



**Planetary Health,
Climate Change
and Sustainable
Healthcare:**

**Essential
Knowledge and
Skills for Nursing
Students**

2023

Authors

The project to develop the planetary health, climate change and sustainable healthcare knowledge and skill statements for nursing students was undertaken in 2023 by members of the Planetary Health in Nursing & Midwifery Research & Education Collaborative. The project was led by Distinguished Professor Tracy Levett-Jones from the University of Technology Sydney (UTS). Project team members included Professor Jane Maguire, Associate Professor Christine Catling, Associate Professor Jacqueline Pich, Dr Erica McIntyre, Sarah Cheer, (UTS), Professor Tracey Moroney OAM (Curtin University), Associate Professor Zerina Lokmic-Tomkins (Monash University), Dr Victoria Pitt (University of Newcastle), Associate Professor Nicola Whiteing, Anna Foster (Southern Cross University) and Loraine Fields (University of Wollongong).

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Background

Climate change is the single biggest health threat facing humanity and healthcare professionals worldwide¹. As nurses comprise the largest healthcare discipline (>60%)², they must be educated to mitigate the health sector's impact on the environment, prepare for current and future health impacts of environmental change, and advocate for greater attention to planetary health. Empowering nurses with appropriate knowledge and skills has the potential to make a significant difference to the carbon footprint of healthcare organisations.

Planetary health recognises the interconnection between the health of the Earth's natural systems and the wellbeing of human beings³. It emphasises the need for sustainable practices and policies that protect both the environment and the health of current and future generations⁴. Climate change is a significant disruptor of planetary health, with direct consequences for ecosystems and natural processes. Escalating global temperatures have resulted in biodiversity loss, shifting disease patterns, food and water scarcity, and extreme weather events, all impacting human health⁵. Nurses have a responsibility to sustain and protect the natural environment from depletion, pollution, degradation and destruction⁶.

Planetary nursing identifies humanity's interconnectedness with the stability of the planet, the grassroots efforts of nurses worldwide and the profession's willingness to embrace planetary health as a priority in our work as facilitators of healing, leaders, and activists for social justice and health equity

- WILLIAM ROSA

Given the expected increase in climate change impacts on human health, current and future healthcare professionals must be able to respond effectively. Nurses are at the forefront of this call to action because they represent the most trusted profession globally². They also have significant community outreach, especially to disadvantaged and marginalised communities, which are often disproportionately affected by climate change events⁷.

The International Council of Nurses advocates that, in order to enhance the capacity of the nursing profession to deliver climate-related interventions, the concepts of planetary health, climate change and sustainability must be imbedded into nursing curricula⁶. Until now, the lack of consensus on the essential knowledge and skills required by nursing students has hindered the advancement of curricula and impacted educators' confidence in teaching planetary health and climate change. The Delphi study profiled in this report was conducted to seek expert consensus on the knowledge and skills needed to enable undergraduate nursing students to steward healthcare towards a more sustainable future and the findings are internationally relevant. While the knowledge and skills framework provides a discipline-specific approach, the concepts nevertheless align with the AMEE Consensus statement for Planetary Health and Education for Sustainable Healthcare and the Planetary Health Alliance Planetary Health Education Framework.

Among the pressing realities of environmental and health challenges, educational institutions are uniquely positioned to contribute to achieving the transitions needed for a healthier future by incorporating planetary health education into curricula

- CARLOS GUZMAN ET AL.

Research Design

A two-phase Delphi study was undertaken for this project. Phase 1 included the generation of planetary health, climate change and sustainability domains, knowledge and skill statements, and Phase 2 consisted of a real-time Delphi survey conducted to seek consensus on the proposed statements.

The Delphi technique is a flexible, iterative, group facilitation method that systematically elicits expert input and allows for asynchronous participation and anonymity of participants⁸. The Delphi technique correlates informed judgements and transforms opinions about a given issue into group consensus⁹. The 'real-time' Delphi approach uses purposively designed software to conduct a 'round-less' survey which facilitates free flow of information between panel members over a defined period of time¹⁰. The real time presentation of results enables panel members to continually review the responses of others and reassess and amend their own responses in order to generate consensus¹¹.

