



## **Rice Farmers Knowledge and Attitude towards Climate Change in Southeast, Nigeria**

**S. U. Ujoh<sup>1</sup>, Chijioke A. Anya<sup>2</sup> and C. K. Igwe<sup>3</sup>**

*Department of Rural Sociology and Extension  
Michael Okpara University of Agriculture, Umudike*

E-mail: [sujoh@yahoo.com](mailto:sujoh@yahoo.com)

+2348037557101

[anyachijiokeakunnaya22@gmail.com](mailto:anyachijiokeakunnaya22@gmail.com)

+348034868189

[igweclara\\_gmail.com](mailto:igweclara_gmail.com)

+2348063480927

### **Abstract**

This paper analyzed rice farmers' knowledge and attitude towards climate change in Southeast. The specific objectives were to; describe the socio-economic characteristics of rice farmers; assess the level of knowledge of climate change among rice farmers; and determine rice farmers' attitude towards climate change. A purposive random sampling technique was used in selecting 160 rice farmers'. Data were collected using structured questionnaires, and analyzed using descriptive statistics. The findings showed that majority (58.88%) of the farmers were in their active and economic age bracket of 30-49 years. Majority (78.75%) were males, while (88.13%) were married and a greater proportion (46.25%) had primary education. The result also depicted that (28.13%) of the respondents had an income of over ₦60,000 per annum. About (84.38%) had rice farming as their main occupation while (33.63%) had farming experience spanning up to 13-15 years. Most of the respondents (28.75%) and (27.50%) had large household sizes respectively, with mean household size of 6 persons, mean farming experience of 8.80 years, mean farm size of 1.5 hectares and mean annual income of ₦34,100. All the respondents had high knowledge of climate change about rice production. Such knowledge as proper tillage reduces weed growth with a mean value of ( $X=3.84$ ), moisture stress causes severe damages to crops ( $X=3.81$ ), and heat stress through increased temperature limits rice productivity ( $X=3.77$ ). Climate change is one of the ways God deals with evil in the world ( $X=2.59$ ), I do not consider climate change when thinking about my future ( $X=3.04$ ) and associating climate change with droughts, floods and heat stress over the last decades ( $x=3.06$ ) where the different attitudinal disposition of the respondents.

**Key words:** Rice farmers, Knowledge, Attitude, Climate Change

### **Introduction**

Rice (*Oryza sativa*) is a food crop of worldwide importance and forms the foundation of the diet of over three billion people, constituting half of

the world's population (Cantral and Reeves, 2002). It is difficult to find rice missing on the daily menu of most Nigerians, or the refreshment list of important ceremonies like weeding, burial or

birthday parties. Rice is consumed in all households in Nigeria, which cuts across all tribes and groups of people. Rice cultivation is carried out in all regions having necessary warmth and abundant moisture favorable for its growth, mainly subtropical rather than hot or cold areas. Nigeria has the capacity to be self-sufficient in rice production because virtually all agro-ecological zones in the country are suitable for rice cultivation (Erenstein, 2003).

In recent times rice farming in Nigeria has been badly affected by increasing temperatures, irregularities in rainfall patterns and lower amount of precipitation. This has been attributed to climate change, which is also known as global warming. Available evidence shows that climate change is global, likewise its impacts, but the most adverse effects will be felt mainly by developing countries especially those in Africa due to their low level of coping capabilities (Nwafor, 2004). Despite technological advances such as improved rice varieties and irrigation systems, weather and climate are important factors, which play significant role in rice production (Wassmann, 2010). Climate change refers to the change in climate,

which is a direct result of anthropogenic factors, which increases the concentration of greenhouse gases. These gases include carbon dioxide (CO<sub>2</sub>), Nitrous Oxide (N<sub>2</sub>O), Methane (CH<sub>4</sub>) and Ozone (O<sub>3</sub>). According to Fuehrer (2011), rice farmers are worst hit by climate change in Nigeria, with the season less predictable

