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Analysis of climate change awareness in Nigeria

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The science of climate change, its effects and adaptation measures have received much attention but climate change education and awareness are given very little attention. This prompted this study that analyses the level of climate change awareness in Nigeria. 1200 copies of the Questionnaire were administered in the two climatic zones (Tropical Maritime (mT) and Tropical Continental cT) of Nigeria. In mT climatic zone, three states were randomly selected and 4 in cT which summed up to seven states. In each state, the state capital was purposefully selected while a rural area within 100 km radius of the state capital was also randomly selected. The data were analysed using statistical techniques like percentages and Chi-square among others. The results show that majority of the respondents either in the rural or urban areas have limited knowledge about climate change while their sources of information slightly differ. Although aware that the climate is changing, majority are not aware of the impacts of climate change outside their immediate environment. Majority are not aware of the adaptive measures to be taken in the face of climate change impacts. The paper recommended among others that for sustainable development and to reduce the causal factors and effects of climate change, climate change education and awareness campaign must be vigorously pursued by all levels of government and NGOs.

Key words: Climate change awareness, environment, climatic zones, Tropical Maritime (mT), Tropical Continental (cT)

INTRODUCTION

IPCC (2007) Fourth Assessment Report (AR4) gave the most current and acceptable definition of climate change, which states that “climate change is a change in the state of the climate that can be identified (eg., by using statistical tests) by changes in the mean and /or the variability of its properties, and that persists for an extended period typically decades or longer”. Climate change is different from the generally known terms like climatic fluctuations or climatic variability. Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Climate may vary on a large range of spatial and temporal scales. Spatial scales may range from local (less than 100,000 km^2), through regional (100,000 to 10 million km^2) to continental (10 to 100 million km^2).

Temporal scales may range from seasonal to geological (up to hundreds of millions of years). Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

The key to understanding global climate change is to first understand what global climate system is and how it operates. At the planetary scale, the global climate is regulated by how much energy the Earth receives from the Sun. However, the global climate is also affected by other flows of energy which take place within the climate system itself. This global climate system is made up of the atmosphere, the oceans, the ice sheets (cryosphere), living organisms (biosphere) and the soils, sediments and

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rocks (geosphere), which all affect, to a greater or lesser extent, the movement of heat around the Earth's surface. The atmosphere, however, does not operate as an isolated system. Flows of energy take place between the atmosphere and the other parts of the climate system, most significantly the world's oceans. The significance of the oceans is that they store a much greater quantity of heat than the atmosphere. The top 200 m of the world's oceans store 30 times as much heat as the atmosphere (Ngungar, 2010). Therefore, flows of energy between the oceans and the atmosphere can have dramatic effects on the global climate. A drastic change in the climate systems either due to natural forces or unsustainable human activities results in climate change.

The alteration of the climate system which leads to climate variation and change is caused by both natural and anthropogenic factors. The cause of the current climate change has been attributed to anthropogenic factors and among the anthropogenic factors; fossil fuel burning that produces carbon is a major contributor. While these carbons are released more by the developed nations, the developing nations are worse hit by the adverse effects of climate change caused by these carbons and other greenhouse gases like methane, nitrous oxides and chlorofluorocarbons among others (IPCC, 2007).

Various scientists have studied the different components of climate change to some extent. The causes of climate change have been scientifically studied and showed that industrialization, urbanization, water pollution, deforestation and transportation are among the highest contributors (IPCC, 2007; Hengeveld et al., 2005; Nwafor, 2007; Odjugo, 2009). Other researchers have concentrated on the effects of climate change and revealed that it has started impacting and will continue to impact on human health, ecological destabilization, melting of polar ice, sea level rise, coastal flooding, desertification, aggravation of coastal and gully erosion and extreme weather conditions among others (IPCC, 2007; Ayuba et al., 2007; Odjugo, 2009). Some research efforts have also been focussed on mitigation and adaptation to climate change and the few studies in this area show that while climate change is caused more by the developed countries, the developing nations will suffer more of the effects because of their high level of vulnerability and low level of adaptation measures due to poverty and low technological development (Abiodun and Olabinupe, 2007; Nwafor, 2006; Adefolalu, 2007; Jagtap, 2007; IPCC, 2007;Odjugo, 2010).

