

PERCEIVED IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND IMPLICATIONS FOR SUSTAINABLE FOOD SECURITY IN ABIA STATE, NIGERIA.
Nwosu, I.E¹ & Obi, A²
¹Department of Rural Sociology & Extension
 Michael Okpara University of Agriculture, Umudike, Nigeria.
 Department of Agricultural Economics & Extension
 University of Fort Hare, South Africa.
 E-mail: nwosu.iheanyi@yahoo.com

Abstract

The study was specifically carried out to determine the perceived impact of climate change on agricultural production and implications for sustainable food security in Abia State, Nigeria. Structured questionnaire forms were used in eliciting information from the respondents. A multi-stage sampling method was used in collecting data from the respondents, giving a total of 240 respondents. The data collected were analyzed with simple descriptive statistics including percentages, frequencies and mean scores. The result of the study revealed that the mean scores for most of the climate change events including high intensity of rainfall/unusual flooding, (3.32), extreme temperature, (3.70), destructive wind, (3.21), and unusual thunderstorm, (3.18) were above the pooled mean score of 2.50; indicating high prevalence of the stated extreme weather events. Similarly, the respondents' mean score on the perceived effects of climate change on agricultural production were all above the pooled mean score of 2.50. For example, the mean score for respondent's perceived effect of insufficient rainfall on crop cultivation was 3.41, while the mean score for respondents on low agricultural yield due to climate change was 3.63. The research results further revealed that the mean scores of respondents for most of the variables on the perceived implications of climate change on household food security were above the pooled mean score of 2.50. These results are in line with the observations of Mannak (2008) that climate change affects African food system in the broadest sense of the word and that it affects the availability of access to and utilization of food.

Keywords: Climate change, Agricultural production, Sustainable food security

Introduction:

The phenomenon of climate change has not only become an issue of global concern, but has remained one of the biggest challenges of our time and a threat to human existence. Similarly, the effects of climate change on food production and sustainable food security has also remained an issue of great concern especially in the developing countries that are often characterized by high rate of population growth, low agricultural productivity and hunger.

The United Nations Farmers' Convention on Climatic Change (UNFCCC), (1992) as reported by

Farauta ([www.http://unfcc.inc/2860php](http://unfcc.inc/2860php)) defines climate change as change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time period. Nwachukwu and Nnadozie (2011) simply refers to climate change as a change in the statistical distribution of weather over periods of time that range from decades to millions of years. It is the deviation from normal climatic conditions of an area over a long period of time, whether due to natural conditions or as result of man that results in degradation of environment (Nwosu, 2012). Generally, climate change represents the prevalent average weather conditions; of an area over a long period of time, usually in decades. On the other hand, food production has to do with the aggregate output of food in a community, region or nation over a given period of time. Similarly, food security is said to exist when all people at all times have physical and economic access to sufficient, safe and nutritious foods to meet their dietary needs and food preference for an active healthy life (FAO,2006; Short, 2001).

Undisputably, climate change has serious implications for food production generally and food security in particular. Mannak (2008) has explained that the relationship between climate change and food security is complex and that climate change affects African food system in the broadest sense of the words in terms of availability, accessibility and utilization of food.

The need to appreciate the impact of climate change on food production and sustainable food security is better appreciated when considered against the backdrop that food self sufficiency in Nigeria has fallen from 98% in early 1960s to less than 54% in 1986 and that presently, over 40% of Nigeria's estimated population of 150 million people is food insecure, (Nwosu, 2011). Similarly, Abbey (2011) has explained that over the years, the rate of growth in agricultural production in Nigeria stagnated and failed to keep pace with the needs of rapidly growing population. Okolo (2010) had also explained that food insecurity problem in Nigeria has become so worrisome that 25.3% of households have problems meeting food needs and that the greatest percentage (65%) of households indicated that the primary mechanism for coping with poverty was reducing the

number of meals. More revealing and perhaps, worrisome are the research findings of Boko *et al* (2007) that yield from rain fed crops could be halved by 2020 in some countries of Africa and net revenue from crops could fall by 90% in 2010.

Justification

It is expected that the results of the study will assist the government and other relevant agricultural and rural development planning agencies in Nigeria in designing appropriate policies and strategies that would mitigate the effects of climate change on food production and promote sustainable food security in Abia State, Nigeria in particular.

Objectives

The broad objective of this study was to analyze the impact of climate change on agricultural production and the implication for sustainable food security in Abia State, Nigeria. Specifically, the study will seek to:

- Examine the socio-economic characteristics of farmers in the study area.
- Identify the climate change events in the study area.
- Identify the effects of climate change on agricultural production in the study area.
- Determine the implications of climate change on household food security in the study area.

