




REVIEW

Rapid Review: Integrating Climate Change into Nursing Practices and Education in the Arab Middle East

Revisión Rápida: Integración del Cambio Climático en las Prácticas y Educación de Enfermería en el Medio Oriente Árabe

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ABSTRACT

Introduction: the Middle East confronts substantial challenges from climate change, characterized by elevated temperatures, water shortages, and increasingly severe weather phenomena. Despite its crucial significance, Arab nursing students lack a notable education regarding climate issues. This study examines the integration of climate change considerations within nursing across Arab Middle Eastern countries.

Method: a rapid review of studies published between 2018 and 2024 focused on climate change in nursing education and practices. Major academic databases, including Scopus and Web of Science, were searched using terms related to nursing and climate change. Thirteen studies were included in the final review following the recommendations proposed by PRISMA.

Results: the studies centered on nursing students, interns, and professionals, emphasizing the implications of climate change on health practices. Key themes included climate change integration in education and the role of nursing interventions, highlighting the need for improved educational strategies and interdisciplinary collaboration.

Conclusions: there is a crucial need for a comprehensive framework in nursing education that integrates climate change and environmental health, emphasizing emotional well-being and proactive strategies to address climate-related health impacts and promote environmentally conscious behaviors among vulnerable populations.

Keywords: Climate Change; Nursing; Nursing Student; Nurse; Arab; Middle East.

RESUMEN

Introducción: el Medio Oriente enfrenta desafíos sustanciales debido al cambio climático, caracterizado por temperaturas elevadas, escasez de agua y fenómenos meteorológicos cada vez más severos. A pesar de su importancia crucial, los estudiantes de enfermería árabes carecen de una educación notable sobre los problemas climáticos. Este estudio examina la integración de las consideraciones sobre el cambio climático en la enfermería en los países árabes del Medio Oriente.

Método: se realizó una revisión rápida de estudios publicados entre 2018 y 2024 que se centraron en el cambio climático en la educación y las prácticas de enfermería. Se buscaron en las principales bases de datos académicas, incluyendo Scopus y Web of Science, utilizando términos relacionados con la enfermería y el cambio climático. Trece estudios se incluyeron en la revisión final siguiendo las recomendaciones propuestas por PRISMA.

Resultados: los estudios se centraron en estudiantes de enfermería, pasantes y profesionales, enfatizando las implicaciones del cambio climático en las prácticas de salud. Los temas clave incluyeron la integración del cambio climático en la educación y el papel de las intervenciones de enfermería, destacando la necesidad de mejorar las estrategias educativas y la colaboración interdisciplinaria.

Conclusiones: existe una necesidad crucial de un marco integral en la educación de enfermería que integre el cambio climático y la salud ambiental, enfatizando el bienestar emocional y las estrategias proactivas para abordar los impactos en la salud relacionados con el clima y promover comportamientos ecológicos entre las poblaciones vulnerables

Palabras clave: Cambio Climático; Enfermería; Estudiante De Enfermería; Enfermera; Árabe; Medio Oriente.

INTRODUCTION

The Middle East confronts substantial challenges from climate change, characterized by elevated temperatures, water shortages, and increasingly severe weather phenomena. Research indicates that the region is exceptionally vulnerable, with forecasts suggesting a temperature rise of 3,5-7°C by the end of the century.⁽¹⁾ These climatic shifts disproportionately impact healthcare systems, intensifying pressure on nursing professionals and worsening pre-existing weaknesses in public health infrastructure.⁽²⁾ An interdisciplinary strategy is essential to address these issues, positioning future and current nurses at the forefront of mitigation and adaptation efforts.

Integrating Climate Change: Educating for a Sustainable Future in Nursing

Despite its crucial significance, Arab nursing students lack a notable education regarding climate issues. A study covering four Arab nations revealed that nursing students had limited comprehension of the health impacts of climate change, thereby exposing substantial educational shortcomings.⁽³⁾ These findings underscore the pressing need to incorporate climate-related content into nursing curricula, enabling students to address emerging health challenges.⁽⁴⁾ Nursing faculties are vital in equipping students with the competencies and knowledge to overcome these obstacles. While international nursing organizations have made advancements in integrating climate change into educational frameworks, initiatives within the Arab region remain disjointed.⁽⁵⁾ Consequently, it is imperative for Arab nursing schools to swiftly formulate a multidisciplinary curriculum that addresses local climatic effects while offering culturally relevant solutions to prepare future healthcare professionals. Although mid-level Arab nursing students exhibit a degree of understanding regarding climate change and its health implications, many curricula still neglect this essential topic.⁽³⁾ Cruz et al. contend that incorporating climate education into nursing programs is critical for equipping future healthcare workers to meet the challenges posed by environmental changes.⁽⁶⁾

