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Assessment of Nursing Students' Knowledge Regarding Climate Change and Its Impact on Health

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ABSTRACT:

Background: Climate change is recognized as one of the most pressing global public health challenges of the 21st century. It refers to long-term alterations in temperature, precipitation patterns, and overall climate systems, largely driven by human activities such as burning fossil fuels, deforestation, rapid industrialization, and unsustainable agricultural practices.

Methodology: A quantitative, descriptive cross-sectional study was conducted at the University of Chenab, Gujrat, over a period of four months after obtaining ethical approval. A total of 109 nursing students were selected through random sampling from a population of 150 students enrolled in Generic BSN and Post RN BSN programs. Data were collected using a structured questionnaire comprising demographic characteristics and the standardized Climate Change Knowledge Test (CCKT). Written informed consent was obtained from all participants, and questionnaires were completed within 15–20 minutes. Data were coded and analyzed using SPSS version 25. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize participant characteristics and knowledge levels.

Results: A total of 109 nursing students participated in the study. The majority of participants were aged 18–20 years (58.2%), were enrolled in the 2nd year of the BSN program (34.9%), were single (63.3%), and resided in urban areas (59.6%). Regarding climate change knowledge, most participants correctly identified that climate change causes biodiversity loss (60.6%), contributes to increased wind and water erosion of soil (58.7%), and increases the frequency and intensity of extreme weather events (52.3%). However, many participants had misconceptions about the effects of climate change on food security, water shortages, infectious diseases, and sea-level rise. Overall, 64 (58.7%) participants demonstrated moderate knowledge, 25 (22.9%) had poor knowledge, and only 20 (18.3%) had good knowledge regarding climate change and its impact on health.

Conclusion: The study concluded that nursing students possessed a predominantly moderate level of knowledge regarding climate change and its impact on health, with noticeable gaps in understanding several important climate-related health issues. These findings emphasize the need to strengthen climate change and planetary health content within nursing curricula and implement educational interventions to enhance students' knowledge and preparedness for addressing climate-related health challenges in future nursing practice.

INTRODUCTION

Climate change is recognized as one of the most pressing global public health challenges of the 21st century. It refers to long-term alterations in temperature, precipitation patterns, and overall climate systems, largely driven by human activities such as burning fossil fuels, deforestation, rapid industrialization, and unsustainable agricultural practices (Horn, 2025). These activities have significantly increased greenhouse gas emissions, leading to global warming and widespread environmental disruption. According to the World Health Organization (WHO), climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050 due to malnutrition, malaria, diarrhea, and heat stress, highlighting its serious implications for human health (Lugten & Hariharan, 2022).

The impact of climate change on health is multifaceted and affects populations globally, with vulnerable groups such as children, the elderly, and individuals in low-income countries being disproportionately affected. Rising temperatures contribute to heat-related illnesses, dehydration, and cardiovascular complications (Prina et al., 2024). Changes in weather patterns have also led to an increased frequency and intensity of extreme events such as floods, droughts, heatwaves, and storms, which further result in injuries, displacement, food insecurity, and mental health issues. Moreover, climate change facilitates the spread of vector-borne diseases such as malaria, dengue fever, and Zika virus by altering the habitats and breeding patterns of disease-carrying vectors (Patrick et al., 2025).

In addition to direct health impacts, climate change also affects social determinants of health, including access to clean water, food security, and air quality. Air pollution, intensified by industrial emissions and environmental degradation, is strongly associated with respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD) (Muhonja et al., 2024). Similarly, water scarcity and contamination contribute to gastrointestinal infections and malnutrition, particularly in developing regions. These complex and interconnected effects emphasize the urgent need for healthcare professionals to understand and respond effectively to climate-related health challenges (Figueiredo et al., 2024).

Nurses constitute the largest segment of the healthcare workforce and play a vital role in health promotion, disease prevention, patient education, and community awareness. As frontline healthcare providers, nurses are often the first point of contact for patients affected by climate-sensitive health conditions (Flaubert et al., 2021). Therefore, their knowledge and preparedness regarding climate change are essential for delivering effective care and advocating for sustainable health practices. Nursing students, as future healthcare professionals, must be equipped with adequate knowledge and awareness of environmental health issues, including climate change and its consequences (Alsharif et al., 2025).

