

Multifaceted Roles of Nurses in Mitigating Climate Change-Related Health Impacts

A Scoping Review

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ABSTRACT

Climate change is increasingly amplifying global morbidity and mortality, disproportionately affecting vulnerable populations and placing sustained pressure on health systems. Nurses, as the largest segment of the healthcare workforce, are strategically positioned to mitigate climate change-related health impacts; however, the scope and empirical basis of these roles remain insufficiently consolidated. This scoping review aimed to map and critically examine the multifaceted roles of nurses in addressing climate-related health consequences. A comprehensive search of SCOPUS, PubMed, ProQuest, and ScienceDirect identified 15 articles eligible for inclusion in this review. Four core nursing roles were identified: (1) integrating climate change into nursing curricula and community health education, (2) advancing research on planetary health, (3) influencing climate-related health policies, disaster preparedness, and resilience strategies, and (4) providing climate-responsive care to vulnerable populations. A key finding was the predominance of normative and conceptual literature, revealing a substantial gap between expected nursing roles and empirically supported practices, particularly in direct caregiving interventions.

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Introduction

Climate change is a real threat that affects every part of life, from our environment to our health and social conditions. Recent events like extreme weather, higher temperatures, droughts, floods, air pollution, food shortages, and water contamination have had a major impact on public health [1]. Problems such as extreme heat, changing rainfall, rising sea levels, and severe storms have been linked to health issues like malnutrition, mental health problems, heart and lung diseases, allergies, and infections [1]-[4]. These effects are not felt equally. Vulnerable groups, including children, older adults, and people with chronic illnesses, face higher risks because they have less physical resilience and less access to healthcare [5]. As health emergencies related to climate change become more common and serious, it is more important than ever to have a skilled and adaptable health workforce that understands climate issues.

Over the past 50 years, climate change and extreme weather have led to more than 11,000 natural disasters and over two million deaths [6]. These changes have also contributed to the rise or worsening of 277 diseases and 58% of known infectious diseases [7]. Additionally, there have been more than one million cases of illnesses spread through water, food, dust, and other sources [8]. Climate change has worsened respiratory conditions like COPD and asthma, now affecting about 545 million people worldwide [9], [10]. It has also significantly impacted mental health, with reported rates of PTSD ranging from 19% to 52.7%, depression from 10.3% to 32.8%, anxiety disorders from 8.7% to 31.6%, and emotional and behavioral problems from 19.8% to 35% [11]. Between 2030 and 2050, experts expect climate change to cause an additional 250,000 deaths each year from malnutrition, malaria, diarrhea, and heat stress [1].

Climate change poses serious challenges to health systems. The growing severity of its effects shows that we need to respond urgently [12]. Although there have been many efforts to improve environmental health, particularly regarding air pollution and extreme weather, there is still a gap in research. Further research is needed to identify effective mitigation strategies for infectious diseases, chronic diseases, nutrition-related conditions, and mental health problems associated with climate change.

The healthcare sector is vital in responding to health crises caused by climate change, yet it also plays a major role in harming the environment. This contradiction highlights the need to incorporate sustainability into healthcare practices and to redefine professional roles to include responsibilities for the planet's health. Nurses, as the largest segment of the healthcare workforce, are uniquely positioned to integrate clinical care with environmental stewardship. They are expected to help with efforts to lessen the impact of climate change and to support individuals and communities in facing its effects [13].

Up to now, no comprehensive synthesis has mapped the full spectrum of nursing roles in mitigating climate-related health impacts, including diverse patient groups and practice settings. Although a few reviews have considered either the educational or the advocacy functions of nurses singularly, a comprehensive analysis that brings these multiple roles together to reveal new insights and trends is lacking. This paper presents the role of nurses in mitigating the health impacts of climate change for future areas of research in climate-responsive nursing care.

