

Climate Change Impacts, Socio-Demographic Securities and Graduate Student's Perceived Academic Achievements in The University of Calabar, Nigeria

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Abstract

This paper explores the interrelationship between climate change impacts, socio-demographic securities and perceived academic achievements of graduate students in the University of Calabar, Nigeria. This study adopted mix method using correlation survey and secondary data from other research materials. Three research objectives were pursued and translated into three research questions and three null hypotheses. Stratified and proportional random sampling technique was used to select a sample of 462 graduate students (masters and doctoral programs) from 6 faculties and 18 departments. Data was collected using a structured questionnaire designed by the researchers in three sections and validated by experts in Test and Measurement in the University of Calabar. The researchers personally administered the instruments and collected same on the spot. Simple percentage, Pearson

Product Moment Correlation and multiple regressions were used for data analyses. Result of the analyses shows that there is a significant relationship between climate change impacts and graduates student's socio-demographic securities ($r\text{-cal} = 0.333$, $r\text{-crit} = 0.000$, 0.05 and 460 df), the second hypothesis also shows a significant relationship between graduate students socio-demographic securities and their perceived academic achievement ($r\text{-cal} = 0.973$, $r\text{-crit} = 0.000$, 0.05 , 460 df). While the third hypothesis was analyzed using multiple regression which shows that the 5 factors identified all contribute to influence graduate student's academic achievements in the University of Calabar, Nigeria. It was concluded that climate change has a significant influence on the socio-demographic securities of graduate students and also on their academic achievements in the University of Calabar. It was recommended among others that there should be climate smart infrastructural improvements, targeted financial support and the integration of climate resilience into educational policies and the introduction of climate change education into the general study courses in the university.

Keywords: *Climate change impacts, Climate change awareness, Socio-demographic Securities, Graduate student's perceived academic achievements and Learning environment*

1. Introduction

The University of Calabar situated in Nigeria, Cross River State is increasingly confronting the dual challenges of climate change and socio-demographic insecurity. These factors are not only environmental and economic concerns, but also shaping educational outcomes of graduate students in this university. Climate change is a natural but mostly human induced processes leading to the alterations of the world climate regime, even at this, some anthropogenic activities had been fingered as being responsible for the global climate changes. Some human activities like- burning of fossil fuel, mineral exploration and mining, agricultural pesticides usage, deforestation and agricultural land expansion, methane from waste dumps and paddy rice field, bush burning, indiscriminate waste disposal, escapes from nuclear warfare production and storage facilities, radioactive substance-uranium, thorium among others. Majorly, these activities are carried out for the sole purpose of improving human livelihoods, wellbeing and security, (Hausfather & Peters, 2020; Eneji, et al., 2021; Prager & Wiebe, 2021; Rosegrant, Sulser & Wiebe, 2022).

A trending report shows how climate change would have very negative effects on the economies of 22 different sectors of the world economy under two different scenarios. The study projected that if global temperatures continue to rise to 28°C , from the pre-industrial levels by 2100 increasing by 4.5°C , the effects of climate change on the entire US economy would cost at least \$520 Billion each year. Multiply this by the total numbers of world economy, the outcome will be huge. The US was used as a classical example of what the effects would be on the world economy. Other countries including developing economies would suffer the same fate, (Berhanu & Wolde, 2019; Amadu, et al., 2020; Ani, et al., 2022; Tuffuor & Tenkorang, 2023).

Crops and food production including animal production are affected through shortages or excessive rainfalls, increased temperature, relative humidity, cloud cover among others. Food security is compromised, social justices and socioeconomic perspectives are also affected, climate change also affects human livelihoods, human health, species and protected areas are also affected, there are also increased greenhouse gases emissions and carbon accumulation in the atmosphere, which are not good enough for human health and longevity (Ebi, et al., 2021; Eneji, et al., 2021; Eneji, et al., 2022; IPCC, 2023).

Unemployment, job security, trade and investment, small, micro and medium scale business enterprises are compromised negatively, family ties are sometimes broken due to hunger, poverty, social security and high rates of crimes among others. Global climate change has also been fingered as been responsible for exacerbating the effects of most of the current pandemic faced in the world since 2020- some of these pandemic include the dreaded Covid-19, the Monkey pox (Mpox), XEC Cov (new strain) among others. This has also contributed to the war raging in different parts of the world over finite resources and their control. How do we maintain good health amid hunger, poor sanitation and hygiene, poor water supply and poverty (Monroe, et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2020; Vergunst & Berry, 2021).

Studies have shown that in most tertiary institutions, climate change awareness among students is still at the lowest level, most students have heard about the concept of climate change that it is a global scourge, but what is exactly the issue at stake, leaves more to be desired. Most undergraduate students are aware of the term climate change; it is assumed that the same mentality they carried from under graduates programs are also being carried forward to their postgraduate levels (Marchetta, et al., 2019; Morril & Westall, 2023; Özek, 2023). Some few may be aware of the concept of climate change, may be because they have something beyond the rhetoric of the concept, maybe there are in environmentally related discipline or courses; however, it appears most of these students seem not to quite understand the concept.

There is also the incidence of poor academic performance among undergraduate and postgraduate students of various universities across the regions (Deuchert & Felfe, 2015; Rousell & Cutter-Mackenzie-Knowles, 2020;

Thamtanajit, 2020). Studies have also attempted to look at various conventional factors affecting graduate students academic performance, could it be funding, school location and school type?, could it be school environmental factors?, could it be student's personal variables?, or the students home fronts? All these factors have been variously studied, but yet, the situation persist (Eneji, et al., 2015; Reid, 2019; Eneji, et al., 2021; Eneji, et al., 2022; Eneji, et al., 2023).

It became imperative for researchers to look further and deeper into the causes of poor graduate students academic performance in the universities, based on this propping, these researchers tried to bring in the issue of global climate change and its effects on the socio-demographic securities of graduate students and how it affects their academic performance, hence the origin of this study. Some specific variables related to global climate change were x-rayed in this paper.

