FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 3 No. 3, September, 2019, pp 115 - 122

DETERMINANTS OF FARMERS' PERCEPTION AND ADAPTATION STRATEGIES TO CLIMATE CHANGE IN IWO LOCAL GOVERNMENT AREA OF OSUN STATE, NIGERIA.

AKINTOBI, O. S,

Department of Agricultural Extension and Rural Sociology, Faculty of Agriculture,
Federal University Dutsin-Ma, Katsina State, Nigeria.

Corresponding authors Email: akintobiolanrewaju@gmail.com Telephone: +2347088246184

ABSTRACT

This study was carried out to identify the adaptation measures employed by the farmers and the determination of the pattern of crop production as a result of perceived effect of climate change. Both simple and multi stage random sampling were used to select 120 respondents from the 15 wards making up the local government. Pearson Product Moment Correlation was used to determine the relationship between the variables. The study revealed most of the respondents were relatively older between ages of 50-59, 76.7% were married, and 36.6% of the entire population possess primary education, It is evident that farmers in the study area are well informed of the changes in climatic variables in their environment and are employing adaptation measures which include crop rotation, tillage methods and livelihood diversification to curb the negative effect of climate change. However, multiple farming, multiple cropping and ley farming are the crop production patterns used by the farmers as a result of perceived effect of climate change. Years of schooling and Farming experience showed a significant relationship with the farmers' climate change perception. Conclusively, policies must aim at promoting farm level adaptation; timely advice and help from research institution and training workshop for arable farmers, use of interpersonal and mass media for farmers awareness and timely and accessible meteorological reports on fluctuating climatic variables.

Keywords: Climate Change, Perception, Adaption, Climatic Variables, Crop production.

INTRODUCTION

Climate change refers to all changes in climate be it as a result of human activities or natural variations (Ifeanyi-Obi *et. al*, 2012). The earth is surrounded by a layer of gases that act like a glass wall (earth's blanket) and ceiling of a green house. These so called greenhouse gases are necessary to sustain life on earth. They allow sun rays to enter but stop much of the heat from escaping, keeping the earth warm to allow life. The problem that we face today is that the blanket of greenhouse gases that occurs naturally in the troposphere is quickly getting thicker as a result of increased emissions of greenhouse gases and this result in the rapid warming of the world's climate (lfeanyi-Obi *et. al*, 2012). The Intergovernmental Panel on Climatic Change (IPCC, 2007) stated that human activities are the main cause of the changes seen in climate, these it does in three major ways; burning of fossils fuel, deforestation, and growing world population (Lobell *et al*, 2008).

Agriculture is a climate dependent activity that places serious burden on the environment in the process of providing the teeming Nigeria population with food and fiber. The effect of climate on agriculture is related to variability in local climates rather than in global climate patterns. Climatic variation is the mean state of climate on all temporal and spatial scales of weather events. Climate variability is the resultant effect in the alterations of ecosystem structures to satisfy human land use and livelihood potentials of the human race. Effects of climate variation are physical, economic, social and cultural, endangering environmentally based livelihoods of the Nigeria population (Oluwasusi, 2013).

Adger *et.al* (2003) posited that climate variability, poor infrastructure, economic poverty, drought, excess rainfall, poor livestock health, reduced crop yields, low productivity and a range of other problems associated with climate variability will constitute important challenges for Africa countries in particular. The effect of climate variation is being felt by the whole population but, it will disproportionately affect vulnerable groups and vulnerable population. Africa's population in which Nigeria is a key player in terms of population size and market for agricultural produce domestically is very vulnerable to climatic and non- climatic changes, due to high level of poverty, conflicts and prevalence of diseases.