Material and Methods

A. Design

A scoping review is a methodological approach used to map relevant scientific evidence within a specific field without critically appraising study quality [14]. For the completion of this scoping review, the approach proposed by Arksey & O'Malley in 2005 was followed. A scoping review, in this scenario, is appropriate for understanding the scope, features, and conceptualization surrounding the role of nurses in mitigating the effects of climate change, where the empirical data is still in an emerging state. This study was informed by the research question "What are the roles of nurses in mitigating the health impacts of climate change?"

B. Identifying Relevant Studies

A literature search was done by all authors using various databases including SCOPUS, PubMed, ProQuest, and ScienceDirect. A search was restricted to articles published between the years 2016-2025 in the English language. A final search was conducted on 30th April, 2025. While performing the search, keywords were used in combination with both controlled vocabulary (MeSH) terms as well as free keywords in three fields: (nurs OR "nursing role")* AND ("climate change" OR "global warming" OR "environmental change") AND (health impact OR morbidity OR vulnerability)*. Boolean operators AND/OR have been used. Since the availability of literature based primarily on current nursing roles in climate change mitigation is limited, this review deliberately includes conceptual literature, narrative reviews, and policy-driven literature.

C. Study Selection: Inclusion and Exclusion Criteria

From the initial search in five online databases, Scopus, PubMed, ProQuest, and ScienceDirect, a total of 615 records were identified. All identified records were then copied into a paper management system (Mendeley) for easy removal of duplicates, resulting in the removal of 217 duplicates, leaving a total of 398 records for screening based on their titles and abstracts.

In this screening process, a total of 317 records were removed based on predefined eligibility criteria because they did not relate to the nursing function, climate change, or health in relation to these changes. Of the remaining 81 records, attempts were made to get the full

texts; however, 44 failed after several attempts, leaving a total of 37 full texts for evaluation of eligibility. Of these, a total of 22 were removed because they did not relate to the role of nurses (n=2), did not relate to climate change (n=5), or did not relate to the mitigation of health effects of climate change (n=15). Therefore, a total of 15 studies were retained for the qualitative analysis. All steps in the screening are depicted in the PRISMA flowchart (Fig. 1).

