

# Climate Anxiety and Depressive Symptoms among Undergraduate Students of a College in a Higher Education Institution in Manila, Philippines

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## ABSTRACT

**Background and Objectives.** Climate anxiety is an emerging concept defined as increased anxiety about climate change and has been linked to negative mental health outcomes. As a relatively new concept, only a few have characterized it and its relationship with mental health, especially in the Global South populations. This study aimed to investigate the relationship between climate anxiety and depressive symptoms among undergraduate students from a college in a higher education institution in Manila, Philippines. Specifically, it aimed to (1) determine the proportion of undergraduate students who reported high levels of climate anxiety and depressive symptoms; and (2) determine the association between climate anxiety and depressive symptoms.

**Methods.** Using a cross-sectional design and a convenience sampling method, the investigators collected data through an online survey to assess levels of climate anxiety and depressive symptoms using the Climate Change Anxiety Scale (CCAS) and the Patient Health Questionnaire 9 (PHQ-9), respectively. Data was analyzed using multiple logistic regression.

**Results.** Among the 148 respondents (N=325), 14.86% had high climate anxiety (i.e., CCAS score  $\geq 3$ ) and 62.84% had high depressive symptoms (i.e., PHQ-9 score  $\geq 10$ ). Regression analysis showed that the odds of those having high climate anxiety reporting high depressive symptoms are higher than those with low climate anxiety, though this is not significant (OR = 2.53,  $p=0.144$ ).

**Conclusion.** The study verifies the existence of climate anxiety among undergraduate students and reflects an alarming mental health situation in the selected college. It is recommended that wide-scope investigations on the current state of climate anxiety and mental health among the youth be done to verify their impacts, along with inter-sectoral efforts such as increasing awareness through health education interventions to improve the youths' mental health literacy and resilience to the effects of climate change, and promoting climate change-responsive mental health services to address these as pressing threats to youth health.

**Keywords:** climate anxiety, depressive symptoms, mental health

## INTRODUCTION

Climate change is one of the greatest threats to human health, especially among populations belonging to low- and middle-income countries. The Philippines is particularly more vulnerable to its effects, ranking 17<sup>th</sup> worldwide among countries most affected by extreme weather events.<sup>1</sup> While climate change visibly affects physical health, recent studies have shown its effects on mental health in the form of increased anxiety and worry. An emerging concept that encompasses these feelings is known as climate anxiety.

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Climate anxiety is anxiety related to anthropogenic climate change.<sup>2</sup> It is also defined as “heightened emotional, mental or somatic distress in response to dangerous changes in the climate system.”<sup>3</sup> Surveys across different populations reveal that a portion of the respondents are worried about climate change.<sup>4,5</sup> The youth, indigenous populations, and those belonging to the Global South have been found to be more affected by climate anxiety.<sup>2,6,7</sup> This stems from the greater pressure on these populations to be future leaders who have to face the worst impacts of climate change.<sup>8</sup> Several studies have linked climate anxiety to negative mental health outcomes. Negative climate-related emotions such as climate anxiety have been found to be related to poorer mental health, insomnia, and psychological distress,<sup>9,10</sup> as well as depression, anxiety, and stress.<sup>11,12</sup>

Mental health and depressive symptoms continue to be pressing concerns among Filipino youth aged 15 to 24 years old. Approximately one in ten Filipinos in this demographic suffers from moderate to severe depressive symptoms and commonly experience “feeling lonely” and perceiving other people as unfriendly. Several factors have been known to affect mental health, such as gender, sex, socioeconomic status, and educational attainment.<sup>13</sup> In the Philippines, climate-related disasters continue to take a toll on the population's mental health. For example, in the aftermath of Typhoon Haiyan (local name Yolanda) which hit the country in 2013, authorities have noted rising cases of post-traumatic stress disorder (PTSD) and depression.<sup>14</sup> Despite this, faith and religiosity have been found to be important coping strategies among Filipinos in times of crisis which may serve as a protective factor against mental health conditions.<sup>15,16</sup>

While climate anxiety is gaining some attention in Western countries, there is still a lack of studies that characterize it and its effects on mental health in the Global South. This prompts the importance of investigating climate anxiety and its relationship with mental health in a country like the Philippines. Different associations and manifestations may arise among these populations given their greater vulnerability to the severe impacts of climate change, as well as their restricted ability to prevent and recover from said impacts.<sup>17</sup> Given these gaps in knowledge, this study aimed to investigate the relationship between climate anxiety and depressive symptoms among undergraduate students of a college in a higher education institution in Manila, Philippines. Specifically, it aimed to (1) determine the proportion of undergraduate students who reported high levels of climate anxiety and depressive symptoms; and (2) determine the association between climate anxiety and depressive symptoms.

