Integrating Sustainability and Climate Change into Nursing Education: Impact on Students' Knowledge and Practices

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Abstract

Background: Climate change and sustainability are widely acknowledged as the two foremost global health challenges that are expected to significantly affect individuals' health over the next decade. It is essential to both alleviate and adjust to the effects of climate change on the healthcare industry. **Aim:** To evaluate the impact of integrating sustainability and climate change into nursing education on students' knowledge and practices. **Methods:** A quasi-experimental research design involving a one group was employed to fulfill the objectives of this study. **Setting**: This study was conducted in faculty of nursing at Sohag University Hospitals. **Sample**: A convenience sample consisting of 800 nursing students in first academic year participated in this research. **Three instruments were utilized for data collection: Tool (I):** Personal data of nursing students, **Tool (II):** Knowledge of nursing students regarding climate change, and **Tool (III):** Nursing students' understanding of green management and sustainability practices. **Results**: Findings from the study indicated that 90% of nursing students exhibited unsatisfactory knowledge prior to the implementation of integrating sustainability and climate change into nursing education , whereas 95% demonstrated satisfactory knowledge following integrating sustainability and climate change into nursing education , with a highly significant difference at a p-value of <0.01**. Furthermore, 85% of nursing students showed unsatisfactory practices before integrating sustainability and climate change into nursing education , while 90% displayed satisfactory practices after the integrating sustainability and climate change into nursing education , also with a highly significant difference at a p-value of <0.01**. **Conclusion**: Integrating sustainability and climate change into nursing education has a positive effect on students' knowledge and practices **Recommendations**: It is advisable to encourage nursing students to engage in ongoing education programs related to sustainability and climate change.

Keywords: Climate Change, Nursing Students' Knowledge, Practices, Sustainability Development

Introduction:

Human health is inextricably linked to the realities of climate change. The climate crisis underscores the need for more comprehensive knowledge of the connections between climate and health, as well as emergency preparedness for climate-related disasters and resilient health systems. Health practitioners should understand that environmental health is inextricably linked to human health and should work to influence policies at the individual, group, and policy levels for the benefit of all people (**Butterfield et al., 2021).**

The World Health Organization, Sigma Theta Tau, the Alliance of Nurses for Healthy Environments, the International Council of Nurses, and others acknowledge that nurses have a significant opportunity to take action to safeguard the climate . Many nursing students lack sufficient preparation to understand the health implications of climate change and the

nursing profession's reaction, despite national nursing organizations addressing the significance of education and activism (**Shaw et al., 2021**).

To fulfill the 2030 Sustainable Development Goals (specifically, Goal 13,Target 3: "Improving environmental education and awareness") and cut down on emissions, nursing education must provide undergraduate students with the information and abilities necessary to sustainably advance the health and welfare of present and future generations as well as the planet (**Butterfield et al., 2021**).

Students need to be prepared with information about the health risks associated with climate change and how to prevent these issues through primary prevention strategies. They also need to be given the skills necessary to use resources responsibly for their health as well as for their work. Employees act as role models for the general public. It is necessary to educate nurses and students about environmental sustainability and stewardship so they can both comprehend the need for change and be empowered to make it happen . Thus, to bring about the necessary revolutionary shift, integrating planetary health education into the curriculum is a crucial first step (**Norman & Griffiths, 2021).**

The competencies that must be covered in nursing programs are fully explained. Conversely, 12 guidelines for educating health professionals about environmental sustainability were created by **Schwerdtle et al., (2020**). All educational levels should prioritize teaching and learning about climate change, but higher education institutions play a crucial role in this.

