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PERCEPTION OF GLOBAL WARMING AMONG UNDERGRADUATES OF THE UNIVERSITY OF JOS, PLATEAU STATE, NIGERIA

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Abstract: *Global warming is one of those topical issues that gets all sorts of people excited. This is because its impact is global, threatening human existence on planet earth. The study assesses the scope of knowledge about the causal factors, effects and control of global warming among undergraduates of the University of Jos. The research design employed was the cross-sectional survey method, where 300 students from Natural Sciences, Social Sciences and Humanities were selected through stratified random sampling technique. Semi-structured questionnaire was employed to collect relevant data for analysis while Chi-square (X^2) was used to test the hypothesis formulated. Data was analyzed with the aid of SPSS version 16 software and results were presented in frequency tables and percentages. Results showed that 59.7% of the respondents have some good knowledge about global warming and their main sources of information were through lectures (35.6%) and several others sources (19%). The five leading causal factors of global warming as perceived by the respondents were burning of fossil fuels (61.7%), industrial pollution (60.3%), power generation (56.7%), deforestation (54.0%) and urbanization (47.0%). The effects of global warming identified by the respondents were extremes of weather (68.3%), skin cancer (64.0%), soil erosion (63.0%), extinction of species of organisms (62.3%), floods (61.0%), drought (56.7%) and increased temperature (55.3%). Ways of controlling the menace frequently identified by the respondents were, planting of trees (87.7%), recycling of pollutants (70.3%), use of renewable energy (63.7%), use of improved fuel combustion engines (59.0%) and turning off air conditioning system(ACS), refrigerators and other appliances when not in use (51.7%).The Chi-square test result obtained ($X^2cal.=139.81>tab\sim5.99.$ $at\propto0.05$) shows that students' discipline significantly influenced their knowledge on global warming in the study area. The paper concludes by recommending the need for inclusion of environmental education in the curriculum for implementation at all educational levels, formation of environmental clubs and societies, and pursuance of sensitization programmes to enlighten and conscientise students on how they can partake in the fight against global warming and other environmental hazards.*

Keywords: *Global Warming, Greenhouse Gases, Causal Factors, Effects, Control, Undergraduates of Unijos*

INTRODUCTION

Climate plays a principal role in sustaining all lives on the planet earth. Global warming, which is the persistent rise in average measured temperature of the earth's near-surface air and oceans exacerbates climate change that impacts negatively on the environment and human welfare. During the last century, the earth's average temperature was said to have risen by about 0.6°C, and by the end of this 21st century, it is expected to reach between1.1°C and 6.4°C(Ghadegesin and Ogundele, 2008). According to Intergovernmental Panel on Climate Change (IPCC) (2007), as quoted in Obioh (2008), the global atmospheric mixing values of carbon dioxide has exceeded concentration of 377 ppm from the pre-industrial values of 280 ppm; while troposheric methane, nitrous oxide and ozone concentrations have respectively exceeded 1,847 ppm, 319 ppm and 34 ppm, from their pre-industrial levels of 730 ppm, 270 ppm and 25 ppm values. Historical records obtained at Antarctica have shown that carbon dioxide concentration has never exceeded 280 ppm for a 400,000 year-period, but in 1991 the concentration was estimated to be 355 ppm, thus, increasing by about 1.8ppm per year (Graves and Reavey, 1996; Obioh, 2008).

The rise in amounts of greenhouse gases in recent times is no doubt, associated with increased burning of fossil fuel from Nigeria's 11 million of the 2 billion vehicles plying the global routes, 5,000 industries, 60 million generators, massive deforestation that has rendered bare 6,145,000 million hectares of land due to agricultural, infrastructural and logging activities. These anthropogenic activities have aggravated the earth's average surface temperature which has been rising since the last century. Though, the heat-trapping gases, carbon dioxide, methane and nitrous oxide are minor gases that do not make up 1% of the total volume of the atmosphere,

yet their various contribution to global warming are significantly high; carbon dioxide 25%, methane 12.5% and nitrous oxide 6% (Maton *et al.* 2016).

The temperature of global water bodies has also been increasing such that it has reached a depth of 3,000 metres, with additional heat absorption capacity of 80% supplied to the climate system (Ghadegesin and Ogundele, 2008). The impact of global warming is obviously noticable, as there are such phenomenal increase in spread of diseases, melting of mountain and polar glaciers, rising temperatures in drought-prone areas, sea level rise and coral bleaching along the coasts of Nigeria, Egypt and Kenya (Olajide *et al.* 2011; Maton *et al.* 2016). Similarly, the South-South, North-Central and Western regions of Nigeria are already witnessing unusual destructive annual floods and massive soil erosion as manifestations of global warming and climate change.

