Iran J Psychiatry 2025; 20: 4: 1-11

Original Article

Climate Change Awareness, Eco-Anxiety, and Anger among Yemeni Medical Students.

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Abstract

Objective: Climate change is increasingly recognized as a global health threat. However, awareness and psychological responses to climate risks may vary across populations, particularly in conflict-affected regions. This study aimed to assess the levels of climate change awareness, climate anxiety, and aggression among Yemeni medical students.
Method: A descriptive cross-sectional design was utilized for this study. The sample included 212 final-year students from all departments within the Faculty of Medicine and Health Sciences at Taiz University. Data were collected using validated scales for climate change awareness, the Climate Anxiety Scale, and the Buss–Perry Aggression Questionnaire. Descriptive statistics, group comparisons (t-tests and ANOVA), correlation analysis, and multiple linear regression were applied to identify significant relationships and predictors.
Results: More than 60% of the participants demonstrated poor awareness of climate change, and over 50% reported low levels of climate anxiety. Moderate aggression scores were observed in more than half of the respondents. While aggression showed significant associations with sex and climate anxiety, no statistically significant relationship was found between climate change awareness and anxiety.
Conclusion: Despite the environmental vulnerability of Yemen, medical students show limited awareness and low psychological response to climate change. This may reflect a focus on immediate survival needs in conflict-affected settings. Integrating climate-health education and psychological preparedness into medical curricula is essential to empower future healthcare providers in addressing climate-related health challenges.

Keywords: *Anxiety; Climate Change; Environmental Psychology; Medical Students; Mental Health*

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Article Information:
Received Date: 2025/06/13, Revised Date: 2025/07/27, Accepted Date: 2025/08/10

Climate Change and Mental Health

Climate change has become one of the most pressing environmental issues of the 21st century. Over the past fifteen years, the frequency and intensity of natural disasters have increased, driven not only by cyclic climate patterns but also by the growing impact of human-induced climate change. Public awareness and concern about these changes have surged, recognizing climate change as a new challenge with significant implications for public health, including physical and mental well-being (1).

The intricate relationship between climate change and mental health is well-documented (2). Climate-related disasters—such as floods, heatwaves, and droughts—not only cause physical devastation but also lead to psychological trauma (3). Individuals affected by these events often experience loss of loved ones, displacement from homes, and the destruction of communities, all contributing to both immediate and long-term mental health conditions like anxiety, depression (3), and post-traumatic stress disorder (PTSD) (4). Moreover, the growing concern over climate change contributes to a rising prevalence of eco-anxiety and climate-related stress, even among those not directly affected by disasters (4).

Recent studies have empirically linked extreme weather events to both climate change and a rise in psychological disorders. Findings suggest that anxiety about climate change exacerbates existing mental health issues and may contribute to new cases of psychological distress (5). Environmental stress, therefore, plays a significant role in both the onset and progression of mental health disorders.

Eco-Anxiety and Emotional Reactions

Scientific evidence suggests that climate change awareness, especially when paired with problem-focused coping strategies, is significantly associated with elevated eco-anxiety and climate-related anger. According to the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984), individuals appraise climate threats based on perceived severity and available coping resources, which influences their emotional responses. Studies such as Maran and Begotti (2021) demonstrate that awareness becomes psychologically activating when individuals feel responsible yet powerless, leading to anxiety and distress (6). Moreover, Hickman *et al*. (2021) found that young populations experiencing high climate concern frequently express anger toward institutions perceived to be neglecting environmental responsibility (7). These findings highlight the emotional and behavioral consequences of climate engagement and underscore the importance of integrating psychological insights into sustainability discourse.

Yemen's Vulnerability to Climate Change

Yemen is among the countries most vulnerable to the effects of climate change. It faces tremendous environmental challenges, including rising temperatures, shifting rainfall patterns, and more frequent extreme weather events. In 2024, over half a million Yemenis population were severely impacted by unprecedented flooding and windstorms, and thousands of people across multiple governorates were left without shelter, access to clean water, or essential services, with numerous lives lost (8). Among the hardest-hit areas is Ma'rib Governorate, northeast of the capital, Sana'a, where strong winds since August 11 have severely damaged 73 displacement sites, affecting more than 21,000 households. Public infrastructure, including electricity networks, has been critically disrupted, further worsening the crisis in one of Yemen's most vulnerable regions (9).