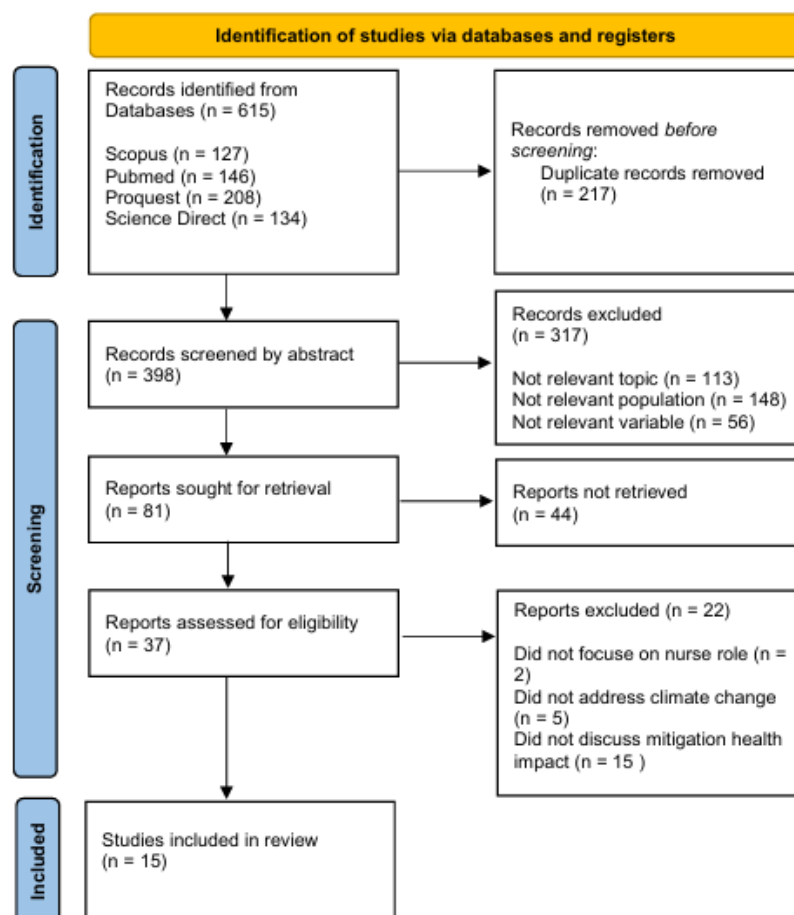


Fig. 1. PRISMA Flowchart

In this process, the data were extracted from the articles using a table with elements such as authors' names, year of publication, goals for conducting research, study designs, as well as study findings. In conducting scoping reviews, no critical appraisal of the articles to be included was done as per the guidelines for scoping reviews [15]. On the aspect of critical appraisal, despite not conducting critical appraisal, articles identified for review can be categorized depending on types of evidence as well as targeted populations.

D. Collating, Summarizing, and Reporting Results

In a scoping review, data analysis can be varied depending on the intention and preferences of the authors [15]. In the thematic synthesis, the authors used an inductive approach of theme synthesis through iterative coding by a team of authors. This involved comparing themes,

consolidating, and developing themes through team member discussion to improve analytical rigor. In this process, the authors applied thematic analysis to synthesize data to establish themes corresponding to the roles nurses play to counteract health effects from climate change. In establishing themes from data, Microsoft Excel was applied to compile data for theme emergence through coding.

Results and Discussions

A. Characteristics of Included Studies

In total, 15 articles have been short-listed for this review, which were published from 2017 to 2025. Only one article in 2017 and one in 2018 were short-listed for the review. For the year 2019, two articles were short-listed, and for 2020, one article in total. The largest number of publications was observed in 2022, 2023, and 2024, with three articles each, while one was in 2025. Different study designs were adopted in the selected articles. For one article, a study was classified as a qualitative study, an exploratory study, and a systematic review. In total, there were three scoping reviews, while two more were classified as discussion papers. Narrative studies constituted the majority of the included studies ($n = 7$). Characteristics of the studies included can be viewed in Table 1.

Table 1. Characteristic of Included Studies

No	Author	Year	Aims	Study design	Results
1	Ward et al. [16]	2024	Explore how nurses respond to extreme weather events	Scoping review	1. Involved in policy development and planning 2. Clinical leadership 3. Vulnerability assessment 4. Continuing service delivery during extreme weather events 5. Education and training
2	Baykara Mat [17]	2022	Examining the evidence regarding the role of nurses in responding to climate change and climate change-induced wildfires.	Systematic Review	1. Involved in early warning systems and emergency response 2. Leading in disaster management 3. Evaluating and ensuring continuity of health services 4. Providing recommendations to national emergency response plans
3	Sibindi et al. [18]	2024	Synthesizing literature related to the role and competence of	Scoping review	1. Need to include the concept of eco-nursing in the nursing education curriculum

No	Author	Year	Aims	Study design	Results
			nurses in eco-nursing		2. Conduct research, education, advocacy, and clinical practice related to climate change
4	Rosa & Upvall [19]	2019	Develop a new paradigm for broader nursing involvement in planetary health	Narrative study	1. Integrated planetary health into nursing education and practice 2. Collaborate with policymakers 3. Develop research on planetary health
5	McDermott-Levy et al. [20]	2019	Providing nurses about climate change and specific interventions for the elderly	Narrative study	Nurses need to identify stressors and help older adults adapt to climate change situations
6	Harris et al. [21]	2022	Discussing the role of nurses in public health, policy, climate change, and the SDG's	Discussion paper	1. Advocacy for nursing education on climate change 2. Education for nurses, health workers, and communities about climate change-related diseases and their prevention 3. Making policies
7	Leffers et al. [22]	2017	Identifying nurses' responses to climate change in nursing education, challenges and recommendations	Discussion paper	1. Integrating climate change into nursing education curriculum 2. Strengthening leadership roles for climate change
8	Lilienfeld et al. [23]	2018	Identifying the health consequences of climate change and their implications for nursing	Scoping review	1. Advocacy 2. Education about climate change
9	Arias et al. [24]	2023	Explaining the role of oncology nurses to reduce the impact of climate change on cancer patients	Exploratory study	1. Communication and education that focuses on the conditions related to climate change 2. Supporting and facilitating patients
10	Samba et al. [25]	2023	Describes how climate change worsens the condition of oncology patients and also describes nursing strategies to	Qualitative study	1. Develop policies related to environmental health 2. Increase education 3. Pay special attention to vulnerable patients,