Studies have shown that climate change associated by global epidemic of 2019/2020 (Covid-19) is aggravating global conflicts like the civil war in Ukraine, Israel, Palestine, Syria, the Arab world, civil invasion in Sudan, Ethiopia, Afganistan, bandit and Boko Haram insurgency in Nigeria, sub-Saharan Africa and most third world countries. Climate change has exacerbated conflicts among herders and farmers, thereby destroying sources of livelihoods and income bringing about conflict and violence. Where there is no peaceful coexistence, attending schools becomes difficult. These issues raised here coupled with global climate change have contributed in no small ways to make the accessibility to food complex and complicated.

All these have contributed to make access to food less accessible in most countries of the world, whether in physical or in terms of economic scarcity. There are also socioeconomic changes in agro food systems, local climate regime, evolution of dietary demands and the capacity of the natural resources to keep pace with human ever demanding needs for resource (Nelson, 2018; Ainsworth & Long, 2021; Ahmed, Barkat, et al., 2022). Climate change has impacted on the socio-demographic securities of graduate students by affecting their food, income, economic, social and security situations among others. Socio-demographic securities like food security are all means, methods and strategies adopted to guarantee the security of graduate student's social, economic and demographic characteristics, including their feeding, income, employment, health and other economic variables which play significant roles in their academic pursuits.

Rosegrant, Sulser, et al., (2024) work on food and nutrition security under changing climate and socioeconomic conditions, found that under changing climatic conditions food and nutrition security has become very critical issues of concern beginning from policy planners to implementers; and those for whom the policy is made to address their challenges and provide succor for. This is so because the slow paces for removing these challenges seem to have reversed in recent times. This is as a result of the increase in the number of persons who have drifted to live in poverty and insecure food provisions by well over a hundred and twenty two million persons, representing twenty per cent of the world human population between the years 1999 to 2022 (Berry, et al., 2018; Cordero, Centeno, et al., 2020; Atwoli, et al, 2021; Miles-Novelo & Anderson, 2022; Rosegrant, et al, 2024).

This was further exacerbated by the rebuilding plan of the aftermath of the Covid-19 pandemic, where global food supplies and situations faced a whole lot of challenges from changing climate regimes, trade distributions, water scarcity, degradation of the environment, human health challenges, social insecurity, economic and job losses, evolving trend of food demand and the crisis associated with meeting the demands for food crops among others. These were all challenges associated with climate crisis. In this study, Rosegrant, et al, (2024) assessed the prospect to 2050 of food and nutrition security with a large focus on low and middle income countries in a broader context of the world food systems changes.

According to this study, the measures of food security included per capita food, kilocalorie availability, the number and prevalence of hungry people and micronutrient availability. The authors also used a projected outcome to assess the latest version of the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) framework, this is a modeling system used to combine information from climate models, crop simulation model and river basin level hydrological and water supply and demand models linked to a global, partial equilibrium multimarket agricultural sector model. These authors concluded that globally, food and nutrition are affected by the trend in climate change; this trend has further been exacerbated by the effects of poverty, gross domestic products, per capita income, unemployment, unavailability and inaccessibility to food supply, loss of jobs and the high cost of inflation among other factors (Berry, et al., 2018; Cordero, Centeno, et al., 2020; Atwoli, et al, 2021; Miles-Novelo & Anderson, 2022).

In another development, Larkin, (2022) observed that climate change negatively influenced crop production and animal breeding reducing yield and productivity. Shortage of rainfall and increased temperature make crops grown wither and die off, while animal fodder and grazing materials dries off making animals starve to death. This leads to reduction in the volume and amount of food crops and animals produced to feed the ever demanding human population (Lieber, Chin-Hong, et al., 2022; Rosegrant, et al., 2023; Wang, et al., 2023). Excess rainfall submerge

crops that do not thrive well in waterlogged areas, they die off also affecting food production and supply. In attempting to understand the amenity of some crops to different climatic conditions, authors like Wang, et al., (2023) found that excess or reduced rainfall affect crop growth and morbidity. When these happen as a result of global climate change, some crops die, while some may survive, but it is a fifty-fifty chance. When the demand for food crops and livestock for human consumption is higher than the supply to the market, there is competition, prices soar and people living in poverty may find it difficult to access food supply (Salvador, Nieto, et al., 2023; Koepp, Lanza, et al., 2023).

More than 72% of human populations are living below poverty line, implying that they are living in poverty, buying food at these exorbitant prices become difficult to feed their population. Meeting their dietary needs at these ceiling high prices make them even more vulnerable to harsh climatic conditions (Abbas, Ekowati, Suhariadi, 2023; Adom, 2024). Climate change has been found to variously affect food security. Desert encroachments in drought prone areas also affect food production especially meeting the needs of the population within these drought regions. Animals browsing dry grasses easily become prey to their predators. There are also the issues of melting of ice at the polar region and releasing flood water to submerge adjoining farmland, where crops are grown. In some cases, the flood water drowns some animals and wipes away entire farmland. These has been the cases with most Nigerian states like Taraba, Benue, Cross River, Adamawa, Kogi, Rivers, Bayelsa, Imo, Anambra, Edo, Akwa Ibom, Delta, Borno, Zamfara, Kebbi among others (Akinbami & Akinbami, 2017; Evans, 2019; Johnston, et al., 2021).

Climate change has brought about unpredictable rainfall and extreme weather events, which are all primary drivers for food insecurity, diminishing water quality, diminishing farm output, leading to loss of income, employment, jobs for a large and vulnerable population of the society. Drought, rainfall storm, flood, melting of ice at the polar region leading to sea level rise, had caused more than two hundred million people to migrate from their aboriginal homes seeking asylum elsewhere making them refugees. Some authors have posited that climate change is a threat multiplier, causing resource scarcity and worsening existing social, economic and environmental issues, (Nelson, et al., 2018; Adhvaryu & Fenske, 2023; Okunade & Kohon, 2023).