Following ethics approval (ETH23-8253), a group of 42 international experts from Australia, United Kingdom, United States, Brazil, Canada and Germany were recruited for the study. Just over half (53.7%) had a nursing background, with other panel members representing Earth sciences, medical, public health and allied health disciplines. Many of the participants held multiple professional roles including that of researcher, educator and/or clinician. In addition, 29% of the participants held roles such as sustainability managers, Net Zero clinical leads, and climate change/planetary health strategy and policy officers. Most of the participants had high level academic qualifications including Doctoral (44%) and Masters degrees (34%).

There was a high level of overall agreement with most of the knowledge and skill statements. Of the 49 items, 44 (90%) achieved $\geq 75\%$ consensus and 26 (53%) achieved $\geq 80\%$ consensus. Three statements were removed and 32 were modified to improve clarity of language.

This final framework of knowledge and skill statements can serve as a guide for integrating planetary health, climate change and sustainability into nursing education programs both in Australia and globally. This in turn has the potential to produce more environmentally conscious and socially responsible nurses who will ultimately have a positive impact on the individuals and communities they serve.



Domain 1: The science of planetary health and climate change

The nursing student has a level of scientific knowledge that enables them to contribute to informed discussions related to climate change and its impact on environmental and human health.

KNOWLEDGE STATEMENTS

The nursing student:

- Discusses the meaning of planetary health, climate change and related terms such as:
 - » Global warming
 - » Greenhouse gas emissions
 - » Carbon footprint
 - » Anthropocene
- Explains the interdependence of human health and the health of the environment
- Describes, in simple terms, the basic scientific principles of climate change
- Describes how human activities, including use of fossil fuels, are exacerbating climate change
- Outlines the contribution of the healthcare system to greenhouse gas emissions
- Outlines the impact of climate change on environmental disasters such as extreme weather, droughts, floods, fires, dust storms, extreme heat and sea level rises, locally, nationally and internationally
- Describes how environmental conditions and climate change influences the prevalence of infectious diseases
- Describes how climate change impacts the environmental determinants of health, including food and water security
- Explains how and why socioeconomically disadvantaged and marginalised communities locally, nationally and internationally, are most impacted by climate change
- Discusses how First Nations peoples' connection with Country, cultural knowledges, land management and conservation practices, inform the agenda for a sustainable future.

SKILL STATEMENTS

The nursing student:

- Communicates effectively with various stakeholders, including colleagues, healthcare consumers and policy makers, about the consequences of climate change for human health, in order to promote informed decision making
- Disseminates scientific evidence related to planetary health and climate change
- Provides a nursing perspective in interdisciplinary discussions related to the challenges associated with climate change
- Advocates for and works with those most impacted by the short and long term impacts of climate change

Climate change refers to a 'change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'¹².

For nursing students to comprehend how climate change disrupts planetary and human health, a foundational understanding of climate systems, historical patterns, and future scenarios is necessary¹³. This understanding is pivotal for several reasons: it illuminates the causes of climate change, including production of greenhouse gases and human activities; provides an understanding of potential climate change impacts, such as rising sea levels and extreme weather events; informs policies related to sustainable healthcare; and creates the shared language needed to confidently educate the public and advocate for climate action^{14,15}.



Domain 2: Mitigation of the adverse impacts of healthcare on the environment

The nursing student takes personal and professional responsibility for mitigating climate change through individual, practice-based, social and population-based initiatives.