Africa remains one of the most vulnerable continents to climate change because of multiple stresses (resulting from both politics and economic conditions), the continent's dependence on natural resources and its weak adaptive capacity. According to the Intergovernmental Panel on Climate Change 4th Assessment Report (2007), between 75 and 250 million people may be exposed to increased water stress due to climate change by 2020 in Africa and this will adversely affect livelihoods in

the region. The area suitable for agriculture, the length of growing seasons and yield potentials, are expected to decrease due to climate change. Yields from rain-fed agriculture in some countries could be reduced by up to 50%. Thus, climate change may have particularly serious consequences in Africa, where some 800 million people are undernourished. (Agwu *et.al*, 2012).

Small scale farmers, who constitute the bulk of the poor in Africa, face prospects of tragic crop failures, reduced agricultural productivity, increased hunger, malnutrition and diseases as a result of climate change (Zoellick, 2009). Countries in Sub-Saharan Africa, including Nigeria, are likely to suffer the most because of their geographical location, low incomes, and low institutional capacity, as well as their greater reliance on climate-sensitive renewable natural resources sectors like agriculture. Given the high level of illiteracy among rural farmers in Nigeria coupled with the poor nature of the public extension service, it is not known if these farmers have access to adequate information on climate change events and their impacts on agriculture. It is also not certain what coping strategies (adaptation measures) have been evolved by the farmers to ensure sustainable production. Their low income status and absence of viable support system may further worsen the impacts of climate change on their livelihood system. (Salau, *et.al*, 2012).

Nigerian agriculture is negatively affected by climate change; this study would be directed at finding out the perceived effects and the adaptation strategies employed by farmers in Iwo local government area of Osun state. The importance of agricultural production as a human life sustenance calls for inquiry about its abundant production on sustainable and continuous basis.

Therefore, the outcome of this research will be very useful for farmers, also very beneficial to Nigerian policy planners and makers as to the dimensions to follow as far as agricultural production is concerned. Philanthropic organizations and non-governmental organizations (NGOs) can also utilize the result of this study in their effort to aid the farmers to maintain sustainable arable crop production.

The continued dependence of agricultural production on sunlight, heat, water and other climatic factors, the dependent of much of the world's population on agricultural activities and the significant magnitude and rapid rates of possible climate changes, all combine to create the need for a comprehensive consideration of the potential impacts of climate on global agriculture.

Objectives of the Study

The general objective of this study is to determine the farmers' perception and adaptation strategies to climate change in Iwo local government area, Osun State.

The specific objectives are to:

1. Identify the socio-economic characteristics of the farmers.
2. Determine the perception of farmers on climate change variables.
3. Identify the adaptation methods employed by the farmers.
4. Determine the patterns of crop production as a result of perceived effect of climate change.

Hypothesis of the Study

Ho1: There is no significant relationship between the socio-economic characteristics of the farmers and perceived effect of climate change.

Ho2: There is no significant relationship between climate change perception and adaptation measure to cushion the effects of climate change on crop production.

MATERIALS AND METHODS

The study was carried out in Iwo local government area of Osun State. The study area occupies a land area of 245 square kilometer. Using the 2.6% growth rate from 2006 census figures, the 2018 estimated population for the local government is 277,380 (worldpopulationreview.com, 2019). Usually, the wet season last between March to October while the dry season lasts between November to February. Mean annual rainfall is between 2000 and 2200mm. Maximum temperature is 32.5°C while the relative humidity is 79.9%.

The population of the study consists of all arable farmers in selected communities in Iwo local government area of Osun state. Multi-stage random sampling was used to select 3 wards from the 15 wards that made up the local government and two communities were selected from each ward. 20 arable farmers were randomly selected from each of the six communities to make 120 farmers.

Primary Data collected using questionnaire was subjected to descriptive statistics, such as frequency counts and percentages were used. However, inferential statistics Pearson Product Moment Correlation Coefficient (PPMC) was used to test the relationships that exist between the variables in the hypothesis.

RESULTS AND DISCUSSIONS.