The above review shows a quite array of research works in the science of various aspects of climate change. But the pertinent question is this: Is the outcome of these studies on climate change available to the general populace? Rukevwe (2008) shows that much emphasis has been devoted to the science of climate change but the education of the people on the causes and impacts is lacking. Pam (2007) also reveals that while the concept of climate change is fully known to majority of those in the atmospheric science, it might not be so for many educated individuals in other disciplines and the uneducated ones. He therefore calls for studies on climate change education and awareness. It is the dearth of information on climate change awareness that prompted this study which focuses on the analysis of climate change awareness in Nigeria.

MATERIALS AND METHODS

The paper is designed to look into climate change awareness in different climatic zones of Nigeria. Information is therefore needed from people on how well informed they are on the concept of and consequences of climate change. To do this, the country was divided into two eco-climatic zones found in Nigeria namely; Tropical Maritime (mT) and Tropical Continental (cT). In each climatic belt, three and four states were randomly selected respectively and they include Lagos, Rivers, and Imo states in the mT and Yobe, Zamfara, Niger and Adamawa states in the cT (Figure 1).

In each of the states, an urban and rural settlement was selected and 200 copies of the Questionnaire were administered. While 150 copies of the Questionnaire were administered in each urban area, 50 were used in each rural area. In each urban area, three quarters were randomly selected and in each quarter, the names of the streets were written and five streets were randomly selected. In each street, 10 copies of the Questionnaire were administered using the systematic random sampling. In the street, every other inhabited building was selected and the questionnaire was administered to any adult in the house who volunteered to answer the questions. In each rural area, five quarters were randomly selected and in each quarter, 10 copies of the Questionnaire were administered to respondents using every other inhabited building. Like in the urban area, a respondent was selected in each house to answer the question.

In all, 1200 copies of the Questionnaire were administered. While 900 copies of the Questionnaire were administered in the urban centres, the remaining 150 went to the rural areas. To solicit volunteered options and avoid prompted or guided answers, the respondents were asked to list five causes, effects and remedial measures of climate change and rank them. During the interview and group discussion, the respondents were allowed to freely express themselves.

The data were analysed using percentages, ANOVA and the T-Test. While the percentages helped us to determine the most outstanding factor the respondent chose to be the cause, effects and remedial measures of climate change, the ANOVA and T-Test helped us to analyse whether the observed variations are statistically significant.

RESULTS AND DISCUSSION

The respondents were made up of male (47%) and female (53%). While the single males and females respondents were 33%, the married, divorced, windowed and separated were 58, 5, 3 and 1% respectively.

As shown in Table 1, 49% of the respondents have stayed in the study area for over 30 years, while others have spent a little below 10 and 29 years. The respondents have been living in the study area long enough to notice changes in the weather condition over