The mainstreaming of this subject in curricula, according to **Thew et al., (2021**), must guarantee that all staff members and students are knowledgeable about climate change. In general, faculty clinical educators have opposed including planetary health in their undergraduate and graduate curricula (**Leffers et al., 2021**)**.**

Climate change must be integrated into nursing education, which means curricula, practice, research, and policy must all include the information, skills, and insights necessary for clinical practice in our changing global environment. Since knowledge of these themes is unrelated to nursing students' awareness, attitudes, and behaviors, global warming and climate change are delicate and significant concerns that cannot be managed and evaluated solely at the knowledge level (**Harris et al., 2022).**

The globe has seen an unparalleled shift in the way we see and confront environmental issues in the last several decades. As two interrelated and unavoidable global imperatives, sustainability, and climate change now require our immediate attention and coordinated action (**Alam, 2022).**

Greenhouse gas emissions have rapidly increased as a result of climate change, which has been mostly accelerated by human activity such as the burning of fossil fuels, deforestation, and industrial operations. This has therefore started a domino effect of negative environmental effects, such as increasing sea levels, increased frequency and intensity of extreme weather events, and disruptions to ecosystems. Global warming has far-reaching effects on human cultures, economy, and health in addition to the natural world (**Okada & Gray, 2023).**

Conversely, sustainability is a comprehensive strategy for preserving the future of our world. It includes social justice, economic viability, biodiversity preservation, and ethical resource usage. The goal of sustainability is to strike a delicate balance so that present needs are met without endangering the ability of future generations to meet their own needs (**Olabi & Abdelkareem, 2022).**

The necessity of sustainable practices to reduce the effects of and prepare for climate change is the link between sustainability and climate change. Transitioning to more sustainable ways of production and consumption is necessary for industries and communities to effectively address climate

change. This includes cutting back on greenhouse gas emissions, switching to renewable energy, protecting the environment, endorsing eco- friendly products, and implementing sustainable land use and urban planning techniques (**Abbass et al., 2022).**

Health inequities and the need for healthcare services are made worse by climate change, which is a danger to public health worldwide. The mitigation and adaptation of climate change in healthcare systems is greatly aided by nurses, who are frontline healthcare providers. However, according to research, nurses frequently lack sufficient knowledge and understanding of sustainable healthcare best practices and the effects of climate change on health. According to **Kemp et al. (2022**), this emphasizes the necessity of including climate change and sustainability science in nursing curricula, especially during clinical training. In part because of increased funding and committed leadership for educational projects aimed at tackling the difficulties of climate change, there has been a noticeable upswing in interest in climate change education in recent years (**Shukla Aleksany, 2022).**

Nursing students or clinical placement as a component of their nursing education or training" is the term used to describe nursing interns. Working alongside seasoned nurses and other healthcare professionals, these internships help nursing students obtain real-world experience and apply their newly learned knowledge and abilities in a hospital setting. Because they enable students to gain clinical competence and get ready for their future employment as registered nurses, these internships are a crucial part of nursing education (**López-Medina et al., 2022).**

In the health sector, nurses play a critical role in efforts to adapt to and mitigate the effects of climate change. They comprise the largest proportion of healthcare personnel worldwide. Notwithstanding, research has indicated that sustainability science, health effects associated with climate change, and methods for implementing "green" healthcare practices are frequently underemphasized in nursing education (**Agache et al., 2022).**

Significant of the Study:

Health professionals should educate students about the health risks associated with climate change, primary prevention strategies to prevent these issues, and responsible resource management for both work and personal use. This is because they set an example for the public. To provide nurses and students with the information and abilities to effect change, environmental sustainability and stewardship education is essential.

To develop a workforce knowledgeable about the connections between environmental sustainability and human health, nursing courses must incorporate climate change (**Pan et al., 2022**). The nursing internship is a developmental phase during which newly acquired skills and knowledge can influence new nurses' practices later in their careers. A limited number of interventions have been experimentally evaluated, though, to enhance nursing comprehension of the factors contributing to climate change, its numerous health implications, how to identify populations at risk from climate threats and useful tactics that healthcare systems can use to enhance climate resilience and adaptation. So, the aim of the study was to evaluate the impact of integrating sustainability and climate change into nursing education on students' knowledge and practices.

Aim of the Study:

To evaluate the impact of integrating sustainability and climate change into nursing education on students' knowledge and practices.

Hypothesis:

H1: Nursing students' knowledge mean score expected to be improved post-integrating sustainability and climate change into nursing education.

H2: Nursing students' practice mean score expected to be improved post-integrating sustainability and climate change into nursing education.