No	Author	Year	Aims	Study design	Results
			reduce and prevent these impacts		4. Conduct research related to the impact of climate change
11	Bignier et al. [26]	2024	Explaining the impact of change on respiratory problems in children and mitigation and adaptation strategies	Narrative study	1. Education about efforts to reduce greenhouse gas emissions 2. Education about climate change adaptation
12	Portela Dos Santos et al. [27]	2023	Explaining the challenges facing nurses due to climate change and health-related environment	Narrative study	1. Making changes to health promotion designs 2. Increasing eco-literacy and developing and implementing innovative interventions
13	Reis da Silva [28]	2025	Exploring evidence-based interventions delivered by community nurses with older individuals during climate change	Narrative study	1. Promotion and education about climate change to vulnerable groups 2. Collaborate with other health workers to carry out health promotion
14	Nicholas et al. [29]	2020	Identifying the impact of climate change on elderly individuals and its prevention	Narrative study	1. Nurses integrate climate change-related health into every visit 2. Conduct assessments, diagnoses, and formulate interventions
15	Brown et al. [30]	2022	Provides an overview of the impacts of climate change on mental health and considerations for nurses in addressing them	Narrative study	1. Conduct initial and ongoing screening for psychiatric symptoms in individuals experiencing severe climate change 2. Engage in focused mental health prevention and care, and policy advocacy related to the health impacts of climate change

Due to heterogeneity in terms of the designs of studies as well as the populations sampled, generalizability of the data in terms of the level of effectiveness is not possible. However, one of the main findings of the review is the heterogeneity itself, with the expectations placed on the role of the nurses not aligned with the evidence. In view of the diversity of study designs, a secondary analysis was performed to identify the type of evidence that exists to sustain each

of the nursing roles. Normative (what should be done by nurses) versus empirical (what has been done) roles represent a vital step in the application of climate and health discourses to operative evidence-based practices. These are summarized in Table 2, and they indicate that the role of caregiving is the only one that lacks empirical basis, whereas the others are primarily ideals.

Table 2. Thematic Mapping of Nursing Roles by Evidence Type, Study Design, and Population Focus

Theme	Sub Theme	Empirical (Y/N)	Study Design	Description	References
Educator	Integrating climate change concepts into nursing education curriculum	N	Narrative study, discussion paper, scoping review	1. Integrate the concept of climate change, its health impacts, and prevention into the nursing education curriculum	[18], [19], [22], [23], [31]
				2. Increase eco-literacy and health into the nursing education curriculum	
	Education about the impacts of climate change on health and how to prevent it for individuals, vulnerable groups, and communities	Partially Y	Empirical: exploratory, qualitative Non-empirical: narrative, discussion	Educate individuals, communities, and especially vulnerable groups in dealing with the impacts of climate change	Empirical: [24], [25] Non-empirical: [16], [21], [26], [28]
Researcher	Conducting research related to the impacts of climate change	N	Narrative study, scoping review, discussion paper	Conduct and develop research related to planetary health, health impacts of climate change in each competency of nurses	[18], [19], [25]
Advocate	Conduct advocacy and contribute to determining policies related to climate change and become a leader in mitigating disasters due to climate change	N	Narrative study, discussion paper, scoping review	Collaborate with policymakers and provide recommendations on the development of health policies	[18], [19], [21], [22], [23]