Climate change also leads to herder-farmers conflict and food insecurity in Nigeria, Abbah, (2020) used the autoregressive distributed lag (ARDL) method to examine the effects of climate change on food security in Nigeria from 1983-2018, the aim of the study was to specifically find out the influence of climate change on farmer – herders conflict and food security-which was parameter to be food crop production and animal breeding outcomes. The authors went further to investigate whether climate change is the primary cause of the intense conflict between farmers and herders as in recent years in the country. The author therefore recommended among others that measures should be taken to mitigate climate change effects, mitigations measures like afforestation, use of sustainable sources of energy (solar, wind), the use of environmentally friendly energy sources like biogas fuel, the practice of climate friendly agriculture, among others should be encouraged.

Authors like Eneji, et al (2015); Tuffuor and Tenkorang, (2023); United Nations, (UN, 2023) and Adom, (2024) conventionally saw social security as the plan geared towards cushioning some social effects to people who are aged, retired, survivors, disabled, vulnerable and are unable to take care of themselves. But in this study, social security covers climate change impacts like social order, war, crimes, personal security and social injustice. How does climate change impact on personal security, social security and justices? Eneji, et al. (2015), looked at the causes of persistent violent outbreak and clashes between farmers and herders in Nigeria and other West African sub-regions.

This study took a critical and cursory look at the causes of these farmer-herder clashes and came up with the conclusion that the major issue is principally the struggles for insufficient natural resources. Farmers are traditional owners of the farmland; the migratory herders come seasonally with their herds to destroy the farmers' crops in their trail to get grasses for their animals to graze. Where the farmers resist them, the herders would attack the farmers. In the event that the farmer is not alone, they too would bring a reprisal attack on the herders leading to the death of either party (Eneji, et al., 2015; William, et al., 2020; Adhvaryu & Fenske, 2023; Okunade & Kohon, 2023; Efobi, Adejumo & Kim, 2024; Efobi, Adejumo & Kim, 2024).

Some studies have shown that human/personal security means safety from any form of serious threats or harms like bullying and intimidation in schools, war, violent conflicts, diseases, hunger, poverty, social injustice, crimes as well as repression and protection from sudden emergencies including natural or manmade disasters in our pattern of daily lives. Be it in schools, at the office or our work place, at home or communities, (Sujakhu, et al., 2016; Tembo & Tadesse, 2018; Panta & Thapa, 2018).

Studies have shown that global climate change poses serious threats to humans and their security. Climate change's effects on human security is directly linked to threats to human personal security, human poverty, hunger and food insecurity; because of this it has intra and inter-generational equity (Tembo & Tadesse, 2018; Tuffuor

& Tenkorang, 2023; United Nations, (UN, 2023). The primary purpose of human personal security is centered on the worth, personality and the dignity of human persons and the extent to which they should be protected and the safety they should enjoy. Some of these personal or social security can be enjoyed in terms of food security, the provision of health care, economic empowerment and self-reliance including being self-sufficient, environmental security, and the community's sustainability based on the international humanitarian laws and international best practices.

Authors like Tuffuor and Tenkorang, (2023) found that the best solution to human security is to develop an integrative approach, which is key to sustainable development. These authors went further to state that one of the key components of these integrative approaches is securing economic security helping to ensure income security, food and health security; all these are dependent on the quality of the environment, which supports all human action and their livelihood activities on the environment.

Silchenko and Murray, (2023) observed that social protection is a vulnerability response tools which is placed to equip climate vulnerable populations including tertiary institutions students and their lecturers with resources that can assist to cushion the livelihoods risks towards a smooth consumption. Silchenko and Murray did a systematic review of 28 studies identifying evidence on social protection as a result of climate change and how it has affected migrations. The study examined how social protection according to International Humanitarian Laws influenced beneficiaries' migration decisions, experiences and outcomes due to changing climate. The study looked at cash transfers, public works programs, social insurance, health care, food provision among others within the migrating populations. The sole purpose of social protection is to reduce financial burden on migrant population; solving harsh drivers and structural factors which compels the migrant population to engage in maladaptive distress, supporting the left behind to maintain their original livelihoods if they have no intention of leaving (Vergunst & Berry, 2021; Ebi, et al., 2021; Miles-Novelo & Anderson, 2022).

Analysis of people facing chronic hunger today is estimated to be about 783 million persons. It was further revealed that a global temperature increase of 20° will definitely push some additional 189 million people further into hunger. The third effect of climate change on human security is to force people into migration to new places with its associated problem of migration-food, shelter, health, economy among others. During climate events, global carbon emissions increases, the impacts are enormously pushing people out of their original homes-flooding, melting of ice, drought, storms, and hurricanes among others.

It is estimated that every year, more than 20 million people are forcibly displaced. Flooding in Nigeria, Pakistan and Democratic Republic of Congo and other West African sub-regions have forced millions of persons to be displaced. Drought in Madagascar, Afghanistan, the Horn of Africa among others have forced people to migrate to other places because of the risks and dangers associated with these weather events, (Rosegrant, et al., 2022; Wang, et al., 2023)

The fourth effects of climate change on human security are the increase in poverty and inequalities. During climate change effects, more persons are drifted to live below the universally accepted poverty line, sources of livelihoods including income, businesses, trades and investments are destroyed. People are forced to migrate and begin all over; livelihood sources and employments are lost due to the risk and dangers of climate aftermaths. Food crops and animals raised are destroyed leaving the farmer with practically nothing to live on. Usually when natural disaster occurs, the poorest countries are the most hit, increasing their economic inequalities, thereby causing more persons to drift into the poverty nexus (Berry, et al., 2018; Cordero, Centeno, et al., 2020; Atwoli, et al, 2021; Eneji, et al., 2021; Miles-Novelo & Anderson, 2022).

The fifth effects of climate change are increase in women and girl child security risks. Before now, there exists inequalities in terms of security risk, this gender inequalities due to gender related roles and expectations has also created inequality in access to resources, leaving the feminine gender disproportionately vulnerable at the intersections of conflict and the climate crisis (Prager & Wiebe, 2021; Ainsworth & Long, 2021). In Nigeria, Somalia and most part of African sub-regions, drifting pattern of rainfall and temperature extremes are leading to water scarcity, contributing to high rates of clannish violence and killing.