Rice is grown in more than 100 countries under widely differing climatic conditions and is particularly productive in tropical regions with abundant moisture. Rice farmers usually choose varieties that are adapted to their region's length of growing season, soil, altitude, and for paddy farmers the depth of water in the field. In Nigeria, rice is important for several reasons. It has the potential to improve nutrition, boost food security, foster rural development and support sustainable land use in Africa (NRC, 1996). The River Niger drainage system is a major rice growing environment. Nigeria has a leading role in rice production in West Africa ranking highest as both producer and consumer of rice in the sub-region with production figures slightly above 50% (Imolehin and Wada, 2000). Mainly two types of rice are cultivated in Nigeria, African

rice (*Oryza glaberima*) and the Asian rice (*Oryza sativa*). According to Jones (1995) the African rice (*O glaberima*) originated from the wild rice (*O, barthii*) some 350 years ago and its offspring domesticated probably in the in-land delta area of Nigeria from where it spread through the upper Niger valley to the rest of West Africa. For the Niger Benue through Sokoto-Rima and Chad Basin, rice has been in cultivation long enough for a rice culture to evolve going as far back as 1500BC (Imolehin and Wada, 2000).

In the Southeast, excessive flooding, iron toxicity and lack of irrigation control has been the bane of low land swamp rice production in Ebonyi State, particularly in Abakaliki area that is attributed to climate change. Farmers have interesting farming system whereby giant mounds are made at the onset of rains and yams planted at the top of the mounds with groundnuts at the base. With the early rains groundnut is harvested and the mounds broken down and puddle by hand and crop residues incorporated into the soil. At this time, the fields are flooded and rice transplanted. Although the system suffices, there can be total crop failure in a year when the Cross

River overflows its banks (Imolehin and Wada, 2000). The crop can grow on different types of soil provided there is adequate supply of moisture. However, rice grows best on rich loam to clayey soils able to retain water and with adequate humus.

Also in Imo State, Ihitte-Uboma is the major rice producing area. It is known for its lowland rice fields. The farmers plant rice varieties like FARO 44 and FARO 52 for swampy areas, FARO 46, and FARO 55 for upland rice cultivation. These varieties could yield as much as 4.5 tons/hectare (USAID, 2008). Rice farmers in this area have been cultivating about 8,000 hectares of land through rain-fed agriculture in the last several years, but the situation has deteriorated to less than 2,000 hectares following massive onslaught of climate change events. It is quite difficult to plough rice fields after the very first rain, or to make multiple harvests in one year. The harvesting shrinkage and diminishing income is further exacerbated by endemic water mismanagement and inappropriate land use by farmers. This has led to soil erosion and loss of soil's productive capacity. The consequence is threatened

food security and livelihood for hundreds of rice farmers in the Southeast agricultural zone of Nigeria (Ezeji, 2008). The farmers in Ihitte transplanted or seeded rice directly into the soil to slightly sloping fields with variable depths and duration of flooding depending on rainfall. Most of these farms are located along the flooded valleys of Imo River. Rice farms tend to be small-scale with farm size of 1-2 hectares (Ezeji, 2008). Consequently, research has shown that Abakaliki soil produces one of the best rice varieties in Nigeria (USAID, 2010). Given the fundamental role of agriculture to human welfare, concerns have been expressed by Federal agencies regarding the potential effects of climate change on agricultural productivity.

### **Methodology**

The study was conducted in Southeast. The area is located between latitudes 5° 06'N to 6° 34' N of the equator and longitudes 6° 38' E and 8° 08' E (Microsoft Corporation). The zone is dominated by plains less than 200mm above sea level. Three major landforms are plains, lowlands and the eastern highlands. Three distinct vegetation found in the zone are humid forest, derived

savannah and semi-montane. The mean annual rainfall varies from 1500mm in the northern fringes of Enugu and Anambra States and over 300mm in the coastal areas. The zone comprises of Abia, Imo, Anambra, Enugu and Ebonyi States. The major soil types found in the area are fluvisol, cambisol, rigosol aerosol and acrisol. Land in the area is used predominantly used for arable and tree crops production. The total arable land in the zone is 5.8 million hectares, out of which 2.8 million hectares are under cultivation (Ekwe, 2004). The occupation of the indigenes is mainly farming and trading.

