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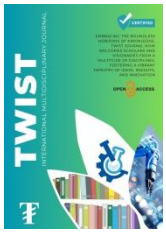

Perception and Knowledge of Global Warming among Undergraduates in Ekiti State, Nigeria

Mercy Adesola Daramola*
Bamidele Olumilua University of Education, Science and Technology,
Ikere-Ekiti, Nigeria
[**Corresponding author*]

Oluwatoyin Gladys Koshoffa
University of Ibadan, Nigeria

Dorcas Omolara Oyawole
Federal College of Education (Special), Oyo, Nigeria

Abstract
This study investigated the perception and knowledge of global warming among undergraduates in universities in Ekiti State, Nigeria. The research focused on three key areas: students' perceptions and knowledge levels regarding global warming, the relationship between perception and knowledge, and any gender-based differences in these aspects. Utilizing a descriptive research design, the study sampled 400 undergraduates from Ekiti State University, Federal University Oye-Ekiti, and Bamidele Olumilua University of Science, Education and Technology, Ikere, selected through multistage sampling. Data were gathered using a researcher-designed questionnaire comprising sections on respondents' bio-data, knowledge, and perception of global warming, with items rated on Likert and binary scales. Validity was ensured through expert reviews, and reliability was confirmed with a Cronbach's Alpha value of 0.82. Analysis involved descriptive statistics, Pearson's Product Moment Correlation, and t-tests. Findings revealed a generally good perception of global warming, with students showing moderate levels of knowledge. There was no significant relationship between perception and knowledge, but a notable gender difference in perception, favoring female students, was observed. Knowledge levels did not differ significantly by gender. The study concludes that while students have a good perception and moderate knowledge of global warming, targeted educational initiatives are needed to address misconceptions and improve understanding across genders.

Keywords
perception, knowledge, global warming, undergraduates

INTRODUCTION

The environment refers to the complete set of conditions and factors that surround an individual organism or a collection of species. The environment, as described by Oruonye (2015), encompasses both the physical and non-physical surroundings in which human beings reside, progress, and eventually pass away. According to Oruonye (2015), the environment can encompass physical, mental, emotional, or social aspects. These perspectives on the environment suggest that any factors, whether living or non-living, that influence an individual's life is considered part of their environment. Therefore, the environment plays a crucial role in the growth and development of an individual, as its impact can either enhance or hinder the individual's progress.

The global patterns of vegetation shape, productivity, and plant and animal species composition are mostly determined by climate. Climate refers to the long-term average weather patterns in a specific location. Although weather can undergo rapid changes within a few hours, climate requires several years to undergo significant changes. The subject of global warming is intricate and controversial; leading to diverse experiences and debates worldwide regarding its threat. Global warming refers to the overall rise in the Earth's temperature, characterized by changes in air and ocean temperatures, the melting of polar ice caps, and an increase in average sea level (Ali, 2015). It leads to climatic,

environmental, seasonal, and ecological alterations. Global warming has significant impacts on the diffusion, spread, and incubation of several diseases that rely on environmental conditions. This is because global warming leads to changes in the environment.

Global warming, as defined by Oruonye (2015), refers to the persistent changes in worldwide weather patterns, particularly the rise in temperature and intensity of storms. It is considered a possible outcome of the greenhouse effect. Greenhouse gases (GHGs), as defined by D'Silva (2015), are gases in the atmosphere that absorb and emit radiation within the thermal infrared range. This phenomenon is referred to as the greenhouse effect. According to Ali (2015), climate change is the progressive increase in temperature of the earth's air and ocean, which leads to a disturbance in the equilibrium of human and natural resources. The aforementioned definitions indicate that the global temperature is increasing, resulting in the disturbance of the Earth's environment. Currently, there is a comprehensive record of satellite-based atmospheric temperatures spanning 22 years, which indicates that the Earth is experiencing a rise in temperature (Ekezie, 2014). Most research on the subject commonly use the term "global warming" to refer to climate change, possibly due to this reason. This study employs the terms climate change and global warming interchangeably to refer to the rise in the earth's temperature above its usual level, caused by the accumulation of greenhouse gases in the atmosphere. This increase in temperature results in various calamities such as hurricanes, increased deaths and destruction from thunderstorms, droughts, floods, diseases, and other disruptions to human life.