Materials and Methods:

Research design

A quasi-experimental research design involving a one group was employed to fulfill the objectives of this study**.**

Setting

This study was conducted in faculty of nursing at Sohag University Hospitals

Sample:

A convenience sample involved 800 nursing students who were enrolled in the current study from the previously mentioned setting**.**

Tools of Data Collection:

Three tools were used to collect data:

Tool I: Personal data of nursing' students: It included nursing students, ' personal data such as age, gender, residence, training courses

Tool (II): Knowledge of nursing students regarding climate change: It was developed by researchers in the Arabic language after conducting a thorough review of the existing literature as **Mustapha et al., 2019** and **Yildiz Çankaya & Sezen, 2019**. It included nursing students' knowledge about climate change and included 26 multiple-choice questions including the Concept of climate change (3 questions), the Concept of sustainability (3 questions), Causes of Climate Change (5 questions), Benefits and barriers of sustainability (5 questions), Mitigation Strategies (5 questions), Impacts on Human Health (5 questions).

Each correct answer was given a score of 1, while incorrect answers received a score of 0. The total knowledge score was categorized as poor (<60.0%), equal to 60% to 75% was average or satisfactory (≥ 75.0%).

Tool (III): Nursing students' green management and sustainability practices : It was adapted by the researchers from **Ghazy & Fathy, (2023**). This tool was employed to evaluate the daily life practices reported by the students, encompassing (11) statements assessing indoor practices and 8 statements evaluating outdoor practices. Participants indicated their responses as either "done" or "not done" for each statement. A total score was computed by summing the practices marked as "done," which was then converted into a percentage. The results were categorized into two groups: unsatisfactory practice if the score was below 70%, and satisfactory practice if the score was equal to or greater than 70%.

Fieldwork:

The researcher was present in the research setting during the morning shift from 9:00 a.m. to 12:00 p.m. The data collection phase extended for three months, starting in February 2023, and ending in March 2023. This period encompassed the pretest, the implementation of the program sessions, and the post-test. The researcher introduced herself to the nursing students and explained the aim of the study. Data collection was carried out through group interviews with the nursing students, and each interview lasted for approximately 40 minutes.

Phases of the study: The study was conducted through the following four phases:

The procedure:

Assessment phase: The researcher provided a detailed explanation of the study's objectives and introduced the components of the research tools to the nursing students under investigation. Subsequently, the researcher distributed a questionnaire to these students to evaluate their knowledge and practices related to climate change green management, and sustainability. The program was meticulously crafted and tailored to meet the specific needs of nursing students, a

process informed by both the pretest results and a thorough review of relevant literature.

Pilot study:

A pilot study involving 80 nursing students, which constituted 10% of the estimated sample size, was carried out to assess the feasibility of the research tools and the clarity of the tool questions. Additionally, the pilot study assisted in gauging the time needed for participants to complete the questionnaire. Following the analysis of the pilot study's results, it was determined that no modifications or exclusions were necessary for the questionnaire items. Furthermore, the nursing internship students who took part in the pilot study were included in the final sample.

Validity and Reliability:

The data collection tools were evaluated by a group of three experts in nursing administration, and two in nursing education to ensure that they accurately measured the concept being studied and covered all relevant aspects. To assess the reliability of the tools, the consistency of results across time, observers, and test sections was measured using Cronbach's alpha test. The reliability scores for tools I, II, and III were 0.897, 0.969, and 0.886. This indicates that the tools were reliable and consistent in measuring the targeted constructs.

Ethical Considerations

The study obtained ethical approval from the from the Ethical Committee of the Faculty of Nursing at Sohag University In addition to this, the researcher obtained oral consent from each nursing student after providing them with a clear understanding of the study's objectives. Moreover, students who consented to participate were guaranteed the confidentiality of all data collected during the study, and they maintained the right to withdraw from the study at any time. The questionnaires were completed anonymously, and the data collected were handled with the utmost confidentiality, exclusively for research purposes.

II. Planning phase:

Based on the results of the previous phase, the objectives, priorities, and expected results were defined to address the practical requirements and knowledge gaps of the nursing students. The researchers scheduled four sessions for the nursing internship students' under study.