Additionally, over 15,000 families in Al Hudaydah and 11,000 in Taiz urgently require emergency support, as floodwaters have destroyed shelters, roads, water sources, and medical facilities. The International Organization for Migration (IOM) emphasized that "these rains have not only led to tragic loss of life but have also wiped out entire communities' belongings and means of survival" (International Organization for Migration, 2024; United Nations, 2024).

Climate change, combined with extensive environmental destruction caused by nearly a decade of conflict, threatens to exacerbate existing tensions in Yemen. The conflict has contributed to the decimation of critical resources, such as water and agricultural land, and led to the loss of livelihoods and forced displacement (10).

"Even if the conflict in Yemen were to end today, Yemenis will have to prepare for another battle: the fight against climate change," says Niku Jafarnia, a CIVIC researcher and author of the report. "We found that resource-based conflicts in Yemen will increase in the coming years as water and land continue to be depleted. The country will bear the environmental scars of warfare in its soil and water sources for decades to come." (11)

The impacts of climate change stretch beyond environmental degradation to influence the mental and emotional well-being of individuals, especially those in fragile environments (12). Heightened awareness of climate-related threats has led to an increase in emotional responses such as eco-anxiety, a persistent fear regarding ecological collapse, and eco-rage, which refers to anger directed toward perceived government or corporate inaction (13).

Emotional Responses and Mental Health in Fragile Settings

In fragile settings—where ecological stress intersects with social and economic vulnerabilities—these responses may be amplified, making it critical to investigate how populations perceive, internalize, and react to climate crises.

Research shows that individuals who are more informed about environmental changes tend to experience higher levels of anxiety and frustration (9, 14). These psychological reactions are not passive outcomes but active drivers of social behavior—many affected

individuals channel their anxiety and anger into environmental activism or demands for policy reform. In this emotional landscape, understanding how climate awareness relates to eco-anxiety and anger can offer insight into both public sentiment and mobilization potential.

Medical Students in Yemen

Therefore, Yemeni medical students face unique challenges that are associated positively with their vulnerability to climate change. Besides the stress of rigorous medical training, they are exposed to the psychological impacts of Yemen's deteriorating environmental conditions and ongoing conflict. As future healthcare providers, these students will be at the forefront of caring for the vulnerable population affected by climate change in high-risk areas. This adds a burden that leads to high levels of stress, eco-anxiety, and concern for the health implications of climate change in their communities, underscoring the need for support in healthcare education.

Globally, mental health has become a growing concern among undergraduate students. University life can be demanding, balancing academic responsibilities with personal and family pressures—which often leads to high levels of stress. This stress, if left unaddressed, can develop into more serious mental health problems like depression and anxiety. Over time, these issues may affect students' academic performance, physical health, and overall well-being, often going unnoticed until they become severe. Research among medical graduates also suggests that psychological distress doesn't just impact the students themselves—it can also compromise the quality of patient care, safety, and professional conduct (15).

Study Objectives

While studies in other countries have explored the mental health effects of climate change on medical students (16, 17), this study aims to investigate the relationship between climate change awareness and mental health among Yemeni medical students who face unique challenges, including both environmental and societal stressors. Specifically, the objectives were to:

1. Assess the level of climate change awareness, the prevalence of climate anxiety, and the level of aggression among final-year medical students at Taiz University.
2. Examine the relationships between climate change awareness, climate anxiety, and aggression.
3. Explore associations between sociodemographic and health-related factors with climate awareness and climate anxiety.

Materials and Methods

Research Design

A descriptive cross-sectional design was utilized for this study. The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure the transparency and rigor of observational research.

Study Setting: The Faculty of Medicine and Health Sciences, Taiz

University of Taiz, was chosen as the study setting. This faculty offers five departments: Medicine, Nursing, Dentistry, Pharmacy, and Medical Laboratory, covering a wide range of health-related disciplines. Taiz, where the faculty is located, is one of the most affected cities by conflict and climate change, making it a crucial location for studying the mental health impacts of these crises on medical students (10). Participants were selected based on their availability and voluntary consent during the data collection period.