These trends particularly affect the women and girl child more. Early marriages are also some of the effects which climate change exerts on the girl's child, coping with livelihoods insecurity, forced displacement, and sexual violence increases among the affected population. Often, women and the girl's child are responsible for providing water for the households; they leave the house very early, walk long distances in search of water, and return late. These also increase sexual harassment and always affect the time they should have been in school and thereby reducing their abilities to pursue paid jobs, (Haverinen-Shaughnessy, 2015; Porras-Salazar, et al., 2018; Wargocki, et al., 2019; Amadu, et al., 2020; Williams et al, 2021; Eneji, et al., 2021; Tuffuor & Tenkorang, 2023; Silchenko & Murray, 2023).

In terms of health security impacts of climate change, during climate change events like flooding, melting of ice, sea level rise with its concomitant health effects, flood water carries dirt and debris from waste bin and gutters to residential areas leaving behind some water, sanitation, hygiene and waste related diseases. The environment becomes dirty, littered with debris and some waste products that are detrimental to human health (Rosegrant, et al., 2022; Rosegrant, et al., 2023). During these processes, diseases conditions like covid, cholera, diarrhea, diphtheria, Mpox, typhoid, chicken pox and other water and sanitation related diseases are usually widespread. Outside the need to ensure that essential health care is being provided, income security is also a cardinal issue in health care during climate change effects (Aleksandrova, 2020; Singh & Basu, 2020; Walelign, et al., 2021). Preserving livelihoods in clean, safe, healthy and sustainable environment is critical for the full realization of the fundamental rights to safe and social security and guaranteed health of everybody including students in their various institutions of learning, (Daliakopoulos, et al., 2017; Boone, et al., 2018; Berry, et al., 2018; Alan, 2019; Eneji, et al., 2021; Eneji, et al., 2022; Adom, 2024; UN-OHCHR, 2023).

The core mandates of every university and other tertiary institutions globally are to teach, research and carrying out community services (Park, 2020; Sims & Vincent, 2021; Romanello, et al. 2023; Adom, 2024). Part of the teaching tripod is to create the needed awareness on every issue disturbing the growth and development of the human race, one such issue is the global climate change and its associated effects, especially on the global health of the environment and humans within the planet. This issue does not only affect humans, but all other life forms on earth. The universities are breeding grounds for knowledge fermentation, fertilization and development. These core mandates must look at the possible causes of global climate changes, their effects on the various dimensions of human livelihoods and wellbeing, their possible mitigation measures and how human can adapt to these global climate variations (Eneji, et al., 2021; Eneji, et al., 2022, Filho, et al., 2023).

To establish that learning has taken place among students, schools are expected to set some examination to assess and grade the students based on set criterion and acceptable standards to make informed decisions from the evaluation of students. This evaluation is seen from the student's academic performance or achievements. When students' performances are seen to be poor, what could be the reasons for the poor academic performance of university students? Most studies like those of Eneji, et al., (2021); Eneji, et al., (2022), Filho, et al., (2023) have attempted to look at the reasons for the poor academic performance of university students from the perspectives of parental background, family front, student's preparedness to learn, school environmental factors- classrooms, infrastructure, facilities, library, studies, laboratory, workshops, lighting system, seating, among others.

Teacher's qualification, their knowledge of subject matter, instructional pedagogic process, classroom management, their relationship with students and colleagues, peer influence, school administration and management among others have been studied as being responsible for the poor students academic performance, yet the situation seems to be unabated. What exactly then is the reason for the poor student's academic achievements in the universities at the postgraduate levels? This paper is designed to investigate the extent to which climate change influence postgraduate student's socio-demographic securities and their academic performance in the University of Calabar, Nigeria.

The current trend of climate change noticed in the University of Calabar is alarming-resulting to excessive rainfall above 3500-4500 mm³, flooding, excessive heat waves from global warming, indiscriminate waste disposal, food insecurity as a result of crop failure, unpredictable rains, increased urban heat island, loss of sources of income and livelihoods and economic strain on graduate students and their sponsors. This has affected graduate student's socio-demographic securities in no small ways, thereby affecting their academic performance in the University of Calabar, (Eneji, et al., 2022). When graduate students 'sources of income are affected, the tendency to pay all their school charges would become a herculean task. Food is essential for their maximum academic performance, graduate student emotional and personal security, including employment and school environmental securities are all essential for graduate student's academic performance. Therefore if there is any alteration in any of these socio-demographic variables, it will adversely affect their academic performance in the University of Calabar.

Looking at the theoretical underpinnings from other researchers, most of their studies on factors influencing students academic achievement were based on economic, social and socio- demographic factor, parents, school and students' factor, but this present research went beyond these factors to look at how climate change impacts influence graduates students socio-demographic securities (finance and income, food security, health security, social/personal security, emotional and psychological security) and how these in turn directs their academic achievements in the University of Calabar, Nigeria.

The following research questions would guide this study thus:

1. What are the extents of graduate student's climate change awareness in the University of Calabar?

2. To what extent does climate change impact on graduate student's socio-demographic securities in the University of Calabar? (food security, economic security, health security and human security-safety, harm and danger, bullying and intimidation among others)
3. What are the relationships between climate change impacts on student's socio-demographic securities and their academic achievements in the University of Calabar?

Three null hypotheses were formulated to also guide the study thus

H₀₁: there is no significant relationship between Climate change impacts and graduate student's socio-demographic securities in the University of Calabar

H₀₂: There is no significant influence of climate change impacts on postgraduate student's socio-demographic securities and their academic achievement in the University of Calabar

H₀₃: Graduate student's socio-demographic securities does not significantly influence or predict their academic performance in the University of Calabar.

Research design and methods

Research design

This study adopted mix method using both quantitative and qualitative methods involving correlation survey and secondary data from other research materials.