Global warming is a significant and pressing concern for both humanity and the environment, and it poses a major obstacle to global growth. There is compelling evidence that human activities are causing fast global warming. While natural factors can contribute to climate change, the primary cause is human actions, including the burning of fossil fuels, industrial pollution, deforestation, and changes in land use (Weart, 2014). Fuel combustion and industrial pollutants contribute to the rise in greenhouse gas levels in the atmosphere, while deforestation and changes in land use disrupt the ability of terrestrial sinks to absorb carbon, resulting in global warming (Weart, 2014). Given that the future of the globe is dependent on today's youth, including university undergraduates, it is crucial to examine their understanding and awareness of global warming.

The understanding of the causes and impacts of global warming is believed to play a role in the development of potential solutions to address the issue (Wolf and Moser 2015). While there is a consensus among scientists and the general public that global warming is occurring, the specific origins and impacts of this phenomenon are subject to debate, which complicates efforts to tackle the issue (Leiserowitz 2011). Efforts have been made on a worldwide scale to tackle global warming. Firstly, there was a commitment to decrease emissions, as outlined in the original framework of the Convention on Climate Change. Secondly, legal and economic penalties were introduced for nations that fail to fulfill the initial objective, as stated in the Kyoto Protocol. However, there has been minimal adherence to the aforementioned (Leiserowitz 2011).

In a study titled "Knowledge, Attitudes, and Practices of Global Environmental Change and Health: Towards Sustainable Behaviour Change," Cardwel (2015) investigated the relationship between people's understanding, beliefs, and actions about global environmental change and health, with the aim of promoting long-lasting behavioural changes that support sustainability. The study aimed to investigate the public's perception and behaviour about global environmental change. The results revealed that while participants demonstrated environmental consciousness and showed concern for local environmental problems such as air pollution, their understanding of the specific causes, repercussions, and hazards associated with global warming was limited. Although most respondents showed apprehension regarding global environmental change, there was also a degree of doubt regarding the causes and effects in the Golden Horseshoe Region. Participants exhibited a propensity to engage in environmentally conscious behaviours, and responses outlined potential eco-friendly actions such as recycling and minimizing energy usage. The primary contribution of the study, as stated by the author, is the progression of understanding of the public's perspective of climate change, global warming, and global environmental change as significant growing dangers to environmental health.

Sharp and Hoj (2015) conducted a comparative study on public attitudes and understanding regarding global warming in Australia and the United States of America. The original Stanford University research obtained data in 2006 from a random nationwide sample of 1002 American individuals. At the 95% confidence level, the highest sampling error for any of the proportional outcomes is 3.1%. The study's findings indicate that a significant proportion of Australians and Americans hold the belief that they possess knowledge regarding global warming. A higher proportion of Australians (72%) expressed confidence in the potential to significantly mitigate future global warming, either through a 'great deal' or a 'good amount'. In contrast, a smaller percentage of Americans (62%) shared this belief. A mere 7% of Australians expressed a sense of futility, in contrast to 16% of Americans.

Converting public concern about global warming into practical daily actions necessitates understanding the causes and dangers of climate change (Oyakale, 2017), particularly through Health Education. To develop effective communication and educational messages, it was imperative to ascertain the undergraduates' existing knowledge level regarding global warming. This is due to the fact that students possess the potential to become future leaders and policy makers. Knowledge, as defined by Bedworth and Bedworth (1978), encompasses a comprehension of particular facts, terminologies, conventions, methods, and strategies for addressing specific patterns, sequences, classifications, categories, methodologies, criteria, universal and abstract principles, as well as theories and structures.

