SOCIO-ECONOMIC ISSUES OF CLIMATE CHANGE ON HEALTH STATUS OF SECONDARY SCHOOLS TEACHERS IN UDU LOCAL GOVERNMENT AREA OF DELTA STATE

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Abstract
This study is a survey research design that assessed the socio-economic relationship of climate change on health status of Teachers in Secondary schools in Udu Local Government Area of Delta State. The study seeks to determine the knowledge of Climate Change impact on health status, causes of climate change relationship on health status, socio-economic relationship of climate change on health status and preventive measures for climate change relationship on health status. The purposive random sampling technique was used to select a total of one hundred and sixty (160) secondary school teachers from eight schools in Udu Local Government Area of Delta State. The data obtained were analyzed using percentage to describe the four research questions and Chi-square was used to test the four hypotheses of this study at 0.05 level of significant. The result revealed that secondary school teachers have a high level on the preventive measures of climate change relationship on health status. 71.25% (114) have the knowledge of climate change and16.25% (26) does not and 12.5% (20) were undecided. 65% of the respondents agreed that climate change affects their health status. There is significant relationship in the socio-economic effect of climate change on health status of teachers. Recommendation was made that Promoting Sustainable Agricultural practices will help mitigate the health impacts of climate change on people and the reduction in the burning of fossil fuels such as coal and oil as it can contribute to climate change and have negative health effects and that health education should be promoted in the community.

Key Words: *Climate change, Health status, Teachers.*

Introduction
Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity (Chan, 2016). The Intergovernmental Panel on Climate Change (IPCC, 2022) defines climate change as a change in the state of the climate that can be identified 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 a phenomenon that has gained widespread attention and significance in recent decades due to its profound impact on the Environment, Societies and Economics World Wide. It is a complex and multifaceted process that has both natural and human-induced causes, resulting in shifts in temperature, precipitation patterns, sea levels and more climate change can disrupt the delicate balance of disease vectors and hosts, potentially affecting the

prevalence and distribution of infectious diseases such as malaria, dengue fever and water-borne illnesses (Herrera, 2022).

Socio-economic factors such as industrialization, Agricultural practices (fertilizer use), energy consumption and fossil fuels etc. further compound the vulnerabilities of Humans population to the impacts of climate change and infectious diseases. The socio-economic challenges faced by secondary school teachers can exacerbate the effects of climate change and create conditions conducive for diseases to thrive in. For example, limited access to clean water and sanitation facilities can increase the prevalence of waterborne diseases such as cholera and typhoid fever (Ajibade, 2016). Additionally, poverty and lack of access to healthcare services can hinder timely diagnosis and treatment of diseases allowing them to spread more rapidly within the community (Ogwumike, 2018). As a result, the interplay of climate change and socio-economic factors can contribute web of health risks that disproportionately affect vulnerable populations. There are various policy implications and intervention towards socio-economic relationship of climate change on health status such as strengthening Healthcare systems, promoting health literacy and educational programs specifically target vulnerable populations (Larson, 2018). This study is therefore designed to determine the level of knowledge of socio-economic relationship of climate change on health status of secondary school teachers in Udu Local Government Area of Delta State.

To grasp the concept of climate change fully, it is necessary to recognize the two primary components – natural climate variability and anthropogenic (human-induced) climate change.

1. Natural climate variability: earth's climate has undergone natural fluctuations throughout its history. These variations are driven by factors such as changes in solar radiation, volcanic eruptions, and oceanic cycles. Natural climate variability can lead to short term fluctuations in temperature and weather patterns.
2. Anthropogenic climate change: in recent centuries, human activities have become the dominant driver of climate change. The burning of fossil fuels, deforestation, industrial processes and agriculture release Green House Gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) into the atmosphere. These Green House Gases trap heat from the sun, leading to the greenhouse effect and increase in global temperatures, a phenomenon known as global warming.

Anthropogenic climate change is the primary focus of concern because of its rapid and unprecedented nature. The burning of fossil fuels for energy and transportation, along with deforestation and other land-use changes has significantly elevated atmospheric GHG concentrations. The consequences of this enhanced greenhouse effect are far-reaching with impacts on weather patterns, sea-levels, ecosystems and human societies.

