

KNOWLEDGE OF CLIMATE CHANGE AMONG UNDERGRADUATES OF UNIVERSITY OF NIGERIA NSUKKA

BY

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Abstract

This study was embarked upon to find out the level of knowledge of climate change possessed by undergraduates of University of Nigeria, Nsukka. Five specific objectives with five corresponding research questions, and one null hypothesis guided the study. The study adopted the descriptive survey research design. The population for the study consisted of 21,907 regular undergraduates of UNN. The sample was 960 undergraduates selected through multi-stage sampling technique. Researcher-designed valid and reliable questionnaire was used for data collection. Percentages were used to answer the research questions, while chi-square (χ^2) statistic was used to test the null hypothesis at .05 level of significance. Results of the study among others indicate that undergraduates of UNN possessed high level of knowledge regarding concepts (60.4%) of climate change; average level of knowledge regarding causes (53%), effects (59%), and mitigation strategies (59.8%) for CC; male (63.5%) and female (60%) undergraduates of UNN had high and average level of knowledge of CC in all dimensions of CC studied respectively, but males had slightly higher knowledge of CC than females. Gender had no significant influence on knowledge of climate change possessed by undergraduates. Based on the findings, recommendations were made among which is that students' level of knowledge of climate change

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should be increased. This could be achieved by the active involvement and participation of relevant stakeholders such as the government, research institutions, and NGOs in teaching students the concepts and activities that help alleviate climate change.

Key words: Climate, Climate Change, Knowledge, Mitigation Strategies, Undergraduates.

Introduction

Climate change (CC) is a global issue and the greatest environmental health challenge facing the earth's citizenry in this 21st century. It has a lot of implications for survival of man, because it is one of the greatest environmental, social, and economic threats experienced by man world over. Many of the major killer diseases appear to be highly climate-sensitive, and may worsen as the climate changes.

Climate means the weather conditions averaged over a period of time. Therefore, climate change is a continuous rapid and prolonged alteration of climate in one direction. Climate change is the statistically significant variations that persist for an extended period, typically decades or longer (Intergovernmental Panel on

Climate Change-IPCC, 2007). This seems to imply shifts in the frequency and magnitude of sporadic weather events as well as the slow and continuous rise in global mean surface. It is a variation or an alteration in the components of the climate (Igwe, 2010). Hence, it relates to changes in temperature, rainfall (timing and volume), atmospheric carbon, intensity of solar radiation, among others.

Climate change manifests as changes in average climatic condition, where some regions may become drier or wetter on average; changes in climate variability, where rainfall events may become more erratic in some regions; changes in the frequency and magnitude of extreme weather events; and changes in sea levels (Eboh, 2009). Man as an ecological being needs to live in a harmonious environment for

peaceful existence. Environment, which is the totality of external factors that influence the survival of living things, interact therein to make some contributions to climate change effects.

Climate change is caused mainly by two agents: nature and man. Before humans, the earth's climate is influenced and changes through natural causes such as volcanic eruptions, ocean current, the earth's orbital changes and solar variations (Offorma, 2014). The author added that anthropogenic activities such as deforestation (felling of trees and bush burning), industrial emissions, agriculture and bombing contribute to climate change. Human activities alter the climate to a large extent through global warming as a result of GreenHouse Gas (GHG) emission (Pender, 2008). According to World Meteorological Organization-WMO (2009), the burning of coal, oil, and natural gas, as well as deforestation and various agricultural and industrial practices, are altering the composition of the atmosphere and contributing to climate change.

In Nigeria, for example, burning of bushes is one of the commonest ways of preparing farm land for agriculture. This singular activity releases carbon dioxide (CO₂), nitrogen oxide (NO_x), methane (CH₄), and other greenhouse gases which destroy the ozone layer, thereby contributing to climate change effects. Gas flaring and vehicular and industrial emissions can also contribute to climate change. Electricity generated through thermal power plants are powered by fossil fuels, and are responsible for the emission of huge amounts of GHGs and other pollutants. High-yielding varieties of crops require large quantities of fertilizers; and more fertilizer means more emissions of nitrous oxide, both from the farms where it is used and the fertilizer industries that produce it (WMO, 2009).