Theme	Sub Theme	Empirical (Y/N)	Study Design	Description	References
		Partially Y	Empirical: systematic review Non-empirical: narrative	Strengthen leadership roles to implement mitigation, adaptation, and resilience strategies	[16], [17], [30]
Care giver	Providing ongoing nursing interventions to individuals, vulnerable groups, and communities	Partially Y	Empirical: exploratory, qualitative Non-empirical: narrative	- Involved in early warning systems and emergency disaster response - Pay special attention to vulnerable patients and provide additional education - Conduct assessments, diagnoses, and interventions	Empirical: [24], [25] Non-empirical: [20], [28], [29], [30]
		Partially Y	Empirical: systematic review (mental health focus) Non-empirical: narrative	Nurses need to help conduct screening, identify stressors, and help adapt to climate change	Empirical: [17] Non-empirical: [30], [32]

*Y = yes; *N = No

B. Integrating Climate Change into Nursing Curricula and Community Health Education

The majority of the articles identified the role of nurses as educators in efforts to mitigate the health impacts of climate change. Two important areas of focus are described within this role. The first approach relates to providing curricular content on climate change within nursing education programs [19], [23], [25], [28]. The proposed curriculum should encompass three key components: climate change, its associated health impacts, and adaptation and prevention strategies aimed at minimizing adverse health outcomes. The second area incorporates eco-nursing concepts into nursing education, which enhances the linkage between health and the environment. This approach emphasizes the integration of eco-nursing concepts into nursing education, highlighting the interrelationship between environmental sustainability and health [18], [26], [27]. Apart from delivering academic learning, nurses are also responsible for educating individuals, vulnerable groups, as well as communities, regarding the effects associated with climate change and how these effects can be averted through nursing [16], [19], [21], [22], [24], [25], [33].

Climate change has caused significant structural alterations and detrimental effects on the organization of care services. In such circumstances, long-term measures must be taken to

prepare the future generation of nurses with adequate knowledge and competency skills. For such purposes, incorporation of the concept into nursing curricula has been suggested for nursing education [31], [33]-[35]. This strategy aims at preparing future nurses to meet health challenges that come with climate change and position them in the advocacy of sustainable nursing practices and public health policies addressing health concerns associated with climate change. In addition to clinical practice, the inclusion of climate change content in nursing education will ensure that future nurses are positioned for even wider roles of advocacy and engagement in policy-making in efforts toward solving health problems arising from climate change [31].

The role of a nurse educator should also include health education for persons, groups, and communities and should pay attention to the health education and promotion of vulnerable populations. Communication and education should highlight the uncertainty of the phenomenon and provide information on associated health conditions and their possible manifestations [24]. Provide special attention to vulnerable patients, such as oncology patients, by giving additional environmental education on not being exposed to sun radiation, decreasing air pollution exposure, and ensuring enough liquid intake [25]. Climate adaptation strategies, such as limiting the time spent outdoors, reducing pollution exposure, and maintaining respiratory health in children, need education [26]. Education is considered one of the major factors that enable resilience and adaptation to climate change. Education could, moreover, positively impact climate change mitigation [36], [37].

Climate-focused health education should go beyond just academic institutions; it needs to become part of health service provision. Nurses practicing in health care facilities such as primary health care facilities, hospitals, and communities need to incorporate climate-based health education in their day-to-day work. This type of education might involve educating patients on how to avoid heat-related illnesses, safe water consumption during floods, protection from air pollution, and managing chronic diseases during extreme weather conditions. In this way, health education will act as a very good mitigation measure within health service provision [38], [39].

In Indonesia, for instance, a nation that is constantly threatened by flood disasters, droughts, and heat stress, nurses are typically the sole first contact in disaster-prone communities. The role that caring professionals take in understanding continuity of care for chronic conditions such as diabetes in times of climate disasters is not only ideal but also an essential immediate responsibility that is not being addressed in nurse training programs in relation to climate change responses.