The key drivers of athropogenic climate change include:

1. Greenhouse Gas Emissions: The combustion of fossil fuels for energy and transportation is a major source of CO_2 emissions. Additionally, methane emissions

result from livestock agriculture and natural gas production, while nitrous oxide emissions stem from agricultural activities and industrial processes.

2. Deforestation and land use: Land use changes, particularly deforestation, contribute to climate change by reducing the Earth's capacity to absorb CO_2. Forest acts as carbon sinks, sequestering carbon through photosynthesis. When trees are cut down or burned, the carbon stored is released into the atmosphere
3. Industrial Processes: Industrial activities release GHGs through processes such as cement production, chemical manufacturing, and refrigerant use. These emissions, although often less prominent than energy-related emissions, contribute to the overall GHG burden.
4. Agricultural Practices: Agriculture contributes to climate change through methane emissions from livestock and rice cultivation, as well as nitrous oxide emissions from fertilizer use and soil management.

Statement of the Problem

Natural climate variability and Anthropogenic climate change is the primary focus of concern because of its rapid and unprecedented nature. Flooding, atmospheric heat, changes in weather, burning of fossil fuels for energy and transportation, along with deforestation and other land-use changes has significantly elevated atmospheric GHG concentrations. The consequences of this enhanced greenhouse effect are far-reaching with impacts on weather patterns, sea-levels, ecosystems, human societies norms, the health status and economic lifestyle of man has changed drastically. Therefore, this is study seeks to examine the effects of climate change on the health status and its socio-economic relationship on secondary school teachers in Udu Local Government Area of Delta State. It also seeks further to examine the potential relationship of climate change on secondary school teachers' health and well-being, as well as how it might affect their work environment and performances.

Research Questions

The following research questions were answered:

1. Would secondary school teachers have the knowledge of climate change relationship on health status in Udu Local Government Area of Delta State?
2. What are the causes of climate change relationship on health status of secondary school teachers in Udu Local Government Area of Delta State?

Hypotheses

The following hypotheses were tested:

1. There is no significant relationship in the knowledge of secondary school teachers in Udu Local Government Area of Delta State of the impact of climate change on health.
2. There is no significant relationship in the relationship between the causes of climate change and its effects on the health status of secondary school teachers in Udu Local Government Area of Delta State.

3. There is no significant socio-economic relationship of climate change on the health status of secondary school teachers in Udu Local Government Area of Delta State.
4. There is no significant relationship in the knowledge of secondary school teachers in Udu Local Government Area of Delta State regarding the preventive measures for climate change's impact on health.

Methodology

The survey research design was adopted. The target population of the study is one thousand, six hundred (1,600) teachers all in Udu Local Government Area of Delta State which comprises of both male and female teachers.The sample for the study consists of 10% of the estimated secondary school teachers which is 160 respondents participated in the study. These one hundred and sixty (160) teachers were randomly selected from eight secondary schools (3 public schools and 5 private schools) in Udu Local Government Area of Delta State. The purposive sampling technique used was for the study to select the respondents for the study. This technique was used after deciding on the number of respondents and the schools to be used to avoid bias. The Researchers used a structured socio-economic relationship of Climate Change on Health Status of secondary school teachers in Udu Local Government Area of Delta State. This questionnaire was self-structures by the Researchers on a 3-point, Likert rating scale of Agreed (A), Disagreed (D) and Undecided (UD). It consists of two (2) main sections. Section “A” comprises of four (4) items on demographic data of respondents (secondary school teachers) such as Gender, Educational qualification, Marital Status and Institution. While Section “B” comprised of questionnaire that are relevant to the variables of the study.

The validity of the instrument was done using the content validity and face validity method by two (2) research experts from Human kinetics and Health Education department, College of Education in Affiliation with Delta State University Warri, Delta State. The questionnaire was given to them separately for criticism and correction. The reliability of the instrument was established using the test-retest method using Pearson product moment correlation co-efficient. From the correlation, a co-efficient of 0.72 was established which indicated that the instrument was reliable.

Copies of a structured questionnaire were administered directly to the respondents by the researchers alongside with two (2) trained research assistants and retrieved immediately they were completed. Data collected was analyzed using frequency table, percentage and mean score analysis while the non-parametric statistical test (chi-square) was used to test the formulated hypothesis using SPSS (Statistical Package for Social Sciences) according to the research questions and hypothesis. In order to effectively analyze the data collected for easy management and accuracy, the chi-square method will be used for test of independence of the hypotheses at 0.05 level of significance.