The primary and most observable effect of climate change is the increase in the global temperature known as global warming. This is made possible by concentration of GHGs in the earth's atmosphere. Global warming is the increase in global

average temperature primarily caused by human emissions of greenhouse gases, primarily CO₂ (Odoh & Chilaka, 2012). Carbon dioxide is the primary GHG that is contributing to recent climate change. Rising atmosphere of CO₂ concentration leads to higher temperature change (IPCC, 2007). Building Nigeria's Response to Climate Change-BNRCC (2008) noted that CC deleterious effects include seasonal cycles disruption, adverse effects on food production, sea-level rise with its attendant consequences, fierce weather, increased frequency and intensity of storms, floods, hurricanes, drought, increased frequency of fires, poverty, malnutrition and series of health and socio-economic consequences.

Climate change presents as serious threat to poverty reduction and sustainable development world over. Fawole and Olajide (2012) observed that every State across the various ecological zones in Nigeria suffer from the effects of climate variable change. Desertification of the sahel belt increases unpredictability of summer rains, reduction of settlement

and agricultural lands, reduced hydrocarbon extraction activities in the Niger Delta Area, flooding, earthquake, emission, volcanic eruption, tsunami, and increased risk of oil spills. All these have negative effect on human health, transport routes, and on electricity supply and distribution. It results in reduction in food yields due to changes in temperature and rainfall patterns. Many parts of Nigeria experienced flooding that caused loss of property, destruction of farmlands, relocation of habitation; and house roofs were blown off by tornadoes in 2012 (Offorma, 2014). Apata (2014) added that recent global warming has influenced agricultural productivity leading to declining food production. The changing climate may indirectly cause misery by increasing the incidence of disease, death and conflict as well threatening biodiversity.

Minimizing the impacts of CC requires adaptation. The ways of adapting to CC include diversification of livelihood sources, migration, sale of assets, settlement and resettlement

activities, and adoption of improved water management systems (Madukwe, 2012). The author added that climate change can be mitigated by engaging in activities such as improving crop and grazing land to increase soil carbon storage; manure management to reduce methane emissions; promotion of low energy production systems; improving the control of wildfires and avoiding burning of crop residues; soil management practices that reduce fertilizer use and increase crop diversification, among others. The IPCC (2007) recommended various mitigation strategies as follow: use of more fuel efficient vehicles, cleaner diesel vehicles, biofuels, non-motorised transport (cycling, walking); the use of efficient electrical appliances, improved or low emission cooking stoves among others. Another mitigation strategy would be to create its awareness, and sensitize people on the effects of their agricultural, economic, industrial activities and their concomitant effects on the climate (Offorma, 2014). One way of doing this is by integrating or mainstreaming climate change issues in the programmes of teacher

education institutions, and school programmes at all educational levels in Nigeria.

Climate change is an issue that requires knowledge and capacity across many disciplines in order to provide effective strategies for mitigation and adaptation (Nwaleji & Onwubuya, 2012). Knowledge of climate change is essential in improving the health and environmental habitations of Nigerians, and achieving the national targets of the health related-Millennium Development Goals (MDGs).

Universities including University of Nigeria, Nsukka (UNN) are custodians of knowledge and provide platforms for transdisciplinary, multidisciplinary and shared thinking that is capable of sustaining the socio-economic and environmental growth and development of any nation. The Conversation Media Group-CMG (2013) noted that until people understand the science behind climate change, they may not support political regulation or make personal decisions

to help reduce greenhouse gas production. Therefore, the young people, including the undergraduates need to possess correct climate change knowledge that will help them to sensitize others about its effects and intervention strategies. This is because the next generation will be the ones to feel the increasing effects of climate change. Theissen (2011) reported that many undergraduates have significant misconceptions about the fundamental science behind climate change. The report added that many of the students do not know that climate change is induced by human actions. However, the level of knowledge of climate change is not the same for all the students. This may depend on certain socio-demographic factors which include gender differences.