C. Advancing Research on Planetary Health

Three articles stressed the need for nurses to take on the role of researchers. It is encouraged that nurses pursue research that explores the effects of climate change on the well-being of people and the globe. They can also conceptualize projects about the effects of climate change on the health of the planet and people, the strategies to manage the effects, and the strategies to prevent the effects of climate change on the health of the planet and the people [18], [19], [25]

Critical appraisal of the type of evidence reveals a substantial mismatch between normative assumptions or expectations and empirical support. Although the four roles are always portrayed equally consistently in the data, 12 studies of the 15 studies follow the type of narrative or conceptual/plan-based approach designs. Only three studies provided original empirical data, including one qualitative study, one exploratory study on oncology nursing care, and one systematic review addressing disaster response [17], [24], [25]. It is important to note that the involvement of nurses as researchers, which has often been encouraged, is exclusively represented by opinion articles, meaning that there has been no investigation conducted on their findings in climate research studies led by nurses.

The nursing profession also has the responsibility to utilize available knowledge as well as develop knowledge within nursing sciences. Due to the rapid growth within nursing sciences, nursing research plays a critical role in ensuring that organizations modify their care processes according to their effective learning and experience from these processes [40]. Evidence-based practice has been identified as a critical tool for enhancing the quality within the healthcare sector as well as ensuring improved outcomes for patients. The objectives of nursing research, which include creating new knowledge, seem to have a slightly different aim from that of evidence-based nursing practice, which aims to provide the best available knowledge within practice, but a wide range of studies have been conducted that seek to incorporate evidence within nursing practice.

Beyond its role in clinical practice, nursing research also contributes to policy development. Research findings have been cited in policy documents related to climate change [41]. The use of research evidence in policy formulation is known as evidence-based policy-making or science-based policy-making [42] and the social impact of such research can be measured and evaluated [43].

D. Influencing Climate-related Health Policies, Disaster Preparedness, and Resilience Strategies

Eight studies pinpointed nurses as advocates in reducing the disease effects caused by climate change. Nurses can participate in advocacy work, as well as offer recommendations in policy formulation on climate-related concerns, by working in collaboration with policymakers,

taking an active role in policy-making, and providing recommendations for the formulation of health policies in relation to climate change [16], [19], [21], [23], [25], [33]. They can also participate by providing recommendations, as well as involvement in preparing for disasters at a national level, environmental health, as well as strategies for managing mental health [17]-[19], [30].

Three of the articles discussed the possible involvement of nurses in leadership roles when it comes to advocacy efforts to reduce the effects of climate change. This involvement could include improving leadership roles of nurses in mitigation, adaptation, and risk-resilience strategies [17], [22], [44] as well as in managing disaster situations to build human resource capacity [17].

In the context of global action on climate change, nurses can advocate and participate in policy efforts to enhance mitigation and adaptation to climate change within their work environments [45], through the development of policies that guarantee waste reduction, proper waste management, and other sustainable methods in health care. Nurses can develop their leadership roles to contribute to the implementation of mitigation, adaptation, and resilience strategies in response to climate change [22]. Provide nursing assessments for government officials or healthcare leaders in communities that have environmental hazards and recommend interventions or programs that will prevent and manage the diseases concerned [47]. During disasters, nurses may be involved in developing national emergency response plans through assuming leadership roles for disaster management to advocate for strengthening human resources, assessing the needs for interventions, guaranteeing continuity in health service provisions, and creating proactive action plans against future disasters [17].

In terms of providing healthcare services, nurses must actively engage in the creation of climate-based service delivery frameworks at all levels of service delivery. Healthcare institutions need to put in place strategies for dealing with climate emergency situations, such as preparedness frameworks that include continuity of care for those with chronic diseases, early detection systems, surge capacity management, and interprofessional collaboration during climate emergencies. Climate-based strategies in the healthcare system may lead to reduced disruption of service delivery [16].