Table 1: Analysis of respondents' demographic data

Variable	Option	Respondents	Percentage	Total
Gender	Male Female	52 108	32.5% 67.5%	160 100%
Level of Education	O' level Diploma Degree Masters	48 46 40 26	60% 28.75% 25% 16.25%	160 100%
Marital status	Single Married	88 72	55% 45%	160 100%
Institution	University College of Education School of Health	66 28 20 46	41.25% 17.5% 12.5% 28.75%	160 100%

In table 1, the data analysis revealed that out of 160 respondents who participated in the study 52 respondents representing (32.5%) were males while 108 respondents representing (67.5%) were females. Therefore, a high percentage of the respondents were females for the study. It was revealed that 48 (30%) of the respondents work with O' level result. 46 (28.75%) work with Diploma result, 40 (25%) had B.Sc. (First degree) certificate and few of the respondents (16.25%) work with Master's certificate. 88 (55%) of the respondents were single and 72 (45%) of the respondents were married. It was revealed that 66 (41.25%) of the respondents attended a university, 28 (17.5%) of the respondents attended College of Education, 20 (12.5%) respondents attended School of health and 46 (28.75%) attended a polytechnic.

Research Question One

Would secondary school teachers have the knowledge of climate change on health status in Udu Local Government Area of Delta State?

Table 2: Percentage analysis of respondent's knowledge of climate change

S/N	Items	A	D	UD
1	Climate change is any change in climate overtime, whether due to natural variability or as a result of human activity.	114 (71.25%)	26 (16.25%)	20 (12.5%)
2	Climate change is a long-term shift in temperature and weather patterns on Earth.	98 (61.25%)	44 (27.5%)	18 (11.25%)
3	Climate change can worsen respiratory conditions and increase the risk of heart-related illnesses.	84 (52.5%)	62 (38.75%)	14 (8.75%)
4	Changes in climate can contribute to the spread of vector-borne diseases like malaria.	88 (55%)	50 (31.25%)	22 (13.75%)
5	Climate change is a threat to sustainable development.	98 (61.25%)	50 (31.25%)	12 (7.5%)
6	There are climate change research agencies at both National and global levels that I know.	70 (43.75%)	58 (36.25%)	32 (20%)
7	Climate change can disrupt food production and to food security, which can have detrimental effects on nutrition and health.	102 (63.75%)	34 (21.25%)	24 (15%)
8	Climate change can have disproportionate impacts on vulnerable populations, including children, the elderly and those with pre-existing health condition.	82 (51.25%)	40 (25%)	38 (23.75%)

From the data analysis in the table above, it was found that the percentage of respondents who responded Agreed (71.25%, 61.25%, 52.5%, 55%, 61.25%, 43.75%, 63.75% and 51.25%) to all the items were higher than the percentage (16.25%, 27.5%, 38.75%, 31.25%, 31.25%, 36.25%, 21.25% and 25%) who disagreed to the statement. Only few percentage (12.5%, 11.25%, 8.75%, 13.75%, 7.5%, 20%, 15% and 23.75%) response were undecided. This indicates that majority of the secondary school teachers in Udu Local Government Area have good knowledge of climate change.

Research Question Two: What are the causes of climate change relationship on health status?

Table 3: Causes of climate change relationship on health status.

S/N	Items	A	D	UD
1	The burning of fossil fuels contributes to climate change and can have negative health effects.	104 65%	36 22.5%	20 12.5%
2	Emissions from industrial processes and transportation contribute to climate change and can have direct and indirect health consequences.	88 55%	60 37.5%	12 7.5%
3	Agriculture and the use of synthetic fertilizers, contributes to greenhouse gas emissions and can affect human health.	82 51.25%	42 26.25%	36 22.5%
4	The release of refrigerants and other gases used in cooling systems contribute to climate change and have health effects.	72 45%	46 28.75%	42 26.25%
5	Deforestation and land-use change contribute to climate change and can have a significant relationship on health status.	92 57.5%	28 17.5%	40 25%
6	Changes in weather patterns affecting the spread of infectious diseases can contribute to climate change.	66 41.25%	82 51.25%	12 7.5%
7	Change in the Earth's orbit and rotation can contribute to climate change.	72 45%	70 43.75%	18 11.25%

