were collected for the study through questionnaire and interview schedule and analyzed using descriptive statistical tools such as frequency, percentage and mean. Multi-stage sampling procedure was adopted in the selection of respondents. In the first stage twelve local government areas (LGAs) were purposively selected across the three agricultural zones (four LGAs each from Edo South, Edo Central and Edo North agricultural zones, this was done based on the high level of agricultural production. In the stage, two communities from the selected LGAs, were purposively selected based on high level of agricultural production, this gave a total 24 communities. In the third and final stage, ten farmers each from the selected communities was randomly sampled amounting to 240 respondents which were used for the study.

## RESULTS

### Measurement of variables

**Socio-Economic Characteristics:** This was measured using frequency, percentage and mean. The variables are specified as follows.

**Age:** farmers were made to indicate their ages in years

**Sex:** farmers were made to indicate their sex (males = 1 or females = 0)

**Household Size:** The respondents were asked to indicate the total number living and feeding together in their households.

**Educational Level:** This was categorized based on level of education (no formal education =1, primary = 2, secondary = 3, tertiary =3)

**Farming experience:** This was measured by the number of years farmers have spent in farming

**Farm Size:** farmers were requested to indicate the size of their farm land in hectares.

**Income:** Farmers were requested to provide information on their annual income earned per year.

**Effects of climate change of farming activities:** The effects of climate change on farming activities were determined using a four point Likert type scale computed as follows: very serious (coded 4), serious (coded 3), less serious (coded 2) and not serious coded 1. A mean benchmark of 2.50 was used to ascertain if the climate change effect was serious (mean $\geq$ ) or not serious (mean  $\leq$  2.50). The benchmark mean of 2.50 computed as follows  $(4+3+2+1)\div 4=2.50$

**Effects of climate change on household welfare:** The effects of climate change on household welfare were determined using a four point Likert type scale computed as follows: very serious (coded 4), serious (coded 3), less serious (coded 2) and not serious coded 1. A mean benchmark of 2.50 was used to ascertain if the climate change effect was serious (mean $\geq$  2.50) or not serious (mean  $\leq$  2.50). The benchmark mean of 2.50 computed as follows  $(4+3+2+1)\div 4=2.50$

The socio-economic characteristics of the respondents examined are shown in Table 1. The result on the sex of the farmers reveals high percentage (81.3%) male as against 18.85% female. This shows clearly that men dominated among farmers of the study area. this is not far from the general belief of most ancient African societies where married women do not claim ownership of their farms but hide under their husbands for production as it is believed culturally. In similar study Onyemekonwu *et al.*, (2019) reported 85.5% males and 14.5% of females for farmers in Delta State, Nigeria. A high proportion (62.5%) were married, suggesting that the respondents could be responsible men and women who will be committed to their farming activities. a similar result was reported by Onyemekihian *et al.*, (2017) who reported that 67% of farmers sampled in Delta (a contingent with Edo State) were married. The farmers were educated with 81.2% having one formal education or the other, implying that the farmers can read and write. Therefore, this will facilitate easy access to climate change information especially as most information is written in printed media. The farmers had mean household of 9 person, suggesting that the household size of the farmers are large and so family labour can be utilized by the farmers for their production activities. The farming experience of the respondents revealed that majority (65.3%) of the farmers had a farming experience 11-20 years with a mean farming experience of 14 years. This result suggests that the farmers had some level of experience in the farm operation; it is believed that with the

experiences, the farmers will be able to provide useful information regarding climate change. The farm size operated by the farmers' shows that a high proportion (33.0%) of the farmers cultivated a farm size of 1-4 hectares, the mean farm size cultivated by the farmers

being 6.1 hectare. This result proposes that the farmers cultivated a fairly large household size. This implies that if provided with the needed facilities, they could produce enough food to fight against food insecurity.

