Hypothetical Analysis of the Effects of Climate Change on Mental Health of Undergraduates in Alex-Ekwueme Federal University, Ebonyi State of Nigeria

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Abstract

Introduction: Mental health (MH) effect caused by climate change, particularly on adolescents and adults is a call for concern. This study aimed at exploring the effects of climate change on the mental health of Undergraduates of Alex Ekwueme Federal University, Ndufu-Alike, Ebonyi State.

Methods: An institutional based cross-sectional study was adopted. The population consisted of 10,000 students. The sample for the study consisted 216 undergraduates. The instrument for the study was a self-structured questionnaire titled: Effect of Climate Change on Mental Health (ECCMHQ). Data was analyzed using bivariate correlational analysis to determine the association of climate change with the effects of MH, while structural equation modelling was used to test the hypotheses.

Results: The findings showed that climate change was positively correlated with stress disorder ($r = 0.25$, $p < .01$), anxiety ($r = 0.32$, $p < .01$), depression ($r = 0.26$, $p < .01$), trauma ($r = 0.28$, $p < .01$), substance abuse ($r = 0.30$, $p < .01$), suicidal ideation ($r = 0.25$, $p < .01$), fatigue ($r = 0.27$, $p < .01$) and suicidal guilt ($r = 0.17$, $p < .05$). There was no evidence of a correlation between climate change and post trauma ($r = 0.12$, $p = .45$) and a negative correlation with trauma ($r = -0.16$, $p < .05$).

Conclusion: The study concluded that climate change can lead to tremendous mental health effects such as anxiety, PTSD, apocalypse, fear with their consequential chronic psychological dysfunctions. Nevertheless, challenges can be averted if an environmental health education intervention is urgently mounted by the university management.

Keywords: Climate change, mental health effects, Undergraduates

1. Introduction

Climate change has severely threatened mental health of all humans particularly adolescents and youths globally (World Health Organization, 2015; Costello et al., 2009; Hayes et al., 2018). Studies have reported that the threat of climate change in every region is seriously impacting every human uncontrollably (Cianconi et al., 2015). The increasing frequency and intensity of heatwaves, floods, droughts, extreme rainfall and severe cyclones in many areas including the transmission of food-borne, water-borne and zoonotic infectious diseases, is greatly impacting every human life and health globally (Cianconi et al., 2015; WHO, 2019). It is noteworthy that the World Health Organization (WHO) has projected an estimate of approximately 250,000 deaths per year between 2030 and 2050 as a result of malnutrition, malaria, diarrhoea and heat arising from climate change (Watts et al., 2015). The magnitude of threat of climate change to the essential ingredients of human lives such as clean air, safe drinking water, nutritious food supply, and safe shelter portend a great danger to the progress so far achieved in global health (WHO, 2021).

In recent years, the increasing impact of climate change to individual health and well-beings including societies globally, have greatly renewed interest in the field of research (Cianconi, Betrò, & Janiri, 2020). Climate change refer to the effect of changes in the global climates both at local, regional, or global scales (Pachauri et al., 2014). Global warming oftentimes is used to describe climate change. This is associated with the rise in temperatures, sun, earth and oceans, wind, rain and snow, forests, deserts and savannas, including human activities with a significant impact on humans, wildlife, and ecosystems globally (Intergovernmental Panel on Climate Change 2012; Pachauri et al., 2014; Skeptical Science, 2017). There is increasing evidence that the mental health impact of climate change on adolescent are in an accelerating pace with multiple deleterious consequences (Hayes et al., 2018; Cianconi, 2020; Charlson et al., 2021). It is in line with these scenarios that the European Parliament have reported that climate change has acute and chronic mental health impacts in a number of ways such as anxiety, depression, post-traumatic stress disorder (PTSD) and substance abuse among adolescents and youth globally (European Parliament, 2020). The shock and psychological trauma arising from injury, damage to homes and eventual loss of home land and other properties are quite devastating and could trigger hazardous lifestyles among individuals particularly undergraduates. Such effects may include higher rates of violence, poverty, school dropout, aggression, suicidal ideation, suicide attempt, psychosis and death. More affected individuals are people with pre-existing mental health challenges (European Parliament, 2020).