Women and men have different interests and needs, and are obliged to acquire different capacities and knowledge including that of climate change. Females usually display less extensive environmental knowledge than males, but they are more emotionally engaged, show more concern about environmental

destruction, believe less in technological solutions, and are more willing to change (Ajah, 2012).

Statement of the Problem

Climate change sensitization need to begin in school with a curriculum which promotes understanding of climate science as well as pro-environmental behaviour. Undergraduates need to have the requisite knowledge of CC including its mitigation and adaptation strategies, so as to be in a better position to wrestle it. However, students appear not to have sufficient knowledge of climate change. Observations and experiences have revealed that the basic sensitization about CC in various levels of educational training was not accompanied with practical exposure to CC adaptation and mitigation guidelines and strategies. Some teachers in various level of education seem to have limited knowledge of the concepts, causes, effects, adaptation and mitigation strategies of climate change, and may not impart its knowledge properly so as to assist the students to improve the quality of their health and environment. Climate

change is not explicitly mentioned in the students' curriculum despite young people's exposure to the topic in the media. However, there are no published studies that have sought to find out the knowledge of climate change possessed by undergraduates of University of Nigeria, Nsukka. In view of the above, the need arose to find out if undergraduates possessed adequate knowledge of climate change.

Objectives of the Study

The purpose of the study was to find out the knowledge of climate change possessed by Undergraduates of University of Nigeria Nsukka (UNN). Specifically, the study found out undergraduates of UNN level of knowledge of:

1. concepts of climate change;
2. causes of climate change;
3. effects of climate change;
4. mitigation strategies for climate change; and
5. climate change based on gender.

Research Questions

Five research questions were posed to guide the study.

1. What is the level of knowledge of

concepts of climate change possessed by Undergraduates?

2. What is the level of knowledge of causes of climate change possessed by Undergraduates?
3. What is the level of knowledge of effects of climate change possessed by Undergraduates?
4. What is the level of knowledge of mitigation strategies for climate change possessed by Undergraduates?
5. What is the level of knowledge of climate change possessed by Undergraduates of UNN based on gender?

Hypothesis

HO₁) There is no significant difference in the level of knowledge of climate change possessed by male and female Undergraduates of UNN.

Methods

This study adopted the descriptive survey research design. This design according to Nworgu (2006) describes situation as they exist in

their natural setting, and determines the relationship that exist between specific events. The population for the study comprised 12,492 males and 9,415 females giving a total 21,907 regular undergraduates of UNN (University of Nigeria Academic Planning Unit, 2014). The multi-stage sampling technique was employed to draw the sample for the study. The first stage involved purposive sampling of eight faculties out of the fifteen faculties of the University. The second stage involved simple random sampling of 3 departments from each of the selected 8 faculties through balloting with replacement. This procedure gave a total of 24 departments. The sample size of 960 was divided by the number of the selected departments in order to determine the number of students to be selected from each department in the next stage thus: 960 divided by 24, gives 40. The third stage involved systematic random sampling of 24 male and 16 female undergraduates from each selected department. In each level of study in a 4-year programme, 6 male and 4 female undergraduates were purposively selected to give 40

students, whereas in a department that offers a 5-year programme, 5 male and 3 female undergraduates were selected from each level to give 40 students. Among the selected departments for the study, none offers a 6-year programme. In all, a total of 582 male and 378 female undergraduates participated in the study, thereby giving rise to 960 respondents used in this study.