Study Sampling

This study focused on final-year students from all departments within the Faculty of Medicine and Health Sciences at Taiz University, where the total number of eligible students was around 460 during the 2024 academic year. Using standard sample size calculations for a 95% confidence level and a 5% margin of error, the target sample was estimated at approximately 210 students. Completed anonymous surveys were submitted by participants into a sealed drop box located in the office of Student Affairs. The study team collected the contents of the drop boxes on a weekly basis over a one-month period. Data were collected between February and March 2024. Printed copies of the survey were distributed to each department head. Of the 230 questionnaires distributed, 212 completed questionnaires were returned from the five participating departments, with a response rate of 92.17%.

Eligibility Criteria

Individuals were eligible to participate if they met the following criterion: Being a final-year student in any department within the Faculty of Medicine and Health Sciences at Taiz University.

Exclusion Criteria

Students from other academic levels and medical interns were excluded from the study.

Study Instruments

- **Tool I: Climate Change Awareness Scale:** Adapted from Tobler *et al*.'s (2012), climate change knowledge questionnaire (18), this 19-item scale assesses climate change awareness across three subscales: climate science (six items), causes (seven items), and impacts (six items). Items include 10 correct and nine incorrect statements. Participants responded to each statement as "true," "false," or "do not know." Correct responses were awarded one point, with a total possible score of 100%. Knowledge levels were categorized as follows: very good/excellent (> 90%), adequate (75-89%), average (50-74%), and poor (< 50%). The tool was translated, back-translated, and

reviewed by experts. Pilot testing on 20 participants showed good internal consistency (α = 0.73) and confirmed face and content validity.

- **Tool II: Climate Anxiety Scale:** This 13-item scale was developed by Clayton and Karazsia (2020) (19). The Arabic version of this tool has been used among Arabic-speaking populations and showed strong reliability (α = 0.925) and validity (S-CVI = 0.95; KMO = 0.93), confirming its suitability for use in Arab countries (20). Pilot testing on 20 participants showed good internal consistency (α = 0.91). It assesses the cognitive, emotional, and behavioral aspects of climate anxiety. Responses were rated on a 5-point Likert scale, and scores were summed to generate subscale and total scores. Higher scores indicated higher levels of anxiety. The subscales included:
  - Cognitive Anxiety (five items, score range 5-25)
  - Emotional Anxiety (four items, score range 4-20)
  - Behavioral Anxiety (four items, score range 4-20)
  - Total score range: 13-65.
- **Tool III: Buss-Perry Aggression Questionnaire (BPAQ):** The BPAQ measures aggression across four dimensions: Physical Aggression (nine items), Verbal Aggression (five items), Anger (seven items), and Hostility (eight items). Responses were rated on a 5-point Likert scale, with higher scores indicating greater aggression. Reverse scoring was applied to selected items (7 and 18) (21). The translated Arabic version of this tool was used in Lebanon and Egypt and was shown to be valid and reliable (22, 23). Pilot testing on 20 participants showed good internal consistency (α = 0.71).
- **Socio-demographic Data Questionnaire sheet:** Developed by the researchers after reviewing the relevant literature (18, 24–30). This tool contains two parts. The first part collects demographic information related to participants, such as age, sex, marital status, area of residence, and level of education. The second part collects clinical data related to participants' health conditions, such as skin allergies, heat illness, eye allergies, mental health issues (e.g., depression, stress), and respiratory problems like asthma.

Statistical Analysis

The data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize sociodemographic characteristics and the levels of climate awareness, climate anxiety, and aggression.

Independent t-tests and one-way ANOVA were implemented to assess differences in mean scores across demographic subgroups. Pearson correlation coefficients were computed to examine associations between continuous variables.

To identify predictors of climate anxiety, multiple linear regression analysis was conducted. The regression model included age, gender, residence, department, disease status, and climate awareness as independent variables. A P-value ≤ 0.05 was considered statistically significant.

Before running the regression, key regression assumptions were checked and met. Linearity, homoscedasticity, and normality of residuals were visually confirmed. The Durbin–Watson statistic (1.919) indicated no autocorrelation, and VIF values were within acceptable limits.

Ethical Consideration

The study complies with the ethical principles of the Declaration of Helsinki. Ethical clearance was granted by the Ethics Committee of the Faculty of Medicine, Taiz University. All participants provided informed consent to participate in the study after a clear explanation of the study's objectives was provided. Voluntary participation was confirmed. The confidentiality of all collected data was ensured, and participants' privacy and anonymity were strictly maintained throughout the study.