The overarching and domineering impact of climate change is increasingly prompting mental health problems of undergraduates particularly those in Alex-Ekwueme Federal University, Ndufu-Alike, Ebonyi State, Nigeria. This is evidence as the university are witnessing a sharp increase in the number of students seeking mental health treatment including some of the students who have attempted committing suicide among the population. It is in line with this observation, that the present study attempted to ascertain the climate change effects on the mental health of undergraduates in the University. The study focused on depression, trauma, stress disorder, anxiety, substance abuse, suicidal ideation, post-trauma, fatigue, survivor guilt and trauma to determine its association on climate change among the undergraduate student's mental health. The selection of these effects of climate change were based on other studies who reported its impact on the mental health of adolescents and youth (Hajat, Connor, & Kosatsky, 2010; Hayes et al., 2018; Liu, Varghese, Hansem, & Xiang, 2021). However, to determine the effect of climate change on mental health of undergraduate students the study hypothesized that: 1). Climate change does not significantly predict stress disorder, 2). Climate change does not significantly predict anxiety, 3). Climate change does not significantly predict depression, 4). Climate change does not significantly predict trauma, 5). Climate change does not significantly predict substance abuse, 6). Climate change does not significantly predict suicidal ideation, 7). Climate change does not significantly predict post-trauma, 8). Climate change does not significantly predict fatigue, 9). Climate change does not significantly predict suicidal guilt.

2. Methods

2.1 Study Design, and Setting

We conducted an institution-based cross-sectional study design among adolescents aged 16 years and above at Alex Ekwueme Federal University Ndufu-Alike (AE-FUNAI), Ebonyi State, Nigeria, formerly Federal University Ndufu-Alike Ikwo (FUNAI). Geographically, the University is located on latitude 060 8.29' N, Longitude 080 8.627'E and Altitude 55m (AMSL). AE-FUNAI is sited in Ikwo Local Government Area of Ebonyi State which is about 25 kilometers from Abakaliki, the State capital. Ikwo is bounded in the north by Abakaliki and Ezza South Local Government Areas and in the south by the Cross River State. The University sits on a landmass of 438 hectares of land surveyed and handed over to the University authorities by the Ebonyi State Government.

2.2 Population

The population of the study consisted of Seven (7) Faculties of AE-FUNAI which include: Faculty of Agriculture, Faculty of Basic Medical Sciences, Faculty of Education, Faculty of Engineering and Technology, Faculty of Humanities, Faculty of Management and Social Sciences, and Faculty of Science with the population of 10,000 undergraduate students of AE-FUNAI based on the available records, (AE-FUNAI 2021).

2.3 Sample Size Determination and Sampling Procedure

The sample for the study consisted of two hundred and sixteen (216) undergraduate students. We calculated the sample size using Slovings' formular thus:

$$n = \frac{N}{1 + N \times e^2}$$

Where N=10,000   e =0.05

$$n = \frac{10,000}{1 + 10,000 \times 0.05^2}$$

$$= \frac{10,000}{1 + 10,000 \times 0.005}$$

$$= \frac{10,000}{1 + 50}$$

$$= \frac{10,000}{51}$$

n = 196.078 = 196

Adding 10% for attrition

10% of 196 = 19.6= 20

Total sample size = 196+20 = 216

Therefore, the total sample size used for this study was 216. The procedure for sample selection involved multi-stages. In the first stage, Alex-Ekwueme Federal University, Ndufu-Alike, Ebonyi State, Nigeria was clustered into seven (7) faculties. In the second stage, simple random sampling technique of balloting with replacement was used to draw four (4) faculties out of seven faculties of the university. In the third stage, a purposive sampling technique was used to select a total of 216 students who participated in the study.

2.4 Inclusion Criteria/ Exclusion Criteria

All students aged 16 years and above who are registered, available and are willing to participate in the study where included, and those students who were critically sick and not available during data collection and unable to communicate were excluded from the study.

2.5 Instrument for Data Collection

The instrument for the study was a self-structured Questionnaire titled: Effect of Climate Change on Mental Health (ECCMHQ) Questionnaire. In order to determine reliability of the instrument of study, 30 copies of the instrument were administered to undergraduate students from another institution. Using the data collected, Cronbach Alpha test of internal consistency of instrument was used and that gave rise to the reliability coefficient of each of the sub sets of the variables for the study. They are as thus: Stress Disorder =0.85; Anxiety = 0.75; Depression = 0.95; Trauma= 0.77; Substance Abuse=0.84; Suicidal Ideation =0.92; Post-Trauma = 0.88; Fatigue = 0.81; Suicidal Guilt = 0.74 and climate change = Climate Change =0.91. All the reliability coefficients were high thus the use of the instrument for data collection.

2.6 Method of Data Collection

We administered copies of the questionnaire at any point where the students could be reached. The questionnaire was responded by the respondents without personal bias as it maintained its pledge for confidentiality of the respondents. Having filled the instrument on the spot, it was collected back by the class representatives serving as research assistants. However, out of 216 copies of questionnaire distributed, two hundred (200) were returned representing 98% returned rate. However, only one hundred and sixty copies (160) were properly filled and fit for data analysis.