Researcher-designed 20-item questionnaire served as the instrument for data collection. The questionnaire was validated by three experts from the Department of Health and Physical Education, University of Nigeria, Nsukka. The reliability of the instrument was established using split half method, and a correlation coefficient of .78 was obtained with the Spearman's rank order correlation formula, which was adjudged reliable for embarking on the study. The instrument was administered and retrieved after completion by the researchers. Percentages were used to answer the research questions, while chi-square (χ^2) statistic was used to test the null hypothesis at .05 level of

significance. In determining the level of knowledge of climate change, Ashur's 1977 modified version by Okafor's (1997) was utilized. By these criteria, below 20 per cent score of the respondents who indicate correct responses in any aspect of the variables being investigated was considered very low level of knowledge (VLK), a score of 21- 39 per cent was considered low level of knowledge (LK), a score of 40-59 per cent was considered average level of knowledge (AK), a score of 60-80 per cent was considered high level of knowledge (HK), and a score above 80 per cent was considered very high level of knowledge (VHK).

Results

Table 1: Undergraduate's Level of Knowledge of Concepts of Climate Change (n = 960).

S/n	Knowledge of concept	Correct Ans		Wrong Ans		Decision
		f	%	f	%	
1.	Increase in temperature due to accumulation of Greenhouse gases in atmosphere	624	65	336	35	High
2.	Variation in temperature, rainfall, and intensity of solar	590	61.5	370	38.5	High
3.	Continuous and rapid prolonged alteration of climate in one direction	642	66.9	318	33.1	High
4.	Alteration in Agricultural practices due to weather for an extended period	462	48.1	498	51.9	Average
Overall percentage		60.4		39.6		High

Table 1 shows that the overall value of undergraduates' level of knowledge of concepts of climate change was 60.4 per cent. This implies that undergraduates of UNN possessed high level of knowledge of concepts of climate change. The table further shows that the respondents' level of knowledge of indices of concepts of CC such as continuous and rapid prolonged alteration of climate in one direction (66.9%), increase in temperature due to accumulation of Greenhouse gases in atmosphere (65%), and variation in temperature, rainfall, and intensity of solar (61.5%) were high; while alteration in Agricultural practices due to weather for an extended period (48.1%) was average.

Table 2: Undergraduate's Level of Knowledge of Causes of Climate Change (n=960).

S/n	Knowledge of causes	Correct Ans		Wrong Ans		Decision
		f	%	f	%	
5.	Climate change is caused by both natural and human activities	665	69.3	295	30.7	High
6.	Accumulation of Greenhouse gases in the atmosphere	603	62.8	357	37.2	High
7.	Burning of fossil fuels	558	58.1	402	41.9	Average
8.	Burning of bushes	321	33.4	639	66.6	Low
9.	Gas flaring	396	41.2	564	58.8	Average
Overall Percentage			53.0		47.0	Average

Table 2 shows that the overall value of undergraduates' level of knowledge of causes of climate change was 53 per cent. This implies that undergraduates of UNN possessed average level of knowledge of causes of CC. The table further shows that the respondents' level of knowledge of indices of causes of CC such as climate change is caused by both natural and human activities (69.3%), and accumulation of Greenhouse gases in the atmosphere (62.8%) were high; burning of fossil fuels (58.1%) and gas flaring (41.2%) were average; while burning of bushes (33.4%) was low.

Table 3: Undergraduate's Level of Knowledge of Effects of Climate Change (n = 960).