Nursing in the Era of Climate Change

Adult nursing in the Arab Middle East encounters substantial community health challenges intensified by climate change, particularly chronic diseases associated with air pollution and water scarcity. This situation underscores the critical need for integrating sustainable health practices into care.⁽⁷⁾ Moreover, elderly populations are especially susceptible to climate-induced heatwaves and the consequent health issues, including cardiovascular and respiratory diseases. Therefore, it is essential to implement preventive measures and develop tailored care strategies within geriatric nursing.⁽⁸⁾

Women, especially nurses, are particularly vulnerable to the impacts of climate change owing to their caregiving and professional responsibilities. This vulnerability is highlighted by the increased risk of heat stress and reproductive health complications faced by pregnant women in Arab nations.⁽⁹⁾ Although there is an awareness of these pressing challenges, maternity nurses lack the specialized skills to effectively address them, indicating a critical need for targeted training, legislative measures, and robust support networks.⁽¹⁰⁾ Furthermore, as primary caregivers, women recognize that children represent one of the most at-risk demographics when it comes to climate change, suffering from malnutrition, respiratory ailments, viral infections, and heat stress.⁽¹¹⁾ Pediatric nurses are crucial in mitigating these hazards through education, preventative strategies, and crisis interventions. However, the existing gap in climate change research and training within the field of pediatric nursing in the Arab region underscores the urgent necessity for climate education and capacity-building initiatives tailored specifically for children.^(3,12)

This rapid review examines the integration of climate change considerations within nursing across Arab Middle Eastern countries, focusing on how curricula are evolving to address the challenges posed by climate change. It seeks to identify effective strategies for promoting climate literacy among nursing professionals and to highlight best practices that enhance the relevance and sustainability of nursing education. The review will also assess existing gaps and opportunities for improvement, contributing to the discourse on nursing's

role in tackling climate-related health issues. By uncovering the literature on climate change and nursing in this region, the review aspires to empower nurses as change agents, equipping them with the necessary competencies to respond to the health impacts of climate change, particularly for vulnerable populations, and advocating for a sustainable future.

METHOD

Key Terms

This review addresses “climate change” as significant alterations in weather patterns impacting health, while “climate variability” refers to short-term fluctuations in these patterns. Both present “challenges” to public health in selected “Arab Middle Eastern countries”, where rising temperatures and extreme weather exacerbate health risks. The review explores how nursing education in these regions adapts to these challenges, preparing future nurses to meet the evolving health needs of their communities amid climate-related issues.

Search Strategy and Selection Criteria

This rapid review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines,⁽¹³⁾ ensuring transparency, comprehensiveness, and reproducibility. Due to time constraints, a formal review technique could not be established for the rapid evidence synthesis; however, the best methods from systematic reviews were employed to ensure rigor. The primary objective was to identify research examining the integration of climate change into nursing courses in Arab Middle Eastern nations. A comprehensive search strategy was developed using major academic databases such as the Web of Science and Scopus. It focused on publications published in indexed nursing journals recognized for their extensive nursing and healthcare education literature coverage. The last search was conducted on December 18, 2024. The search strategy was meticulously crafted to identify articles on climate change and nursing, utilizing relevant keywords and medical subject headings (MeSH) related to the topics. Boolean operators (AND/OR) refined the results, incorporating broad and specific research on the impact of climate change on nursing. Key phrases such as “climate change,” “climate variability,” “nursing,” “nurses,” and “nurse” guided the search process (table 1). This review strictly analyzed peer-reviewed studies from academic databases to ensure the quality and relevance of the findings.

Eligibility Screening

After the database search, all studies were entered into the reference management software “Mendeley,” and duplicates were eliminated. The subsequent phase assessed the remaining publications’ titles and abstracts for relevance, employing established inclusion and exclusion criteria. The corresponding author was evaluated to assure impartiality.

The inclusion/exclusion criteria for the study were as follows:

This rapid review utilizes English-language journal articles indexed in Scopus and Web of Science to maintain uniformity in analysis and interpretation. The empirical study it refutes is randomized or non-randomized, controlled, and observational. The search results confined the geographical focus to Arab nations in the Middle East, rendering the literature study pertinent and contextualized. The researcher excluded narratives, case reports, commentary, editorials, meta-analyses, integrative reviews, rapid reviews, and systematic reviews. Also, studies are not available in full text.