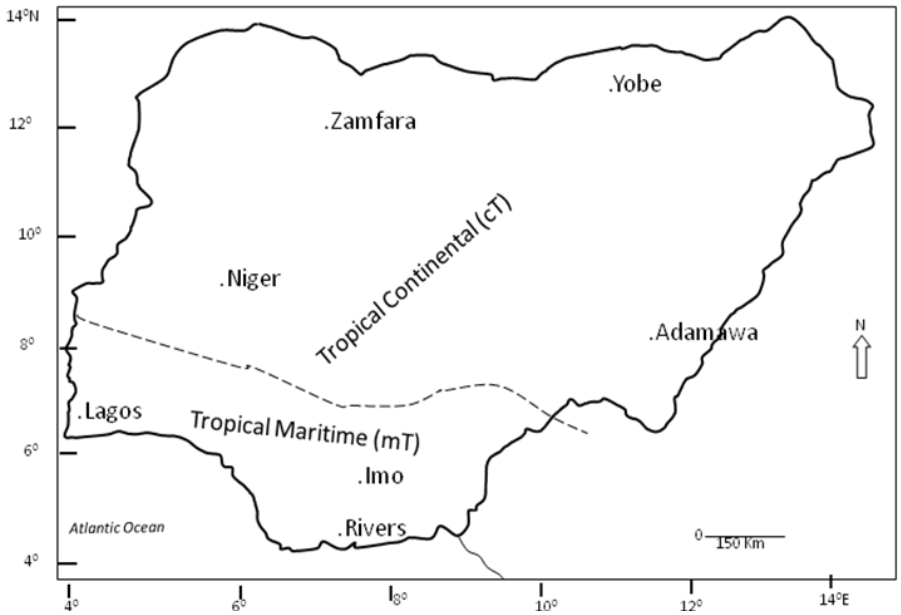

Figure 1. Nigeria showing the study area.

Table 1. Length of stay in the study area.

Length (Years)	%
Above 30	49
20-29	38
10-19	11
Below 10	2

Table 2. Educational status of respondents.

Educational status	%
Ph.D	3
Masters Degree	15
First Degree	31
NCE/OND	20
School Certificate	19
Primary School	6
No formal education	6

Table 3. Occupational status.

Occupational status	%
Public/Civil Servants	31
Students	21
Agriculture	20
Applicants	18
Business	9
Others	1

time. The educational status of the respondents is shown in Table 2 where 69% of the respondents obtained tertiary Institution certificates, ranging from OND and PhD degrees. While 25% had Secondary and Primary School Leaving Certificates, 6% was without formal education. The educational composition of the respondents is a clear indication that they are knowledgeable enough to provide reasonable answers to issues related to climate change and the majority of those without formal education are farmers and fishermen who are used to weather conditions for their agricultural production.

The occupational status of the respondents reveals that the public / civil servants made up the bulk of the respondents followed by students and those in the agricultural sector like farming, fishing and animal husbandry (Table 3). The respondents were asked how much they know about climate change. In their responses, 72% of the Tropical Maritime (mT) and 75% of those in Tropical Continental climate (cT) showed that they have knowledge of and are aware of climate change (Table 4). Those who showed that they have not heard of or did not have knowledge of climate change stood at 27% in mT and 23% in cTl climate. Generally put, 25% of the respondents showed that they have no knowledge of climate change. While 52% of Nigerians have little knowledge of climate change, only 22% have much knowledge of climate change. This awareness level is relatively better than that reported by (Pugliese and Ray, 2009) which shows that only 44% of those in Sub-Sahara Africa are aware of climate change.

The awareness level is higher in the urban areas than in the rural areas (Table 5). The respondents who know

Table 4. How much do you know about climate change?

Region	Not heard of it (%)	Know little about it (%)	Know much about it (%)	No comment (%)	Aware (%)
Rivers	26	48	22	4	70
Imo	34	52	14	1	66
Lagos	20	56	23	1	79
Tropical Maritime (Mean)	26.7	52	19.7	2	71.7
Adamawa	30	45	21	4	64
Niger	29	50	18	3	68
Zamfara	18	55	25	2	80
Yobe	13	57	29	1	86
Tropical Continental	22.5	51.8	23.5	2.5	75.3
Mean	24.6	51.9	21.6	2.3	73.5

Table 5. How much do you know about climate change?