Despite the growing importance of climate change in healthcare, evidence suggests that environmental health topics are often insufficiently addressed in nursing curricula, particularly in developing countries (Melariri et al., 2022). This gap may result in limited awareness and understanding among nursing students, potentially affecting their ability to respond to climate-related health challenges in their future professional practice. In Pakistan, where environmental degradation and climate vulnerability are increasing, there is a need to strengthen awareness and education regarding climate change within healthcare training programs (Moya et al., 2023).

Therefore, this study aims to assess nursing students' knowledge regarding climate change and its impact on health. The findings will help identify existing knowledge gaps and support the integration of climate change education into nursing curricula, ultimately enhancing the preparedness of future nurses to address emerging environmental health challenges effectively.

METHODOLOGY

A quantitative, descriptive cross-sectional study was conducted at the University of Chenab, Gujrat, over four months following ethical approval. The sample size was 109 nursing students, calculated using Yamane's formula from a total population of 150 students with a 5% margin of error. A random sampling technique was used to select eligible BSN (Generic) and Post RN BSN students from first to fourth year. Data were collected using a researcher-developed demographic questionnaire and the standardized Climate Change Knowledge Test (CCKT) adopted from Gazzaz and Aldeseet (2021). The CCKT consisted of 10 true/false items, with one mark for each correct response and zero for each incorrect response. Total scores ranged from 0–10 and were categorized as poor (0–3), moderate (4–7), and good (8–10) knowledge. Data were collected through self-administered questionnaires after obtaining institutional permission and written informed consent. Confidentiality, anonymity, and voluntary participation were ensured. Data were analyzed using SPSS version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic characteristics and knowledge levels.

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RESULTS

Demographic Characteristics of Participants

Table 1: Demographics characteristics of participants

Demographic Variables	Category	Frequency (f)	Percentage (%)
Age	18–20	64	58.2
	21–23	35	31.8
	24-26	7	6.4
	> 26	3	2.7
Qualification	1st Year BSN	15	13.8
	2nd Year BSN	38	34.9
	3rd Year BSN	21	19.3
	4th Year BSN	25	22.9
	Post RN BSN	10	9.2
Marital Status	Single	69	63.3
	Married	40	36.7
Residence	Urban	65	59.6
	Rural	44	40.4

Table 1 presents the demographic characteristics of 109 participants. The majority (58.2%) were aged 18–20 years, followed by 31.8% aged 21–23 years. Regarding academic qualification, most participants (34.9%) were in the 2nd year of BSN, followed by 22.9% in the 4th year. Most participants (63.3%) were single, while 36.7% were married. Regarding residence, 59.6% belonged to urban areas, whereas 40.4% belonged to rural areas.

Knowledge of Nurses Regarding Climate Change

Table 2. Overall knowledge of nurses regarding climate change

Level of Knowledge	Frequency	Percentage
Poor Knowledge	25	22.9
Moderate Knowledge	64	58.7
Good Knowledge	20	18.3
Total	109	100.0

Table 4.15 presents the overall knowledge levels of participants regarding climate change. Among the 109 participants, the majority 64 (58.7%) had moderate knowledge, followed by 25 (22.9%) with poor knowledge, while 20 (18.3%) demonstrated good knowledge. These findings indicate that most participants possessed a moderate level of knowledge regarding climate change, although a considerable proportion still had poor knowledge, highlighting the need for further education and awareness programs on climate change.

DISCUSSION

The present study assessed the knowledge of nursing students regarding climate change. The findings showed that the majority of participants (58.7%) were aged 18–20 years, followed by 32.1% aged 21–23 years. Only a small proportion of participants were older than 23 years. This age distribution is expected because most undergraduate nursing students are enrolled in higher education immediately after completing secondary education. Similar findings were reported by Sulistyawati et al. (2023), who found that most nursing students participating in climate change awareness studies were younger than 22 years. Likewise, Leal Filho et al. (2022) reported that university students aged between 18 and 22 years represented the largest proportion in environmental and climate change research. Regarding the year of study, the majority of participants (34.9%) were enrolled in the second year of the BSN program, followed by students from the fourth year (22.9%), third year (19.3%), first year (13.8%), and Post RN BSN (9.2%). This distribution reflects the normal enrollment pattern in nursing institutions. Similar findings were reported by Anåker and Elf (2022), who noted that nursing students from intermediate years often represent the largest group in studies related to environmental sustainability because they constitute the highest enrollment in undergraduate nursing programs. With respect to marital status, 63.3% of participants were single, while 36.7% were married. This finding is consistent with the demographic characteristics of undergraduate nursing students, who are generally young adults. Similar results were reported by Abuya et al. (2021) and Khan et al. (2023), where the majority of nursing students participating in educational research were unmarried. Regarding residence, 59.6% of participants belonged to urban areas, while 40.4% were from rural areas. The higher proportion of urban participants may reflect easier access to nursing colleges located in urban settings. Similar findings were reported by Ahmed et al. (2022), who observed that most nursing students enrolled in health professional institutions resided in urban areas.