Results

In Table 1, the sociodemographic data of the 212 studied subjects are presented, revealing that the sample comprises 52.4% males and 47.6% females. The majority (64.6%) are ≤ 23 years old, predominantly reside in urban areas (80.2%), and are primarily single (86.3%). The most significant departmental representation comes from Dentistry (27.8%), followed by Pharmacy (21.2%). Regarding disease status, 64.1% report no health issues, while 17.5% have allergic diseases, 9% have mental disorders (anxiety or depression), and 9.4% have both allergic diseases and mental disorders.

Table 2 presents the frequency distribution of participants across categorized levels of climate change awareness, climate anxiety, and total aggression (BPAQ). It indicates that more than half of the subjects studied have poor knowledge about climate change, low climate anxiety, and moderate aggression, with percentages of 61.3%, 50.9%, and 51.9%, respectively.

Table 1 .Sociodemographic Characteristics of Yemeni Medical Student Participants

SOCIODEMOGRAPHIC DATA		
	Total Subjects(212)	
	n	%
Gender		
Male	111	52.4
Female	101	47.6
Age (in years)		
≤ 23	137	64.6
23-27	72	33.9
≥ 28	3	1.4
Residence		
Urban	170	80.2
Rural	42	19.8
Marital Status		
Single	183	86.3
Married	20	9.5
Divorced\Separated	9	4.2
Department		
Medicine	40	18.9
Dentistry	59	27.8
Pharmacy	45	21.2
Medical Laboratory	37	17.5
Nursing	31	14.7
Diseases Status		
None	136	64.1
Allergic Diseases	37	17.5
Mental Disorders (Anxiety or Depression)	19	9.0
Allergic diseases + Mental Disorders	20	9.4

Descriptive frequencies and percentages

Table 2. Frequencies of Climate Awareness, Climate Anxiety, and Total BPAQ Levels

Variables	Category	N = 212	Percentage
Climate Awareness	Poor	130	61.3
	Average	74	34.9
	Adequate	8	3.8
Climate Anxiety	Low	108	50.9
	Moderate	81	38.2
	High	23	10.8
Total Aggression (BPAQ)	Low Aggression	67	31.6
	Moderate Aggression	110	51.9
	High Aggression	35	16.5

Descriptive frequencies and categorized levels. Note: BPAQ = Buss–Perry Aggression Questionnaire

Table 3. Relationship between Sociodemographic Data and Climate Awareness, Climate Anxiety, and Total Aggression (PBAQ) Scores among Studied Subjects

SOCIODEMOGRAPHIC DATA			Climate Awareness		Climate Anxiety		Total PBAQ	
	Total Subjects (212)		Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value
Gender	n	%						
Male	111	52.4	47.7 ± 17.02	0.06	26.6 ± 10.3	0.22	82.7 ± 17.7	0.058
Female	101	47.6	43.3 ± 15.16		28.3 ± 10.2		87.2 ± 16.7	
Age (in years)								
≤ 23	137	64.6	46.3 ± 15.63		28.3 ± 10.7		86.5 ± 17.9	
23-27	72	33.9	44.6 ± 17.4	0.72	25.4 ± 9.5	0.14	82.1 ± 15.9	0.127
≥ 28	3	1.4	50.0 ± 11.16		29.5 ± 0.7		72.1 ± 1.4	
Residence								
Urban	170	80.2	45.4 ± 15.8	0.54	27.4 ± 10.3	0.95	85.1 ± 17.3	0.66
Rural	42	19.8	47.1 ± 17.8		27.3 ± 10.4		83.8 ± 17.9	
Marital Status								
Single	183	86.3	45.9 ± 16.4		27.1 ± 10.1		85.2 ± 17.8	
Married	20	9.5	48.5 ± 13.7	0.19	27.8 ± 11.6	0.61	82.8 ± 15.9	0.770
Divorced\ Separated	9	4.2	36.8 ± 14.4		30.6 ± 12.3		82.3 ± 11.2	
Department								
Medicine	40	18.9	45.8 ± 15.2		27.2 ± 9.6		85.8 ± 17.5	
Dentistry	59	27.8	43.1 ± 13.7		27.4 ± 10.3		87.8 ± 17.2	
Pharmacy	45	21.2	46.7 ± 19.4	0.00*	28.6 ± 12.6	0.83	82.4 ± 20.0	0.485
Medical Laboratory	37	17.5	41.1 ± 15.9		27.2 ± 9.3		84.2 ± 13.1	
Nursing	31	14.7	55.1 ± 13.9		25.7 ± 8.9		82.3 ± 18.0	
Disease Status								
None	136	64.1	44.2 ± 14.9		26.9 ± 10.5		84.0 ± 17.6	
Allergic Diseases	37	17.5	45.1 ± 18.1		28.8 ± 10.8		90.0 ± 18.7	
Mental Disorders (Anxiety or Depression)	19	9.0	46.1 ± 13.7	0.00*	28.0 ± 8.9	0.77	82.8 ± 15.9	0.297
Allergic diseases + Mental Disorders	20	9.4	57.6 ± 19.1		26.5 ± 9.8		83.7 ± 13.0	