An evaluation of the environmental knowledge and attitudes of Nigerian school pupils revealed a moderate degree of awareness or understanding of local environmental problems, but a low level of awareness or understanding of

global environmental issues (Ogunyemi & Ifegbesan, 2021). Acquah (2015) conducted a study in central Ghana to evaluate the extent of awareness and the quality of knowledge pertaining to global warming. A survey was done with a sample of 78 respondents who were selected randomly. The survey used a standard questionnaire. The primary method of data gathering was a meticulously organized interview schedule, whereas the main analytical approaches employed were descriptive statistics and logistic regression analysis. An empirical analysis uncovered deficiencies in the level of awareness, as well as a restricted understanding, about the causes and prevention of global warming. Logistic regression research identifies gender, years of education, and income as important predictors of awareness regarding the importance of global warming. The study indicated that educational programs should specifically focus on females, individuals with low income, and those with little literacy. This is because gender, education, and income were found to have a favourable and significant impact on the awareness of the urgency of global warming.

In Turkey, a study conducted by Dergisi (2015) examined the level of understanding among high school pupils on global warming. A global warming achievement test was delivered to a group of 193 specifically chosen students. Their understanding of global warming, including its theoretical aspects, present impacts, and required preventive measures, was assessed. The author employed the self-disclosure form to gather information about the students, including their academic background of parents, type of high school attended, economic situation, and whether they had previously engaged in any activities related to the subject before to the examination. The data were analyzed using the Statistical Package for Social Sciences (SPSS), followed by finesse and subsequently t-tests, Analysis of Variance (ANOVA), and correlation analysis to ascertain the outcomes. The test's reliability was determined to be 0.734. In the research, it was seen that the students demonstrated the highest level of knowledge regarding the effects of global warming among the three groups of questions.

Researchers have consistently focused on the variable of gender and its impact on knowledge and attitudes towards environmental issues. Women and men exhibit divergent attitudes towards hazards, especially those related to global warming. Oyakale (2017) asserted that women exhibit more sensitivity to hazards and are less inclined to regard governmental policies and procedures aimed at addressing global warming as adequate. Research conducted by the UK's Equal Opportunities Commission substantiates this claim, revealing that women and men engage in travel for distinct goals. According to Oyakale (2017), males are more inclined to utilize transit for commuting and commercial purposes, while women are more like to use it for shopping or sending their children to school. According to Agwu and Okhimamhe (2009), women demonstrate greater knowledge compared to men of the same age groups. A study conducted by Ayodele, Okunade, and Akinlade (2022) found that there was no statistically significant disparity in the level of understanding of environmental matters between male and female pupils in secondary schools. The researchers determined that this can be ascribed to the fact that all pupils, regardless of gender, are exposed to the identical curriculum on environmental matters and are educated in the same learning environment.

In their study, Ekpoh and Ekpoh (2015) investigated the extent of global warming awareness among secondary school teachers in Calabar Municipality. The researchers formulated three research hypotheses to direct their work. The researcher presented a questionnaire called the "Climate Change Awareness Questionnaire (CCAQ)" to a sample of 200 secondary school teachers. The data collected was analyzed using population t-test and independent t-test. The findings revealed a general lack of climate change understanding among instructors, with awareness levels varying according on gender.

Based on the foregoing, this study examined the perception and knowledge of undergraduates in Universities in Ekiti State towards global warming. The study specifically examined:

i. perception and level of knowledge of global warming among undergraduates;
ii. the relationship between perception and knowledge of global warning among undergraduates; and
iii. the difference in the perception and knowledge of global warming among undergraduates based on gender.

RESEARCH QUESTIONS

The following research questions were raised to guide the study.

1. What is the perception of global warming among undergraduates in Ekiti State, Nigeria?
2. What is the level of knowledge of global warming among undergraduates in Ekiti State, Nigeria?

RESEARCH HYPOTHESES

The following null hypotheses were generated for this study:

1. There is no significant relationship between knowledge and perception of global warning among undergraduates.
2. There is no significant difference in perception of global warming among undergraduates based on gender.
3. There is no significant difference in knowledge of global warming among undergraduates based on gender.