The target population for this study comprised of adult rice farmers whose main occupation is rice production. Data were collected from 160 randomly selected farmers using questionnaires, while data were analyzed using percentages, frequency distribution, and mean scores. The level of knowledge about climate change among rice farmers was measured by asking the respondents knowledge questions like crop lodging is attributable to excessive flooding, knowing the risks of rainfall irregularities encourages crop diversification, Heat stress through increased

temperature leads to poor yield and so on. A four-point likert type scale with four response options of strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD), scaled 4-1 respectively. This was applied to either accept or reject rice farmers` knowledge about climate change. The no of items of the scale was added up to obtain a grand mean of 10, which was divided to obtain a value of 2.5. Any item with a mean  $\geq 2.5$  was regarded as agreed which implied that the respondent had high level of knowledge about climate change. While any item with a mean  $\leq 2.5$  was regarded as respondent with low level of knowledge about climate change. To determine rice farmers` attitude towards climate change was measured by asking each respondent how he or she agreed or disagreed to a list of attitudinal questions towards climate change like, associating climate change with drought, floods and heat extremes, people from developed countries are responsible for climate change, I have no control over climate change and so on. A four-point likert type scale with four response options of strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD), scaled 4-1 respectively. This

was applied to either accept or reject rice farmers` attitude towards climate change. The no of items of the scale was added up to obtain a grand mean of 10, which was further divided to obtain a value of 2.5. Any item with a mean  $\geq 2.5$  was regarded as agreed which implied that the respondent has positive attitude towards climate change. Whereas any item with a mean  $\leq 2.5$  was regarded as disagreed which implied that the respondent had negative attitude towards climate change.

## **Result and discussions**

### **Socio-economic characteristics of rice farmers**

**Table 1.0:** This table discussed rice farmers` socio-economic characteristics under the following variables age, gender, level of education, marital status, main occupation, Household size, farm size, farming experience, and income level of the respondents in the study area.

**Age (Years):** Table 1.0 revealed that majority (56.88%) of respondents were in their active and economic age bracket of 30-49 years. They are the very active and functional group with energy to carry on with the strenuous

activities involved in rice production. The mean age could also be as a result of risks involved or the high cash returns associated with rice production relative to other crops in the study area. The mean age of the respondents was 41.6 years. This is similar to the finding of Ozor *et al.*, (2010) which opined that the mean age of farming households in Southern Nigeria is 49 years.

**Gender:** About (78.75%) of the farmers` were male while (21.25%) were females. This indicates that men dominated rice production in the study

area. This scenario possibly indicates that males had more access to land than their female counterparts, who worked on family plots. Only few women mostly the widowed or divorced had legal control over land and crops they cultivated. Earlier studies on extension program show similar results of higher males than females in rice production in Southeast, Nigeria (Solomon and Beulah). Another reason suggested that farming in this area may be mostly practiced by males, as was found by Dipeolu *et al.*, (2006).

**Table 1: Socio-Economic Characteristics of Respondents in the Study Area**

<b>Variables</b>	<b>Frequency (F)</b>	<b>Percentage (%)</b>	<b>Mean</b>
<b>Age (Years)</b>			
20- 29	27	16.88	
30 – 39	45	28.13	
40 – 49	46	28.75	41.6
50 – 59	32	20.00	
60 – 69	10	0.63	
<b>Gender</b>			
Male	126	78.75	
Female	34	21.25	
<b>Level of Education</b>			
Tertiary	23	14.38	
Secondary	36	22.50	
Primary	74	46.25	
No Formal	27	16.88	
<b>Marital Status</b>			
Married	141	88.13	
Others	19	11.88	
<b>Main Occupation</b>			
Rice Farming	135	84.38	
Others	25	15.62	
<b>Household Size</b>			
1 – 3	39	24.38	
4 – 6	46	28.75	6.3
7 – 9	44	27.50	
10 – 12	31	19.38	
<b>Farm-size (hectares)</b>			
0.5 – 0.7	44	27.5%	1.5
1 – 3	77	48.13%	
4 – 6	39	24.38%	
<b>Farming Experience (years)</b>			
1 -3	48	30.00	
4 – 6	31	19.38	8.8
7 – 19	1	1.60	
10 – 12	57	35.63	
13 – 15			
<b>Income (₦,000)</b>			
1 – 4	9	5.63	34.1
5 – 10	10	6.25	
10 – 20	16	10	
20 – 30	30	18.75	
30 – 40	35	21.88	
40 – 50	15	9.38	
50 – 60	45	28.13	