## METHODS

### Study Design

The study employed an analytical, cross-sectional design at a selected college of a higher education institution

in Manila, Philippines (N=325). A sample size of 293 was computed using the OpenEpi Sample Size Calculator for Proportion based on a study that identified a proportion of youths reporting to have high climate anxiety in the Philippines.<sup>6</sup> The final sample size was adjusted with a 20% non-response rate and an addition of 10 for every covariate used in the model.<sup>18</sup> Convenience sampling was done among undergraduate students aged 18 to 24 years old enrolled in the undergraduate course during the first semester of Academic Year 2022-2023. This study excludes those clinically diagnosed with a mental health disorder to account for possible confounding effects since those with pre-existing mental health conditions are more likely to experience anxiety and depressive symptoms.<sup>19,20</sup> Data was collected through an online survey using Google Forms distributed to the students from December 6 to 14, 2022 through the Office of the College Secretary via email. The participants were followed-up via email and Facebook Messenger group reminders a maximum of two times. The self-administered questionnaire was composed of sections collecting the respondents' socio-demographic data, climate anxiety levels, depressive symptoms levels, and religiosity. It also contained the informed consent form.

### Measures

The collected socio-demographic data included age, gender, socioeconomic status, region of residence, belongingness to an indigenous group, and whether or not they have had experiences of climate-related phenomena (e.g., typhoon, flood, tsunami, landslide, drought, wildfire, etc.) in the past three years. Climate anxiety was measured using the 13-item Climate Change Anxiety Scale (CCAS)<sup>7</sup>, which has already been validated for Filipino youth.<sup>21</sup> The questionnaire is composed of two subscales: the cognitive-emotional impairment subscale, which measures difficulty with concentration and emotions, and the functional impairment subscale, which measures difficulty in one's ability to function. Items were answered based on how statements applied to the respondents using a Likert scale from 1 (never) to 5 (almost always). Mean individual scores were computed and classified into high and low climate anxiety using the cutoff of 3. The level of depressive symptoms was measured using the Patient Health Questionnaire 9 (PHQ-9) based on a respondent's feelings in the past two weeks through a Likert scale from 0 (not at all) to 3 (nearly every day). The sum score for each individual was calculated and classified into high and low depressive symptoms using the cutoff score of 10 (moderate to severe depressive symptoms).<sup>22</sup> The respondents' degree of religiosity was measured through the brief version of the Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ)<sup>23</sup> using a Likert scale from 1 (strongly disagree) to 4 (strongly agree). The sum scores of the respondents were calculated and classified into high and low faith using the median score of the sample. Permission to use the CCAS and the SCSRQ were obtained from their respective authors via email.

## Analysis

A Google sheet of the responses received through Google Forms was generated, exported as a Microsoft Excel file for recoding, and analyzed using STATA. Descriptive statistics, specifically frequency and proportion, were generated for the socio-demographic characteristics, as well as the climate anxiety level and depressive symptoms classification. Prior to making the statistical model, the confounding variables (i.e., age, gender, household income, region of residence, belonging to an indigenous population, experience of a natural calamity within the last three years, and religiosity) were screened through simple logistic regression using a p-value of 0.25. The significant confounders were included in the final model. To determine whether climate anxiety is associated with depressive symptoms while controlling for the significant confounders, a multiple logistic regression analysis was performed. The adjusted odds ratios and p-value at  $\alpha=0.05$  of climate anxiety with respect to depressive symptoms were calculated.