Study area: The University of Calabar lies between Latitude 4°58'36"N of the Equator and Longitude 8°20'18" East of the Greenwich Meridian. Located within the tropical rainforest zone, with almost 8-10 months of continuous torrential rainfall throughout the year. The study area is the University of Calabar, Nigeria, where the study centers primarily in the College of Postgraduate Studies. A total of 21 faculties including institutes and Centers of Academic Excellence exist in the University of Calabar. Six faculties were randomly selected using simple random sampling techniques were all the faculties offering graduate programs were written down on a piece of papers, rolled into balls and selected blindly without replacement 6 Faculties were selected representing 30% of the faculties) the faculties selected include: Science Education, Arts and Social Science Education, Environmental Sciences, Agriculture, Forestry and Wildlife Management, Social Sciences, Faculty of Sciences. The next stage of sampling involves the selection of departments to be used for the study, note that these departments have postgraduate programs, (Masters and Doctoral programs). Proportional sampling technique was used to select three departments each from the 6 faculties selected.

Table 1: sample distribution by faculties and department with 50% of the postgraduate students

Faculties	Science Education (S.E.)	Arts and Social Science Education (FAASE)	Environmental Sciences (E.S.)	Agriculture, Forestry and Wildlife (FAFWRM)	Vocational and Entrepreneurship Education (FVEE)	Faculty of science (F.S.)
Departments	Environmental Education	Geography and Sustainable Development	Environmental Resources Management	Forestry	Agricultural Science Education	Genetics and Biotechnology
1	36	18	48	18	26	31
2	Biology Education	Social Studies Education	Architecture	Wildlife Resources Management	Business Education	Zoology and Environmental Biology
	18	35	14	15	28	42
3	Physical Science Education	Economics Education	Survey and Geo-informatics	Range and Landscape Management	Home Economics	Biological Sciences

	28	12	22	13	14	44
50% of PG Students	82	65	84	46	68	117
Grand total						462

Instruments for data collection: The instruments used for data collection is the researchers designed structured questionnaire titled: Climate change impacts, graduate students' socio-demographic securities and their perceived academic achievements Questionnaire. The instrument was divided into three sections, section A looked at the respondent's socio-demographic characteristics like- occupation, income and financial sources, sources of food supplies, among others. Section B looked at the five major sub-variables of socio-demographic securities, (income and finance, health, food, personal and social securities and emotional and psychological security), while section C looked at graduate student's academic achievement test.

This was a comprehensive general objective questions based on the general knowledge which a student must score at least 60% before the postgraduate student can be allowed to defend his/her external thesis before graduation. These questions are general knowledge question usually administered by graduate boards (Comprehensive examination). The questions are assessed based on the following extent: None -means no knowledge of climate change, low- mean low level, average mean- a little knowledge, high means reasonable extent, and very high means fully aware of climate change.

The validation of the instrument was done by three experts in research instrument construction (Test and Measurement), it was also tested for reliability using the Cronbach Alpha Reliability coefficient, which yielded a reliability coefficient of between 0.69-0.82, and this value was considered reliable enough to gather the data for the study. The administration of the instrument was done personally by the researchers and same were collected from the respondents on the spot. 100 percent return rate was recorded, meaning no instrument was missing.

Data preparation and analyses: Upon collection of data, scoring was done using SPSS spreadsheet, this was transferred into SPSS version 25 and was then analyzed using simple percentage, Pearson Product Moment Correlation and multiple regression analysis. Results are presented in the preceding tables. The academic achievement test was used to do a correlation analysis to examine the relationship between graduate student's socio-demographic securities and their academic achievements in the University of Calabar. The regression analysis was used to examine how these five factors predict student's academic achievements in the University of Calabar, Nigeria. The choice of the sub variables selected has been examined to play significant role in shaping student's academic pursuits, hence the reason for their usage in this study. Using these subvariables is premised on the fact that these factors are seriously affected by climate change, hence the ripple effects on student's academic performance. Again the choice of regression analysis here is to identify the relative contribution of each socio-demographic sub variables to graduate student's academic performance using the beta weight.

Results and discussions

What is the extent of graduate student's climate change awareness in the University of Calabar? The simple percentage analysis result on table 2 and 3 summarized the response obtained from the field. While table two is a complete summary, table 3 gives the information used in deciding the extent of climate change awareness among graduate students, this is first broken into doctoral and master's degree students and then summarized as post graduate students.

The result on table two was to give a guide on the composition of the research subjects, table 2 was further used to extract the result on table 3, and hence table 3 was presented and discussed. Table 3 shows that 15 (5.6%) Master's degree students from different faculties and departments ticked that they do not have any knowledge of climate change, 32 (12.1%) respondents also said they have very little knowledge of climate change, 50 (18.8%) Master's degree students said they have average knowledge of climate change, 66 (24.8%) Master's degree students also said they have high knowledge of climate change awareness, while 103 students representing 38.7% of the master's degree students said they have very high knowledge of climate change awareness.

Table 2: Summary of the extent of graduate students' climate change awareness in the University of Calabar

Faculties	SE		FASSE		ES		FAFWRM		FVEE		FS		Total	%
Response	M. Ed	PhD	M. Ed	PhD	M.Sc.	PhD	M. Sc	PhD	M. Ed	PhD	M. Sc	PhD		
None	4	0	5	0	1	0	0	1	4	2	1	2	20	4.3
Low	6	2	3	3	6	0	1	2	8	3	8	7	49	10.6
Medium	6	3	5	6	8	10	8	3	5	5	18	12	89	19.3
High	10	8	6	6	11	13	10	6	14	8	15	14	121	26.2
very high	26	17	15	16	22	13	8	7	10	9	22	18	183	39.6
	52	30	34	31	48	36	27	19	41	27	64	53	462	100

Table 3: Summary response of the extent of climate change awareness of graduate students in University of Calabar

Response	Masters' students	Percentage	Doctoral students	Percentage	Total	Percentage
None	15	5.6	5	2.6	20	4.3
Low	32	12.1	17	8.7	49	10.63
Average	50	18.8	39	19.8	89	19.3
High	66	24.8	55	28.1	121	26.2
Very high	103	38.7	80	40.8	183	39.6
Total	266	100	196	100	462	100

Looking at table 3 for doctoral students, 5 (2.6%) doctoral students from the selected departments and faculties said they do not have any knowledge of climate change, 17 doctoral students representing 8.7% also said they have very low knowledge of climate change, 39 doctoral students (19.8%) said they have average knowledge of climate change issues, 55 (28.1%) said they have high knowledge of climate change issues, while 80 doctoral students representing 40.8% said they have very high knowledge of climate change issues in the University of Calabar.