In response to global warming, many protocols have been signed by countries of the world promising to reduce activities that aggravate the problem. Besides, a lot of studies have been conducted to understand the causal factors and potential consequences (Balogun, 1995; Olajide *et al.* 2011), yet the problem still persists. Even though, the effects of global warming are undeniably manifesting everywhere, there are still a lot of misconceptions and wrong beliefs about it, even among the enlightened urban dwellers and school communities. Limited studies have been done on people's perception about global warming and other environmental problems in Africa, including Nigeria. The need to cover this knowledge gap has led to the present study, which aimed at assessing the perception of undergraduates of University of Jos about the causes, consequences and control of global warming. It is hoped that the findings will yield relevant information to spur the relevant authorities to formulate policies that will carry the people along in the fight against this environmental problems. The study is guided by such thought-provoking questions as: To what extent are undergraduates of the University of Jos conversant with the causes and consequences of global warming? How do they come to know that global warming is an environmental hazard? What are their attitudes towards mitigating the impact of global warming?

Hypothesis: Students' knowledge about global warming is not influenced by educational discipline significantly.

METHODOLOGY

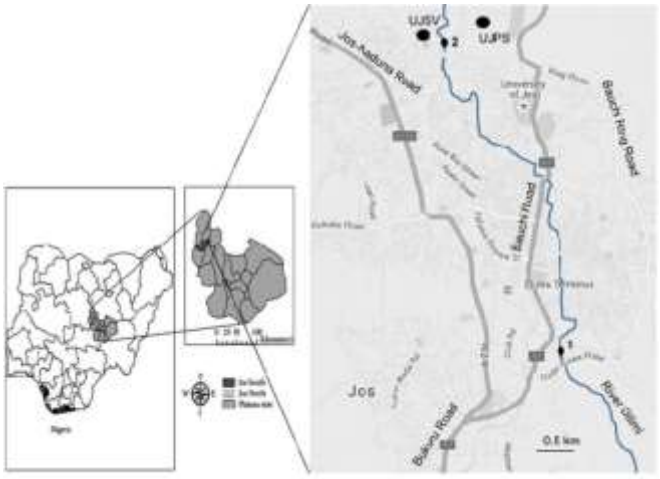
The Study Area

The University of Jos is sited in Jos, the Plateau State capital. Jos is located between latitudes 9°45'00"N and 9°55'00"N, and between longitudes 8°45'00"E and 8°55'00"E (fig.1). Jos is situated at an altitude of 1,238 metres above mean sea level, with a montane climate of distinct wet and dry seasons. The total rainfall amount ranges from 1,400 mm-1,500 mm per year. The average temperature is about 22°C, though in the months of December, January and February, temperature sometimes drop to 10°C, and thereafter rises to 30°C in the months of March and April (Ihemegbulem and Nyong, 2002). The vegetation cover is the montane type, with gallery forests along river valleys and grass on plains and hillslopes.

The main town housing the University of Jos is flanked to the North-East by Naraguta Hills, and to the South-West by undulating plains, dissected by River Delimi that empties its contents into Lake Chad, through River Yobe. The plains, which extend to the Southern part of the city is densely occupied by a projected population of nearly 1 million people; mostly Nigerians from all over the Federation. Jos has a good number of educational, health, commercial, financial and religious institutions, as well as security outfits and communication offices. Many of these ethnic groups work in these establishments, with a small proportion of them engaged in dry season farming, informal mining, construction work and repairs.

University of Jos is one of the 40 Federal Universities in Nigeria located in Jos, the capital of Plateau State in North-central Nigeria (see plate 1 showing the University of Jos Library Complex at the permanent site, Naraguta). It was established in 1971 as a Campus of the University of Ibadan. Since its establishment, the University has developed, as

new programmes have been introduced into the Faculties of Natural Sciences, Social Sciences and Humanities. These three major Faculties have now given birth to new others; thus, bringing the total to 13, with over 90 Departments. The population of the pre-degree, undergraduate and postgraduate Students of the University is about 20,000, drawn from all the 36 States of the Federation, including the Federal Capital Territory, Abuja (Lawal and Akintunde, 2013). Most of the students are Nigerians with few expatriates.



Source: Google Maps, 2014.

Figure 1: The Study Area, University of Jos

Plate 1: Unijos Library Complex, Naraguta

Source: Authors' Field Survey, 2019.