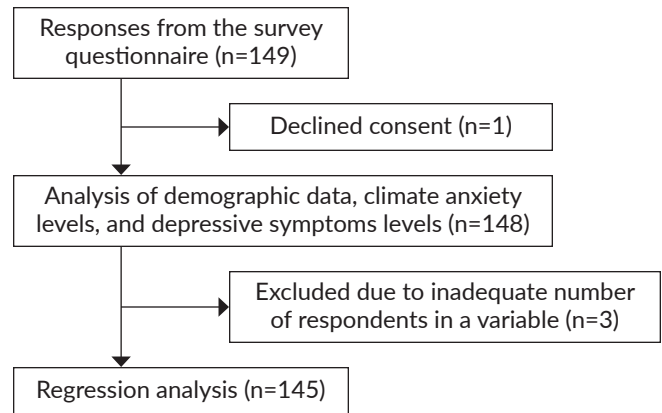
## Ethical Considerations

The study was submitted to and approved by the University of the Philippines Manila Research Ethics Board (UPMREB Code: 2022-0365-UND). The informed consent form was placed before the questionnaire and it included a detailed description of the study, a confidentiality and data protection plan, and a data dissemination plan. Participants were asked to confirm their understanding of the study, their voluntary participation, and eligibility (i.e., an enrolled undergraduate student of the college, aged 18 to 24 years old, and without an existing mental health condition) before proceeding. A debriefing section was present at the start and end of the survey containing crisis hotlines and the researchers' contact information. The final section also asked for the respondents' consent to be contacted in case their PHQ-9 scores were high and were given contact information for mental interventions which they could use at their discretion. Additionally, the first 100 respondents were given Php 50 incentives as tokens for participation.

The collected data was exported into a password-protected Microsoft Excel spreadsheet file that is accessible only to the proponents. The Google Forms, Google Sheets, and Microsoft Excel files were stored for three years after data collection; after which, online and softcopy files will be permanently deleted, and hardcopy files, if any, will be destroyed.

## RESULTS

Among the 325 enrolled undergraduate students, a total of 149 responses were received during the data collection. One response failed to provide consent and was not included in the analysis. A total of 148 responses were included in the analysis of demographic data and levels of climate anxiety and depressive symptoms (Figure 1). Table 1 summarizes the



**Figure 1.** Participant flow diagram.

socio-demographic characteristics, climate anxiety levels, and depressive symptoms levels of the respondents.

The mean age of the respondents was 20.5 ( $\pm 1.34$ ) years, 103 (69.6%) identified as a woman, 113 (76.4%) had been directly affected by climate-related calamities, and 77 (52.0%) were classified as having high faith/religiosity through a median score of 12. The respondents were fairly distributed in terms of socioeconomic status and most resided in the National Capital Region (NCR) or Region IV-A. A total of 22 (14.9%) respondents were classified as having high climate anxiety while 93 (62.8%) respondents were classified as having high depressive symptoms (Table 1).

Table 2 breaks down the characteristics of those who are classified as having high climate anxiety or high depressive symptoms.

Among those who identified as women, 18 (17.5%) respondents had high climate anxiety while 67 (65.0%) had high depressive symptoms. Among those who experienced a natural calamity, 13 (37.1%) respondents had high climate anxiety, and approximately three-quarters ( $n=26$ , 74.3%) had high depressive symptoms. Every income bracket had at least one respondent with high climate anxiety while the majority of respondents from each income bracket, except for the lowest bracket, had high depressive symptoms. Nine regions had at least one respondent with high climate anxiety while at least 40% of respondents from each region had high depressive symptoms. Among those with low faith, 14 (19.7%) respondents had high climate anxiety while 47 (66.2%) had high depressive symptoms (Table 2). With the two-subscale nature of the CCAS, 26 (17.6%) respondents scored above the midpoint for the cognitive-emotional impairment subscale while 29 (19.6%) respondents scored above the midpoint for the functional impairment subscale.