From the item analysis in the table above, it was found that almost all the respondents Agreed to items 1, 2, 3, 4, 5 and 7 with percentages of 65%, 55%, 51.25%, 45%, 57.5% and 45%. About 51.25% of the respondents disagreed to item 6 while few of the respondents (12.5%, 7.5%, 22.5%, 26.25%, 25%, 7.5% and 11.25%) were undecided to items 1, 2, 3, 4, 5, 6 and 7. These shows that secondary school teachers in Udu Local Government Area has knowledge on the causes of climate change relationship on health status.

Hypothesis One: There will be no significant relationship in the knowledge of secondary school teachers in Udu Local Government Area of Delta State regarding the impact of climate change on health.

Table 4: Chi-square (x2) analysis on the knowledge of climate change

Response	Observed	Expected	x^2 cal	x^2 crit	Df	Significant value	Remark
Agreed	84	53.3	48.08	3.841	1	0.05	Rejected
Disagreed	62	53.3					
Undecided	14	53.3					

From the x^2analysis in the table above, it was found that the x^2 calculated value was 48.08 while x^2 critical table value was 3.841 under degree of freedom is 1 at 0.05 level of significant value. Thus the null hypothesis which stated that there is no significant relationship in the knowledge of secondary school teachers in Udu Local Government Area of Delta State regarding the impact of climate change on health status was rejected and is alternative retained since the calculated value was higher than the critical value. This shows that there is significant relationship in the knowledge of secondary school teachers in Udu Local Government Area of Delta State regarding the impact of climate change on health status. Secondary school teachers have the knowledge of the impact of climate change on their health status.The findings of this study confirmed the findings of IPCC (2018) that changes in solar radiations, such as variations in the sun's energy output and sun spot cycles, influence Earth's climate over long periods while solar variability can lead to natural climate fluctuations, its impact on recent global warming; because 61% experienced that climate change is a long-term shift in temperature and weather patterns on Earth.

Hypothesis Two: There is no significant relationship in the causes of climate change relationship on health status.

Table 5: Chi-square (x2) analysis of the significant relationship in the causes of climate change relationship on health status.

Response	Observed	Expected	x^2 cal	x^2 crit	Df	Significant value	Remark
Agreed	88	53.3	55.43	3.841	1	0.05	Rejected
Disagreed	60	53.3					
Undecided	12	53.3					

From the x^2analysis in the table above, it was found that the x^2 calculated value was 55.43 while x^2 critical table value was 3.841 under degree of freedom is 1 at 0.05 level of significant value. Thus: the null hypothesis which stated that there is no significant relationship in the causes of climate change relationship on health status was rejected and its alternative retained since the calculated value was higher than the critical value. This reveals that causes of climate changes have negative inpact on the health status of teachers in the target sample. Trenberth (2018) and IPCC (2018) affirmed the findings of this study that

changes in precipitation patterns, increased rainfall and more intense storms, leading to flooding and water-related disasters, grappling with prolonged droughts and reduced water availability, affecting agriculture, water resources and food security are key trend causes associated with global climate change.

Hypothesis Three: There is no significant socio-economic relationship of climate change on health status.

Table 6: Chi-square (x2) analysis of the significant socio-economic relationship of climate change on health status.

Response	Observed	Expected	x^2 cal	x^2 crit	Df	Significant value	Remark
Agreed	74	53.3	35.47	3.841	1	0.05	Rejected
Disagreed	68	53.3					
Undecided	18	53.3					

From the x^2analysis in the table above, it was found that the x^2 calculated value was 35.47 while x^2 critical table value was 3.841 under degree of freedom is 1 at 0.05 level of significant value. Thus: the null hypothesis which stated that there is no significant socio-economic relationship of climate change on health status was rejected and is alternative retained since the calculated value was higher than the critical value. Therefore, there was significant socio-economic impact of climate change on health status of secondary school teachers in Udu local government area of Delta State. Houghton, (2016), IPCC (2018) and United Nations Framework Convention On Climate Change (UNFCCC) (2016) reviewed that socio-economic causes of climate change include Industrialization and Greenhouse Gas Emissions, Rise of Industrialization which began in the 18th Century, marked a profound shift in human societies. The shift from agrarian economies to industrialized ones was characterized by the widespread use of machinery, increased energy consumption and mass production, Fossil Fuel Dependency, Industrial Emissions, Land Use and Deforestation and Deforestation which is the loss of forest diminishes the Earth's capacity to absorb and store carbon dioxide through processes like photosynthesis, exacerbating the greenhouse effect which invariably can affect the health status of the sampled population.