**Source:** Field Survey, 2012

**Educational attainment:** The result showed that majority (46.25%) of the farmers acquired primary education. This is in support of Solomon (2008) who stated that majority of present day farmers had some formal education. Maddison (2006) also stated that educated and experienced farmers have more knowledge and information about climate change and agronomic practices.

**Marital status:** Result shows that majority (88.13%) of the farmers were married, while (11.88%) were widowed, divorced or single. This implies that many married people engaged in rice production to raise their standard of living and also get assistance from their spouses in carrying out some activities on the farm.

**Main occupation:** Greater percentages (84.38%) of the farmers were engaged in rice farming as their main occupation. This was not surprising as the study was targeted at rice farming households whose main occupation was rice production.

**Household size:** Majority (28.75%) of the respondents had a household size of 4-6 persons. This implies that farmers with large household size could probably make use of their family labor in rice production. This is in line with Olowu (2000) who stated that for local production to improve, it should involve males, females, old and young for increased productivity. The mean household size was 6 persons. This indicates that the farmers were maintaining large

household sizes. This is normal and expected in a typical African rural community where fecundity is encouraged, and celebrated (Ekong, 2003).

**Farm size (Hectares):** The result also indicates that about (48.13%) of the respondents had farm holdings in the range of 1-3 hectares. This implies that most of the respondents were small-scale farmers, who practiced subsistence farming using local farm implements like hoes and cutlasses. The research is in accordance with the findings of Bello *et al.*, (1998) who reports that majority of farmers of Sokoto-Rima basin operate on a small-scale basis with only 2-3 hectares of fadama plots under cultivation. The mean farm size was 1.5 hectares. Most of the respondents are resource poor farmers who maintain very marginal income. This limits their ability to buy or procure land for more productive agriculture.

**Farming experience (Years):** The finding also depicts that majority (35.63%) of the respondents had farming experience of 13-15 years, with mean farming experience of 8.8 years. This indicates that the respondents had acquired enough experience in rice production. Iheke (2010) reports that the number of years a farmer has spent in the business of rice farming may give an indication of the practical knowledge he has acquired on how to overcome certain inherent farm production problems.



**Income (N, 000):** The result equally shows that about (28.13%) of the farmers had an income of N60, 000 and above per annum and a mean income of N34,100 per annum. The annual income earned by the farmers

in the study area seemed very low. Their small land holdings could be responsible for the low annual income and poor adoption of farm technologies.

**Table 2.0: Mean Distribution of Respondents Level of Knowledge about Climate Change in South-East, Nigeria**

This table reveals that majority of the respondents (M=3.84) were aware that proper tillage reduces weed growth, because weed competition is the major constraint that limits yield in many crops. Moisture stress causes severe damages of young plants with mean value of (M=3.81), this means that in upland rice cultivation, moisture stress causes severe damages or even death of rice

plants in areas that receive as much as 200mm in one day and then rain stops for the next 20 days. This may lead to complete crop failure especially if the stress occurs during reproductive stages (Nguyen, 2004). The table also depicted that heat stress through increased temperature (M=3.77) could as well lead to poor crop development and poor yield. The result is in accordance with of Khanal (2009) who noted that heat stress affects the whole physiological development, maturation and finally reduces the yield of cultivated crops.