The program:

The creation and revision of **the program** was done. It included lessons regarding climate change and sustainability development.

The general objective of program sessions:

At the end of the sessions, the nursing students were expected to acquire knowledge and practices that improve their practices regarding climate change and sustainability.

Specific objectives of the training:

- Define climate change.
- Define sustainability.
- Enumerate the Causes of Climate Change
- Enumerate Benefits and barriers of sustainability.
- Identify the Mitigation Strategies.
- Discuss Impacts on Human Health.
- Apply indoor practices and evaluate outdoor practices.

II: Implementation phase:

The researcher organized the studied nursing internship students into four groups and conducted a series of four one-hour training sessions for each group, consisting of

both lectures and seminars. Students were informed of their respective group assignments through invitation letters that also detailed the training schedule and venue. The theoretical sessions took place in the hospital conference hall over eight weeks, with sessions held from 9 a.m. to 10 a.m. The awareness program was designed by the researcher after a comprehensive literature review, aiming to enhance the student's knowledge and implementation of climate change and green management and sustainability principles.

After analyzing the relevant literature and taking into account the actual needs of the nursing internship students under study, a simplified booklet was created and distributed to nursing students in Arabic. It covered every topic about knowledge and practice relating to climate change and sustainability development.

Applying an program was utilized by a variety of teaching methods, such as lectures, brainstorming sessions, and small-group discussions. The use of a range of teaching aids, such as figures, PowerPoint, handouts, flipcharts, and animated movies, enhanced nursing students' knowledge regarding climate change and sustainability development.

Program regarding Climate Change and Sustainability included these sessions:

The first session began with the researchers introducing themselves, extending their gratitude to the nursing students for participating in the study, and outlining the goals of these training sessions. The first session's topics included an introduction to Sustainability and Climate Change: Introductions and expectations from the training, Definition, and principles of sustainability, Importance of sustainable practices, Causes and consequences of climate change, and Overview of global climate change agreements. At the end of the session, encourage participants to ask questions and engage in a group discussion.

The second session addressed topics about **Sustainable Practices and Solutions**: A brief review of key concepts from the first session, Sustainable Energy and Resource Management, Renewable energy sources, Efficient resource management, Reducing food waste and promoting sustainable diets, Strategies for waste reduction and recycling, Encourage participants to ask questions and share insights.

Third (Practical) Session: During this session, the nursing internship students under study received instruction on **Climate Action and Personal Commitment** which Summarized key takeaways from the previous sessions, Climate Action at the Individual Level, Personal carbon footprint reduction, How organizations can integrate sustainability into their strategies, Green certifications and initiatives.

The fourth session, This session focused on. implementation of climate change and green management and sustainability principles. Also, asking participants about their past experiences and answered any concerns they had about climate change and sustainability development. After that, she administered the post-test and thanked each participant for their participation in the study.

IV-Evaluation phase: the impact of integrating sustainability and climate change into nursing education on students' knowledge and practices was evaluated by reevaluating the nursing students using the aforementioned tools following the implementation of the program (posttest) and two months later.

Statistical Analysis:

The collected data were meticulously organized and categorized, with the results presented in tabular format for clarity. Data analysis was carried out on a compatible personal computer using SPSS; version 21). The ANOVA test was utilized to compare mean scores before, after, and during the follow-up intervention, following the methodology described by Franke et al. (2012). The correlation coefficient was employed as a

numerical indicator of statistical relationships between various variables, revealing the extent of their correlation. Additionally, linear regression analysis was utilized to predict the value of one variable based on the value of another. Results were considered significant if $p < 0.05$ and highly significant if $p < 0.01$. Furthermore, the developed research tools were subjected to reliability testing using Cronbach's alpha test, as outlined by Nayak and Hazra (2011), to ensure their consistency and accuracy in measuring the intended constructs.

Results:

Table (1) shows that the mean age of nursing students was 20.11(2.23) years, with 75% of them being female. According to residents, 65% of them were from rural areas.

Figure (I) shows that no one of nursing students participated in climate change and sustainable development training programs.