Table 1. Search Strategy

Database	Search terms
Web of Science	S1 “climate change” (Topic) and nursing (Topic) and Nursing (Web of Science Categories) and Nursing (Research Areas)
	S2 “climate change” (Topic) and nursing (Topic) and Nursing (Web of Science Categories) and BAHRAIN or EGYPT or LEBANON or JORDAN or SAUDI ARABIA or OMAN or PALESTINE or QATAR or U ARAB EMIRATES or TUNISIA or YEMEN or SYRIA or MOROCCO or SUDAN (Countries/Regions) and Nursing (Research Areas)
Scopus	S1 (TITLE-ABS-KEY (climate AND change) OR TITLE-ABS-KEY (climate AND variability) AND TITLE-ABS-KEY (nursing) OR TITLE-ABS-KEY (nurses) OR TITLE-ABS-KEY (nurse))
	S2 (TITLE-ABS-KEY (climate AND change) OR TITLE-ABS-KEY (climate AND variability) AND TITLE-ABS-KEY (nursing) OR TITLE-ABS-KEY (nurses) OR TITLE-ABS-KEY (nurse)) AND (LIMIT-TO (AFFILCOUNTRY , “Bahrain”) OR LIMIT-TO (AFFILCOUNTRY , “Egypt”) OR LIMIT-TO (AFFILCOUNTRY , “Iraq”) OR LIMIT-TO (AFFILCOUNTRY , “Jordan”) OR LIMIT-TO (AFFILCOUNTRY , “Kuwait”) OR LIMIT-TO (AFFILCOUNTRY , “Lebanon”) OR LIMIT-TO (AFFILCOUNTRY , “Morocco”) OR LIMIT-TO (AFFILCOUNTRY , “Palestine”) OR LIMIT-TO (AFFILCOUNTRY , “Qatar”) OR LIMIT-TO (AFFILCOUNTRY , “Saudi Arabia”) OR LIMIT-TO (AFFILCOUNTRY , “Tunisia”) OR LIMIT-TO (AFFILCOUNTRY , “United Arab Emirates”)) AND (LIMIT-TO (SUBJAREA , “NURS”))

Data extraction

Data extraction was systematically performed to collect all relevant details from the selected studies thoroughly. Information such as study design (e.g., randomized controlled trials, cross-sectional studies), year of publication, country of study, and sample size was gathered to provide the review context and understand each study's scope and setting. The corresponding author independently executed this process using a predefined form to maintain consistency and completeness. Discrepancies were resolved through collaborative discussion or consulting a second reviewer when necessary (Table 2 Characteristics of Selected Studies).