**Table 2.0: Mean responses and standard deviation of Respondents level of knowledge about climate change in Southeast, Nigeria**

Indicator for Knowledge	Mean	Std Dev.
Crop lodging attributable to excessive flooding	2.71	0.58
Increasing types and occurrences of pests and diseases	3.42	1.02
Knowing the risk of rainfall irregularities enhances crop diversification	3.52	1.16
Heat stress through increased temperature limits rice productivity	3.76	1.48
Proper tillage reduces weed growth	3.84	1.64
Knowledge of poor and unpredictable yields encourages fertilizer application	3.22	0.88
Occurrences of extreme drought leads to total crop failure	3.32	1.01
Total avoidance of bush burning increases soil fertility	3.45	1.05

Others include knowing the risks of rainfall irregularities enhances crop diversification (M=3.53), when a farmer plants different types of crops on her farm, there is the tendency that rainfall irregularities will affect the crops differently. Increasing types and occurrences of pests and diseases ((M=3.42), Occurrences of extreme drought leads to total crop failure (M=3.32), knowledge of poor and unpredictable yields (M=3.22) and the last statement revealed that crop lodging is attributable to climate change (M=2.71). Thus the variations in the farmers` responses may be due to their knowledge level about climatic factors. It also implies that most of the respondents know that adverse climatic factors usually lead to decrease in agricultural production. This is in line with the findings of Umoh and Eketelpe (2010) that effects of climate change on farming activities increase pests and diseases infestation.

**Table 3 Mean Distribution of Respondents Attitude towards Climate Change in South-East, Nigeria.**

Attitudes are the established ways of responding to people and situations that we have learned based on the beliefs, values and assumptions we hold (Vadim, 2009). Attitudes become manifest through behaviour. It is also a complex mental state involving beliefs, feelings and value dispositions to act in a certain way. Some farmers believe that environmental and resource problems can easily be dealt with via science and technology rather than through changes in behaviour that led to problems in the first place. Analysis of the respondents attitude depicts that majority of them were considered positively inclined towards climate change.

The result in the table depicted some attitudinal dispositions exhibited by the respondents towards climate change. In general, attitudes were significantly positive for seven out of the nine statements listed as was shown by a statistical change in mean scores. Majority (M=3.06) of the respondents agreed with the

statement associating climate change with drought, floods and extreme heat over the last decades. This was followed by I do not take climate change into account when thinking about my future (M=3.04), I am uncertain about the ability of my farm to adapt to climate change (M=2.99).

**Table 3.0: Mean and standard deviation of Respondents Attitude towards climate change issues in Southeast, Nigeria.**

Indicators for Attitude	Mean	Std Dev.
Climate change or global warming will not hurt or affect me	2.27	0.37
Greenhouse gas emissions from human activities are responsible for global warming	2.85	0.56
Climate change is none of my business	2.64	0.64
I do not take climate change into accounts when thinking about my future	3.04	0.87
Climate change is one of the ways God deals with evil in the world	2.59	0.55
People from developed countries are responsible for climate change	2.86	0.65
Indiscriminate felling of trees does not cause climate change	2.43	0.38
I am uncertain about the ability of my farm to adapt to climate change	2.99	0.64
Associating climate change with droughts, floods and heat stress over the last decades.	3.06	0.72

**\*Mean  $\geq$  2.50**

Other variables include people from developed countries are responsible for climate change (M=2.86), greenhouse gas emissions from human activities are responsible for global warming (M=2.85). This agrees with World Bank findings (2008) which states that Nigeria accounts for roughly one-sixth of worldwide gas flaring. Human activities like deforestation, bush burning, improper waste

management and excessive use of agrochemicals have exacerbated climate change and its impacts on agriculture in some communities in Nigeria. Furthermore, Edino *et al.*, (2010) examined peoples` perception and attitudes towards gas flaring in the Niger Delta Region. The research concluded that most residents appear to be resigned to the continued presence of gas flaring activities in the communities. However, many

respondents agreed to negative statements like, climate change is none of their business (M=2.64), another group of farmers agreed that climate change is a feeling of punishment from God (M=2.59). Conclusively, farmers` showed

negative attitude on two negative statements towards climate change which include climate change or global warming will not hurt or affect me (M=2.27) and Indiscriminate felling of trees does not cause climate change (M=2.43).