One-way ANOVA test was used for comparing more than two groups. t: Student's t-test was used for comparing two groups.
*: Statistically significant at P ≤ 0.05, BPAQ = Buss–Perry Aggression Questionnaire

Table 3 demonstrates that individuals with mental and allergic disorders report significantly greater climate awareness (P < 0.001). Also, the analysis showed that nursing students had the higher awareness than students in other departments, with statistically significant differences (P < 0.001). However, no statistically significant differences were observed in climate anxiety and total aggression across the studied sociodemographic variables.

In Table 4, The relationship between sociodemographic variables and Buss-Perry Aggression Questionnaire (BPAQ) subscales among the study subjects indicates no statistically significant differences across most variables, except for gender in verbal aggression (P = 0.004) and younger participants, who reported higher levels of anger (P < 0.001).

Table 4. Relationship between Sociodemographic Variables and PBAQ Subscales among Studied Subjects

SOCIODEMOGRAPHIC DATA			Physical Aggression		Verbal Aggression		Anger		Hostility	
	n	%	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value
Gender										
Male	111	52.4	24.9 ± 6.6	0.84	15.2 ± 4.4	0.00	20.3 ± 6.6	0.22	22.3 ± 6.3	0.054
Female	101	47.6	25.1 ± 7.1		16.9 ± 3.9		21.3 ± 4.9		23.2 ± 6.2	
Age (in years)										
≤ 23	137	64.6	25.3 ± 7.4		16.3 ± 4.0		21.4 ± 6.4		23.5 ± 6.5	
23-27	72	33.9	24.4 ± 5.6	0.387	15.5 ± 4.7	0.12	19.7 ± 4.7	0.00*	22.5 ± 5.8	0.074
≥ 28	3	1.4	23.5 ±4.9		15.0 ± 2.8		19.5 ± 2.1		14.0 ± 1.4	
Residence										
Urban	170	80.2	25.0 ± 6.9	4.3	16.1 ± 4.1	0.45	20.8 ± 5.2	0.90	23.1 ± 6.3	0.68
Rural	42	19.8	24.6 ± 6.3		15.6 ± 4.7		20.9 ± 8.4		22.7 ± 6.5	
Marital Status										
Single	183	86.3	25.3 ± 7.0		15.9 ± 4.3		20.9 ± 6.1		22.9 ± 6.5	
Married	20	9.5	23.6 ± 5.1	0.500	16.2 ± 4.3	0.58	19.6 ± 4.4	0.77	23.4 ± 6.1	0.271
Divorced \ Separated	9	4.2	21.0 ± 4.7		17.7 ± 3.4		19.9 ± 3.5		23.8 ± 4.1	
Department										
Medicine	40	18.9	26.2 ± 9.1		16.8 ± 3.9		20.9 ± 5.9		21.8 ± 5.9	
Dentistry	59	27.8	25.5 ± 6.2		16.6 ± 4.1		21.3 ± 4.7		24.5 ± 6.2	
Pharmacy	45	21.2	25.2 ± 7.5	0.19	15.0 ± 4.9	0.26	19.2 ± 5.5	0.30	22.9 ± 7.6	0.78
Medical Laboratory	37	17.5	24.5 ± 5.3		15.9 ± 3.7		20.9 ± 4.3		23.0 ±5.1	
Nursing	31	14.7	22.4 ± 4.4		15.7 ± 4.6		22.0 ± 9.4		22.2 ± 6.2	
Diseases Status										
None	136	64.1	24.8 ± 7.5		16.2 ± 4.2		20.4 ± 5.2		22.8 ± 6.6	
Allergic Diseases	37	17.5	26.0 ± 6.0		16.7 ± 4.4		21.9 ± 5.8		24.5 ± 6.4	
Mental Disorders (Anxiety or Depression)	19	9.0	22.8 ± 4.8	0.23	15.5 ± 4.0	0.17	21.5 ± 5.2	0.44	23.1 ± 6.4	0.50
Allergic diseases + Mental Disorders	20	9.4	25.2 ± 4.8		14.3 ± 4.0		21.8 ± 11.0		22.5 ± 3.0	