E. Providing Climate-responsive Care to Vulnerable Populations

Most of the articles also discussed the involvement of nurses in the provision of care during the occurrence of climate change. Nurses are expected to offer continuous nursing practices to individuals, groups, and communities. In early warning systems and disaster response, nurses assess intervention requirements, the continuity of healthcare services, and proactively design intervention plans if disasters are to occur in the future [17]. Nurses also play a part in

screening, stressor identification, and helping people adjust to climate conditions [24], [31]. Attention should also be focused on vulnerable groups such as the older generation, children, and cancer patients. Nurses are recommended to offer extra educational support such as protecting themselves from the sun, minimizing air pollution exposure, and staying hydrated [25], [26], [28], [44]. Furthermore, nurses are also engaged in assessment and diagnosis alongside designing intervention plans as shielding strategies for climate-related disruptions that could further worsen health and climate-related risks [29], [30]. In the day-to-day practices of nursing, nurses must ensure that climate-resilient nursing care is included in routine patient evaluations. The factors that need to be evaluated include patients' exposure to the environment, the state of their housing, access to safe water, food security, and susceptibility to climate extremes. By conducting climate risk screening as part of a patient evaluation, healthcare professionals will be able to identify vulnerable individuals and take action accordingly.

Nurses must provide continuity in healthcare service delivery due to the uncertain conditions brought about by climate change, further deteriorating health. Community nurses and primary care nurses can address climate-related health concerns among families and provide protections for vulnerable populations through thorough assessments [16], [48], physical examinations, and the creation of nursing care plans [29]. This includes developing individual emergency plans, teaching about first aid and how to recognize an emergency, and ensuring that the patient with a chronic condition has a supply of medication sufficient to last several days and an end plan should their condition deteriorate [49].

For children, nurses need to determine those health conditions that are directly or indirectly influenced by climate change and predict those environmental factors that can exacerbate the conditions, such as asthma and allergies [3], [50]. Nurses are called upon to evaluate climate-related health risks in each patient encounter and offer family education regarding concerns like air pollution, physical activity, and other specific needs that impact health [51], [52]. Nurses play a role in the identification of complications that could arise, monitor the changes brought about by climate change, and apply intervention measures to reduce the risks to health associated with these changes [53]. The nurses can help in this process by adopting sustainable practices in their caregiving, such as the reduction of unnecessary consumption of resources, minimizing health care waste, green purchasing, and encouraging energy efficiency. Sustainable health care provision not only reduces the ecological impact of health care organizations but also provides long-term public health benefits.

To address global effects, mental health monitoring and testing of individuals can be done in anticipation of global effects or during their occurrence. Through this testing, it is possible

to establish the extent of psychological effects arising from climate change [30]. The above interventions are also aimed at assisting people in adapting to uncertainty and change and in increasing their ability to effect change [32]. In addition to this, nurses are also supposed to help cancer patients engage in personal care practices such as performing environmental hygiene [24].

Limitations

Notwithstanding its strengths, this review also has several limitations. Firstly, the fact that articles were restricted to those published in English may have led to the omission of relevant literature published in other languages, thereby introducing language bias. Secondly, a larger number of included studies were either narrative or scoping reviews, which may suggest a relatively lower level of evidence as opposed to primary research. Thirdly, the rate at which literature related to climate change and health issues keeps rising, thereby suggesting the need to update this evidence base.

Conclusion

Instead of claiming the effectiveness of the projects explicitly, the discussion of this scoping review tends to address the dynamic and complex positioning of nursing in the discourse of climate and health. The strength of this review stands in the understanding of the field of concepts and the development of this review for a research agenda aimed at a more effective nursing practice in the context of climate change. This review highlights the central and multifaceted roles of nurses in mitigating the health impacts of climate change.

A novel contribution of this review is the distinction between normative nursing roles and those supported by empirical evidence. The identification of areas for future studies based on the need for adaptation and mitigation strategies regarding climate change is part of the role definition process, where the role is first identified in terms of the groups in relation to the types of evidence available.

In keeping with the findings, it is important that this review defines precisely that today, concerns are normative about nursing roles in climate change initiatives. While there are nursing roles within education, advocacy, and research, there are few primary studies about nursing as a caregiver. The evidence mapping from here would recommend, as a priority, that there are nursing areas warranting a focus for future primary studies, including nursing interventions in relation to climate change outcomes.

Conflict of Interest

There is no conflict of interest in this work

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