Table 2. Characteristics of the studies

N.	Author/Year	Overview/Aim	Population	Location	Design	Key Findings
1	Felicilda-Reynaldo et al. 2018 ⁽³⁾	Nursing students in Arab countries have a moderate knowledge of climate change's health impacts, with most predicting increased health risks within 20 years.	1059 Nursing students from four Arab countries	Egypt, Saudi Arabia, Iraq, and Palestine	Observational Study (Cross-sectional study)	Nursing students in Arab countries have a moderate understanding of climate change's health implications, with Saudi Arabia and Palestine showing higher knowledge levels than Egypt and Iraq. This underscores the need for better-integrating climate change and its health impacts in nursing education curricula across these nations.
2	Cruz, Alshammari, et al. 2018 ⁽¹⁴⁾	Saudi nursing students show moderate pro-environment attitudes but extremely positive attitudes towards sustainability in healthcare, highlighting the need for enhanced education on environmental and sustainability concepts in nursing curricula.	280 Saudi nursing students	Saudi Arabia	Observational Study (Survey and data analysis)	The study reveals that education about environmental issues positively impacts nursing students' sustainability attitudes, highlighting the importance of enhancing their awareness of environmental concerns and promoting sustainable practices within healthcare.
3	Cruz, Felicilda-Reynaldo, et al. 2018 ⁽⁶⁾	Arab nursing students have positive attitudes towards climate change and environmental sustainability, suggesting that their inclusion in nursing curricula can enhance critical thinking and adaptive healthcare delivery.	1059 Nursing students from four Arab countries	Egypt, Saudi Arabia, Iraq, and Palestine	Observational Study (Cross-sectional study)	The findings show that Saudi students have the most positive attitudes toward environmental sustainability in healthcare, highlighting the need to integrate climate change and sustainability into nursing curricula across the Arab region. Incorporating these practices into education will enhance student nurses' critical thinking and skills for adaptive healthcare delivery in resource-constrained settings.
4	Saleh & Elsabahy, 2022 ⁽¹⁵⁾	Integrating sustainability education programs in nursing significantly improves student nurses' knowledge, attitudes, and behavior, promoting sustainable healthcare delivery	160 Saudi and Egyptian nursing interns	Saudi Arabia and Egypt	Non-RCT Trial	The program significantly improved nursing interns' knowledge, attitudes, and behaviors regarding sustainability, highlighting its effectiveness in promoting sustainable development and enhancing practice standards in the field.
5	Amin et al. 2024 ⁽¹⁶⁾	This study explores how environmental literacy among nursing students relates to climate anxiety, aiming to improve educational strategies and mental health support for future nurses.	620 nursing students	Egypt	Observational Study (Cross-sectional study)	The study underscores the need to integrate environmental literacy into nursing education to promote pro-environmental behaviors, support mental health, advocate for policies, and prepare nurses for the health impacts of climate change, fostering a resilient healthcare system
6	Atta et al. 2024 ⁽¹⁷⁾	Climate change anxiety negatively impacts asthma control and quality of life, emphasizing the need for integrated healthcare approaches considering environmental and psychological factors.	1266 Asthmatics from four Arabian countries	Egypt, Saudi Arabia, Yeman, Palestine	Cross-sectional study.	The study shows that climate anxiety negatively affects asthma control and quality of life, highlighting the need to assess and address it as a key management strategy. Nurses should include climate anxiety evaluations in the care plans for asthmatic patients.

7	Amin et al. 2024 ⁽¹⁸⁾	Emotional responses to climate change and antenatal anxiety are strongly linked, and integrating climate-related emotional distress into prenatal care is crucial for promoting maternal-fetal attachment.	285 Primigravida women	Egypt	Observational Study (Cross-sectional study)	Emotional responses to climate change are found to negatively impact maternal-fetal attachment, suggesting that the emotional distress caused by climate change can hinder the bonding process between a mother and her fetus.
8	Abdelaziz et al. 2024 ⁽¹⁹⁾	Nurses at Al Azhar Hospital in Egypt have higher knowledge, skills, and attitudes regarding climate change than their counterparts at Beni-Suef Hospital.	336 Pediatric nurses	Egypt	Cross-sectional comparative study	Nurses at Al Azhar Hospital demonstrated a good understanding of climate change, with 69,6 % showing good knowledge, 29,2 % exhibiting good skills, and 82,1 % reflecting positive attitudes. Their knowledge, skills, and attitudes regarding climate change were notably higher compared to nurses at Beni-Suef Hospital.
9	Shaban et al. 2024 ⁽²⁰⁾	This study evaluates a geriatric nursing-led sustainable heat prevention program for elderly agricultural workers, addressing their increased risk of heat strain due to climate change.	120 elderly agricultural workers aged 60 and older were divided into intervention and control groups over three months.	Egypt	Community-based quasi-experimental design	The results showed significant improvements in heat strain metrics, with the Heat Strain Score Index (HSSI) and Observational-Perceptual Heat Strain Risk Assessment (OPHSRA) Index indicating enhanced safety levels and reduced risk among participants. This study underscores the effectiveness of tailored nursing interventions in mitigating heat strain risks in vulnerable populations and highlights nursing's crucial role in addressing climate change-related health challenges.
10	Atta, Zoromba, Asal, et al. 2024 ⁽²¹⁾	This study seeks to identify the predictors of climate change literacy among nursing students in A Multi-Site Survey	10 084 nursing students from all 27 governments	Egypt	A multi-site descriptive cross-sectional study	Nursing students showed a moderate grasp of climate science, averaging 14,38 in climate science, 14,41 in communication skills, and 13,33 in adaptation strategies, with the highest score of 17,72 in climate health impacts. Faculty knowledge significantly correlated with all literacy domains ($p < 0,001$), indicating it predicts climate literacy. These results imply associations rather than causation, emphasizing that nursing professionals must have a strong knowledge of climate adaptation strategies to advocate effective public health measures.
11	Abousoliman et al. 2024 ⁽²²⁾	The study aimed to investigate the relationship between nursing students' knowledge and attitudes toward climate change and their psychological distress	377 nursing students	Saudi Arabia, Jordan, and Egypt	Descriptive cross-sectional study	The study found a positive correlation between climate change knowledge and attitudes ($r = 0,213$), while psychological distress was negatively correlated ($r = -0,182$ and $-0,110$). Regression analyses indicated that academic achievement increased psychological distress, while greater knowledge and positive attitudes reduced it. These findings highlight the need for educational programs in nursing curricula focusing on climate change to mitigate psychological stress for future healthcare professionals.