Methodology

The study was conducted in Abia State, Nigeria. The area lies between latitude 40471 and 60121 North and longitude 70231 and 8021 East and occupies a landmass of 5833.77 square kilometers (ABSEED, 2006). According to the Official Gazette of the Federal Republic of Nigeria (2007), Abia state has a total population of 2,833,999, with a population density of 486 persons per square kilometer. Most of the people of Abia State especially the rural dwellers are subsistence farmers. The major farm crops include cassava, rice, cocoyam, maize, melon, plantain and banana. It also produces palm oil and cocoa on commercial basis. Importantly, too, Abia State is a mineral oil producing state in Nigeria.

Sampling Procedure

A multi-stage sampling technique was used in choosing the respondents. The first stage involved the stratification of Abia State into three agricultural zones with each agricultural zone forming a stratum. One of the Local Government Areas was chosen from each of the agricultural zones by simple random sampling technique and two rural communities were chosen from each of the Local Government Areas, giving a total of six communities in the study area. The six communities represented the six study locations for the study. Forty farmers were chosen at

the household level by random sampling procedure from each community. In all 240 respondents/farmers were chosen as sample size for the study.

Data collection and analysis

Two Hundred and Forty (240) structured questionnaire forms were distributed, completed and collected back from the respondents. In addition, relevant data and information were extracted from such secondary sources as journals, seminar papers, textbooks, internet and reports. The study involved the use of simple statistical tools in the data analysis including means, frequency counts and percentages. Based on a four point Likert type scale of 4, 3, 2, 1, a mean rating of 2.5 and above was regarded as "agree" and so accepted. Any response less than 2.5 was regarded as "disagree" and unacceptable.

Results and Discussion

Table 1 indicates that females (55%) were relatively more than the males (45%). The results agree with earlier observations by Nwosu (2007) that women constitute a significant proportion of most countries' population and also play significant role in society, especially in agricultural and household activities. The results are also supported by Akpabio (2005) who stated that in the world of physical work, women perform nearly two-thirds work hours and make up between 60-80 percent of the agricultural labour force in Nigeria.

Table 1 also shows that a great majority (77.50%) of the respondents were married while another high proportion (78.75%) of the respondents were located within the age bracket of 36 and 65 years; the most productive segment of the population in the study area. Similarly, most (78.75%) of the respondents were literate. The implication of this result is that more literate persons were increasingly getting involved in agriculture as a viable means of livelihood. This trend may be attributed to the agricultural transformation agenda of the Federal and other levels of government in Nigeria and Abia State in particular in which some billions of naira have been set aside as loan to farmers.

Table 1 further reveals that only 10.83% of the respondents received estimated monthly income below N4500 per month, an indication that only a relatively small percentage (10.83%) of the respondents could be said to be living below the international poverty line, the equivalent of US\$1 Per day. Most of the respondents (72.09%) were mainly engaged in trading and civil service. The results of the study further revealed that a majority (58.75%) of the respondents described as moderate or fairly high spent their total expenditure on food purchases arising from earnings derived from non-farm activities. This could be attributed to the facts that

72.09% of the respondents received extra earnings from such non-agricultural activities as trading and civil service.

More importantly, too, more than half (50.42%) of the respondents had a relative small household size of 1 – 5 persons. The implication of this result is that it might impact negatively on the availability of farm labour force and food security in the study area.

Table 1.: Distribution of Respondents according to socio-economic characteristics

Variables	Frequency	Percentage (%)
Gender		
Male	108	45
Female	132	55
Total	240	100
Marital Status		
Married	186	77.50
Single	30	12.50
Divorced	7	2.92
Widowed	17	7.08
Total	240	100.00
Age Range		
16 – 25	5	2.08
26 – 35	30	12.50
36 – 45	55	22.92
46 – 55	90	37.50
56 – 65	44	18.33
66 – 75	16	6.67
Total	240	100.00
Educational Level		
No formal Education	51	21.25
Primary	63	26.25
Secondary	59	24.58
Tertiary	67	27.92
Total	240	100.00
Income Range		
Less than N4500	26	10.83
N450 – N9000	49	20.41
N9001 – N18000	52	21.67
N18001 – N22500	47	19.58
N2251 – N26500	31	12.92
Above N26500	31	12.92
Total	240	100.00
Source of livelihood		
Trading	115	47.92
Civil Service	58	24.17
Carpentry/Macine/Artisan	39	16.25
Restaurant/Beer Parlour	17	7.08
Menial jibs	11	4.58
Total	240	100.00
Household Size		
1 – 5	121	50.42
6 – 10	115	47.92
11 – 15	4	1.66
Total	240	100.00

Source: Field Survey, 2013

Table 2 indicates that the mean score of respondents in each item on the perceived prevalence of climate change events were above the pooled mean score of 2.5 indicating a high prevalence of extreme weather

conditions in the study area. The result in Table 2, no doubt, has addressed objective 2 that tends to identify the climate change events in the study area. These results, with regard to the duration, late arrival and

high intensity of rainfall in particular, tend to corroborate the explanations of Olsen (2007) that in many places, growing seasons are changing and

ecological riches are shifting, while rainfall is becoming more unpredictable and unreliable both in its timing and its volume.