According to Figure (2), 90% of the nursing students under study said that doctors were the primary source of information about sustainability and climate change.

Table (2) displays the total knowledge scores of nursing students on sustainability and climate change. There was a substantial improvement and difference between the pre- and post-programs (P-value: <0.01**). The nursing students' pre-program mean score was 17.99±8.33, and their post-program mean score climbed to 56.23±1.22, with statistically significant changes.

According to Figure (3), 71% of nursing students had a unsatisfactory total knowledge level regarding sustainability and climate change before participating in an awareness program, and 10 % had unsatisfactory knowledge regarding these topics following their participation in a program. Significant progress was also made in the pre-and post-programs on sustainability and climate change.

Table (3) displays that There was a substantial improvement and difference between the pre-and post-program regarding total practice mean scores of nursing students concerning sustainability and climate change(P-value: <0.01**). The nursing students' pre- program mean score was 21.44±7.13, and their post-program mean score climbed to 42.42±1.77, with highly statistically significant changes.

Figure (4) shows that there was a significant improvement in the practice regarding climate change and sustainability before and after the awareness program. 93% of nursing students had unsatisfactory total practice about climate change and sustainability, pre program, and 10% of them had unsatisfactory total practice about climate change and sustainability, post program.

Table (4) shows a strong positive correlation between the total knowledge and practice levels pre and post-awareness program, with a p-value of <0.001**, indicating statistical significance >0.05.

Table (1): Nursing students' distribution regarding their data (n=200)

Items	n	%
Age:		
< 23	600	75.0
23 - 24	200	25.0
Mean (SD) 20.11(2.23)		
Gender:		
Male	200	25.0
Female	600	75.0
Residence:		
Rural	520	65.0
Urban	280	35.0
Training program about sustainability and climate change		
Yes	80	10
No	720	90