12	Atta, Zoromba, El-Gazar, et al. 2024 ⁽²³⁾	Climate change profoundly impacts well-being, contributing to climate anxiety. This anxiety can diminish job engagement among nursing professionals, leading to reduced commitment.	359 nursing university faculties	Egypt	Cross-sectional comparative study	Demographic factors did not significantly affect climate anxiety, environmental attitudes, or job involvement, but notable geographical variations revealed an inverse correlation between climate anxiety and job engagement, as well as overall environmental attitudes. The results indicate that climate anxiety negatively influences environmental attitudes and job engagement among nursing university faculty, with higher anxiety linked to lower attitudes and engagement, while better attitudes correlate with decreased overall job engagement.
13	Khalil et al. 2025 ⁽²⁴⁾	To examine the associations between emotionally charged reactions to climate change, self-care, quality of life among older adults, coping mechanisms, and pro-environmental practices	609 older adults	Three governorates in Egypt.	A multi-center, descriptive, correlational approach	The findings can aid in creating targeted interventions to promote self-care, enhance coping strategies, and encourage pro-environmental behavior among older adults, ultimately improving their quality of life and resilience. These insights have significant implications for geriatric nursing education, clinical protocols, and community initiatives aimed at strengthening the mental well-being of older adults in the face of climate change challenges.