S/n	Knowledge of effects	Correct Ans		Wrong Ans		Decision
		f	%	f	%	
10.	Global warming	571	59.5	389	40.5	Average
11.	Seasonal cycles disruption	568	59.2	392	40.8	Average
12.	Sea-level rise and flooding	516	53.7	444	46.3	Average
13.	Drought and low Agricultural productivity	552	57.5	408	42.5	Average
14.	Ecological degradation	491	51.1	469	48.9	Average
15.	Increasing incidence of disease, death, and threatened biodiversity	701	73.0	259	27.0	High
Overall percentage			59.0		41.0	Average

Table 3 shows that the overall value of undergraduates' level of knowledge of effects of climate change was 59 per cent. This implies that undergraduates of

UNN possessed average level of knowledge of effects of CC. The table further shows that the respondents' level of knowledge of indices of effects of CC such as increasing incidence of disease, death, and threatened biodiversity (73%) was high; while global warming (59.5%), seasonal cycles disruption (59.2%), drought and low Agricultural productivity (57.5%), sea-level rise and flooding (53.7%), and ecological degradation (51.1%) were average.

Table 4: Undergraduate's Level of Knowledge of Mitigation Strategies for Climate Change (n = 960).

S/n	Knowledge of mitigation strategies	Correct Ans		Wrong Ans		Decision
		f	%	f	%	
16.	Moderate use of agro-chemicals and fertilizers	593	61.8	367	38.2	High
17.	Use of improved or low emission cooking stoves	621	64.7	339	35.3	High
18.	Construction of drainage system	584	60.8	376	39.2	High
19.	Sensitizing people on effects of climate change	599	62.4	361	37.6	High
20.	Integrating climate change issues in programmes of both teachers and students	472	49.2	488	50.8	Average
Overall percentage			59.8		40.2	Average

Table 4 shows that the overall value of undergraduates' level of knowledge of mitigation strategies for climate change was 59.8 per cent. This implies that undergraduates of UNN possessed average level of knowledge of mitigation strategies for CC. The table further shows that the respondents' level of knowledge of indices of mitigation strategies for CC such as use of improved or low emission cooking stoves (64.7%), sensitizing people on effects of climate change (62.4%), moderate use of agro-chemicals and fertilizers (61.8%), and construction of drainage system (60.8%) were high; while integrating climate change issues in programmes of both teachers and students (49.2%) was average.

Table 5: Undergraduate's Level of Knowledge of Climate Change Based on Gender (n = 960).

S/n	Knowledge of climate change (CC)	Male (n=582)			Female (n=378)		
		f	%	Decision	f	%	Decision
1.	Knowledge of concepts of CC	388	66.7	High	232	61.4	High
2.	Knowledge of causes of CC	386	66.3	High	222	58.7	Average
3.	Knowledge of effects of CC	343	59.0	Average	208	55.0	Average
4.	Knowledge of mitigation strategies for climate change	360	61.8	High	240	63.5	High
	Overall percentage		63.5	High		59.7	Average

Table 5 shows that male undergraduates (63.5%) had high level of knowledge, while female undergraduates (59.7%) had average level of knowledge. This implies that there is a difference in the level of knowledge of climate change possessed by undergraduates; with males having slightly higher knowledge than females. The table further shows that the male undergraduates' level of knowledge of: concepts of CC (66.7%), causes of CC (66.3%), and mitigation strategies for CC (61.8%) were high; while knowledge of effects of CC was average. The table also shows that the female undergraduates' level of knowledge of: concepts of CC (61.4%), and mitigation strategies for CC (63.5%) were high; while knowledge of: causes (58.7%) and effects (55%) of climate change were average.

Table 6: Summary of Chi-Square (X²) Analysis of No Significant Difference in the Level of Knowledge of Climate Change Possessed By Undergraduates of UNN Based On Gender.