Hypothesis Four: There is no significant relationship in the preventive measures for climate change relationship on health status of secondary school teachers in Udu Local Government Area of Delta State.

Table 7: Chi-square (x2) analysis of the significant relationship in the preventive measures for climate change relationship on health status of secondary school teachers.

Response	Observed	Expected	x^2 cal	x^2 crit	Df	Significant value	Remark
Agreed	92	53.3	42.23	3.841	1	0.05	Rejected
Disagreed	36	53.3					
Undecided	32	53.3					

In table 7 above, the analysis shows that the x^2 calculated value was 42.23 while x^2 critical table value was 3.841 under degree of freedom is 1 at 0.05 level of significant value. Thus the null hypothesis which stated that there is no significant relationship in the preventive measures for climate change relationship on health status of secondary school teachers in Udu Local Government Area of Delta State was rejected and is alternative retained since the calculated value was higher than the critical value. The study confirmed the findings of Larson (2018) that Socio-Economic disparities in health literacy and education can impact individuals' understanding of climate-related health risks and their ability to seek appropriate healthcare services. Implementing policies that prioritize equity and social justice can help the socio-economic disparities in climate change impacts on health status. Watts (2018), Phelan (2018), Aldunce (2018) and Larson (2019) in a related study revealed that strengthening Healthcare systems, promoting health literacy and educational programs specifically target vulnerable populations, providing financial assistance and subsidies for healthcare services, engaging communities, especially those most affected by climate change and socio-economic disparities in decision-making processes, caring for vulnerable groups, including the elderly, children and those with pre-existing health conditions, are disproportionately affected by climate change due to socio-economic factors will help as preventive measures against climate change effects on health status of people.

Discussion of findings

This study examines the socio-economic relationship of climate change on health status of teachers in secondary schools in Udu Local Government Area of Delta State. Findings from this study showed that the awareness level of socio-economic relationship of climate change on health status of teachers in the selected secondary schools in Udu Local Government Area of Delta State is high.From the analysis in table 3 above, it was found that the level of respondents who Agreed to the different items were higher than the percentage of those that disagreed. This means that secondary school teachers have knowledge on the causes of climate change relationship on health status.

From the analysis in table above, it was found that only few percentage of respondents disagreed to the items. This also shows that secondary school teachers have good knowledge on socio-economic relationship of climate change on health status and only a few have poor knowledge on the socio-economic relationship of climate change on health status.From the analysis in table 5 above, the percentage of respondents who agreed to all the items were more than those who disagreed and also those who were undecided, these shows secondary school teachers in Udu Local Government Area of Delta State has knowledge on the preventive measures for climate change relationship on health status. The study shows that secondary school teachers in Udu Local government area of Delta State have awareness of socio-economic relationship of climate change on health status and can adhere to preventive measures for climate change relationship on health status.

Conclusion

The study outcome revealed that secondary school teachers in Udu Local government area of Delta State have awareness of socio-economic influence of climate change on health status and can adhere to preventive measures for climate change influence on health status.Based on the findings and conclusions drawn, the Researchers made the following recommendations which are as follows:

1. It is vital to promote health education, raise awareness and ensure access to healthcare services.
2. Promoting sustainable Agricultural practices to help mitigate the health impacts of climate change.
3. Implementing policies that prioritize equity and social justice can help the socio-economic disparities in climate change impacts on health
4. Reduction in the burning of fossil fuels such as coal and oil as it can contribute to climate change and have negative health effects.
5. Engaging communities, especially those most affected by climate change and socio-economic disparities in decision-making processes (
6. Similarly, research should be carried out in another Local Government Area and different states in order to know the knowledge of climate change, socio-economic relationship of climate change on health status and preventive measures for climate change relationship on health status.

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