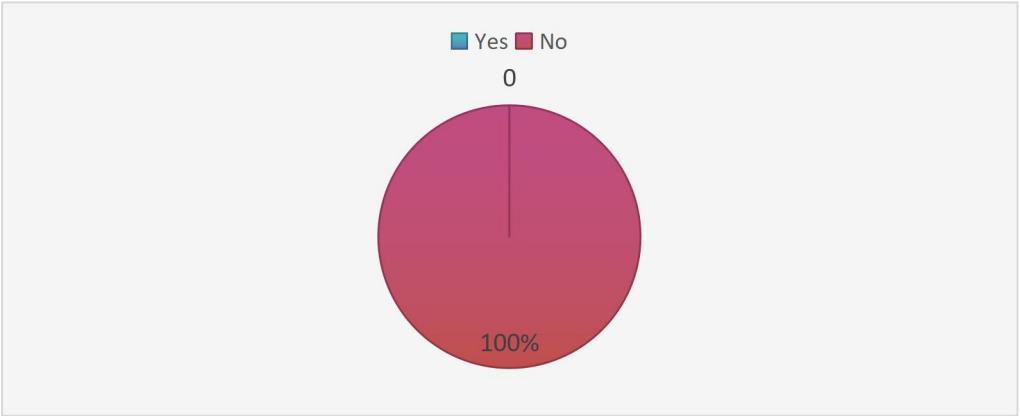

Figure (1): Training program about sustainability and climate change

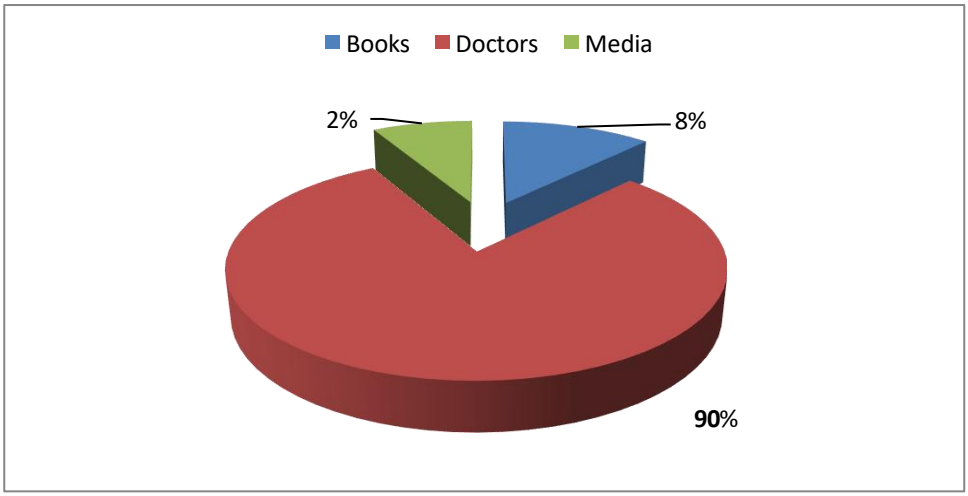

Figure (2): Nursing students' source of knowledge regarding climate change and sustainability (n=800)

Table (2): Mean Score Differences in the Nursing Students' Knowledge Regarding Climate Change and Sustainability Pre and Post Program (n=800)

Knowledge items	e program	t-program	t-test	P-value
Total knowledge scores	17.99±8.33	56.23±1.22	24.78	<0.001**

(**) highly statistical significance at p < 0.001

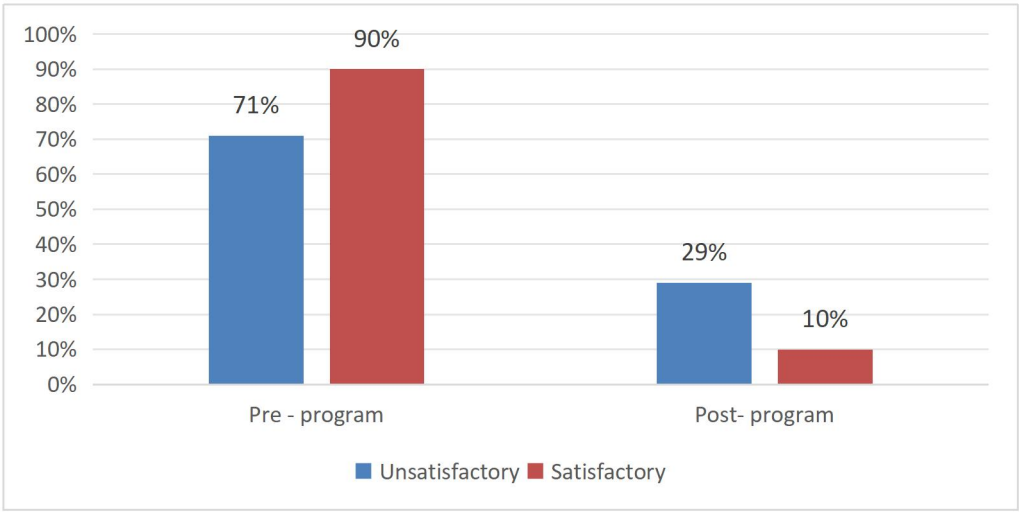

Figure (3): Total nursing students' Knowledge Level regarding climate change and sustainability Pre and Post awareness program (n=800)

Table (3): Mean Scores Differences in the nursing students' practice regarding climate change and sustainability Pre and Post program (n=800)

Knowledge items	Pre program	Post-program	t-test	P-value
Total knowledge scores	21.44±7.13	42.42±1.77	28.89	<0.001**