## References

- Bello, H.M., Singh, B.C. and Garba, V.A. (1998). Improvement strategies for Fadama farming in Sokoto State.
- Cantral, R.P. and Reeves, T.G. (2002). The cereals of the world`s poor takes center stage, *Sciences* 296, 53.
- Dipeolu, A.O., Bello, K.A. and Akinbode, S.O. (2006). Comparative economic analysis of organic and inorganic vegetable production in Ogun State, Nigeria. *Proceedings of the second National Conference on Organic Agriculture*, University of Ibadan, Ibadan, Nigeria. 27-29 November, 2000. Pp 24.
- Edino, M.O., Nwafor, G.N. and Bombom, L.S. (2010). Perceptions and attitudes towards gas flaring in the Niger Delta, Nigeria. 30: 67-75.
- Ekong, E.E. (2003). *An introduction to Rural Sociology* (2<sup>nd</sup> Edition) Ugo Dove Educational Publishers.
- Ekwe, K.C. (2004). Factors associated with the utilization of an improved Gari processing technology in South-east, Nigeria. Ph.D Dissertation MOUAU Umudike Pp 48-50.
- Erenstein, O., Lancon, F., Akande, S.O., Titilola, S.O., Akpokodje, G. And Ogundele, O.O. (2003). *Rice production Systems in Nigeria. A survey . The Nigerian Rice Economy in a Comparative World Constraints, Opportunities and Strategies Choices.* WARDA, Abidjan.
- Ezeji, J.I. (2008). *Travails of rice production in Ihitte-Uboma Adapting to Climate Change: A Long Walk with Uboma Rice Farmers.*
- Fuehrer, M. (2011). *Sustainable Farming Practices: Key to combating climate change.* <http://www.edu.de/dw/article/o,1488033,00.html>
- Iheke, O.R. (2010). *The impact of migrant remittances on efficiency and welfare of rural smallholder arable crop farm households in South-east, Nigeria.* Ph.D Dissertation, Michael Okpara University of Agriculture, Umudike.

- Imolehin, E.O. and Wada, A.E (2000). Meeting the rice production and consumption demand in Nigeria with improved technologies, *International Rice Commission Newsletter* 49, 23-41.
- Jones, M.P. (1995). The rice plant and its environment, WARDA. Training Guide 2, 27-30.
- Khanal, R.C. (2009). Climate Change and agriculture. *The journal of agriculture and environment* vol. 10, pp 100-110.
- Maddison, D. (2006). The perception of adaption to climate change in Africa. CEEPA Discussion Paper No 10, CEEPA, University of Pretoria.
- National Research Council (1996). *Lost Crops of Africa: Grains* National Academies press, Washington D.C, 17.
- Olowu, A.T. (2000). Agricultural Extension Proceedings of the 6<sup>th</sup> Annual National Conference of the Agricultural Extension Society of Nigeria.
- Solomon, A.V. and Beulah, E.E. (2008). "In cooperating subsistence Farmers` perspective into Extension Education and Dissemination of Technology on New and Underutilized Crops". *Agricultural Journal*, 3(5) 319-322  
<http://medwelljournal.com/medtrck/login.php>.
- United States Agency International Development (2008). Improved package of practices for rice production. USAID MARKETS from the American People (2008). Pp, 1-23.
- Vadim, K. (2009). The power of Attitude [online]. Retrieved January 17, 2010 from <http://www.100ventures.com/uk.html>.
- Wassmann, R., Butterbach-Bahl, K. and Dobermann, A. (2007). Irrigated Rice Production Systems and Greenhouse Gas Emission. *Crop and Residue Management Trends, Climate Change Impacts and Mitigation Strategies*. CAB Review: Perspective in Agriculture, Veterinary Science, Nutrition and Natural Resources, 2(4), pp, 14.