Table (I): The Socio Economic Characteristics of the Respondent

Variables	Frequency	Percentage
Age		
30-39	9	7.5
40-49	25	20.8
50-59	52	43.4
60-69	30	25
>70	4	3.3
Gender		
Male	80	66.7
Female	20	33.3
Educational level		
No formal education	37	30.8
Primary school	44	36.6
Secondary school	22	18.3
Tertiary education	17	14.2
Farming Experiences (years)		
<22	30	24.9
23-30	63	52.5
31-39	12	10
>40	15	12.5

Field Survey (2018)

From the data in table I above it shows that 7.5% of the respondents fall between the age range of 30-39, while 20.8% of the respondents were between the age bracket of 40-49 and 3.3% of the respondents are above seventy years of age. It can be deduced that most of respondents are still young and active adults and if proper inputs are set in place they can produce more from their present production rate.

The gender status indicates that male respondent has the highest percentage of 66.7% while female respondents take 33.3% share of the whole respondents. It reveals that males are actively involved in farming activities in the study area which tends to increase agricultural production because of their strength and energy. This correlates with the study of Ayanwuyi *et al.* (2010) which stated that arable farming is predominantly male occupation and little women are involved in crop production.

Most of the respondents (36.6%) attended primary school, 14.2% of the respondents completed tertiary education while 30.8% had no formal education. It reveals that most of the respondents had formal education, this study complement with the study of Sofoluwe et. al (2011) which stated that educated farmers have been found to be more knowledgeable about better practices and may be more willing to bear risk and adapt to better farming techniques because of their exposure to education and better understanding of innovation and its importance.

More than half 52.5% of the respondents possess between 23-30 years of farming experience, 12.5% of the respondents possesses above 40 years of farming experiences, 24.9% possess less than 22years of farming experience while 10% of the respondents fall between 31-39 years farming experience. This study shows that the respondents are well experienced farmers and this should help them in tackling climate change effect as they are well experienced farmers who might have experienced climate change effect on crop production at one time or another. This is in line with Apata (2009) who stated that farmers who have an experience of over ten years are no more novices in agricultural production.

Climate Change Perception Information

Table II shows the perception of climate change variables by the farmers, from the table it can be deduce that appreciable amount of the respondents are at one time or the other aware of the changes in climate change variables, the knew there are changes in the environmental climatic conditions. Majority of the respondents strongly agreed that planting time had been irregular in recent years because of inadequate and irregular rainfall pattern. l.68, while some agreed that rainfall pattern is becoming irregular with a weighted mean of 1.32.

All the respondents agreed that rainfall pattern can no longer be timed or calculated any longer at WMS of 2.00, while they all agreed that rainfall do not start earlier as it used to be at 2.00. most of the respondents agreed on rainfall scarcity with a mean score of -0.46 while majority of the respondents disagree on rainfall scarcity even though rainfall do not start earlier as expected it isn't scarce when it eventually start raining at mean score of -1.59. all the respondents agreed that evidence of drought is now becoming rampant because when the rainfall eventually stops drought incidence becomes so serious which

leads to all the respondents agreeing that heat and sun intensity has increased, which has reduced man hour day on farms and has subsequently reduced the productivity of the soil and negatively affect tuber and vine developments.

This study correlates with the study of Adebayo (2012) who indicated that respondents have unfavorable disposition towards Climate change.

Table II: Frequency and percentage distribution of respondents by climate change perception