2.7 Ethical Approval

The study material was reviewed and approved by the ethical review board of Alex Ekwueme Federal University, Ndufu-Alike (AE-FUNAI), Ebonyi State, Nigeria.

2.8 Method of Data Analysis

The bivariate correlational analysis was used to determine the relationships between dependent and independent variables of climate change and mental health effects. The results revealed the relationships existing between the variables. Positive correlations were indicated with figures without negative symbols, while negative correlations had figures with negative symbols.

To test the 9 null hypotheses, structural equation modeling was used to predict the effect of climate change on students' mental health (stress disorder, anxiety, depression, trauma, substance abuse, suicidal ideation, post-

trauma, fatigue, and suicidal guilt). We used the structural equation modeling (SEM-AMOS), applied 2000 resampled bootstraps to learn whether climate change knowledge influence these outcome variables in this population. The model showed the following model fit index: $X^2 = 117.72$, df = 3.27, $X^2/df = 36$, CFI = 0.94, GFI = 0.92, TLI = 0.93, IFI = 0.93, SRMR = 0.03, RMSEA = 0.05 indicating acceptable model fit for the analysis.

3. Results

Table 1. Mean, Standard Deviation and Bivariate Correlations among Variables

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1.67	0.47	1											
2. Gender	2.51	1.05	0.01	1										
3. Class Level	3.10	0.93	-0.05	0.14	1									
4. Climate Change	12.55	2.35	-0.04	-0.09	-0.07	1								
5. Depression	13.00	1.65	-0.02	-0.13	0.01	0.26**	1							
6. Trauma	16.48	2.96	-0.16*	0.09	-0.04	0.28**	-0.08	1						
7. Stress Disorder	14.43	3.84	-0.01	-0.12	0.01	0.25**	0.11	0.20*	1					
8. Anxiety	16.50	2.25	-0.08	0.13	0.08	0.32**	0.01	0.35**	0.48**	1				
9. Substance Abuse	17.73	2.02	0.12*	0.03	0.05	0.30**	0.01	0.64**	0.29**	0.45**	1			
10. Suicidal Idea	17.49	2.43	-0.04	-0.05	-0.11	0.25**	-0.03	0.45**	0.15	0.28**	0.48**	1		
11. Post-Trauma	18.71	1.69	-0.08	-0.16	0.05	0.12	0.31**	-0.11	-0.01	-0.10	0.08	0.16*	1	
12. Fatigue	13.09	1.43	0.01	-0.20	-0.12	0.27**	0.19*	0.03	0.26**	0.13	0.11	0.12	0.30**	1
13. Survivor Guilt	16.12	1.96	-0.15	0.20	0.03	0.17*	0.10	0.36**	0.09	0.36**	0.24**	0.23**	-0.02	0.10

Note. Sample = 160; *P <.05, **P< .01.

The bivariate correlational analysis in Table 1 above showed that climate change was positively correlated with stress disorder ($r = 0.25$, $p <.01$), anxiety ($r = 0.32$, $p <.01$), depression ($r = 0.26$, $p <.01$), trauma ($r = 0.28$, $p <.01$), substance abuse ($r = 0.30$, $p <.01$), suicidal ideation ($r = 0.25$, $p <.01$), fatigue ($r = 0.27$, $p <.01$) and suicidal guilt ($r = 0.17$, $p <.05$). The analysis showed no evidence of correlation between climate change and post-trauma ($r = 0.12$, $p =.45$). Regarding the covariates, the analysis showed evidence of positive correlation between climate change and substance abuse ($r = 0.12$, $p <.05$) and a negative correlation with trauma ($r = -0.16$, $p <.05$). There was no evidence of correlation between gender and the outcome variables in this population.

Table 2. Results of Hypotheses 1 to 9

Variables	Estimates	Standard Errors	95% Confidence Intervals	
			Lower Limits	Upper Limits
Climate change stress disorder	0.25***	0.75	0.11	0.39
Climate change Anxiety	0.33***	0.75	0.18	0.45
Climate change Depression	0.26***	0.70	0.11	0.41
Climate change Trauma	0.28***	0.76	0.12	0.43
Climate change Substance abuse	0.30***	0.76	0.15	0.44
Climate change Suicidal ideation	0.25***	0.75	0.99	0.39
Climate change Fatigue	0.27***	0.76	0.13	0.41
Climate change Suicidal guilt	0.17*	0.78	0.02	0.32
Climate change Post-trauma	0.12	0.81	-0.04	0.28