METHODS AND MATERIALS

The study design employed in this study was the quantitative method. The study aimed at assessing the perception level about the causal factors, effects and control of global warming among Undergraduates of the University of Jos. The Students' population is about 20,000; comprising the Pre-degree, Undergraduates and Post-graduates. However, the study focused on only the Undergraduates whose population is three-quarters of the entire population of the University of Jos. Three Faculties: the Natural Sciences, Social Sciences and Humanities were selected out of the thirteen Faculties of the University. The three Faculties chosen represent 23%, with a total population of 8,282 Undergraduates. Stratified sampling was used to choose the Faculties and Departments within each of the Faculties. Purposive sampling method was then applied to choose 100 Undergraduates, each from the Natural, Social Sciences and Humanities, while also putting gender into consideration. Purposive sampling was found very much convenient to the researchers, because most Undergraduates of the same level tend to have similar academic intelligent quotient. Therefore, the sample size was determined by applying Krejcie and Morgan's (1970) Model:

$$s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P) \quad \ldots \quad (1)$$

Where **s** = required sample size;

X^2 = the table value of Chi-Square for 1 degree of freedom at the desired confidence level;

N = the population size;
P = the population proportion (0.50); and
d = the degree of accuracy expressed as a proportion (0.05).

A total of 300 Undergraduates were drawn from the three Faculties, purposely with equal number of male and females respondents from 100 – 400 levels for convenience.

A semi-structured questionnaire, made up of two parts was used to collect data. The first part elicited personal information about gender, age, institution, religion, educational discipline, level and Geopolitical Zone of the respondents. The second part was designed to elicit information on the respondents' knowledge about the causal factors, effects and control of global warming. Copies of the questionnaire were distributed to respondents in their lecture halls for two weeks, 10-24th February, 2019 during break and leisure periods (1-2pm) each day. The researchers administered copies of questionnaire to the respondents, and all were recovered for analysis. The data were collated, summarized, analyzed and presented in frequency tables and percentages. Chi-Square statistics was used to test the hypothesis that was earlier formulated, denoted by the formula:

$X^2 = (O - E)^2/E$ ... (2)

Where X^2 = Chi-Square statistics;
O = the observed outcome;
E= the expected outcome.

Data collected from the field was collated, summarized and analyzed using Statistical Package for Social Sciences (SPSS) version 16 software. Frequency counts, tables and percentages were used for the descriptive statistics, while for the inferential statistics, Chi-Square test was applied in order to determine the values, degree of freedom and P-values of the tested hypothesis.

RESULTS AND DISCUSSION OF FINDINGS

This study was conducted with the aim of assessing the level of knowledge about the causes, effects and control of global warming among Undergraduates of the University of Jos. The analyzed data is presented in this section.

Respondents' Knowledge of Global Warming by Faculty

Table 1 shows that about three-fifths (59.7%) of the respondents have good knowledge about global warming as an environmental hazard, while only two–fifths (40.3%) had poor knowledge about the menace. On respondents' educational discipline, the results show considerable variations in knowledge about global warming: Natural Sciences 100.0%, Social Sciences 61.0% and dropped down to just 18.0% for Humanities. The results obtained in this study is in concord with what was obtained in Lagos and USA, where 78.7% and 77% respectively claimed to have some good knowledge about global climate change (Ghadegesin and Ogundele, 2008).

Table 1: Respondents' Knowledge about Global Warming by Faculty

Variable	Natural Sc.	Social Sc.	Humanities	Total
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Have good knowledge	100 (100)	61 (61.0)	18 (18.0)	179 (59.7)
Have poor knowledge	0 (0)	39(39.0)	82 (82.0)	121 (40.3)
Total	**100 (100.0)**	**100**	**100**	**300 (100)**

Source: Authors' Field Survey, 2018.

Respondents' Sources of Information about Global Warming

Table 2 indicates that many of the respondents acquired the knowledge about global warming in school (35.6%), followed by those who got it from several sources (19.0%). This finding is dissimilar to what Olajide *et al.* (2008) found in the Obafemi Awolowo University Ile-Ife where students' sources of information about the menace were television (83.1%), newspapers (70.8%), and internet (69.8%), while lectures lower (62.6%).

Table 2: Respondents' Sources of Information

Sources	Frequency	Percentage (%)
Lectures in School	107	35.6
Several	57	19.0
Textbooks	4	1.3
Television	3	1.0
Radio	3	1.0
Newspaper	2	0.7
Internet	2	0.7
Worship Centres	1	0.4
No response	121	40.3
Total	300	100.0

Source: Field Survey, 2018.