Taking a critical look at the result on table 3 further revealed that a combined 20 respondents including Masters and doctoral students representing 4.3% of the sample said they have practically no knowledge of climate change issues, 49 respondents, representing 10.63% said they have very low idea of climate change issues. 89 respondents (19.3%) said they have average level of knowledge of climate change awareness, while 121 respondents (26.3%)

said they have a high extent of climate change awareness and 183 respondents representing 39.6% said they have very high knowledge of climate change issues. Summarily, the result shows that 304 respondents, (65.8%) have result ranging from high to very high, while 158 respondents (34.2%) on the other hand posited their extent of climate change knowledge ranged from none to average. This implies that the extent of climate change awareness among graduate students from the selected departments and faculties are above average, hence these graduate students have some appreciable knowledge of climate change awareness in the University of Calabar.

Hypothesis one: there is no significant relationship between Climate change impacts and graduate student's socio-demographic securities in the University of Calabar

The result of the Pearson Product Moment Correlation analysis shown on table 4 revealed that the r-cal value is 0.333, while the r-critical value is .000, implying that the null hypothesis is rejected. Therefore there is a significant influence of climate change impacts on graduate student's socio-demographic securities in the University of Calabar.

Table 4: Pearson product moment correlation analysis of the relationship between Climate change impacts and graduate student's socio-demographic securities in the University of Calabar (N=462)

Variable	X	SD.	r-Cal	Sig
Climate change impacts	28.19	2.33	.333	.000
Graduate students socio-demographic securities	36.12	3.12		

Significant at .05 level, r- Critical = .000, df= 460

Hypothesis two: There is no significant influence of climate change impacts on graduate student socio-demographic securities and their academic achievement in the University of Calabar. The Pearson Product Moment Correlation Analysis was used to test this hypothesis; the result is shown on table 5.

Table 5: Pearson product moment correlation analysis showing the influence of graduate student socio-demographic securities and their academic achievement in the University of Calabar, Nigeria (N=462)

Variable	X	SD.	r-Cal	Sig
Graduate student's socio-demographic securities	28.99	2.07	.973	.000
Graduate student's academic achievement	36.12	3.12		

Significant at .05 level, r- Critical = .000, df= 460

The result of the correlation analysis shown on table 5 revealed that the calculated value of .973 is greater than the critical table value of .000, which is significant at 0.5 and 460 degree of freedom, the result implies that climate change impacts on graduate student's socio-demographic securities significantly influence their academic achievement in the University of Calabar, Nigeria. To further investigate how graduate students socio-demographic securities influence or predict their academic achievements, a test of regression analysis was again carried out. The calculated beta weight was used to predict the relative contribution of each variable to graduate student's academic achievement in the University of Calabar. The result of the regression analysis is shown on table 6.

Hypothesis three: Graduate student's socio-demographic securities does not significantly influence or predict their academic achievement in the University of Calabar (see Table 6).

The multiple regression analysis in table 6 of the independent and joint impact of the relationship between financial and income security, health security, personal/social security, food security and emotional and psychological security and graduate students' academic achievement in the University of Calabar, Nigeria, produced an adjusted R² of .962. This result implies that only 96.2 percent of the variables can be predicted from the independent variable (financial and income, health, personal/social security, food security and emotional and psychological security) in predicting the academic achievement of graduate students in the University of Calabar,

Nigeria. The F-value of the Analysis of Variance (ANOVA) obtained from the regression table was $F = 2001.552$ having a p-value .000 with 5 and 457 degrees of freedom at .05 level of significance. The null hypothesis is rejected.

This result therefore signifies that the joint effect of financial and income security, health security, personal/social security, food security and emotional and psychological security significantly predicts graduate student's academic achievement in the University of Calabar by 96.2 percent. This result therefore implies that Financial and income security, health security, personal/social security, food security and emotional and psychological security significantly influence the academic achievement of graduate students in the University of Calabar, Nigeria.

To find out the relative contributions of the individual factors, the researchers examined the regression weight. The result on table 6 further shows that the standardized regression weights (Beta) ranged from -.021 to .967 and t – ratio from 93.026 to -1.796. The Beta weight of the entire variables (financial and income security, health security, personal/social security, food security and emotional and psychological security) were significant at .05 levels. This result implied that when the variables were taken individually, all the variables namely; financial and income security, health security, personal/social security, food security and emotional and psychological security have significant impacts on the academic achievement of graduate students in the University of Calabar, Nigeria. The result further showed that food security ($t=93.026$) made the greatest contribution by seriously impacting on the academic achievement of graduate students, followed by emotional and psychological security ($t=9.032$), while financial and income and security ($t=-1.796$) made the least contribution to graduate student's academic achievement. Personal and social security (-3.6650 has a significant relationship with graduate student's academic achievement. Health security, (4.196) made the very least contribution to graduate student's academic achievements in the University of Calabar.

Table 6: Summary of multiple regression analysis showing the influence of graduate student's socio-demographic securities and their academic achievement in the University of Calabar

Model	Sum of square	DF	Mean Square	F	Sig
Regression	3619.83	5	723.97	2001.55	.000
Residual	137.45	457	.362		
Total	3757.28	461			

Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	-8.011	.768		-10.434	.000
Income /financial security	-.032	.018	-.021	-1.716	.013
health security	.069	.014	.065	4.196	.000
Personal/social security	-.072	.020	.054	-3.665	.034
food security	-1.462	.016	.967	93.026	.039
emotional/psychological security	.112	.012	.116	9.032	

$P < .05$; $R = .982$; $R\text{ Square} = .963$; $Adjusted\ R\ Square = .962$

Predictors: (Constant): Financial and income, health, personal/social security, food security and emotional and psychological security

Dependent Variable: graduate student's academic achievement.