RESULTS

Data analysis and synthesis: Identification of studies

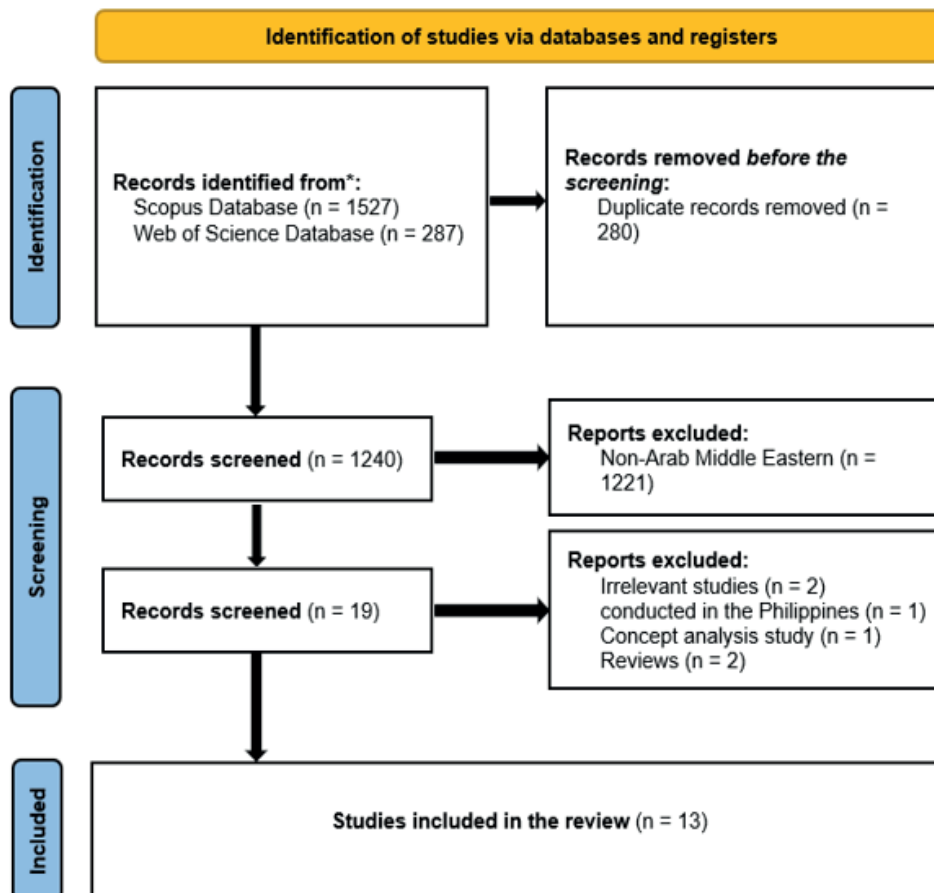


Figure 1. The PRISMA Flow Chart

The review process commenced with an initial identification of 1 814 articles, of which 19 unique articles were isolated, specifically focusing on Arab Middle Eastern countries after removing duplicates. A comprehensive evaluation of the titles and abstracts facilitated the selection of all 19 articles for full-text review. Ultimately, 13 of these studies met all established inclusion criteria and were integrated into the review (figure 1 the PRISMA Flow Chart). This approach underscores a systematic filtering method designed to ensure the relevance and quality of the literature examined. As a result of our search strategy, thirteen studies^(3,6,14,15,16,17,18,19,20,21,22,23,24) related to climate change and nursing were identified, all published in indexed journals within the Scopus and Web of Science databases as of December 18, 2024. Excluded from our analysis were two articles that did not address the relevant topic, one focusing on concept analysis, two rapid reviews, and another originating from outside the Arab region (specifically the Philippines). Notably, only four of the thirteen studies—three in 2018 and one in 2022—were published before 2024, with the inaugural publication dating back to 2018.^(3,6,14,15,16) Most of the contributions to this body of published studies in and after 2024 came from the research team by Mohamed Atta and Mohamed Zoromba.^(17,18,21,22,23,24) The first, second, third, fourth, fifth, tenth, eleventh^(3,6,14,15,16,21,22) and twelfth concentrated on the effects of climate change in the nursing education sector, predominantly regarding nursing students, except for one study⁽²³⁾ that investigated faculty members in nursing universities. The sixth study concentrated on adult health,⁽¹⁷⁾ whereas the ninth⁽²⁰⁾ and thirteenth⁽²⁴⁾ studies focused on the elderly. The eighth study was the only one directly targeting pediatric nurses,⁽¹⁹⁾ while just one focused on women's health care.⁽¹⁸⁾

Data analysis and synthesis: Characteristics of selected studies

Eleven of the thirteen studies reviewed were cross-sectional; one was a non-randomized controlled trial, and the other was quasi-experimental. The research was conducted across various Arab countries, including Egypt, Saudi Arabia, Iraq, Palestine, and Yemen. The total sample size across all studies amounted to 16 614 participants, with specific studies reporting sample sizes of 1 059 nursing students,⁽³⁾ 280 Saudi nursing students,⁽¹⁴⁾ and 1 266 asthmatics.⁽¹⁷⁾ The Cruz and Felicilda-Reynaldo research team conducted the initial three studies on climate change in nursing in 2018, focusing on Arab nursing students in four Arab countries.^(3,6) Following a hiatus, Saleh and Elsabahy released a paper in 2022 regarding incorporating a sustainable development education program in nursing to tackle challenges encountered during nursing students' internships in healthcare settings.⁽¹⁵⁾ 2024 marks a significant milestone for Arab nursing research, particularly with climate change. Eight of the thirteen manuscripts in our rapid assessment were published, indicating a substantial contribution to the subject.^(16,17,18,19,20,21,22,23) One study among the thirteen is the most recent article published in 2025.⁽²⁴⁾ Notably, the studies primarily focused on nursing students, nursing interns, and healthcare professionals, with a significant emphasis on understanding the implications of climate change on health and nursing practices. The studies highlighted various themes, including integrating climate change into nursing education, environmental literacy's impact, and nursing interventions' role in addressing climate-related health challenges. The findings underscore the necessity for enhanced educational strategies and interdisciplinary collaboration to prepare nursing professionals for the evolving challenges of climate change in the healthcare sector.

Climate Change in Higher Nursing Education

The analysis of the seven studies targeting nursing students reveals a compelling need for integrating climate change and environmental health into nursing education across Arab countries. Felicilda-Reynaldo's research highlighted the urgent need to incorporate environmental health and climate change into nursing curricula, noting that current educational frameworks emphasize acute care. In contrast, nursing students generally exhibit neutral attitudes toward environmental issues.⁽³⁾ However, urban and second-year students tended to demonstrate a better understanding of the health implications of climate change. Extending this perspective, Cruz's work underscored the importance of integrating sustainability and environmental considerations into nursing programs in Saudi Arabia, revealing that students require further training to address climate change's impact on healthcare effectively.⁽⁶⁾ Furthermore, Cruz et al. reported strong support among nursing students in four Arab nations for including climate change education in nursing curricula, suggesting that perceptions of environmental issues are influenced by factors such as nationality and awareness.⁽¹⁴⁾