RESEARCH METHODS

This study utilized a survey-based descriptive research design. The population comprised all undergraduate students enrolled in the public universities in Ekiti State. The universities mentioned are Ekiti State University in Ado–Ekiti, Federal University in Oye–Ekiti, and Bamidele Olumilua University of Science, Education and Technology in Ikere. The study sample comprised 400 undergraduate students who were selected from three universities in Ekiti State. The sample was chosen using a multistage sampling technique. During the initial phase, a simple random selection procedure was

employed to choose four faculties from each university. In the second step, a stratified proportionate random sampling technique was used to choose 400 undergraduates from each level (i.e. 100-400) in the universities. The stratification was based on gender.

The researcher utilized a questionnaire named "Perception and Knowledge of Global Warming Questionnaire (PKGWQ)" to gather pertinent data for the study. The instrument was partitioned into three distinct portions, specifically portions A, B, and C. Section A of the survey collected data on the respondents' bio-data, including their field of study, academic level, and gender. Section B comprised a total of 20 items designed to assess the level of global warming knowledge among undergraduate students. The rating scale used is a binary 2-point scale, consisting of only "Yes" or "No" options. Section C comprises 10 items that gathered data on students' perception of global warming. The scoring for both Sections B and C was based on a 4-point Likert scale, which included the options of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

The validity of the instrument was ensured through face and content validity. The items in the questionnaire were presented to experts in the fields of Social Studies and Tests, Measurement and Evaluation. To ensure face validity of the instrument, the experts helped to determine the face value of the instrument while the content validity was ensured through experts' scrutiny of each of the items to ascertain that they represented the factors specified in the research questions and hypotheses and their observations were used to effect the necessary correction on the instrument. In so doing, all irrelevances and ambiguous items were eliminated.

The internal consistency of the instrument was ensured through Cronbach's Alpha method of testing reliability. In doing this, a pilot study was carried out outside the sampled locations. The instrument was administered on 40 respondents. A reliability co-efficient value of 0.82 was obtained and adjudged to be high enough to measure what it is purported to measure.

The researcher personally administered the instrument in the universities sampled in the study. The researcher's personal contact and visit to the respondents helped in ensuring better understanding of the items of the questionnaire and also eased retrieval of the questionnaire. The data collected were analyzed using descriptive and inferential statistics. The research questions were answered using frequency count, percentages, mean, standard deviation and bar chart, while the hypotheses were tested using inferential statistics such as Pearson's Product Moment Correlation, and t-test. Specifically, hypotheses 1 was tested using Pearson's Product Moment Correlation, while hypotheses 2-3 were tested using t-test analysis. All hypotheses were tested at 0.05 level of significance.

RESULTS

Research Question 1: What is the perception of global warming among undergraduates in Ekiti State, Nigeria?

Table 1 Percentage and Mean of the perception of global warming among undergraduates

S/N	Items	Mean	Remark
1.	Global warming is a measurable increase in the average temperature of earth's atmosphere.	2.63	Agreed
2.	Global warming is characterized with high temperature	3.02	Agreed
3.	Global warming comes with rise in sea level	2.54	Agreed
4.	Most streams in hinterland are drying up as a result of global warming.	3.07	Agreed
5.	Global warming is characterized by desertification.	3.02	Agreed
6.	Change in weather condition over an extended period of time is global warming.	2.53	Agreed
7.	There is observed increase in sea level in the coastal areas.	2.17	Disagreed
8.	There is decrease in agricultural products in Nigeria.	2.71	Agreed
9.	The rate of sunshine is now is as a result of global warming	2.94	Agreed
10.	The weather seems to be hotter nowadays	2.52	Agreed

Mean Cut-off: 2.50

Table 1 provides insights into undergraduate students' perceptions of global warming. Overall, students showed a moderate agreement with several key aspects of global warming. For instance, they agreed that global warming is a measurable increase in the average temperature of the Earth's atmosphere, reflected by a mean score of 2.63. Similarly, they concurred that global warming is characterized by high temperatures (mean score: 3.02) and associated with rising sea levels (mean score: 2.54). Students also agreed that global warming contributes to the drying up of streams in hinterland areas (mean score: 3.07) and is linked to desertification (mean score: 3.02). The perception that global warming involves a change in weather conditions over an extended period was also supported (mean score: 2.53).