Perception statements on trend of climate parameters	SA (%)	A (%)	U (%)	D (%)	SD (%)	WMS
Number of rainy days in a year have increased	120(100)	0(0)	0(0)	0(0)	0(0)	2.00
Rainfall pattern cannot be timed any longer.	120(100)	0(0)	0(0)	0(0)	0(0)	2.00
Too much heat causes soil to be dried.	82(68.3)	38(31.7)	0(0)	0(0)	0(0)	1.72
Too much & continuous heat Promote pest and diseases	33(27.5)	0(0)	0(0)	87(72.5)	0(0)	1.72
Too much heat reduce productivity of the soil	87(72.5)	33(27.5)	0(0)	0(0)	0(0)	1.72
Inadequate rainfall as a result of climate change negatively affect tuber and vine development.	87(72.5)	33(27.5)	0(0)	0(0)	0(0)	1.72
Planting time had been irregular in recent years because of inadequate and irregular rainfall pattern.	120(100)	0(0)	0(0)	0(0)	0(0)	1.68
Usual period of March-April is no longer feasible to make early planting of arable crops due to inadequate rainfall.	0(0)	120(100)	0(0)	0(0)	0(0)	1.68
Rainfall pattern can no longer be predicted.	38(31.7)	82(68.3)	0(0)	0(0)	0(0)	1.68
Incidence of drought is becoming rampant	71(59.2)	49(40.8)	0(0)	0(0)	0(0)	1.59
Heat and sun intensity have increased on my farm.	82(68.3)	38(31.7)	0(0)	0(0)	0(0)	1.32
Rainfall pattern is becoming irregular.	82(68.3)	38(31.7)	0(0)	0(0)	0(0)	1.32
Too much heat reduce man hour per day of farm workers	87(72.5)	33(27.5)	0(0)	0(0)	0(0)	1.28
Very dry soil is not good for planting arable crops.	87(72.5)	33(27.5)	0(0)	0(0)	0(0)	1.00
We experience scarcity of rain between January to May	0(0)	49(40.8)	0(0)	38(31.7)	33(27.5)	-0.46
Sun intensity is becoming too much these days.	82(68.3)	38(31.7)	0(0)	0(0)	0(0)	-0.5
Rain starts early in year and stops after few rains have fallen which is followed by long delay before beginning to rain again in the year.	0(0)	0(0)	0(0)	49(40.8)	71(59.2)	-1.59

Field Survey, 2018

Adaptation Measures Information

Table (III) reveals the adaptation method employed by the respondents to combat the negative effect of climate change on their respective farms, crop rotation as an adaptation method is the most frequent adaptation method used with a mean score of 1.65, while tillage methods is the second most frequent adaption method used which had 1.55 wms. Respondents diversify their means of livelihood as a means of adapting to climate change effect on their farms and it has a frequent usage mean score of 1.47. However adaptation method such as change of cropping calendar and shift from crop to livestock are seldom used at a mean score of 0.89 and 0.78 respectively.

This correlate with the study of Oluwasusi (2013) which stated that crop rotation, tillage methods and livelihood diversification are one of the major adaptation techniques used by the rural farmers to cushion the effect of adverse climate condition.

Table (III): Distribution of respondents according to the adaptation measures

Adaptation Measures	Frequently Used	Occasionally Used	Never used	WMS	Rank order
Crop rotation	87(72.5%)	24(20%)	9(7.5%)	1.65	1st
Tillage methods	80(66.67%)	26(21.67%)	14(11.67%)	1.55	2nd
Diversify livelihood	72(60%)	32(26.67%)	16(13.33%)	1.47	3rd
Pest resistant seed varieties	52(43.33%)	47(39.17%)	21(17.5%)	1.26	4th
Increased use of fertilizer	40(33.33%)	68(56.67%)	12(10%)	1.23	6th
Mulching	38(31.67%)	53(44.17%)	29(24.17%)	1.08	7th
Irrigation	42(35%)	31(25.8%)	47(39.17%)	0.96	5th
Change of cropping	17(14.17%)	73(60.83%)	30(25%)	0.89	9th
Shift from crop to livestock production	27(22.5%)	39(32.5%)	54(45%)	0.78	8th

Field Survey, 2018

Patterns of Crop Production Information

Table (IV) reveals the crop production patterns adopted by the respondents to cushion the effects of climate change on their productivity. Multiple farming was the frequently used crop production pattern by all the respondents at 2.00 wms, multiple cropping was also employed by the respondents at 1.92 weighted mean score followed by ley farming at 1.78 which is the production of arable crops and vegetable crops on the same piece of land and at the same time. While, alley cropping and mixed farming are the least crop production patterns used. This study corroborate with the study of Ayanwuyi *et. al* (2010) which stated that multiple farming and ley farming constitute the major crop production pattern employed by the rural arable farmers to maintain their output level, this crop production pattern as believed by the farmers are cost effective and also makes proper and efficient use of soil nutrients presents in the soil.