**Table 1: Socio-economic characteristics of respondents**

Variables	Categories	Frequency	Percentage	Mean
Sex	Male	195	81.3	
	Female	45	18.8	
Marital status	Single	45	18.8	
	Married	150	62.5	
	Divorced	3	1.2	
	Widowed	3	1.2	
Age (years)	35 and below	21	8.8	
	36-40	90	26.8	38
	41-45	108	32.1	
	46-50	12	3.6	
Education	51 and above	9	2.7	
	No formal education	6	18.0	
	Primary	144	42.9	
	Secondary	63	18.8	
	Tertiary	27	8.0	
Household size	Others	3	.9	
	4 an below	12	3.6	
	5-8	93	27.7	9
	9-12	132	39.3	
Farming experience (years)	13 and above	3	.9	
	10 and below	57	33.3	
Farm size(ha)	11-20	165	65.3	14
	21 and above	18	5.4	
	1-4	111	33.0	
	5-9	72	21.4	
	10-14	57	17.0	
	15 and above	0	0.0	

**Source: Field Survey, 2022**

### Farmers' perception of climate change

The farmers' perception of climate change is presented in Table 2. Using a mean benchmark of 2.50, the climate change indices with mean  $\geq 2.50$  were perceived to have changed in the study area. The result therefore suggests that the climate change indices perceived to have changed from the farmers' point of view were early rainfall (mean=3.30), cold weather (mean=2.92), temperature (mean=2.77), late rainfall (mean=2.76), flooding (mean=2.58) and frequency of

rainfall (mean=2.57). Climate change indices such as soil moisture (mean=2.06), gully erosion (mean=1.88) and drought (mean=1.85) were perceived by the farmers not to have changed as they fell below the mean benchmark of 2.50. This result agrees with the submission of IPCC (2007) which stated that agricultural activities have been most vulnerable to climate change. This is because agriculture depends heavily on weather elements such as rainfall and temperature.

**Table 2: Farmer's perception of climate change**

Indices	Unpredictable		Increased		Decreased		No change		Mean
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Early rainfall	156	65.0	6	2.5	72	30.0	6	2.5	3.30
Cold weather	36	16.3	162	67.5	36	16.3	18	7.5	2.92
Temperature	21	8.8	165	68.8	36	15.0	36	15.0	2.77
Late rainfall	3	1.3	183	76.3	51	21.3	3	1.3	2.76
Flooding	0	0.0	168	70.0	54	22.5	18	7.6	2.58
Frequency of rainfall	9	3.8	150.0	50.0	111	46.3	0	0.0	2.57
Soil moisture	0	0.0	39	16.3	186	77.5	15	6.3	2.06
Gully erosion	81	33.8	81	33.8	30	12.5	111	46.3	1.88
Drought	3	1.3	99	41.3	39	16.3	99	41.3	1.85

Mean 2.50= changed climate indices

Source: Field Survey, 2022

**Effects of climate change on respondents farming activities**

Table 3 presents the effects of climate change on farming activities of the farmers. From the table, climate change effects with mean  $\geq 2.50$  were regarded as serious while climate change effects with mean below 2.50 were regarded as not serious. The result therefore, revealed that drought (long absence of rain) (mean=3.22), increased outbreak of crop diseases (mean=2.65), increased in insects infestation (mean=2.58) and damage to crop production/ yield loss (mean=2.53) were the effects of changes found to be serious. Climate change effects such as loss of plant stand (mean=2.48), land degradation (mean=2.10), flooding away fish farm (mean=1.50), flooding away

farm buildings (mean=1.43), flooding away crops (mean=1.42) increased outbreak of livestock diseases (mean=1.30), land slide/erosion of farm land (mean=1.25), flooding away homes/houses (mean=1.25), were climate change effects found not to be serious among the farmers. Other areas of climate change effects found not to be serious were effects on livestock health (mean=1.18), damage to livestock production (mean=1.00) and flooding away livestock (mean=1.00). This result suggests that the farmers have suffered from the effects of climate in the production process. The implication of this result is that, if no measure is put in place to check these effects of climate change, many farmers may be forced out of production.