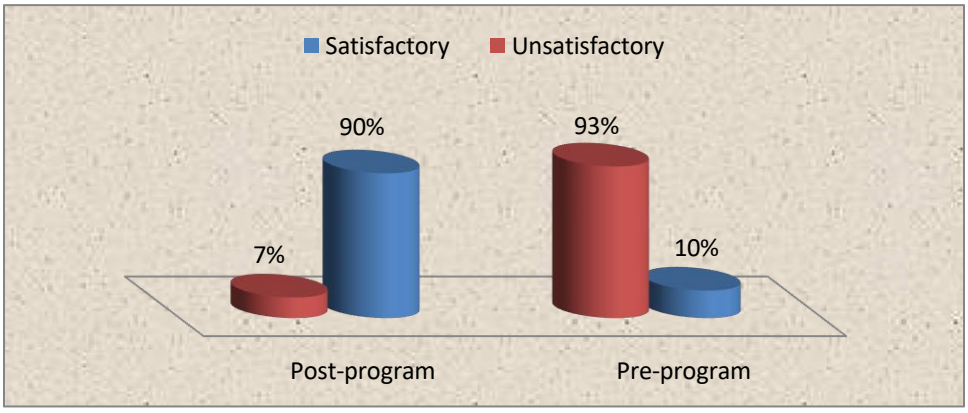

Figure (4): Total nursing students' practice Level regarding climate change and sustainability Pre and Post program (n=800)

Table (4): Correlation between nursing students' knowledge and practice Pre and Post awareness program

	r.	p. value
Knowledge and Practice Pre-awareness program	0.623	<0.001**
Knowledge and Practice post-awareness program	0.614	<0.001**

Discussion:

Incorporating sustainability and climate change education into nursing internship programs will not only equip aspiring nurses to tackle environmental health concerns but will also build a more resilient and sustainable healthcare system. The future generation of healthcare professionals must be prepared to handle the complicated health issues connected with environmental challenges by raising an understanding of sustainability and climate change (**La Torre et al., 2023).**

According to the personal data of the current sample, three-quarters of the students enrolled in nursing internships were female. This finding helps to explain why the nursing faculty is seen to be relatively new to having male students. Due to the benefits of working in the human sector, earning a high salary, assisting others, and other factors, more students may have lately enrolled in nursing programs, which could explain this outcome.

It was noted that, of the nursing students, three-fifths resided in rural areas. This observation speaks to the Egyptian rural culture, which is characterized by its customs, norms, beliefs, and unlawful environmental practices. The results of a study conducted by **Kah et al. (2021**) on "Awareness of the causes, impact, and solutions to global warming among undergraduate students" from various schools at the University of the Gambia were not consistent with these findings. The study found that over two-thirds of the participants were male and lived in urban areas.

According to the most recent data, no one of nursing students took part in training programs related to sustainable development and climate change. Researchers found that nursing internship students must take part in programs that raise knowledge of climate change and sustainable development.

According to the current data, the majority of the study's nursing students believed that doctors were the best sources of information regarding climate change and sustainability. According to the researchers, this indicated that the nursing students had learned their information from reliable sources.

The results showed that, in terms of nursing students' knowledge of climate change, there was a highly statistically significant improvement and difference post-program compared to the pre- program. Following the implementation of the current study-related awareness program regarding climate change, the majority of nursing students' total knowledge increased, indicating the success and effectiveness of the program. The results of a study named "Knowledge and Perception of Climate Change and Global Warming in the Context of Environmental Challenges and Policies" conducted in Dammam, Saudi Arabia by **Almulhim (2021**) were comparable to these findings. According to the study, one-third of the participants had inadequate knowledge about the causes and effects of climate change. Furthermore, more than one-quarter of the studied sample had good knowledge and awareness of climate change at post-test.

Additionally, the findings of the study align with other research that has demonstrated that students lack the knowledge required to support and engage in climate change initiatives. For example, **Reynaldo et al. (2018**) found that students have a greater awareness of the environment and climate change due to media coverage, political channels, and firsthand experience with natural disasters both locally and globally.

The current findings showed that before taking part in an program, over three-

fifths of nursing students had poor knowledge overall regarding sustainability and climate change, and, after the program, less than ten percent had poor knowledge overall regarding these topics. The results of the study "Finnish studied nurses' perceptions of the health impacts of climate change and their preparation to address those impacts" by **Tiitta et al. (2021)** corroborated these findings by pointing out that nurses lacked the knowledge required to support and engage in strategies for climate change and sustainability development. According to **Ibrahim et al. (2022**), "The effectiveness of educational interventions about sustainability development among nursing students" in Egypt, the study results are corroborated and concluded that the majority of students had insufficient knowledge of climate change at pre-educational intervention.