However, there was some disagreement regarding the observed increase in sea levels in coastal areas, with a mean score of 2.17 suggesting skepticism. Students did agree that global warming is contributing to a decrease in agricultural products in Nigeria (mean score: 2.71) and influencing the current rate of sunshine (mean score: 2.94). Additionally, they agreed that the weather seems hotter nowadays (mean score: 2.52). The data indicates that while students generally agree with the broader impacts of global warming, such as increased temperatures, changes in water resources, and desertification, there is some skepticism about specific effects, particularly the increase in sea levels in coastal areas.

Research Question 2: What is the level of knowledge of global warming among undergraduates in Ekiti State, Nigeria?

Table 2 Level of knowledge of global warming among undergraduates

Levels of Knowledge	No of Respondents	Percentage
Low (0.0 – 9.0)	89	22.25
Moderate (10.0 – 14.0)	172	43.00
High (15.0 – 20.0)	139	34.75
Total	**400**	**100**

Table 2 displays the distribution of undergraduate students' levels of knowledge about global warming. According to the data, 22.25% of the students have a low level of knowledge about global warming, scoring between 0.0 and 9.0. This suggests that a significant minority of students possess limited understanding of the topic. In contrast, a substantial portion of students, 43.00%, fall into the moderate knowledge range, scoring between 10.0 and 14.0. This indicates that nearly half of the respondents have a moderate grasp of global warming, suggesting a fairly widespread but not universally deep understanding among the undergraduate population.

Additionally, 34.75% of the students have a high level of knowledge, scoring between 15.0 and 20.0. This shows that over a third of the respondents have a strong understanding of global warming, indicating a significant proportion with comprehensive knowledge on the subject. The table reveals that while most students have moderate to high levels of knowledge about global warming, there is still a notable percentage with lower knowledge levels. This distribution highlights the need for targeted educational initiatives to enhance understanding across all knowledge levels. Figure (i) further reveal the level of knowledge of global warming at a glance.

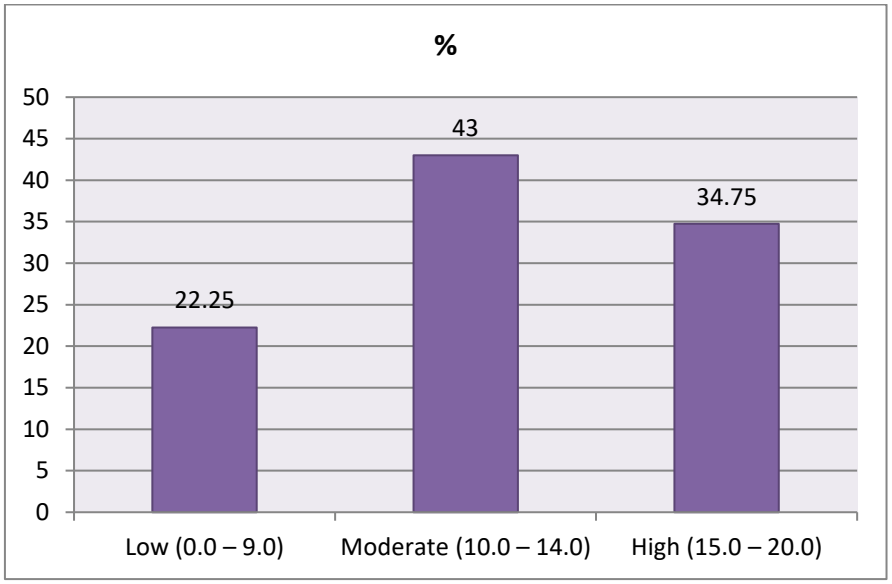

Fig. 1 Bar Chart showing knowledge of global warming among undergraduates

Testing of Hypotheses

Hypothesis 1: There is no significant relationship between perception and knowledge of global warning among undergraduates.