One-way ANOVA test was used for comparing more than two groups. t: Student's t-test was used for comparing two groups.
*: Statistically significant at P ≤ 0.05, BPAQ = Buss–Perry Aggression Questionnaire

Table 5. Univariate and Multiple Linear Regression Analysis of Predictors of Climate Anxiety

Predictor	B (Univariate)	95% CI Lower	95% CI Upper	P-value	B (Multiple)	95% CI Lower	95% CI Upper	P-value
Climate Awareness	0.811	0.406	1.217	< 0.001	-0.201	-0.285	-0.117	< 0.001
Gender	0.078	-2.683	2.839	0.956	0.069	-2.645	2.783	0.960
Age	-3.086	-5.798	-0.373	0.026	-3.229	-5.902	-0.557	0.018
Residence	-0.220	-3.637	3.197	0.899	-0.210	-3.575	3.155	0.902
Department	-0.139	-1.158	0.880	0.788	-0.105	-1.108	0.899	0.837
Disease Status	1.738	0.343	3.132	0.015	1.512	0.127	2.897	0.033

*: Statistically significant at P ≤ 0.05

Table 5 illustrates the univariate regression analysis, indicating that climate awareness was positively associated with climate anxiety (B = 0.811, P < 0.001), while age (B = –3.086, P = 0.026) and the presence of disease (B = 1.738, P = 0.015) were also significant predictors. However, in the multivariate regression model (also shown in Table 5), climate awareness had a significant negative association with climate anxiety (B = –0.201, P < 0.001). Age remained a significant negative predictor (B = –3.229, P = 0.018), and disease status continued to show a positive association (B = 1.512, P = 0.033).

Discussion

In conflict-affected countries like Yemen, the burden of climate change is alarmingly severe, necessitating urgent attention and immediate action. The cumulative effects of ongoing conflicts and climate-related disasters, such as floods and extreme weather events, exacerbate existing vulnerabilities. The destruction of shelters and restricted access to essential services due to floods will affect many people in Yemen, making recovery from the impact of conflict even more challenging for communities (31, 32).

This study is among the few investigations conducted in a conflict-affected, low-resource setting, providing novel insights into climate-related psychological responses among medical students in Yemen. It focused on final-year medical students—a critical yet underrepresented group in climate-mental health research—thereby contributing to an important but overlooked area.

The study findings indicate that most medical students in vulnerable areas have poor knowledge about climate change challenges. This might indicate that medical students in conflict areas are primarily focused on immediate survival and local events and are unaware of the long-term and progressing health problems like climate change, even though their region is among the most affected by climate change, according to reputable studies (33–35). This result highlights the need to revise the curriculum of medical schools in conflict areas to prepare the students for the burden of climate change that they will face post-graduation.

There were significant differences in climate awareness among students from different departments (P < 0.001), with nursing students showing the highest awareness. This finding is congruent with the study by Ryan *et al*. (25), which reported that nursing students generally show a higher level of concern and commitment toward addressing climate change and resource conservation compared to other medical students. They believe in the importance of these issues for patient care and advocate for including education on these topics in the curricula of various medical specialties.

These findings underscore the critical need for targeted climate education, particularly for those who may not feel personally affected. Integrating health-focused climate discussions into medical curricula and framing climate change as a public health issue could bridge awareness gaps and ensure positive engagement by medical students in understanding the effects of climate change and ways to alleviate its adverse impacts, emphasizing the significant role that medical education can play in addressing climate change.

This study brings to light the strong association between health conditions and climate change awareness. Individuals with mental or allergic disorders exhibited significantly higher climate awareness (P = 0.023), likely due to their heightened sensitivity to environmental triggers. For example, allergic symptoms are often worsened by climate-related changes such as poor air quality and rising temperatures. These findings align with previous studies suggesting that individuals with chronic health conditions perceive climate change as a direct personal threat (36).