Only a total of 145 responses were included in the final regression analysis model after omitting three entries with less than five respondents in a variable (i.e., belonging to an Indigenous group and non-binary) during confounding screening. For this analysis, the variable regions of residence had to be merged and re-classified into "High-risk" ( $n=98$ ,

**Table 1.** Socio-demographic Characteristics, Climate Anxiety Level, and Depressive Symptoms Level of Study Participants (n=148)

Characteristic	
Age (Mean, SD)	20.5 ± 1.34
Gender, n (%)	
Man	42 (28.4%)
Woman	103 (69.6%)
Non-binary	3 (2.0%)
Household Monthly Income, n (%)	
Below P10,957	3 (2.0%)
P10, 957 to P21,914	12 (8.1%)
P21,914 to P43,828	19 (12.9%)
P43,828 to P76,669	26 (17.6%)
P76,669 to P131,484	40 (27.0%)
P131,484 to P219,140	21 (14.2%)
P219,140 and above	27 (18.2%)
Region of Residence, n (%)	
BARMM	1 (0.7%)
CAR	3 (2.0%)
NCR	59 (39.9%)
Region I	8 (5.4%)
Region II	3 (2.0%)
Region III	14 (9.5%)
Region IV-A	30 (20.3%)
Region V	8 (5.4%)
Region VI	1 (0.7%)
Region VII	2 (1.3%)
Region VIII	3 (2.0%)
Region IX	2 (1.3%)
Region XI	9 (6.1%)
Region XII	5 (3.4%)
Belonging to an Indigenous Population, n (%)	
Yes	1 (0.7%)
No	147 (99.3%)
Natural Calamities Experienced, n (%)	
Yes	35 (23.6%)
No	113 (76.4%)
Religiosity, n (%)	
High	77 (52.0%)
Low	71 (48.0%)
Climate Anxiety, n (%)	
High	22 (14.9%)
Low	126 (85.1%)
Depressive Symptoms, n (%)	
High	93 (62.8%)
Low	55 (37.2%)

66.2%) and “Moderate-risk” (n=50, 33.8%) according to risk level for natural hazards because some regions had less than five respondents.<sup>24</sup> Of the six confounding variables, only gender (p = 0.248), income (P21,914 to P43,828; p = 0.196), and experience of natural calamities within the past three years (p = 0.091) were found to be significant correlates. While controlling for these variables, the multiple regression analysis revealed that the odds of those having high climate

anxiety to report high depressive symptoms is 2.53 times more than those with low climate anxiety (Table 3). However, this association was not statistically significant (p=0.144).

## DISCUSSION

This study presents a view of climate anxiety among Filipino undergraduate students in a higher education institution in Manila, Philippines, one of the few to describe its prevalence among Filipino youth and investigate its relationship with depressive symptoms. The results show that climate anxiety affects 14.7% of the respondents. An increase in awareness of climate change through education brought about by the Climate Change Act of 2009<sup>25</sup> and the environmental health subjects offered at the college may contribute to the increasing trend of climate anxiety.<sup>26</sup> Students enrolled in environmental majors tend to have higher levels of environmental concern, anxiety, and despair amidst the climate crisis.<sup>27,28</sup> A proportion of respondents reported difficulty in their concentration or ability to function as reflected by their high scores for either subscale, with similar proportions found in African and European French-speaking individuals and Americans.<sup>7,29</sup> This further supports that climate anxiety and its negative effects are not isolated phenomena.<sup>6,30</sup> Higher proportions of climate anxiety are also seen among women as they tend to worry more about the climate crisis and are more vulnerable to climate-related mental health impacts.<sup>12,31</sup> Those who are directly affected by climate change are more likely to experience climate anxiety,<sup>32</sup> as seen in how more than a third of these individuals reported having high climate anxiety. Even the mere awareness of extreme weather events seen through social media may also cause emotional responses to climate change,<sup>30</sup> which may explain the high climate anxiety among those who did not experience a climate-related event in the past three years. Those belonging to lower income brackets had relatively higher proportions of high climate anxiety compared to those from higher income brackets. A disaster's impacts on these populations are amplified by the lack of resources, financial capability to cope, and impaired access to necessities in times of crisis, increasing anxiety and stress.<sup>8,33</sup> As of writing, only two studies have used the CCAS to measure climate anxiety among Filipinos.<sup>10,21</sup> Although the scale was seen to be usable on Filipino youth,<sup>21</sup> its Western origin limits its ability to capture the experience of Filipinos on climate change and climate anxiety. Further investigations and a possible scale tailor-made for Filipinos should be done to accurately describe climate anxiety in the country.