Knowledge of CC	Male (n=582)				Female (n=378)				X ² -cal	df	X ² -crit
	CA		WA		CA		WA				
	O	E	O	E	O	E	O	E			
Concepts	388	(375.9)	194	(206.1)	232	(244.1)	146	(133.9)	2.79	1	3.84**
Causes	386	(368.6)	196	(213.4)	222	(239.4)	156	(138.6)	5.69	1	3.84*
Effects	343	(334)	239	(247.9)	208	(216.9)	170	(161)	1.43	1	3.84**
Mitigation strategies	360	(363.8)	222	(218.3)	240	(236.3)	138	(141.8)	.26	1	3.84**

*Significant, **Not significant, CA = Correct Answer, WA = Wrong Answer, O = Observed frequency, E = Expected frequency

Table 6 shows the calculated chi-square (x^2) values with their corresponding critical (table) values for concepts of CC ($x^{2-cal} = 2.79 < x^{2-crit} = 3.84$); effects of CC ($x^{2-cal} = 1.43 < x^{2-crit} = 3.84$); and mitigation strategies for CC ($x^{2-cal} = .26 < x^{2-crit} = 3.84$). Since their calculated x^2 values were less than their critical (table) values, the null hypothesis of no significant difference in the level of knowledge of climate change possessed by undergraduates based on gender was therefore accepted. The table also shows that causes of CC ($x^{2-cal} = 5.69 > x^{2-crit} = 3.84$) was rejected. This implies that the level of knowledge of climate change possessed by male and female undergraduates is same.

Discussion

The findings of the study in Table 1 show that undergraduates of UNN possessed high (60.4%) level of knowledge regarding concepts of climate change. The findings were expected and therefore not surprising because undergraduates supposed to have been sensitized on the basic issues about climate change in the

course of their higher education. These findings were in line with the assertions of IPCC (2007) who asserted that climate change is the statistically significant variations that persist for an extended period, typically decades or longer; and Igwe (2010) who asserted that climate change is a variation or an alteration in the components of the climate. The findings also disagree with the report of Theissen (2011) who reported that many undergraduates have significant misconceptions about the fundamental science behind climate change. These findings may be as a result of adequate sensitization on issues of climate change in institutions of learning. These findings have implications for reviewing academic programmes of undergraduates so that they could obtain adequate knowledge of concepts of climate change that would help them to improve the quality of their health as well as their environment for optimal living. Also, adequate knowledge of concepts of climate change has implication for survival of man, because it is one of the greatest environmental, social, and economic threats experienced by man

world over.

The findings of the study in Table 2 show that undergraduates of UNN possessed average (53%) level of knowledge of causes of climate change. These findings were expected and therefore not surprising because it is a well known fact that climate change is caused by both human activities and nature; therefore undergraduates supposed to have basic knowledge of its causes. The findings were in line with the assertion of Pender (2008) who asserted that human activities alter the climate to a large extent through global warming as a result of GreenHouse Gas (GHG) emission; and WMO (2009) who reported that the burning of coal, oil, and natural gas, as well as deforestation and various agricultural and industrial practices, are altering the composition of the atmosphere and contributing to climate change. The findings on burning of bushes and burning of fossil fuels were in agreement with the assertion of Offorma (2014) who asserted that anthropogenic activities such as deforestation (felling of trees and bush

burning), industrial emissions, agriculture and bombing contribute to climate change. In Nigeria, for example, burning of bushes is one of the commonest ways of preparing farm land for agriculture. This singular activity releases carbon dioxide, nitrogen oxide, methane, and other greenhouse gases which destroy the ozone layer, thereby contributing to climate change effects. Before humans, the earth's climate is influenced and changes through natural causes such as volcanic eruptions, ocean current, the earth's orbital changes, solar variations among others. The findings have implications for policy makers to make policies both at local, national, and international level that would improve and protect the environment from degradation due to climate change.