Region	Not heard of it	Know little about it	Know much about it	No comment
Urban	15.8	47.2	34.2	1
Rural	33.4	56.6	9	3.6
Mean	24.6	51.9	21.6	2.3

much about climate change were 34% in the urban areas and only 9% in the rural areas. This result is worrisome in that while only 9% of those in rural areas have much knowledge of climate change, almost 34% revealed that they do not know what climate change is all about. This clearly shows that information on climate change in the grassroots or the rural areas is poor. This is not a good omen for Nigeria's economy because it has been established that the impact of climate change is hitting harder those in the rural areas of African countries whereas the rural areas hold the agricultural strength of the continent (Rukevwe, 2008; Odjugo, 2010). So, if those in the agricultural sector of the country have little or no knowledge of climate change, then, adapting to the impacts of climate change will be problematic while food security of the country is in danger. Moreover, personal discussion with some of those who claimed to know much about climate change reveals otherwise as their knowledge is actually poor; since majority of them could not say what climate change actually means. In general, Nigerians understand climate change in terms of change in weather pattern. And this is limited to their sensual awareness of abnormal increase in the level of heat and the effect it has on farm yield in a rain-fed agricultural economy.

Those who are aware of climate change also made clear their sources of information as shown in Table 6. The respondents in the mT got to know of climate change mainly through television and radio presentations followed by printed materials like textbooks, bulletins, newspapers, newsletters, journals and leaflets (Table 6). In the cT, their major source of information is the radio, followed by television and printed materials. Radio is a major source of information in Zamfara and Yobe States while it is television in the other five states (Rivers, Lagos, Imo, Adamawa and Niger). The χ^2 results show that the variation of the respondents between the mT and the cT climatic zones on the sources of information about climate change is $\chi^2 = 2.4$, which is lower than the critical value of 3.84 at $p < 05$. This implies that the sources of information available to respondents are radically the same.

In the urban areas, television (77%) and printed materials (26%) are the major sources of information on climate change while it is the radio (41%) in the rural areas (Table 7). Respondents in the urban area have access to electricity and they also have money to buy television sets that is why they listen more to the television. Most rural areas in Nigeria have no electricity provided by the government and since most of the rural dwellers are very poor, they cannot buy generators or television sets. The basic truth about most rural dwellers in Nigeria is that, majority of them cannot afford the cost of buying a television set even if the electricity is there, so the best option is the radio transistor which they can afford. Another noteworthy result from the rural areas is the 7% who indicated that their knowledge of climate change is based on personal observation or experience. This is so because, most rural dwellers in Nigeria are in the agricultural sector; be it farming, fishing or animal rearing. This makes them to be in constant touch with nature, most especially when over 95% of agricultural

Table 6. Sources of information on climate change.

Information source	Rivers (%)	Imo (%)	Lagos (%)	mT (%)	Adamawa (%)	Niger (%)	Yobe (%)	Zamfara (%)	cT (%)	Mean
Television	50	57	61	56	40	44	34	31	37.3	46.7
Radio	14	7	8	9.7	33	38	45	43	39.8	24.8
Printed materials	21	25	15	20.3	8	6	9	10	8.3	14.3
Lecturers/teachers	8	5	9	7.3	6	3	2	4	3.8	5.6
Friends/colleagues	5	3	6	4.7	6	4	2	5	3.8	4.3
Personal observation	2	3	1	2	7	5	8	7	6.8	4.4

Table 7. Sources of information on climate change.

Information source	Urban (%)	Rural (%)	Mean (%)
Television	78.6	14.8	46.7
Radio	9.1	40.5	24.8
Printed materials	26.2	2.4	14.3
Lecturers/teachers	9.4	1.8	5.6
Personal observation	1.7	7.1	4.4
Friends/colleagues	5.4	3.2	4.3

practices in Nigeria are based on rain-fed agriculture (Okoye and Onietan, 2009). When asked whether they have noticed changes in climate over the years, 95% of the respondents showed that they have observed changes in the weather and climate in recent times, 4% claimed they have not noticed any change while 1% declined comment. Some of those who observed the changes in climate in recent times attributed the cause to Act of God (36%) (Table 8). Many of the respondents think that climate change is caused by God. The basic reason given is that climate change impacts are divine punishment being meted out on the world for the numerous sins that the entire world has committed against the environment and God who created it. This clearly shows the pervasive influence of religion on the perception of the environment; an idea (Pugliese and Ray, (2009) refer to as the 'God-frame' thinking. Religious leaders and groups as well as local people strongly believe that the changes in the weather pattern has been ordained by God so they see themselves as powerless and could do little or nothing to change events within their own environment, thereby leaving everything for fate to decide.