Multiple linear regression analysis further confirmed that the presence of health conditions — particularly chronic or mental disorders — was associated with increased climate anxiety. This heightened anxiety may stem from increased vulnerability or a perceived lack of control in the face of environmental instability. Prior research in Middle Eastern populations with chronic diseases like asthma and COPD also found that eco-anxiety could negatively affect disease management (37, 38). Moreover, students with mental health conditions such as anxiety may focus intensely on environmental threats due to cognitive tendencies like rumination, which could further amplify both their anxiety and awareness. This is supported by findings from Di Giorgi *et al*. (30) who observed similar effects among African migrants, and Jones *et al*. (27) who found climate-related concerns among OCD patients in Sydney.

Interestingly, the multivariate regression analysis also showed that higher climate change awareness was associated with lower climate anxiety. This may indicate that informed individuals are more confident in their ability to adapt, reducing psychological distress. Zacher & Rudolph (38) suggested that greater environmental knowledge reduces uncertainty and enhances self-efficacy. However, this is not a universal pattern: Çelik Eren & Kabataş Yıldız (39) found that in some groups, such as nursing students, increased awareness may intensify eco-anxiety, possibly due to emotional engagement or perceived helplessness. These findings highlight the complex and context-dependent relationship between climate awareness and anxiety. A nuanced, individualized approach is needed, one that combines health education with emotional support to help vulnerable individuals manage both physical symptoms and psychological distress. This reinforces the need for integrated, holistic care in both educational and clinical settings.

The regression model also showed that younger students reported higher levels of climate anxiety. This finding is consistent with global findings showing that youth are very concerned about climate change, even without

direct exposure. Those with higher anxiety were more likely to consider climate change when planning their careers, families, and futures (19, 40). Current sociodemographic characteristics indicate the limited influence of these factors, such as age, gender, marital status, or residence, on climate awareness. This finding parallels the study by Atta, Zoromba, *et al*. (29), which concluded that there was no association between climate change awareness and sociodemographic variables. However, this finding is in contrast with the study by Ifegbesan *et al*. (28). That study found statistically significant differences in climate awareness across gender, residence, educational level, and region. Females in their study demonstrated higher levels of climate change awareness than males, and rural residents were more aware than urban counterparts. The authors attributed the rural-urban gap to the greater reliance of rural communities on natural resources, making them more directly exposed to the effects of climate variability. Additionally, age emerged as a significant negative predictor—awareness declined as age increased with the younger population showing the highest awareness. These contrasting results likely reflect differences in sample composition: our participants were medical faculty students with relatively uniform education and age profiles, possibly reducing the variability seen in more general populations.

Limitation

This study faced several limitations. The use of a cross-sectional design restricts causal interpretations of the observed relationships between climate awareness, anxiety, and aggression. Additionally, the study was conducted within a single faculty at Taiz University, which may limit the generalizability of the findings to broader academic or regional populations. The reliance on self-reported data introduces the potential for response biases, particularly social desirability bias, which may have influenced participants' reporting of eco-anxiety or aggressive tendencies.

Despite these limitations, the study offers valuable insights into climate-related psychological responses among future healthcare providers in a conflict-affected setting. It highlights the growing mental health burden posed by climate change in fragile environments. Future research should expand to include multiple institutions and employ mixed-methods approaches to capture deeper psychosocial and contextual factors. Longitudinal studies are recommended to assess changes in awareness, anxiety, and aggression over time and in response to educational or policy interventions. Developing culturally sensitive tools tailored to Arab and conflict-zone contexts would also enhance the accuracy and relevance of future assessments. Moreover, integrating climate mental health education into medical curricula could better equip students to cope with and address climate-induced stress in their professional roles.

Conclusion

The study highlights the complex interplay between climate change awareness, mental health, and sociodemographic characteristics among Yemeni medical students. Tailored educational interventions and psychological support systems are crucial to equip future healthcare professionals to cope with the mental health burden of climate change in conflict-affected settings as well as to deliver holistic healthcare to patients, particularly those with health conditions that make them vulnerable to climate change threats with the goal of improving their quality of life.

Acknowledgment

The authors would like to thank all participants who took part in the study.

Conflict of Interest

None.

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