Similarly, Saleh and Elsabahy investigated the impact of sustainability development education programs within the nursing curriculum on 160 nursing interns from Saudi Arabia and Egypt.⁽¹⁵⁾ Their findings indicated that such educational interventions significantly enhanced the interns' understanding, perspectives, and behaviors toward sustainability, promoting sustainable healthcare practices. This sentiment was expanded upon by,⁽¹⁶⁾ who recommended the integration of environmental literacy into nursing education to promote pro-environmental behaviors, mental health support, policy advocacy, and ongoing efforts to prepare nurses for managing the health effects of climate change. Lastly,⁽²¹⁾ explored predictors of climate change literacy among Egyptian nursing students, emphasizing that knowledge of climate change, educational interventions, and personal and environmental factors significantly influence students' climate literacy, reinforcing the critical

need for curricula that integrate climate change education.

Climate Change in Nursing Practice

The analysis of the studies examining the impact of climate change on various populations in Arab countries reveals a critical need for healthcare professionals, particularly nurses, to address the emotional and psychological dimensions of climate change. Atta et al. conducted a multi-national study involving 1 266 asthmatics, uncovering that climate change anxiety significantly impairs asthma control and quality of life, with stronger negative correlations observed in middle-aged individuals and those with prolonged disease durations. This finding underscores the importance of incorporating climate anxiety assessments into asthma management protocols.⁽¹⁷⁾ Similarly, Amin et al. explored the emotional responses to climate change among primigravida women in Damanhur, Egypt, revealing significant positive correlations between climate-related emotional distress and antenatal anxiety, while maternal-fetal attachment was negatively affected. These results suggest that healthcare providers must integrate climate-related mental health assessments and supportive interventions into prenatal care to foster better maternal-fetal bonding.⁽¹⁸⁾ Further highlighting the role of nursing in addressing climate change's health impacts, Abdelaziz et al. evaluated pediatric nurses' knowledge and skills regarding climate change and children's health, finding a significant training gap between nurses in different hospitals. This study advocates enhanced training and incorporating sustainable nursing practices in educational curricula to equip nurses with the necessary tools to mitigate climate change effects on pediatric populations.⁽¹⁹⁾

Moreover, Shaban et al. investigated a geriatric nursing-led sustainable heat prevention program for elderly agricultural workers, demonstrating that tailored nursing interventions can effectively reduce heat strain risks associated with climate change. The significant improvements in heat strain metrics among participants highlight the essential role of nursing in safeguarding vulnerable populations.⁽²⁰⁾ Lastly, Khalil et al. examined the emotional reactions to climate change in older adults, revealing negative associations with quality of life and self-care capabilities. At the same time, positive correlations were found with pro-environmental behaviors and coping strategies. These findings emphasize the necessity for customized interventions that enhance resilience and self-care among the elderly, further reinforcing the critical role of nursing education and community initiatives in addressing the multifaceted challenges posed by climate change.⁽²⁴⁾

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DISCUSSION

Climate Change and Nursing Education

Integrating climate change and environmental health into nursing education has become a critical requirement, particularly in Arab countries. A comprehensive analysis reveals a significant gap in current nursing curricula, which predominantly emphasizes acute care and often overlook environmental considerations. Felicilda-Reynaldo et al. highlights that nursing students typically exhibit neutral attitudes toward environmental issues, indicating a clear need for more robust educational interventions. Urban and second-year students, however, show a greater understanding of the health implications linked to climate change, suggesting a potential for curriculum development targeted at fostering this awareness early in their training.

Cruz et al. advocate for the inclusion of sustainability and environmental education within nursing programs in Saudi Arabia, arguing that enhanced training is essential for students to navigate the complexities of climate change's impact on healthcare effectively. This sentiment is echoed by the strong support from nursing students

across four Arab nations who favor climate change education in their curricula, underscoring the potential for increased engagement with these pivotal issues.⁽¹⁴⁾

Supporting these findings, Saleh and Elsabahy demonstrate that sustainability development education significantly enhances the understanding and behaviors of nursing interns in Saudi Arabia and Egypt. Their research suggests that well-structured educational interventions can instill a deeper commitment to sustainable healthcare practices.⁽¹⁵⁾ Moreover, Amin *et al.* argue for the integration of environmental literacy into nursing education, positing that such measures would not only encourage pro-environmental behaviors but also equip nurses with the necessary skills to advocate for mental health support and policy change in the face of climate challenges.⁽¹⁶⁾ At a broader level, Atta *et al.* emphasize the importance of knowledge and educational interventions in shaping climate change literacy among nursing students. As such, there is a pressing need for curricula encompassing climate change education to prepare future healthcare professionals for the realities of a changing environment.⁽²¹⁾