Seeing the large number and the academic status of respondents who believe that the cause of climate change is a divine punishment due to their sins prompted the researcher to go further to find out through interview and group discussions what their sins actually are that warrant this type of plague from God. The respondents, irrespective of their educational status and dwelling places (rural and urban), stated that mankind is composed of bad and greedy tenants on earth. They showed that man is destroying the whole forests (deforestation), polluting the air and water and burning the bushes indiscriminately. They revealed further that through greed and corruption, few people holding tight the wealth of the nations impoverishing many whose last resort for survival is the environment. These, they claimed, are serious sins against God, the creator of the earth, hence the climate change plague on the earth like the ten plagues on ancient Egypt (Exodus 7:19-12:31).

Other factors the respondents scored high among the causes of climate change are gas flaring (20%) and bush burning (15%). These causes, the respondents during interview also enumerated as acts of God. Most of the respondents believe that because of the serious sins against God, the acts of God is against them as a form of punishment. The three major causes of climate change that the respondents gave are in contrast with scientific factors researchers have observed over the years about the global causes of climate change. The scientific facts on climate change show that the major causes of global climate change are industrialization, urbanization, transportation and agriculture that release greenhouse gases (carbons, nitrous oxide, methane, chlorofluorocarbons among others) into the atmosphere (NEST, 2003; Odjugo, 2007a).

Although the reasons given by the respondents did not actually tally with the global causes of climate change, they revealed the local causal factors of atmospheric greenhouse gas concentrations in Nigeria. Gas flaring is a major source of air pollution in the Niger Delta region, although its impact is localized and statistically insignificant 20 km from the flare site (Odjugo, 2005,

Table 8. Perceived causes of climate change in eco-climatic zones.

Perceived causes	Rivers (%)	Imo (%)	Lagos (%)	mT (%)	Adamawa (%)	Niger (%)	Yobe (%)	Zamfara (%)	cT (%)	Mean
Act of God	33	29	36	32.7	41	35	44	40	40	36.4
Industrialization	6	9	16	10.3	4	5	2	3	3.5	6.9
Urbanization	8	7	6	7	5	4	3	5	4.3	5.7
Deforestation	5	8	5	6	7	8	9	10	8.5	7.3
Gas flaring	28	21	13	20.7	17	20	17	19	18.3	19.5
Bush burning	13	16	10	13	14	18	16	18	17	15
Transportation	2	4	8	4.7	6	3	2	2	3.3	4
Agriculture	3	4	3	3.3	3	5	4	2	3.5	3.4
Water pollution	2	2	3	2.3	3	2	3	1	2.3	2.3

2007b). A further proof of local knowledge of the causes of climate change is obvious in the regional results in Table 8, where those in Rivers State rated gas flaring very high. Lagos is an industrialized area and the respondents in Lagos also noted that industrial pollution is a major cause of climate change while respondents in the cT also mentioned bush burning as a major cause. Other factors which have strong scientific support on the causal factors of climate change are deforestation and water pollution. These factors reduce carbon sinks and enhance or upset the amount of atmospheric carbon concentration. The χ^2 results show that the variation of the respondents between the mT and the cT climatic zones on the causes of climate change is χ^2 =1.7, which is lower than the critical value of 3.84 at $p < 0.05$. This shows that the way Nigerians perceive the causes of climate change irrespective of their geographical locations is statistically the same. The urban dwellers perceive the main cause of climate change as the Act of God (31%); this was followed by gas flaring (14%), bush burning (11%) and industrialization (11%). The rural dwellers picked first the action of God against man's sins (Act of God) (41%) as the main cause of climate change, followed by gas flaring (25%), bush burning (19%) and deforestation (8%) (Table 9).