On the other hand, post-intervention analysis showed a significantly substantial improvement in understanding of sustainability and climate change developments. The researcher holds that for nursing intern students to receive the necessary instruction to comprehend the connection between climate change and global health issues, they should learn about environmental themes in nursing faculties, be aware of climate change, and attend seminars and trainings related to the environment.

These results are consistent with a study by **Nousheen et al. (2020**) that showed a significant improvement in student-teacher knowledge about sustainable development (SD) after an intervention. Furthermore, **Breakey et al.'s, (2023**) study showed that a sizable percentage of students had little to no understanding of climate change, highlighting the importance of teaching aspiring medical professionals about the relationship between climate change and health. The importance of treatments and educational initiatives in addressing these pressing concerns is highlighted by the body of evidence. Additionally, **Olsson et al., (2022**) found that following the intervention, students' understanding of sustainability increased. Additionally, **Esringü & Süleyman, (2020**) noted that following training, university students had great awareness and good knowledge.

Moreover, **Ayanlade, A., & Jegede, 2016** showed that most of the students had poor knowledge about sustainability and climate change and recommended continuous training programs related to these vital topics.

In terms of sustainability and climate change, the current results showed that nursing students' overall practice mean scores. The pre- and post-programs showed a significant improvement and difference. These findings, which were corroborated by **Grandisoli & Jacobi's (2020)** study, showed that, in comparison to a control group, the participating students had significant changes in both knowledge and habits. Additionally, it was demonstrated by **Badea et al. (2020**) that sustainable development enhanced the subjects' practices. Furthermore, a program for teaching about climate change enhanced university students' motivation to take action (**Kelenatý et al., 2022).** Furthermore, **Ghazy & Fathy, (2023**) found that students' knowledge, attitudes, and day-to-day practices about climate change had been significantly and favorably impacted by the educational program.

Additionally, the current results showed that, both before and after the awareness, there was a considerable improvement in the overall practice level addressing climate change and sustainability. Less than one-fifth of nursing students reported unacceptable overall practice regarding climate change and sustainability following a post-awareness session, while the majority had unsatisfactory total practice regarding these topics before the awareness program. They will be able to remove the risks associated with climate change and mitigate its negative health effects once they have reached a suitable standard of daily living.

A very strong positive correlation was discovered between the post-program total knowledge score level and total practices, according to the current study Correlation between pre/post total knowledge of investigated students and practices. For healthcare practitioners, this expanded

knowledge is essential because it gives them the tools to address health issues related to climate change and advance sustainable healthcare practices. These results highlight how crucial educational programs are in equipping aspiring medical professionals to address the pressing problems related to sustainability and climate change.

The findings of **Sah et al. (2018**), who investigated "Assessment of the knowledge and practice regarding global warming among high school students of Ramnagar, Belgaum City: A cross-sectional study," in India, and **Freij et al. (2016)** in Bahrain concur with this finding. According to **Michel and Zwickle's research (2021)**, training programs improved students' understanding of sustainability. These results corroborate their findings. Furthermore, **Zhang and colleagues (2022**) discovered a favorable association between the degree of actual application and knowledge.

This finding is in line with the findings of two previous studies: **Sah et al. (2018) and Freij et al. (2016)** in Bahrain, which assessed high school students' knowledge and knowledge about global warming in Ramnagar, Belgaum City, India, using a cross-sectional survey design. These results are consistent with the study done by **Michel and Zwickle, (2021**) who found that training programs improved students' understanding of sustainability. Furthermore, **Zhang et al. (2022**) discovered a favorable relationship between knowledge and the degree of practical application.

Conclusion:

Based on the current study's findings, the study concluded that the integrating education regarding climate change and sustainability significantly improved the level of knowledge and practices among nursing students.

Recommendations:

Based on the current study's findings, the following recommendations were made:

1. Encourage nursing to take part in continuing education programs about climate change and sustainability.

2. Use constructive comments and frequent evaluations to monitor nursing development in knowledge and behaviors related to sustainability and climate change.

3. Promote multidisciplinary cooperation to improve knowledge sharing and real-world applications between nursing and programs in environmental science or sustainability.

4. Involve nursing students in climate change and sustainability-related community initiatives.

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