The findings of the study in Table 3 show that undergraduates of UNN possessed average (59%) level of knowledge regarding effects of climate change. These findings were expected and therefore not surprising because the primary and most observable effect of climate change

which is the increase in the global temperature known as global warming is constantly experienced by everyone recently. The findings conform to the observations of Fawole and Olajide (2012) who observed that every State across the various ecological zones in Nigeria, suffer from the effects of climate variable change. Desertification of the sahel belt increases unpredictability of summer rains, reduction of settlement and agricultural lands, reduced hydrocarbon extraction activities in the Niger Delta Area, flooding, earthquake, emission, volcanic eruption, tsunami, and increased risk of oil spills. The findings on seasonal cycles disruption, sea-level rise and flooding, drought and low agricultural productivity, and ecological degradation agree to the notification of BNRCC (2008) who noted that CC deleterious effects include seasonal cycles disruption, adverse effects on food production, sea-level rise with its attendant consequences, fierce weather, increased frequency and intensity of storms, floods, hurricanes, drought, increased frequency of fires, poverty, malnutrition and series of

health and socio-economic consequences. The finding on global warming is in line with the report of Apata (2014) who reported that recent global warming has influenced agricultural productivity leading to declining food production. All these have negative effect on human health, transport routes, and on electricity supply and distribution.

The findings of the study in Table 4 show that undergraduates of UNN possessed average (59.8%) level of knowledge regarding mitigation strategies for climate change. These findings were expected and therefore not surprising because the findings were in line with the assertion of Madukwe (2012) that climate change can be mitigated by engaging in activities such as improving crop and grazing land to increase soil carbon storage; manure management to reduce methane emissions; promotion of low energy production systems; improving the control of wildfires and avoiding burning of crop residues; soil management practices that reduce fertilizer use and increase crop diversification, among others. The

findings were also in line with the recommendation of IPCC (2007) who recommended the use of efficient electrical appliances, improved or low emission cooking stoves among others; and suggestion of Offorma (2014) that one of the mitigation strategies would be to create its awareness, and sensitize people on the effects of their agricultural, economic, industrial activities and their concomitant effects on the climate. One way of doing this is by integrating or mainstreaming climate change issues in the programmes of teacher education institutions, and school programmes at all educational levels in Nigeria. Inclusion of climate change in the curricula of educational institutions will have a ripple effect as the learners will be ploughed back to the society at graduation to transfer the knowledge they gained in school to facing the challenges of climate areas. Such challenges may be new pedagogical skills, new technologies and resources, and new knowledge.

The finding of the study in Table 5 shows that male undergraduates (63.5%) had high level of knowledge,

while female undergraduates (59.7%) had average level of knowledge. This implies that there is a difference in the level of knowledge of climate change possessed by undergraduates; with males having slightly higher knowledge than females. This finding was expected and therefore not surprising because it agrees with the report of Ajah (2012) who reported that females usually display less extensive environmental knowledge than males, but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change. The summary of chi-square analysis in Table 6 shows that there was no significant difference in the level of knowledge of climate change possessed by undergraduates of UNN based on gender. These findings were anticipated and therefore were not surprising because it is a well established fact that women and men have different interests and needs, and are obliged to acquire different capacities and knowledge including that of climate change.

Conclusions

Based on the findings and discussion, the following conclusions were reached. Undergraduates of UNN possessed high level of knowledge regarding concepts of CC; average level of knowledge regarding causes, effects, and mitigation strategies for CC; male and female undergraduates of UNN had high and average level of knowledge of CC in all dimensions of CC studied respectively, but males had slightly higher knowledge of CC than females. Gender had no significant influence on knowledge of climate change possessed by undergraduates. Undergraduates' responses were however, at a moderate pace due to their exposure to an institution of higher learning. Thus, there is need to include CC in the programmes of educational institutions which will contribute to the dissemination of information on it as an issue, and invariably reduce poverty and other environmental health challenges faced due to climate change.

Recommendations

Based on the findings, discussion and conclusions drawn, the following

recommendations were made:

1. Climate change should be incorporated in the curriculum of school programmes of both teachers and students of all levels so as to disseminate information and build capabilities, and as well be aware of the various international conventions and protocols surrounding climate change. Also, to create awareness and sensitize all stakeholders.
2. The Federal Ministry of Agriculture in collaboration with the Federal Ministry of Environment should disseminate appropriate knowledge, skills and practices to farmers and young generation that may have to combat with more effects of global warming due to human activities on the environment.
3. The major contents of educational curriculum in Nigeria should be the concepts, causes, effects, mitigation, adaptation strategies, governance, and resilience of climate change.
4. Students' level of knowledge of climate change should be increased. This could be achieved by the active involvement and participation of relevant stakeholders such as the

government, research institutions, and NGOs in teaching students the concepts and activities that help alleviate climate change.