**Table 2: Effects of climate change on farming activities**

Changes	Very serious		Serious		Less Serious		Not Serious		Mean
	F	%	F	%	f	%	F	%	
Drought (Long absence of rain)	114	46.3	78	32.5	45	18.8	6	2.5	3.22
Increased outbreak of crop diseases	30	12.5	120	50.0	72	30.0	18	7.0	2.65
Increase insect infestation	12	5.0	135	56.3	75	31.3	18	7.5	2.58
Damages to crop production/yield loss	0	0.0	153	63.8	75	31.3	12	5.0	2.53
Loss of plant/crop stand	66	27.5	69	28.8	21	8.8	84	35.0	2.48
Land degradation	0	0.0	84	35.0	108	45.0	48	20.0	2.10
Flooding away of fish farm	0	0.0	3	1.3	3	1.3	234	97.5	1.50
Flooding away of farm buildings	21	8.8	12	5.0	18	7.5	189	78.8	1.43
Flooding away of crops	3	1.3	12	5.0	69	28.8	156	65.0	1.42
Increased outbreak of livestock diseases	0	0.0	12	5.0	15	6.3	213	88.8	1.30
Land slide/erosion of the farm	0	0.0	15	6.3	60	25.0	165	68.8	1.25
Flooding away of homes/houses	0	0.0	6	2.5	18	7.5	216	90.0	1.25
Effects on livestock health	9	3.8	9	3.8	0	0.0	222	92.5	1.18
Damages to livestock production	0	0.0	0	0.0	0	0.0	240	100	1.00
Flooding away of livestock	0	0.0	0	0.0	0	0.0	240	100	1.00

Mean 2.50 = Serious

Source: Field Survey, 2022

**Effects of climate change on household welfare**

The effects of climate change on household welfare are presented in Table 4. As presented in the Table, indices with mean  $\geq 2.50$  were regarded serious effects on household welfare of the farmers while the indices with mean  $\leq 2.50$  were regarded not have serious effects on the farmers' household welfare. From the result, the indices with serious effects on the household welfare are increase in cost of production and household spending (mean=3.50), reduction of farm income (mean=3.18) reduction of non-farm income (mean=2.92), loss of harvest (mean= 2.70), affected household access to food (mean=2.55) and increase in

pests and disease infestation in homes (mean=2.52). Indices such as effects on human health (mean=2.17) and increased incidence of sickness among family members (mean=1.98) were regarded not to have serious effects on household welfare as they fell below the mean benchmark of 2.50. This suggests that climate change have affected the farmers' household welfare in diverse area. A possible implication of this result is that if nothing is done to reduce this climate change affects many farming households may diversify to other income sources neglecting farming.

**Table 4: Effects of climate change on household welfare**

Indices	Very serious		Serious		Less Serious		Not Serious		Mean
	F	%	F	%	F	%	F	%	
Increase in cost of production and household spending	186	77.5	21	8.8	15	6.3	18	7.5	3.50
Reduction of farm income	144	60.0	36	15.0	33	13.8	27	11.3	3.18
Reduction of non-farm income	87	36.3	36	15.0	36	15.0	27	11.3	2.92
Loss of harvest	87	36.3	27	11.3	96	40.0	30	12.5	2.70
Affected household access to food	87	36.3	57	23.8	30	12.5	66	27.5	2.55
Increase in pest and disease infestation in homes	33	13.8	96	40.0	84	35.0	27	11.3	2.52
Affected human health	24	10.0	87	36.3	57	23.8	72	30.0	2.17
Increased incidence of sickness among family members	6	2.5	57	23.8	120	50.0	57	23.8	1.98

**Mean 2.50 = serious**

**Source: Field Survey, 2022**

## CONCLUSION AND RECOMMENDATIONS

There is no doubt that the farmers have experienced the effects of climate change in their production. However, the effects of climate change on the farmers were majorly noticed in their farming activities and household welfare. On the farming activities, the effects reflected majorly as a result of drought, increase outbreak of crop diseases, insect infestation and damage to crops while increase in cost of production and household spending, reduction of farm and none farm income, loss of harvest and increased and increased pests and disease infestation in homes were the major areas of climate change effects reflected in household welfare. It was therefore, recommended that relevant stakeholders should provide farmers with needed facilities such as irrigation facilities to help reduce the effects of drought. Also agricultural extension agencies in the study area should target the farmers with the view of providing solution to the incidence of pests and disease resulting from climate change and advice farmers on appropriate strategies to cope with climate change.

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