Respondents' Knowledge about Causal Factors of Global Warming

Table 3 shows respondents' extent of knowledge about the causes of global warming where burning of fossil fuels, industrial pollution, use of generators, deforestation and urbanization ranked high with respective ratings of 61.7%, 60.3%, 56.7%, 54.0% and 47%. However, as much as 67.0%, 51.3% and 59.0% of the respondents were not sure if burying of organic wastes, use of electric bulbs plus other appliances, and the use of fairly old cars respectively, could cause global warming. About three- fifths (61.7%) of the respondents outrightly rejected the belief that the use of modern cars equipped with air conditioning system (ACs) could cause global warming. The findings slightly differ from the study conducted by Olajide *et al.* (2008), who discovered that in Obafemi Awolowo University, the respondents identified industrial pollution (92.4%), fossil fuel burning (92.%), use of generators (83.3%), cutting down trees (77.5%) and converting rural areas to urban centres (51.1%) as the leading causes of global warming. There are more causal factors than these which both students and the general public need to know, hence this study recommends greater public enlightenment about environmental problems for active participation in solving them.

Table 3: Respondents' Knowledge about Causal Factors of Global Warming

Causal Factor	Agreed (%)	Not Sure (%)	No (%)
Burning fossil fuel	185 (61.7)	72 (24.0)	43 (14.3)
Industrial pollution	181 (60.3)	74 (27.7)	45 (15.0)
Use of generators	170 (56.7)	72 (24.0)	58 (19.3)
Deforestation/logging	162 (54.0)	98 (32.7)	40 (13.3)
Urbanization	141 (47.0)	87 (29.0)	72 (24.0)
Bush burning	113 (37.7)	101 (33.7)	86 (28.7)
Use of fairly old cars	94 (31.3)	177 (59.0)	29 (9.7)
Electric bulbs & appliances	69 (23.0)	154 (51.3)	77 (25.7)
Decaying of organic wastes	77 (25.7)	201 (67.0)	22 (7.3)
Uses of modern cars with ACs	48 (16.0)	67 (22.3)	185 (61.7)

Source: Authors' Field Survey, 2018.

Respondents' Perception of the Effects of Global Warming

Table 4 shows that respondents perceived extremes of weather (68.3%), skin cancer (64.0%), soil erosion (63.0%), extinction of species of organisms (62.3%), floods (61.0%), drought (56.7%) and increased temperature (55.3%), as the obvious effects of global warming. Other effects of global warming accepted by the respondents include increased illness and deaths (54.0%) and famine (53.0%), among others. However, many respondents were not sure that genetic mutation (92.0%) and rise in sea level (59.3%) could be attributed to the impact of global warming. The results are, to a large extent, in agreement with Olajide *et al.'s (*2008) report the consequences of global warming were extremes of weather (87.5%), skin cancer (80.1%), death and illness (69.2%), extinction of animal and plant species (68.0%), while famine, flooding and erosion were 63.4%, 59.8% and 51.9% respectively.

Table 4: Respondents' Perception of the Effects of Global Warming

Variable	Agreed (%)	Not Sure (%)	No (%)
Extremes of weather	205 (68.3)	67 (22.3)	28 (9.3)
Aggravates skin cancer	192 (64.0)	104 (34.7)	4 (1.3)
Accelerates soil erosion	189 (63.0)	73 (24.3)	38 (12.7)
Extinction of species	187 (62.3)	81 (27.0)	32(10.7)
Flooding	183 (61.0)	107 (35.7)	10 (3.3)
Drought	170 (56.7)	87 (29.0)	43(14.3)
Increased temperature	166 (55.3)	94 (31.3)	40 (13.3)
Increased illness & deaths	162 (54.0)	93 (31.0)	45 (15.0)
Causes famine	159 (53.0)	84 (28.0)	57 (19.0)
Inundation of lowlands	39(13.0)	135 (45.0)	126(42.0)
Rise in sea level	27 (9.0)	178 (59.3)	95 (31.7)
Genetic mutation	11 (3.7)	276(92.0)	13 (4.3)

Source: Authors' Field Survey, 2018.

Respondents Perception about the Control of Global Warming

On the control measures of global warming, table 5 indicates that respondents perceived: the planting of trees (87.7%), recycling of industrial wastes (70.3%), the use of renewable energy (63.7%), the use of cars with improved fuel combustion engines (59.0%), and turning off electronic appliances especially fans, refrigerators and air conditioners (51.7%) as effective control measures. However, some respondents were not sure if the use of energy efficient appliances (71.3%), and the use of public transport,vinstead of private cars (69.0%) could be effective measures for controlling global warming. The results obtained in this study seem to tally with that of OAU where planting of trees topped the list with 78.9%, followed by recycling of waste materials (72.6%) and then use of renewable energy like solar (71.2%) (Olajide *et al.* 2008). However, about the use of public transport instead of private cars, the same report indicated that only 30.4% advocated for it which is does not compare well with the finding in Jos (Table 5).