Table 3 Relationship between perception and knowledge towards global warning

Variables	N	Mean	SD	r-cal	p-value
Perception	400	27.15	2.98	0.012	0.780
Knowledge	400	40.17	2.86		

**p>0.05*

Table 3 shows that r-cal value of 0.012 is not significant because the p-value of 0.780 is greater than 0.05 at 0.05 level of significance. The null hypothesis is not rejected. This implies that there was no significant relationship between perception and attitude towards global warning among undergraduates.

Hypothesis 2: There is no significant difference in perception of global warming among undergraduates based on gender

Table 4 t-test Analysis for difference in Perception of Global Warming among Undergraduates based on gender

Variations	N	Mean	SD	df	t_{cal}	P
Male	229	26.21	2.49	398	3.578*	0.010
Female	171	27.96	2.84			

**P<0.05*

Table 4 shows that the t-cal value of 3.578 was significant because the P value (0.010) < 0.05. This implies that null hypothesis was rejected. Hence, there was significant difference in perception of global warming among undergraduates based on gender. The mean difference was 1.75 in favour of female students.

Hypothesis 3: There is no significant difference in knowledge of global warming among undergraduates based on gender.

Table 5 t-test Analysis for difference in knowledge of global warming among undergraduates based on gender

Variations	N	Mean	SD	df	t_{cal}	P
Male	229	14.38	3.18	398	0.098	0.957
Female	171	14.43	3.16			

P>0.05

Table 5 shows that the t-cal value of 0.098 was not significant because the P value (0.957) > 0.05. This implies that null hypothesis was not rejected. Hence, there was no significant difference in knowledge of global warming among undergraduates based on gender.

DISCUSSION

The study's findings indicated that students had a favourable perception of global warming. Cardwel (2015) found strong evidence supporting this conclusion, as participants had a high level of awareness and understanding regarding climate change, global warming, and global environmental change. Sharp and Hoj (2015) demonstrate that a significant proportion of Australian and American students possess a favourable understanding of global warming.

The survey found that the undergraduates had a moderate level of understanding on global warming. The likely reasons for a moderate level of awareness could be attributed to the fact that global warming is not included as a topic in the standard curriculum. In support of this discovery, Mings and Jeffery (2012) stated that students possess a moderate level of understanding of global warming. In their study, Dergisi (2015) also found that students possess a significant understanding of global warming, particularly about its impacts. Contrary to the current findings, Acquah (2015) revealed that students possess limited understanding regarding the causes and prevention of global warming.

A study uncovered that there was no substantial correlation between the perception and knowledge of global warming among undergraduate students. The likely cause could be their expertise in matters related to global warming. This suggests that their understanding of global warming may stem from their familiarity with the concept rather than their own sense of it. Consistent with the study's findings, Ayodele, Okunade, and Akinlade (2022) found no statistically significant correlation between students' perception and knowledge of global warming.

The survey found a substantial disparity in the impression of global warming among undergraduate students, with female students exhibiting a more favourable view compared to their male counterparts. Oyakale (2013) stated that women exhibit greater sensitivity towards global warming and regard it as a significant issue that demands serious attention. Raudsepp (2015) discovered a considerable gender disparity, with women exhibiting a higher likelihood of expressing concern towards environmental issues compared to men. The survey found no discernible disparity in the understanding of global warming among undergraduate students based on gender. Ayodele, Okunade, and Akinlade (2022) found evidence supporting this claim by demonstrating that there was no substantial disparity in the understanding of environmental matters between male and female students in secondary schools.

CONCLUSION

Sequel to the findings of this study, it is concluded that most of the undergraduates have good perception and moderate knowledge of global warming. The perception of global warming differs based but the knowledge of global warming was at same level irrespective gender.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made.

1. The university administration, in collaboration with the Environmental Science and Science Education department, should implement targeted educational campaigns to address misconceptions about global warming and provide clear, evidence-based information on its effects, including sea level rise. This can include interactive workshops and seminars integrated into academic curricula.
2. Academic advisors and curriculum developers should offer introductory courses for students on global warming.
3. The university's gender studies department, in coordination with environmental educators, should design gender-sensitive educational programs to address the distinct interests and concerns of male and female students. This strategy aims to improve engagement and understanding of global warming across genders.

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