As regard the effects of climate change, the respondents revealed that increasing temperatures (22%), changes in rainfall pattern (14%), flood problems (10%), drought (9%) and increased erosion (8%) are the major effects of climate change (Table 10). Apart from this general pattern, regional pattern is also noticed. In Lagos and Rivers States, the most serious problems identified are flood and increasing temperatures while it was increasing erosion and temperatures and changes in rainfall pattern in Imo State. In the entire cT climatic zone, increasing temperature topped the list, followed by changes in rainfall pattern, increased occurrence of drought and desertification. These are the major effects in the study area but other very serious effects in other parts of the world are rated low. For instance, melting of the polar ice, sea level rise, coastal inundation and ecological destabilization that were rated high (Mcquire et al., 2002; IPCC, 2005; Odjugo, 2009) have very low rating in this study. Due to poor knowledge of climate change by the respondents, majority of them are not aware of the most dreadful effects of climate change in the global scene. The perceived effects of climate change between the mT and the cT climatic zones are with χ^2 of 4.6, which is higher than the critical value of 3.84 at $p <$ 05. This indicates that the way the respondents perceived the effects of climate change is spatially different.

Table 9. Perceived causes of climate change among urban and rural dwellers.

Perceived causes	Urban (%)	Rural (%)	Total (%)
Act of God	31.2	41.2	36.4
Industrialization	10.6	3.2	6.9
Urbanization	8	3.4	5.7
Deforestation	6.1	8.3	7.3
Gas flaring	14	25	19.5
Bush burning	11	19	15
Transportation	6	2	4
Agriculture	2.8	4	3.4
Water pollution	3.6	1	2.3

The perception of the rural and urban dwellers on the effects of climate change is also analysed. Their views actually reflect what is obtained in their locality. For instance, in the urban areas the respondents listed increasing temperature as the worst effect; this is followed by flood problems, changes in rainfall pattern and coastal inundation (Table 11). This view is in line with earlier researches which show that the major problems of climate change are increasing urban temperature and rainfall, flooding sea level rise and coastal inundation (Ikhile, 2007; Odjugo, 2009). Among the rural dwellers, increasing temperature also came up first as the worst impact, followed by changes in rainfall pattern, increased occurrence of drought and erosion and desertification. Majority of rural dwellers are in the agricultural sector so

Table 10. Perceived effects of climate change in eco-climatic zones.

Perceived effects	Rivers (%)	Imo (%)	Lagos (%)	mT (%)	Adamawa (%)	Niger (%)	Yobe (%)	Zamfara (%)	cT (%)	Mean (%)
Increasing temperature regime	16	18	21	18.3	22	25	28	24	24.8	21.6
Changes in rainfall pattern	15	11	8	11.3	20	16	15	17	17	14.2
Flood problems	20	10	22	17.3	4	3	1	2	2.5	9.9
Increased occurrence of drought	5	2	2	3	11	16	15	16	14.5	8.8
Increased erosion	2	25	8	11.7	5	5	3	4	4.3	8
Desertification	5	2	3	3.3	8	7	12	10	9.7	6.5
Coastal inundation	13	5	16	11.3	1	2	1	1	1.3	6.3
Changes in harmattan conditions	3	4	2	3	8	10	8	10	9	6
Ecological destabilization	4	8	3	5	5	3	4	4	4	4.5
Sea level rise	11	2	9	7.3	2	1	1	1	1.3	4.3
Drying rivers and lakes	1	2	1	1.3	7	6	7	6	6.5	3.9
Reduce/increased land for agriculture	1	7	2	3.3	3	4	3	3	3.3	3.3
Increase health problems	3	2	2	2.3	2	1	1	1	1.3	1.8
Melting ice	1	2	1	1.3	2	1	1	1	1.3	1.3

Table 11. Perceived effects of climate change in urban and areas.