Table 2: The mean of responses of respondents according to perceived prevalence of climate change events.

Climate change events	Scores on level of perception				Total score $\sum FX$	Mean score \bar{X}
	Strongly agree	Fairly agree	Fairly disagree	Strongly disagreed		
	4	3	2	1		
• Extreme heat/long period of heat	197	37	4	2	909	3.79
• Late arrival of rain	158	51	25	6	841	3.50
• Very short duration of rainfall	99	83	48	10	751	3.13
• Very high intensity of rainfall/unusual flooding	128	70	32	10	796	3.32
• Destructive thunder storm	125	54	39	22	762	3.18
• Unusual/destructive wind	121	74	19	26	770	3.21
• Uncertainty in seasonal climate	157	49	30	4	839	3.49
• Total pooled mean						2.50

Source: Field Survey, 2013

Table 3 similarly indicates that the mean scores in each of the items/variables on the perceived effects of climate change in agricultural production were above the pooled mean score of 2.5, showing that all the variables/factors were accepted as possible causes of climate change on agricultural production in the study area. The results in Table 3, addresses objective 2 which seeks to determine the effects of climate change on agricultural production in the

study area. Earlier, Nzeh *et al.* (2012) have explained that unpredictable changes in the onset of rains in the last three to 10 years have led to situations where crops planted with the arrival of early rains get smothered in the soil by an unexpected dry spell that can follow early planting. They explained that crops smothering and the late arrival of rains due to climate variability results in harvest failures in ecosystems that rely on rain-fed agriculture.

Table 3: The mean of responses of respondents on the perceived effects of climate change on agricultural production

Variables/effects of climate change on agricultural production	Responses				Total score $\sum FX$	Mean score \bar{X}
	Strongly agree	Fairly agree	Fairly disagree	Strongly disagree		
	4	3	2	1		
• Insufficient rainfall for crop cultivation	153	48	23	16	818	3.41
• Insufficient pastures/vegetation for animal grazing	142	68	21	9	823	3.43
• Decrease in soil fertility	174	40	19	7	861	3.59
• Late commencement of farming	131	57	47	5	794	3.31
• Health related problems arising from heat such as illness, excessive sweating etc	189	43	4	4	897	3.74
• Flooding of farmland	124	43	25	48	723	3.01
• Poor harvest of farm crops/product	141	60	33	6	816	3.40
• High post harvest losses	134	61	36	9	800	3.33
• Low agricultural yield	162	68	10	0	872	3.63
• Crop destruction on the farm due to excessive rainfall/flooding, wind	159	61	12	8	851	3.55
• Shortening of crops cycle	103	72	51	14	744	3.63
Total Pooled Mean						2.5

Source: Field Survey, 2013

Table 4 shows that the mean scores of respondents for most of the variables on the perceived implications of climate change on household food security were above the pooled mean score of 2.50. The results obtained from the mean scores of the various items on Table 4 strongly indicate a strong influence of climate change on household food security in the study area. The results are supported

by reports and explanations of the United States Agency for International Department (2008) which stated that food security is vulnerable to extreme weather and is dependent on rainfall patterns. Mannak (2008) has also explained that climate change affects African food system in the broadest sense of the word, adding that it affects the availability of access to and utilization of food.

Table 4: The mean of Responses of respondents on the perceived implication of climate change on household food security

Variables/implications of climate change on household food security	Responses				Total score $\sum FX$	Mean score \bar{X}
	Strongly agree	Fairly agree	Fairly disagree	Strongly disagree		
	4	3	2	1		
• Scarcity of food for consumption	173	49	11	7	868	3.62
• Limited availability of farm product for market sale	152	64	18	6	842	3.51
• Ability to eat balanced diet from farm produce	40	67	35	98	529	2.20
• Prices of food items are not easily affordable	182	29	18	11	862	3.59
• The problem of household food insecurity can largely be traced to the effects of climate change on agriculture	163	57	14	6	857	3.57
Total Pooled Mean						2.50

Source: Field Survey, 2013

Conclusion

The purpose of this study is to ascertain the impact of climate change on agricultural production and implications for sustainable food security in Abia State, Nigeria.

From the results obtained on tables 2, 3 and 4 we may conclude as follows:

1. That the perceived prevalence of climate change events (i.e. extreme weather conditions) in the study area was high.
2. That the perceived effects of climate change on agricultural production in the study area were far-reaching and mostly negative.
3. That the perceived implications of climate change on food security in the study area were similarly negative and far-reaching.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. That periodic training and retraining programmes be organized for the farmers in the study area by appropriate agricultural agencies, with a view to updating their knowledge on the dynamics of climate

change in terms of causes and effects on agricultural production.

2. that the farmers in the study area be trained by experts in climatology and agricultural extension on the adaptation and mitigation strategies on climate change, with a view to minimizing the attendant negative consequence of climate change on agricultural production as a whole and food security in particular.

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