The present study evaluated participants' knowledge regarding various aspects of climate change. Overall, 58.7% of participants demonstrated moderate knowledge, 22.9% had poor knowledge, and only 18.3% had good knowledge. These findings suggest that although nursing students possess a basic understanding of climate change, important knowledge gaps remain. Similar findings were reported by Kurth (2021), who concluded that nursing students generally possess moderate knowledge regarding climate change but require additional education to understand its health implications and professional responsibilities. Likewise, Leffers et al. (2022) reported that nursing students had moderate environmental health literacy but lacked comprehensive knowledge of climate-related health issues.

Regarding biodiversity, 60.6% of participants correctly recognized that climate change causes biodiversity loss. This finding is consistent with the Intergovernmental Panel on Climate Change (IPCC, 2023), which identifies biodiversity loss as one of the major consequences of climate change. Similarly, UNEP (2023) reported that increasing global temperatures continue to threaten ecosystems and biodiversity worldwide.

More than half (55.0%) of the participants correctly disagreed with the misconception that climate change causes a global decrease in temperature. This finding indicates that many students understood the basic concept of global warming. Similar observations were reported by Monroe et al. (2022), who found that university students generally recognize rising global temperatures but continue to misunderstand other climate-related concepts.

The present study also found that 53.2% correctly rejected the statement that climate change increases soil fertility, while 58.7% correctly identified that climate change contributes to soil erosion. These findings are supported by FAO (2023), which reports that climate change accelerates land degradation, reduces soil productivity, and increases erosion due to droughts, floods, and extreme weather events.

However, important misconceptions were identified. More than half of the participants failed to recognize that climate change affects food security (56.0%), water availability (54.1%), and sea-level rise (52.3%). Similarly, 51.4% incorrectly believed that climate change decreases infectious diseases. These findings indicate inadequate understanding of the broader public health consequences of climate change. According to the World Health Organization (WHO, 2023), climate change contributes to food insecurity, water scarcity, malnutrition, displacement, and the spread of infectious diseases. Likewise, the IPCC Sixth Assessment Report (2023) concluded that climate change significantly increases the burden of vector-borne, water-borne, and food-borne diseases globally.

The present study also found that 52.3% correctly recognized that climate change increases the frequency and intensity of extreme weather events. This finding agrees with IPCC (2023) and WMO (2023), which reported increasing occurrences of heat waves, floods, droughts, and severe storms worldwide due to climate change.

Overall, the findings indicate that although participants demonstrated moderate awareness regarding certain environmental effects of climate change, significant deficiencies remain in understanding its effects on human health, food security, water resources, and disease transmission. Similar conclusions were drawn by Kurth (2021), Leffers et al. (2022), and Leal Filho et al. (2022), who emphasized that nursing curricula worldwide provide insufficient education regarding climate change and planetary health.

The findings of the present study support the recommendations of the World Health Organization (2023), the International Council of Nurses (ICN, 2024), and the International Council of Nurses' position statement on Nurses, Climate Change and Health, which recommend integrating climate change, environmental sustainability, and planetary health into undergraduate nursing curricula. Strengthening climate change education will prepare future nurses to recognize climate-related health risks, educate communities, participate in disaster preparedness, and contribute effectively to sustainable healthcare systems.

CONCLUSION

The study concluded that most nursing students had a moderate level of knowledge regarding climate change, while considerable knowledge gaps existed regarding its effects on food security, water scarcity, infectious diseases, and human health. Overall, climate change education and awareness programs should be integrated into nursing curricula to prepare future nurses for climate-related health challenges and climate-resilient healthcare practice.

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