References

Ajah, J. (2012). Gender differentiation in daily farm wage rates in Nigeria. *Journal of Agricultural Extension*, 16, 1. Retrieved from <http://www.aesonigeria.org>.

Apata, T. G. (2014). Effects of global climate change on Nigerian Agriculture: An empirical analysis. *CBN Journal of Applied Statistics*, 2 (1), 31-50.

Ashur, S. S. (1977). An evaluation plan for the development and updating of nutrition curriculum of the upper elementary and preparatory levels in Jordan. VES, UNESCO. *International Conference on Nutrition Education*, 207 (2), 67-74.

BNRCC. (2008). *Annual workshop of environmental study team (NEST): The recent global and local action on climate change, held at Hotel Millenium, Abuja, Nigeria, 8 – 9th October, 2008.*

Conversation Media Group. (2013). *What do Young people really know about climate change.* Retrieved from <http://theconversation.com/climate-change-19754>.

Eboh, E. (2009). Introduction. *Debating Policy Options for National Development: Implications of Climate change for Economic Growth and Sustainable development in Nigeria.* Enugu Forum Policy paper 10. Enugu: African Institute for Applied economics.

Fawole, O. P., & Olajide, B. R. (2012). Reporting of climate change news in three Nigerian Newspapers. *Journal of Agricultural Extension*, 16, 1.

- Igwe, C. A. (2010). Climate change and the need for curriculum development in agricultural sciences. In N. Ozor (Ed.), *First technical report submitted to the Global Change Systems for analysis, research and training (START) under the African Climate Change Fellowship Programme (ACCFP). African Technology Policy Studies (ATPS), Nairobi, Kenya.*
- IPCC. (2007). *Summary of policy makers, climate change 2007: The physical science basis, contribution of working group 1 to the Fourth Assessment Report of the Intergovernmental panel on Climate Change.* Retrieved from <http://ipcc-wgl.ucar>.
- Madukwe, M. (2012). Concept of climate change. *Talk Presented at PAA Meeting, University of Nigeria Nsukka.*
- Nwaleji, H. U., & Onwubuya, E. A. (2012). Adaptation practices to climate change among Rice Farmers in Anambra State of Nigeria. *Journal of Agricultural Extension, 16, 1.*
- Nworgu, B. G. (2006). *Educational research: Basic issues and methodology (2nd ed.)*. Nsukka, Enugu: University Trust Publishers.
- Odoh, S. I., & Chilaka, F. C. (2012). Climate change and conflict in Nigeria: A theoretical and empirical examination of the worsening incidence of conflict between Fulani Herdsmen and farmers in Northern Nigeria. *Arabian Journal of Business and Management Review (OMAN Chapter), 2 (1), 1-15.*
- Offorma, G. C. (2014). Climate change in Nigeria. *Pen Magazine University of Nigeria Nsukka (2nd ed.), 27-31.*

Okafor, R. U. (1997). Sexual knowledge and sources of sexual information on secondary school students in Anambra State. *Journal of Nigerian Health and Movement Education*, 1 (1), 9-19.

Pender, J. S. (2008). What is climate change? And how it may affect Bangladesh. Dhaka, Bangladesh: Church of Bangladesh Social Development Programme.

Theissen, K. M. (2011). Climate mitigation and adaptation. Retrieved from <http://hyperlink.org>.

World Meteorological Organization-WMO (2009). What human activities contribute to climate change. Retrieved from <http://www.gcrio.org/ipcc/qa/04.html>.