To further establish how graduate student's socio-demographic securities influence student's academic achievements, an academic achievement test was administered and the result is as shown on table 7.

Table 7: Summary of graduate student's academic achievement test in the University of Calabar

Faculties	Master's degree			Doctoral degree		
	Pop	Scores	Scores	Pop	Scores	Scores
		1-59	60-100		1-59	60-100
Scores range	52	11	41	30	8	22
Science Education	34	4	30	31	6	25
Arts and Social Science Education	48	6	42	36	2	34
Environmental Sciences	27	2	25	19	1	18
Agriculture forestry and wildlife Mgt	41	14	27	27	6	21
Vocational and Entrepreneurship	64	20	44	53	15	38
Faculty of Science						
	266	57	209	196	38	158
Total scores		21.4	78.6		19.4	80.6
				367	79.4	

From table 7, a total of 57 Master's degree students (21.4%) scored below the pass mark of 60%, while 209 (78.6%) master's degree students scored above 60, which means they pass the achievement test with the required grades. At the doctoral level, 38 (19.4%) students scored below 60%, implying that they failed the achievement test. While 158 (80.6%) doctoral students scored above 60% which is the benchmark for pass grade. In effect they passed the achievement test as administered. The result on table 7 further revealed that a total of 95 postgraduate students failed the academic achievement test (20.6%), while 367 graduate students (79.4%) passed the academic achievement test with scores above 60%. The implication of this result is that when climate change impacts the socio-demographic securities of graduate students, there is the tendency that it will affect their academic achievement, especially if they do not have the necessary climate change awareness knowledge on mitigation, prevention and adaptation. However, from the result available, the extent of climate change awareness among graduate student is commendable; hence the effect does not seem to have any serious influence the graduate student's academic achievement in the University of Calabar.

Discussion of findings

The result on table 3 shows a combined response from both Master's degree and doctoral degree students. Their response shows that 20 (4.3%) of the sample said they have practically no knowledge of climate change issues, 49 respondents (10.63%) said they have very low idea of climate change issues, 89 respondents (19.3%) said they have average knowledge of climate change awareness, while 121 respondents (26.3%) said they have a high extent of climate change awareness and 183 respondents representing 39.6% said they have very high knowledge of climate change issues. This shows that 304 respondents have result ranging from high to very high, while 158 respondents on the other hand posited their extent of climate change knowledge ranged from none to average. This implies that the extent of climate change awareness among graduate students from the selected departments and faculties are above average, hence there is some reasonable extent of climate change awareness among graduate students of the University of Calabar.

This result obtained from this study is a confirmation of the earlier results gotten by Monroe, et al., (2019) and Morill and Westall, (2023) on identifying effective climate change education strategies using a system review; Morill and Westall, (2023) also looked at the heterogeneity in the educational impacts of natural disasters, evidence from Hurricane Florence. These authors looked at the extent of effectiveness with which climate change

education has been implemented and the extent of awareness such recipients' possess to combat climate change events in their operational environment. This result is a confirmation of the findings of Marchetta, et al., (2019) on the role of weather on schooling and work of young adults in Madagascar; Eneji, et al., (2023) did an evaluation of the products of Environmental Education Curriculum/Program Implementation in the University of Calabar, Nigeria.

These authors found that most of those who were engaged in the program had some basic ideas about the course contents of the curriculum, while some are gainfully employed in relevant environmental organizations and they are actually doing well. A minute proportion of those who studied the course are found wanting, this was observed because of the concept of individual differences that normally exists among learners. This was also attributed to the vision and mission these students have for life.

Rousell and Cutter-Mackenzie-Knowles, (2020) in their systematic reviews of climate change education: giving children and young people a 'voice' and a 'hand' in redressing climate change found a striking semblance with the role climate change education (awareness) can play among graduate students in not just the University of Calabar, but other institution of learning across the globe. Authors like Eneji, et al., (2022) and Okunade and Kohon, (2023) did not find similar results in their work. The authors posited that some of the students do not really engage in serious academic discourse, some are truant in their studies; others hardly go for lectures, while others pay people to do their individual practice assignments for them, so they attributed the poor academic performance of students in the universities to academic dishonesty or fraud.

Hypothesis one sought to establish the relationship between climate change impacts and graduate student's socio-demographic securities in the University of Calabar. The result of the correlation analysis shown on table 4 indicates that there is a significant influence of climate change impacts on graduate student's socio-demographic securities in the University of Calabar ($r\text{-cal}$, 0.333; $r\text{-crit}$, .000). The implication of this result is that climate change has some influence on the socio-demographic securities of graduate students in the University of Calabar. This influence is found in terms of graduate student's income and financial security, health security, food security, social and personal security and emotional and psychological security. These are some curious factors that influence students' academic performance.

Nelson, et al., (2018) studied income growth and climate change effects on global nutrition security to mid-century; they found that climate change has a very significant influence on income and human development. This influence can be felt in terms of income loss, crop failure, livestock failure, loss of property and human lives as a result of climate change events. In two other researches carried out in two different locations by different authors on income and human capital development in India and the United States, Garg, Jagnani and Taraz, (2020) and Oppen, Park and Husted, (2023) found that natural disasters orchestrated by global climate change has impacted negatively on people's income and capital, distorting trade distribution and food production including other raw materials and resources.

The effects of natural disasters on human capital in the United States and India based on the findings of Garg, et al., (2020) and Oppen, et al., (2023) has been confirmed by this current study. When climate events occur, sources of livelihoods, economies of the world, businesses, properties and other economic activities are truncated. Food security is compromised and finances meant for other purposes are usually diverted to meet the health challenges including the dietary requirement of the victims of these disasters. When postgraduate student's sources of income for funding their academic activities are lost, their completion or taking up of the program in the first place would be difficult to comprehend. When natural disasters like the effects of climate change occurs, the income and finances of graduate students are affected, their food supply, social and personal security are compromised. These all affect the academic achievements of graduate students in the University of Calabar.