***p < .001, *p < .05.

As shown in Table 2, the results of the hypotheses showed that climate change knowledge was a statistically significant predictor of stress disorder (β = 0.25,), anxiety (β = 0.33,), depression (β = 0.26, p <.001), trauma (β = 0.28, p <.001), substance abuse (β = 0.30, p <.001), suicidal ideation (β = 0.25, p <.001), fatigue (β = 0.27, p <.001) and suicidal guilt (β = 0.17, p <.05). The analysis showed no evidence of relationship between climate change knowledge and post-trauma (β =0.12, p =.13). This result shows that climate change knowledge significantly influence the students' mental health: stress disorder with 6.50% of the variance explained, anxiety with 10.40% of the variance explained, depression with 7.0% of the variance explained, trauma with 7.80% of the variance explained, substance abuse with 9.10% of the variance explained, suicidal ideation with 6.10% of the variance explained, fatigue with 7.30% of the variance explained and survivor guilt 2.90% of the variance explained in this population. The results also showed that hypotheses 1, 2, 3, 4, 5, 6, 7 and 8 were accepted while the hypothesis 9 was rejected.

4. Discussion

Our study tried to add knowledge regarding the magnitude of impact of climate change on mental health of Undergraduate students and the society at large. The findings from the bivariate correlational analysis in Table 1 showed that climate change was positively correlated with stress disorder, anxiety, depression, trauma, substance abuse, suicidal ideation, fatigue and suicidal guilt. The current findings supported the earlier studies who reported a strong link between natural disasters and mental disorders (Cianconi, Betrò, & Janiri, 2020). The current findings were also in agreement with the studies who reported that the impact of Mental health as a result of climate change ranges from minimal stress and distress symptoms to clinical disorders, including anxiety and sleep disturbances (Blanc, Spruill, Butler, Casimir, & Girardin, 2019). The current findings also agree with the studies who reported effect of climate change to include among others depression, post-traumatic stress, and suicidal thoughts (WHO 2013; Ursano, Morganstein, & Cooper, 2017). The findings of the current study also supported the finding of other related study who indicated that temperature and suicide had a positive relationship (Williams, Roberthill, & Spice, 2015). Williams, Roberthill, and Spice, also found that irregular changes in temperature were positively associated with suicide incidence with a record of 1.8% for any added I degree centigrade temperature as more deaths occurred with temperature rise (Williams, Roberthill, & Spice, 2015). The seasonal temperature variation had no linear relationship with suicide especially when demographic differences were in control. Geographic change in temperature negatively correlated with incidence of suicide among the undergraduates. On the other hand, a negative correlation was found by （Robbins et al., 1972; Rotton, 1986; Souetre et al., 1990; Lester, 1999). However, the positive relationship between temperature rise and suicide was reported by other studies (Yan, 2000, Page et al, 2007; Yang et al, 2011; Likhvar et al, 2011; Muller et al, 2011). The results of the present study were not far-fetched as it recorded both positive and negative relationships as the case may be. This can be attributed to the difference in locations of the previous study and current study. Also, it may be attributed to the respondents' own peculiarity with the investigation and level of knowledge with the concept irrespective of gender.

The results of the hypotheses confirmed the results in Table 1. The findings were expected and consequently not surprising given to the most recent study whose findings supported the positive association between elevated ambient temperatures and/or heat waves with adverse mental health problems (Liu, Varghese, Hansen, & Xiang 2021). Hypothesis 9 of no significant difference between climate change and trauma was not in consonance with a previous study that found heat waves to be significantly associated with mental and behavioural disorders such as PTSD (WHO, 2019; CHAN, 2020). In Australia, a study found significant correlation between heat waves and increased rates of mental health disorders like trauma, suicide, aggressive behavior, anxiety disorders, mood disorders amongst others (Hansen, Bi, Nitschke, Ryan, Pisaniello, and Tucker, 2008). The results are not surprising at all considering the present-day drastic change in seasons, economic and epidemic infectious which are impacting negatively on peoples' physical and mental health.

5. Conclusion

The findings of the study have revealed the adverse effects of climate change to the mental health of undergraduates such as heat strokes, trauma, anxiety, PTSD, suicide ideation and suicide attempt. This is attributed to climate changes which ranges from rise in temperature, flooding, wildfire, increase in sea levels, earthquakes, disappearance of rivers and desertification amongst others. Hower, having established a significant relationship of the climate changes with the mental health effects of the students, no further evidence is needed to alert the public to take charge of their health especially the mental health. Thus, the citizenry education on the effects and adaptation strategies of global warming requires a deepened public engagement of all stakeholders. The Government at all levels, NGOs, Ministries, Agencies and Parastatals should organize periodic awareness and sensitization programmes for all university students and other youths. This is to get them physically, emotionally

and mentally prepared early enough on the effect of climate change and its immediate solutions through presentation of well-informed coping strategies.

Authors' contributions

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