Results show that at least six in ten of the respondents reported having high depressive symptoms. Recent investigations have related depressive symptoms to the lockdown from the COVID-19 pandemic, leading to isolation, fear of contracting the virus, change in social contact, and change in methods of education.<sup>34,35</sup> Academic pressure and stress also contribute to the presence of depressive symptoms,



**Table 2.** Characteristics of Study Participants with High Climate Anxiety or Depressive Symptoms Levels, (n=148)

Characteristics	Frequency	High Climate Anxiety	High Depressive Symptoms
<b>Gender, n (%)</b>			
Man	42	4 (9.52%)	23 (54.76%)
Woman	103	18 (17.48%)	67 (65.05%)
Non-binary	3	0	3 (100.00%)
<b>Household Monthly Income, n (%)</b>			
Below P10,957	3	1 (33.33%)	1 (33.33%)
P10, 957 to P21,914	12	2 (16.67%)	7 (58.33%)
P21,914 to P43,828	19	6 (31.58%)	14 (73.68%)
P43,828 to P76,669	26	6 (23.08%)	16 (61.54%)
P76,669 to P131,484	40	3 (7.50%)	26 (65.00%)
P131,483 to P219,140	21	3 (14.29%)	13 (61.90%)
P219,140 and above	27	1 (3.70%)	16 (59.26%)
<b>Region of Residence, n (%)</b>			
BARMM	1	0	1 (100.00%)
CAR	3	1 (33.34%)	2 (66.67%)
NCR	59	6 (10.17%)	36 (61.02%)
Region I	8	1 (12.50%)	6 (75.00%)
Region II	3	1 (33.33%)	3 (100.00%)
Region III	14	0	6 (42.86%)
Region IV-A	30	4 (13.33%)	14 (46.67%)
Region V	8	4 (50.00%)	6 (75.00%)
Region VI	1	0	1 (100.00%)
Region VII	2	0	1 (50.00%)
Region VIII	3	0	3 (100.00%)
Region IX	2	1 (50.00%)	2 (100.00%)
Region XI	9	2 (22.22%)	8 (88.89%)
Region XII	5	1 (20.00%)	4 (80.00%)
<b>Belonging to an Indigenous Population, n (%)</b>			
Yes	1	1 (100.00%)	1 (100%)
No	147	21 (14.29%)	92 (62.59%)
<b>Natural Calamities Experienced, n (%)</b>			
Yes	35	13 (37.14%)	26 (74.29%)
No	113	9 (7.96%)	67 (59.29%)
<b>Religiosity, n (%)</b>			
Low	71	14 (19.72%)	47 (66.20%)
High	77	8 (10.39%)	46 (59.74%)

**Table 3.** Multiple Regression Model of Climate Anxiety and Depressive Symptoms, (n=145)

Variable	High Depressive Symptoms		Confidence Interval	
	OR <sup>a</sup>	p-value	LL	UL
<b>High Climate Anxiety</b>	2.53	0.144	0.73	8.79
<b>Gender (Woman)</b>	1.69	0.187	0.77	3.71
<b>Natural Calamities Experienced</b>	1.85	0.193	0.73	4.69
<b>Household Monthly Income</b>				
1 (low income vs poor)	2.50	0.520	0.15	41.18
2 (low middle income vs poor)	7.34	0.152	0.48	112.28
3 (middle income vs poor)	4.12	0.294	0.29	58.07
4 (upper middle income vs poor)	5.53	0.200	0.41	75.27
5 (high income vs poor)	4.21	0.292	0.29	60.22
6 (rich vs poor)	4.24	0.286	0.30	60.22

<sup>a</sup>Multiple logistic regression

p=0.05

which may be more prominent in the study due to the period of data collection falling on the weeks with final exams.<sup>36,37</sup> The resulting proportion of students with depressive symptoms in this study is much higher than previous reports<sup>13</sup> which may suggest that depression among Filipinos is underreported. There is a need to gather more data on depression as it may result in lower academic performance and lower satisfaction with one's studies.<sup>38-40</sup>