Climate change also affects the health and food security of graduate student, if their mental and overall health is not stable and there is no food to get the right nutrition. Their taking up of strenuous academic activities with all the rigors it requires would not be there, hence, they will be distracted by a whole lot of things, which will definitely affect their academic performance. Same will be said if graduate student's personal and social security is disrupted by climate change impacts, they live perpetually in fear, their concentration level will be diminished for fear of who knows what will happen next. Personal and social security also includes robbery, sexual harassment (rape), civil unrest, and attack from gangsters, bullying and intimidation among others. These are some of the situation that arises when natural disaster or human induced disaster occurs.

In testing hypothesis two, the correlation analysis shown on table 5 indicates that $r\text{-cal}$ is .973 which is greater than the $r\text{-crit}$ of .000, at 0.5 and 460 degree of freedom, implying that graduate student's socio-demographic securities significantly influence their academic achievement in the University of Calabar, Nigeria. To further investigate how graduate students socio-demographic securities influence or predict their academic achievements, a test of regression analysis was again carried out. The calculated beta weight was used to predict the relative

contribution of each variable to graduate student's academic achievement in the University of Calabar (see table 6).

The regression analysis produced an adjusted R^2 of .962 implying that 96.2 percent of the variables can be predicted from the independent variable (financial and income, health, personal/social security, food security and emotional and psychological security) in predicting the academic achievement of graduate students in the University of Calabar. To identify the relative contribution of each variables to graduate students academic achievement in the University of Calabar, the result on table 6 revealed that the standardized regression Beta weights ranged from -.021 to .967 and t – ratio from 93.026 to -1.796.

The Beta weight of the entire variables (financial and income security, health security, personal/social security, food security and emotional and psychological security) were significant at .05 levels. This result implied that when the variables were taken individually, all the variables namely; financial and income security, health security, personal/social security, food security and emotional and psychological security have significant influence on the academic achievement of graduate students of the University of Calabar. The result further showed that food security ($t=93.026$) made the greatest contribution by seriously influencing the academic achievement of graduate students, followed by emotional and psychological security ($t=9.032$), while financial and income security ($t=-1.796$) made the least contribution to graduate student's academic achievement. Personal and social security (-3.665) has a significant relationship with graduate student's academic achievement.

Since these variables were used to assess the influence student's academic achievements in the University of Calabar, the result on table 7 is a result of the academic achievement test administered. Table 7 shows that a total of 57 Master's degree students (21.4%) scored below the pass mark of 60%, while 209 (78.6%) master's degree students scored above 60, which means they pass the achievement test with the required grades. At the doctoral level, 38 (19.4%) students scored below 60%, implying that they failed the achievement test. While 158 (80.6%) doctoral students scored above 60% which is the benchmark for a pass grade. In effect they passed the achievement test as administered.

The result on table 7 further revealed that a total of 95 postgraduate students failed the academic achievement test (20.6%), while 367 graduate students (79.4%) passed the academic achievement test with scores above 60%. This implies that when climate change impacts the socio-demographic securities of graduate students, there is the tendency that it will affect their academic achievement, especially if they do not have the necessary climate change awareness on mitigation, prevention and adaptation.

This result has come to confirm the findings of Ahmed, et al., (2022) whose result found a significant influence of flooding on the education of children and adolescents in Pakistan, this is also a further confirmation of the earlier finding of Sims and Vincent, (2021) whose work on education, girls' education and climate change and emerging issues reported a positive influence of climate change on the girl child education. This is also a further affirmation of the various works of Haverinen-Shaughnessy and Shaughnessy, (2015); Porras-Salazar, et al., (2018) Wargocki, et al., (2019); when they found in their respective studies that climate change disrupts student's academic activities and also delay their graduation which in turn affects their academic achievements.

This was again reiterated by Thamtanajit, (2020) and Özek, (2023) who at different times examined the educational spillover effects of severe natural disasters occasioned by climate change events, they found that when climate change events occurs, there is bound to be a spillover effects on students academic programs and activities. This will lead to delay in graduation, excess work on both the teachers and the students and also on the parents and school administrators. From the result so far, it has been established beyond all reasonable doubts that climate change influence graduate students' socio-demographic securities and their academic achievements in the University of Calabar. Drawing upon empirical studies and regional data, it examines how environmental disruptions and socio-demographic securities influence graduate students academic outcomes. The study reveals that climate induced challenges, such as extreme weather events and health issues coupled with socioeconomic constraints, significantly affect graduate student's academic achievements.

Conclusion

The academic achievements of graduate students in the University of Calabar are intricately linked to both environmental and socio-demographic securities. Climate change poses significant challenges through infrastructural damage, insecurity in terms of income and finances, food and health risk, personal and social, emotional and psychological insecurities, while socio-demographic challenges limit access to resources and support systems. Addressing these issues requires a multifaceted approach that considers the complex interplay between environmental challenges during extreme climate change events and socio-demographic insecurities. All these have ripple effects on the academic outcomes of graduate students in all universities, University of Calabar inclusive.

Recommendations

Arising from the findings of this study, the following recommendations are suggested for policy formulation

1. Infrastructural improvements: invest in climate –resilient educational infrastructure to withstand environmental disruptions. This would include the construction of climate-resilient infrastructures like improved classroom ventilation, warming system, flood controlling channels and disaster preparedness plans
2. Financial support: implement scholarships and bursaries targeted at students from lower socioeconomic background to alleviate financial burdens
3. Health services integration: provide accessible healthcare services on campus to address climate – induced health challenges. This also includes mental health support services to be provided by the University for the mental and psychological wellbeing of the graduate students.
4. Students should be availed of counselors to cater for their emotional; and psychological securities especially during extreme climate events and disasters.
5. Within the school, environment, school authorities should assist in subsidizing the cost of meal for students. The school feeding program should also be extended to students who are in need of food. Students who are in need can apply and be captured under the program
6. Part time jobs should be created for students within and outside the school. This should be made a compulsory part of every academic program to build self-reliance among the students.
7. Basic climate change education should be made compulsory and included in the general studies courses. This can come as a climate change topic or under Education for sustainable Development. This will also include the overhauling of the current school curriculum, where climate change education and disaster preparedness and management can be included in the school curriculum.

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