Table IV: Distribution of respondents according to their patterns of crop production as a Result of Climate Change

Crop production	Frequently used	Occasionally used	Never used	WMS	Rank
Multiple farming	120(100%)	0(0%)	0(0%)	2	1 st
Multiple cropping	110(91.67%)	10(8.33%)	0(0%)	1.92	2nd
Ley farming	96(80%)	21(17.5%)	3(2.5%)	1.78	3rd
Crop rotation	87(72.5%)	24(20%)	9(7.5%)	1.65	4th
Mixed cropping	74(61.67%)	46(38.33%)	0(0%)	1.62	5th
Alley cropping	37(30.83%)	21(17.5%)	62(51.67%)	0.79	6th
Mixed farming	32(26.67%)	15(12.5%)	73(60.83%)	0.66	7th

Field Survey, 2018

Test of Hypothesis

For hypothesis one, Pearson Product Moment Correlation was conducted and the result revealed year of schooling and farming experience from the selected socio-economic characteristics had a significant relationship with perceived effect of climate in arable crop production. The year of schooling of a farmer can help him/her understand climate change in his environment, high number of school years results to consciousness and better understanding of event in the surrounding environment. Also, farmers that have been into farming over a longer period of time must have witnessed a change in weather variables, the more farming experience a farmer possess the higher his perception of climate change.

Therefore, null hypothesis is rejected and alternative hypothesis accepted.

H_a: There is significant relationship between the socio-economic characteristics of the respondents and the perceived effect of climate change on arable crop production.

Table V: Test of Significant relationship between socio-economic of respondents and perceived effect of climate change in crop production (PPMC).

Statements	Correlation coefficient	Significance level	N	Results	Decision
Age	0.052	0.573	120	NS	Accept Hol
Marital status	0.083	0.366	120	NS	Accept Hol
Gender	-0.040	0.668	120	NS	Accept Hol
Religion	-0.021	0.816	120	NS	Accept Hol
Educational level	-0.029	0.752	120	NS	Accept Hol
Year of schooling	0.256	0.005	120	S	Reject Hol
Major occupation	0.66	0.473	120	NS	Accept Hol
Minor occupation	0.141	0.125	120	NS	Accept Hol
Household size	0.086	0.350	120	NS	Accept Hol
Farming experience	0.279	0.002	120	S	Reject Hol
Source of information	0.175	0.055	120	NS	Accept Hol

Field survey, 2018.

Significance level is ≤5%

For the second hypothesis, Pearson product moment correlation (PPMC) was also employed to determine the correlation between climate change perception and adaption measures employed. However, the result shown in the table below shows that adaption measures employed by the respondents shows a direct positive correlation with climate change perception. This reveals that adaptation measures increases as perception increase, farmers tend to increase the use of adaptive measure as a result of a little knowledge of climate change in the study area.

Therefore, null hypothesis is rejected and alternative hypothesis accepted

H_a: There is significant relationship between the adaption measures employed and the climate change perception.

Table VI: Test of significant relationship between adaptation measure and climate perception using Pearson Product Moment Correlation.

Perception	Correlation Coefficient	Significant level	No. of respondents	Remarks
Adaptation	0.588**	1%	120	Significant

Field Survey, 2018

Significance level is ≤5%

CONCLUSION

It is concluded that farmers perceived the changes in climate and are adapting to the effect of the change in their own little ways. The results shows that majority of the respondents were sparingly educated and do not have access to credible information on climate change. Due to low outputs from farms, as a result of low rainfall and increased temperature, farmers appear to be abandoning mono-cropping for multiple cropping and most of the farmers are diversifying their livelihood from food crop production. While, farming experience and access to

quality education were found to promote adaptation.