Climate Change and Nursing Practice

The consequences of climate change extend beyond educational frameworks and significantly impact nursing practice. A growing body of evidence indicates that healthcare professionals are integral to addressing the emotional and psychological dimensions associated with climate change. For instance, Atta *et al.* conducted a multi-national study involving 1 266 asthmatics. They found that climate change anxiety substantially impairs both asthma control and quality of life, particularly among middle-aged individuals.⁽¹⁷⁾ This highlights the necessity for incorporating climate anxiety assessments into asthma management protocols, ensuring that nurses can provide holistic care. Amin *et al.* further explored emotional responses to climate change among primigravida women, revealing that climate-related distress correlates positively with antenatal anxiety while negatively affecting maternal-fetal attachment.¹⁸ This suggests the urgent need for healthcare providers to incorporate climate-related mental health assessments into prenatal care, affirming that nurses play a crucial role in fostering better maternal-fetal bonds.

Climate change affects nursing practice in ways that extend beyond educational frameworks. Healthcare providers are increasingly recognized for addressing climate change's mental and emotional impacts. Atta *et al.* conducted a study involving 1 266 asthmatic individuals and indicated that anxiety around climate change significantly undermines asthma management and quality of life in middle-aged individuals.⁽¹⁷⁾ This underscores nurses' need to incorporate climate anxiety evaluations into asthma management protocols to ensure comprehensive care. Amin *et al.* investigated the emotional responses to climate change among first-time mothers.⁽¹⁸⁾ Climate change-induced distress heightened prenatal anxiety and diminished the maternal-fetal bond. This underscores the significance of nurses in enhancing maternal-fetal attachment and the pressing necessity for climate change mental health evaluations in prenatal care.

Moreover, studies conducted by Abdelaziz *et al.* and Shaban *et al.* illustrate the varying nursing knowledge regarding climate change and its health impacts. Abdelaziz *et al.* identify significant training gaps among pediatric nurses, advocating for enhanced education to equip them with the skills to address climate change's effects on children.⁽¹⁹⁾ Meanwhile, Shaban *et al.* highlight the effectiveness of geriatric nursing-led intervention programs in reducing heat strain risks among elderly agricultural workers, showcasing how targeted nursing strategies can protect vulnerable populations from climate-related health issues.⁽²⁰⁾

Finally, Khalil *et al.* examined the emotional impact of climate change on older adults. They found that it harms quality of life and self-care capabilities while revealing positive correlations with pro-environmental behaviors. This affirms the necessity for tailored interventions that promote resilience and self-care strategies among the elderly.^(24,25,26)

Limitations

This rapid review has notable limitations. Systematic search may have missed relevant studies due to specific search terms, potentially omitting key work. The chosen studies may not encompass the entire range of nursing research in the Arab Middle East as published in non-indexed journals outside of Scopus or Web of Science. Also, the lack of a detailed quality assessment limits the reliability of the findings. Most studies were from high-income countries, affecting the generalizability to low- and middle-income contexts. Additionally, the absence of grey literature and longitudinal studies restricts comprehensiveness and insights into long-term effects, while variability in methodologies complicates consistent conclusions on best practices.

CONCLUSION

The findings from this review illuminate the critical need for a comprehensive framework within nursing education and practice that thoroughly integrates climate change and environmental health. Additionally, emphasizing the importance of nurturing emotional well-being and implementing proactive strategies within nursing practice underscores nurses' pivotal role in addressing the health impacts of climate change and

promoting environmentally conscious behaviors among at-risk populations.

The findings from this review emphasize the pressing need for a transformative framework in nursing education and practice that effectively integrates climate change and environmental health. By equipping nursing professionals with the necessary knowledge and skills to advocate for sustainability and address the emotional consequences of climate change, the nursing profession can serve as a crucial guardian of public health in the face of escalating environmental challenges. This transformation demands the development of comprehensive curricula that ensure future nurses are well-prepared to tackle these pressing issues. By infusing climate change education into nursing programs, we foster a generation of proactive healthcare professionals committed to sustainable practices and resilient healthcare systems. Consequently, an integrated educational approach is vital for empowering healthcare professionals to navigate the complexities of a rapidly changing environmental landscape skillfully.

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