This study also contributes to a further understanding of climate anxiety and its relationship with depressive symptoms and is the only study as of writing to involve Filipino youth. Despite analysis revealing a relationship between the two, this is not statistically significant, similar to studies involving Australians and adolescent patients in an outpatient psychiatric facility.<sup>41,42</sup> Additionally, only the functional impairment subscale is associated with depressive symptoms in an American study.<sup>11</sup> These suggest that climate anxiety is distinct from depressive symptoms in terms of characteristics and manifestations despite some overlaps. Previous literature, however, have found a significant relationship between climate anxiety and depressive symptoms,<sup>11,12</sup> and even more present climate anxiety's negative relationship with overall mental health.<sup>10,43-45</sup> This implies that while climate anxiety may affect overall mental health, it does not necessarily co-occur with or manifest as depressive symptoms. Other mental health conditions have been shown to be associated with climate anxiety including stress and generalized anxiety disorder.<sup>11,12,46</sup>

Possible differences with previous studies may suggest that different populations may respond differently to climate anxiety due to some factors, such as the presence of possible coping strategies. Filipinos have been shown to cope with environmental disasters by receiving and giving social support, depending on faith, or collective action such as *pakikipagkapwa* (camaraderie) and *bayanihan* (mutual cooperation) to manage climate anxiety and the feeling of despair.<sup>15,16</sup> Studies have also shown that engaging in pro-environmental behaviors can be a coping strategy against climate anxiety. In fact, climate anxiety has been seen to lead to adaptive behaviors by inspiring collective action and climate mitigation practices.<sup>8,21,46-48</sup> Characterizing these factors, however, is beyond the scope of this study, and thus remains unexplored. Despite this hopeful possibility, individuals are still at risk of feeling dejected should there be a realization that current efforts to address climate change are insufficient.<sup>49</sup> Hickman et al.<sup>6</sup> suggest that those in power can take action by recognizing and validating the worries of young people, recognizing their rights, and shifting the focus to young people in policy-making in order to dissuade feelings of anxiety and stress.

With the results of the study, the group recommends the college use these statistics as grounds for developing interventions geared towards addressing climate anxiety among students as primary prevention. These may include investigating its varying manifestations among students, raising awareness of climate anxiety, and promoting coping

behaviors like pro-environmental action. These results may also be forwarded to the institution's administrators to justify the need to investigate climate anxiety among its constituents. As leaders of public health, we also urge the college to emphasize that beyond addressing the mental health impacts of climate change, it also entails systemic, politically driven solutions. With the alarming proportion of students with depressive symptoms, it is also recommended to streamline the mental health intervention in the university, reinstating or modifying the screening of depressive symptoms for students, promoting mental health services at the college level, and identifying and addressing academic-related underlying factors. Health education interventions through curricular and extracurricular approaches and the use of alternative learning systems for affected youth can be explored to improve the mental health literacy and resilience of the youth on the effects of climate change. Lastly, these results may also justify the need for prompt investigation of local and national youth situations in terms of climate anxiety and students' mental health.

This study is not without its limitations. No causal relationship between climate anxiety and depressive symptoms was established due to the cross-sectional nature of the study design. The small sample size may also have reduced the precision of the findings and statistical power. Convenience sampling might have introduced self-selection bias thereby limiting the results' generalizability. Non-response bias may also be present due to the online nature of the survey and social desirability bias may be caused by the sensitive nature of the study, causing some inaccuracies with the respondent's answers. The questions may also have brought recall bias, especially when asked to remember how they felt over a period of time. These biases were appropriately controlled during data collection and analysis by emphasizing the importance of the study, prompt follow-ups in answering the survey, ensuring data confidentiality, and limiting recall questions to a small time period.

## CONCLUSION

In summary, the study shows that a proportion of students already experience climate anxiety, and even more experience depressive symptoms. The study also reveals that the odds of those who have high climate anxiety to report having high depressive symptoms is higher than those with low climate anxiety, however, this difference in the odds was not statistically significant. Despite this, we still cannot ignore climate change, its implications on mental health, and climate anxiety's rising trend. We recommend a wide-scope investigation of the current state of climate anxiety and mental health among the youth using a sampling methodology that will yield greater generalizability of the findings.

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### Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

### Author Disclosure

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