RECOMMENDATION

Government policies must aim at promoting farm level adaptation; timely advice and help from research institution and training workshop for arable farmers, use of interpersonal and mass media for farmers awareness and timely and accessible meteorological reports on fluctuating climatic variables

REFERENCES

Adebayo, O, O. (2012) Climate Change Perception and Adaptation Strategies on Catfish Farming in Oyo State, Nigeria Global Journal of Science Frontier Research Agriculture and Veterinary Sciences Volume 12 Issue 6 Version 1.0.

Adger, W.N.; Huq, S.; Brown, K.; Conway, D. Hulme, M. (2003). Adaptation to climate

change in the developing world. Progress in Development Studies 3: 179-195.

Agwu, E.A.; Egbule, C.L., Amadu, F.O.; Morlai, T.A.; Wollor, E.T. and Cegbe, L.W. (2012).

What policy options can promote agricultural innovations for climate change adaptation and food security in the West African Sub-region African Technology Policy Studies Network. Technology Brief No.29. www.atp~net.org.

Apata T. G., K. D Samuel, A.O Adeola, (2009) Analysis of Climate change perception

and Adaptation among Arable Food Crop Farmers in south Western Nigeria. paper presented at the conference of International Association of Agricultural Economics pp.2-9.

Ayanwuyi, E Kuponiyi, F.A Ogunlade, Oyetoro J. O (2010) Farmers Perception of lmpact of Climate Changes on Food Crop Production in Ogbomosho Agricultural Zone of Oyo State, Nigeria Global Journal of Human Social Science Vol. 10 Issue 7 307-311.

Ifeanyi-obi C.C, Etuk U.R Jike wai O. (2012) Climate change, effects and adaptation strategies; implication for agricultural extension system in Nigeria. department of agricultural economics and extension university of port Harcourt Nigeria.

Intergovernmental Panel on Climate Change (IPCC), (2007): Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change Parry, Martin 1., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul 1., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

Intergovernmental Panel on Climate Change-IPCC (2007). Climate change Impact adaptations and vulnerability. In: Parry, M.C., Canzien, O.F., Palulikot,J.P., van der Linden, Paul, J. and Hanson, C. (eds.). Contribution of Working group II to the 4th Assessment Report of the IPCC. Cambridge: University Press, Cambridge.

Lobell D.B, Burke M.B, Tebaldi C, Mastrandrea M.D, Falcon W.P, and Naylor R.L (2008).

"Prioritizing climate change adaptation needs for food security in 2030". Science 319 (5863): 607-10

Oluwasusi J. O. (2013) Farmers adaptation strategies to the effect of climate variation on yam production in Ekiti State, Nigeria College of Agricultural Sciences, Department of Agricultural Extension and Rural Sociology, Afe Babalola University Ado - Ekiti (ABUAD) Journal of Food, Agriculture & Environment VaLlI (2): 724-728.

Salau, E.S.; Onuk E.G. Ibrahim, A. (2012) Department of Agricultural Economics and Extension Nasarawa State University, Keffi. Knowledge, Perception and Adaptation Strategies to Climate Change among Farmers in Southern Agricultural Zone of Nasarawa State, Nigeria Journal of Agricultural Extension Vol. 16 (2).

Sofoluwe N. A., A. A. Tijani O. I. Baruwa (2011) Farmers' perception and adaptation to climate change in Osun State, Nigeria Department of Agricultural Economics, Obafemi Awolowo University, Ile-ife, Osun State, Nigeria. African Journal of Agricultural Research Vol. 6(20), pp. 4789-4794.

Zoellick, Robert B. (2009) A Climate Smart Future. The Nation Newspapers. Vintage Press Limited, Lagos, Nigeria. Page 18

www.worldpopulationreview.com (2019). Accessed on 7th January 2019