Perceived effects	Urban (%)	Rural (%)	Total (%)
Increasing temperature regime	25.2	18	21.6
Changes in rainfall pattern	10.6	17.8	14.2
Ecological destabilization	3	6	4.5
Desertification	6	7	6.5
Sea level rise	5.4	3.2	4.3
Flood problems	15.2	4.6	9.9
Increased occurrence of drought	6.8	10.8	8.8
Melting ice	1.8	0.8	1.3
Reduce/increased land for agriculture	2	4.6	3.3
Increase health problems	2.1	1.5	1.8
Drying rivers and lakes	2	5.8	3.9
Coastal inundation	9	3.6	6.3
Increased erosion	5.5	10.5	8
Changes in harmattan conditions	5	7	6

the effects they identified are the actual climate change problems affecting agriculture as observed by earlier researches (Odjugo, 2010; Atedhor et al., 2011). The respondents' perception of the effects of climate change like increasing temperature, changes in rainfall regime and urban flooding among others have scientific backing. IPCC (2007), Spore (2008) and Odjugo (2009, 2010) show that in Nigeria and most parts of the world, temperatures are on the increase. They revealed that while global temperature increase is 0.74°C since 1860 when weather record started, that of Nigeria is 1.1°C since 1901. Rainfall pattern in Nigeria has been proven to be changing. While rainfall duration and amount is decreasing, the intensity is increasing (Odjugo, 2009). The same papers also show that while the short-dry-season is gradually shifting from August to July, the area experiencing Equatorial climatic rainfall characteristics of double maxima rainfall is shifting southward thereby increasing the area with Sudan climatic type with single peak of rainfall.

The way the respondents perceive the measures to reduce climate change effects is also a reflection of their local environment. The measures respondents in the mT climatic zone identified to reduce climate change include stopping gas flaring, public enlightenment, increased use of solar, wind and hydro-electricity and clean industrial production mechanism among others (Table 12). The respondents in cT climatic zone are of the opinion that to reduce the effects of climate change, public enlightenment must be followed by increased use of solar, wind and hydro-electricity, reduction of the rate of deforestation, and stopping of gas flaring (Table 12).

Table 12. Perceived measures to reduce climate change in eco-climatic zones.

Reduction measures	Rivers (%)	Imo (%)	Lagos (%)	mT (%)	Adamawa (%)	Niger (%)	Yobe (%)	Zamfara (%)	cT (%)	Mean (%)
Public enlightenment	17	19	14	16.7	20	18	23	21	20.5	18.6
Reduce deforestation	6	11	10	9	12	11	14	13	12.3	10.7
Stop water pollution	1	1	3	1.7	1	2	1	2	1.5	1.6
Use of low cost solar energy cookers	7	5	8	6.7	4	6	5	7	5.5	6.1
Increased use of ethanol in petrol	9	6	10	8.3	6	8	5	4	5.8	7.1
Clean industrial production mechanism	10	7	12	9.7	8	7	5	5	6.3	8
Increased use of solar, wind and hydro-electricity	11	13	10	11.3	12	14	15	17	14.5	12.9
Reduced use of wood for cooking, furniture and roofing	6	3	4	4.3	3	4	3	5	3.8	4.1
Mechanised agriculture	2	2	1	1.7	6	5	4	3	4.5	3.1
Stop bush burning	5	8	3	5.3	11	10	13	12	11.5	8.4
Stop gas flaring	20	18	15	17.7	5	3	3	2	3.3	10.5
Stop the use of old vehicles	5	6	8	6.3	8	9	5	6	7	6.6
Discourage urbanization	1	1	2	1.3	4	3	4	3	3.5	2.4

Majority of the respondents believe that to reduce the ongoing climate change and its impacts, public enlightenment should be vigorously pursued. This is so because many of the respondents did not have in-depth knowledge of what climate change is all about and they are not aware that their daily actions like deforestation, bush burning and water pollution among others are contributing immensely to climate change. They are also of the opinion that to stop bush burning, reduced deforestation and engaging in mechanised agriculture will help to reduce climate change.