Table 5: Respondents Perception about the Control of Global Warming

Variables	Agreed (%)	Not Sure (%)	No (%)
Planting of trees	263 (87.7)	28 (9.3)	9 (3.0)
Recycling of industrial waste	211 (70.3)	75 (25.0)	14 (4.7)
Renewable energy	191 (63.7)	96 (32.0)	13 (4.3)
cars with improved engines	177(59.0)	106 (35.3)	17 (5.7)
Turn off electronic appliances after use	155(51.7)	121 (40.3)	24(8.0)
Energy efficient appliances	52 (17.3)	214(71.3)	34(11.3)
Better use public transport	30(10.0)	207 (69.0)	63 (21.0)

Source: Authors' Field Survey, 2018.

Attitudes toward Mitigating the Danger

Table 6 shows the responses of the respondents as to what they could do to mitigate the effects of global warming at their level. Most of the respondents admitted (in descending magnitude) such measures as planting of trees (87.7%), enlightening others (86.0%), the use of less hot water (74.3%), reduction and recycling of wastes (70.3%) and using energy-efficient products (63.7%), the use of compact fluorescent bulbs (59.7%) and switching off the lighting system when not using it (51.7%) as effective ways to control global warming. Regrettably, many of the respondents were ignorant of the fact that the use of less heating and air conditioning (82. 7%), getting home energy audit report from utility companies for efficient-energy use (64.7%) are other effective ways of controlling global warming. This implies that there is need for the relevant authorities to enlighten students and the general public through

lectures, workshops and seminars on what they should do on their own parts to mitigate the effects of global warming.

Table 6: Attitudes towards Mitigating the Danger

Actions	Agree	Not Sure
Plant trees	263 (87.7%)	37 (12.3%)
Enlighten others to conserve energy	258 (86.0 %)	42 (14. 0%)
Use less hot water	223 (74.3%)	77 (25.7%)
Reduce, reuse & recycle wastes	211 (70. 3%)	89 (29. 7%)
Energy-efficient products	191 (63. 7%)	109 (36.3%)
Compact fluorescent bulbs	179 (59.7%)	121 (40.3%)
Drive car less & use bicycle more	177(59.0%)	123 (41.0%)
Switch off lighting system when not using eg ACS	155 (51.7%)	145 (48.3%)
Energy audit from utility company	107 (35. 7%)	193 (64.3%)
Use less heating & air conditioning syetems	52 (17.3%)	248 (82. 7%)

Source: Authors' Field Survey, 2018.

CONCLUSION AND RECOMMENDATION

The study assessed the perception of global warming among Undergraduates of the University of Jos, using cross-sectional survey method. Findings revealed that about 60% of the respondents have some good knowledge about the causal factors, effects and control of global warming. However, some of the respondents (40%) lack good knowledge of the menace; being higher among non science-oriented Students. Sequel to this discovery, the paper recommends the following steps to take as mitigation measures:

1. Environmental education, which explores and develops insight, awareness, knowledge, skills and attitudes that enable students to make reasoned responses to environmental issues should be included in the school curriculum and taught at all levels of education. This will enable students to understand the dimensions of anthropogenic activities that readily contribute to global warming so they can curtail them.
2. Periodic educational programmes, such as seminars, workshops and public discussions should be organized for students in all teaching and learning institutions to enable them keep abreast with global warming issues. This will go a long way to create a new pattern of behavior among non science-oriented students towards correcting the misconceptions about the causes, consequences and control of global warming and other environmental issues.
3. Clubs and societies should also be organized for students of environmental studies by educational institutions to sensitize students on such environmental issues like global warming and climate change so they can actively get involved in the mitigation.
4. Deliberate actions, such as tree planting can help to ameliorate global warming through carbon sequestration. Students at all levels of education should be made to plant at least a tree and take care of it while in school before issuing them certificates of graduation.
5. Religious leaders should be well informed about environmental issues through seminars and workshops so they can participate actively in enlightening students who attend religious meetings on the menace of global warming and other hazards currently degrading the environment.
6. Concerted efforts should be made by the National Orientation Agency (NOA), the National Environmental Standard Regulations and Enforcement Agency (NESREA), UNESCO, UNDP, FAO, and NGOs to support any advocacy group whose focus is checking the excesses of man's activities that aggravate global warming and other natural hazards that threaten the natural environment.

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