KNOWLEDGE STATEMENTS

The nursing student:

- Discusses the meaning of mitigation of climate change and related terms, such as:
 - » Environmental sustainability
 - » Net Zero targets
 - » Carbon neutral
 - » Planetary boundaries
- Discusses examples of the environmental impact of healthcare delivery and nursing practice
- Explains the relevance of Net Zero plans to the work of nurses
- Provides examples of direct and indirect health co-benefits of mitigation measures
- Discusses personal, interpersonal, organisational and political enablers and barriers to nurses' sustainable behaviours
- Discusses the roles of nurses as change agents and advocates for environmentally sustainable healthcare practices
- Explains how nurses uphold the ethical principles of beneficence, nonmaleficence, autonomy and justice by practicing in an environmentally sustainable manner
- Identifies healthcare staff involved in sustainability initiatives and describes their roles and responsibilities
- Describes local healthcare initiatives for reducing greenhouse gas emissions and their impact
- Investigates legislative and organisational requirements for segregating and managing waste disposal

SKILL STATEMENTS

The nursing student:

- Responsibly selects and uses healthcare products
- Accurately segregates and disposes of bio-hazardous, chemical, pharmaceutical and nuclear waste according to legislative and organisational requirements
- Educates colleagues and consumers on rationales for waste segregation and management practices
- Advocates for minimisation and environmentally sustainable disposal of waste
- Identifies strategies for waste reduction, reuse and recycling
- Advocates for appropriate antimicrobial stewardship
- Contributes to organisational initiatives and quality improvement projects related to environmental sustainability
- Uses risk communication strategies to advocate for proactive action to address the impacts of climate change

Climate action encompasses two main strategies: mitigation and adaptation. Mitigation refers to human interventions that limit or prevent greenhouse gas emissions or that remove these gases from the atmosphere by addressing its root causes¹⁶.

Healthcare organisations are resource intensive enterprises and major contributors to climate change. In Australia, healthcare is responsible for 7% of all carbon emissions¹⁷. While greenhouse gas emissions result from all aspects of healthcare operations, only 25% of the health system's carbon footprint comes from energy use. A much larger proportion (70%) is attributable to the manufacture, supply, use and waste management of healthcare goods and services [18]. Nurses therefore require the knowledge and skills to mitigate the impact of care on the environment, individuals and communities by prudently selecting and using healthcare products, appropriately segregating and disposing of bio-hazardous, chemical and pharmaceutical waste, and addressing concerns associated with wasteful and low value healthcare.



Domain 3: Adaptation to the actual and expected impacts of climate change on healthcare and health outcomes

The nursing student supports individuals and communities to anticipate, respond to and recover from the current and future effects of an unstable climate on healthcare provision and health outcomes.

KNOWLEDGE STATEMENTS

The nursing student:

- Discusses the meaning of adaptation to climate change and related terms, such as:
 - » Climate-driven disasters
 - » UN Sustainable Development Goals
 - » Sustainable development
 - » Climate resilience
 - » Climate justice
- Discusses how climate change affects the social and environmental determinants of health such as clean air, safe drinking water, food security and safe housing, especially for priority populations
- Explains the interconnected nature of climate change adaptation measures and the UN Sustainable Development Goals
- Describes strategies nurses can use to support individuals and groups most at risk of climate impacts (such as air pollution, extreme temperatures, floods and fires), with particular attention to frail and elderly people, young children, pregnant women and those with pre-existing co-morbidities and/or disabilities
- Describes the health impacts of climate change on cardiovascular, respiratory, renal, gastrointestinal, neurological, integumentary, endocrine and reproductive systems across the lifespan
- Outlines potential psychological responses and mental health impacts of climate change, including anxiety and stress
- Discusses how healthcare settings can adapt models of care and resourcing to manage climate-driven disasters.

SKILL STATEMENTS

The nursing student:

- Provides effective and person-centred care to individuals whose health is impacted by climate change and/or climate related disasters
- Engages with community members to promote and protect health in the context of weather extremes and climate-driven disasters
- Works collaboratively and within interprofessional teams to respond to climate related health issues and disasters
- Responds appropriately to the emotional and mental toll of climate change impacts on colleagues' and own wellbeing
- Provides evidence-based information and education to healthcare consumers and colleagues about preparing for, responding to, and recovering from the effects of climate change
- Applies knowledge and expertise to influence environmental policies and to advocate for solutions that build climate resilience
- Discusses examples of successful adaptation strategies and, in particular, those that have impacted priority patients and marginalised communities

Adaptation refers to actions taken to minimise the adverse effects of climate change on human health and the environment, with a particular focus on safeguarding priority populations and marginalised communities. Adaptation strategies also aim to build individual and community resilience against climate change¹⁶.