Personal discussion with most of the respondents shows that they are not aware of how increased use of ethanol in petrol, reduced use of wood for cooking, furniture and roofing among others will reduce climate change. This clearly depicts how ignorant majority of Nigerians are with respect to the causes and effects of climate change. Many concluded that it will be difficult to reduce the use of wood for cooking, furniture and roofing since cooking gas and kerosene are so costly and above the reach of many while alternative roofing and furniture materials like iron and steel, aluminium are too costly to afford. This is an indication that a lot is needed to be done in order to combat climate change impacts in developing poor nations like Nigeria. The Nigerian government at all levels need to bring down to the barest minimum the cost of kerosene and cooking gas so as to discourage the use of firewood for cooking. This can be achieved if the refineries are repaired and start refining crude oil instead of the country depending on importation of these commodities. On the other hand, if the country still wishes to import these commodities, they should be heavily subsidized. The respondents (89%) revealed that the media, government at all levels and the non-governmental organizations (NGOs) are not doing enough in sensitizing the populace on the causes and effects of climate change while 11% affirmed that they are doing enough. The perceived remedial measures of climate change between the mT and cT climatic zones have a χ^2 of 5.4, which is higher than the critical value of 3.84 at $p < 0.05$. This indicates that the way the respondents perceived the remedial measures to climate change is spatially different to some extent as shown in their rating of the solutions in Table 12.

CONCLUSION AND RECOMMENDATIONS

The study is able to reveal that only 22% of the respondents actually have much knowledge about climate change. Majority of the respondents (52%) know very little and 25% are ignorant of the concept of, causes and effects of climate change. The urban dwellers are more knowledgeable than those in the rural areas since 34% of the former and only 9% of the latter say they have much knowledge about climate change. Knowledge about climate change did not vary much spatially since those who are actually conversant with climate are 20% in the mT climatic zone and 24% in the cT climatic zone. Television is the major source of information about climate change to the people followed by radio and printed materials. The urban dwellers and those from the mT climate zone get information about climate change mainly from television programmes while the radio is the major source of information to those in the rural areas and the cT climatic zone.

The respondents perceive that the Act of God is the major cause of climate change, followed by gas flaring and bush burning. Apart from the Act of God which runs through the respondents as a major cause of climate change, they were able to identify local causes of climate change within their environment but lack knowledge of the causes in the global scene. Increasing temperatures, changes in rainfall patterns and flood problems are the major general effects of climate change, however, in Imo State, increasing erosion is a major problem while

increasing occurrence of drought is a crucial one in the cT eco-climatic zone. The way the respondents perceive the measures to reduce climate change effects is also a reflection of their local environment. Generally, the respondents are of the view that to reduce the effects of climate change, public enlightenment is a must, increased use of solar, wind and hydro-electricity should be encouraged while deforestation and gas flaring must be stopped.

Majority of Nigerians have very poor global knowledge of the causes, effects and remedial measures of climate change. This therefore calls on all levels of government in Nigeria to pursue vigorously, public enlightenment on climate change using media like television, radio and printed materials such as newsletters, newspapers, leaflets, bill boards, journals and textbooks. Religious leaders, traditional rulers, market leaders and teachers should be sent by the government to 'train the trainers' courses on climate change so that they can impact such knowledge on their subjects. The Federal Government should make it compulsory through policy backing that climate change should be infused into the school curriculum at all levels of education. Climate change is among the most pervasive threats to the Earth today. We have the power to address its root causes and limit its impact on the planet. Educating young people plays a critical role in this effort. Seminars and workshops on climate change should be organized more frequently by various levels of government. Such seminars and workshops should be free to participants and the communiqué of such conferences be repeatedly published or broadcast on different mass media. The regional mass media mostly used by the people should be adapted. It is only when the people are aware of the causes and effects of climate change that they can adjust their unsustainable actions on the environment. Such knowledge will also help them to adapt to the effects of climate change.

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