Acute climate events can have both direct and indirect impacts on human health, including respiratory and cardiovascular illnesses, nutrition-related disorders, vector-borne diseases, water-borne illnesses, and poor mental health resulting from post-traumatic stress disorders and climate migration⁵. Nurses must be educated to support individuals most at risk of climate impacts (such as air pollution, extreme temperatures, floods and fires), with particular attention to frail and elderly people, young children, pregnant women and those with pre-existing co-morbidities and/or disabilities⁷.

References

1. Watts, N., et al. (2015). Health and climate change: Policy responses to protect Public health. *Lancet*. 386 (10006):1861–914. DOI: [10.1016/S0140-6736\(15\)60854-6](https://doi.org/10.1016/S0140-6736(15)60854-6)
2. Lokmic-Tomkins, Z., Nayna Schwerdtle, P., & Armstrong, F. (2023). Engaging with our responsibility to protect health from climate change. *Journal of Advanced Nursing*. 79(6), e41–e44. <https://doi.org/10.1111/jan.15508>
3. Planetary Health Alliance. Accessed November 24, 2023 at: <https://www.planetaryhealthalliance.org/planetary-health>
4. United Nations. *Climate Change*. Accessed November 24, 2023a at: <https://unfccc.int/climate-action/un-global-climate-action-awards/planetary-health>
5. Abhijeet., Singh, E. & Shindikar, M. (2023) A comprehensive review on climate change and its effects. *International Journal of Environment and Climate Change*. 13(11). 924–931. DOI [10.9734/ijec/2023/v13i113240](https://doi.org/10.9734/ijec/2023/v13i113240)
6. International Council of Nurses . (2018). *Position Statement - Nurses, climate change and health*. Accessed October 30, 2023: <https://www.icn.ch/sites/default/files/inline-files/ICN%20PS%20Nurses%252c%20climate%20change%20and%20health%20FINAL%20.pdf>
7. Thorne, S. (2021). Awakening to the climate emergency. *Nursing Inquiry*. 28(4), e12459. <https://doi.org/10.1111/nin.12459>
8. Linstone, H. & Turoff, M. (2011). Delphi: A brief look backwards and forward. *Technological Forecasting & Social Change*. 78(9), p.1712–1719. DOI: doi.org/10.1016/j.techfore.2010.09.011
9. Rowe, G. & Wright, G. (2011). The Delphi technique: Past, present, and future prospects. *Technological Forecasting and Social Change*. 79(9), 1487–1490. <https://doi.org/10.1016/j.techfore.2011.09.002>
10. Gnatzy, T., Warth, J. von der Gracht, H. & Darkow, I. (2011). Validating an innovative real-time Delphi approach - A methodological comparison between real-time and conventional Delphi studies. *Technological Forecasting & Social Change*. 78, p. 1681–1694. DOI: [10.1016/j.techfore.2011.04.006](https://doi.org/10.1016/j.techfore.2011.04.006)
11. Varndell, W., Fry, M. & Elliott, D. (2021). Applying real-time Delphi methods: development of a pain management survey in emergency nursing. *BMC Nursing*. 20(1), 149. DOI: [10.1186/s12912-021-00661-9](https://doi.org/10.1186/s12912-021-00661-9)
12. United Nations. *Framework Convention on Climate Change*. Accessed October 24, 2023b at: <https://unfccc.int/resource/ccsites/zimbab/conven/text/art01.htm>
13. Shaman, J., & Knowlton, K. (2018). The need for climate and health education. *American Journal of Public Health*. 108(S2), S66–S67. <https://doi.org/10.2105/AJPH.2017.304045>
14. United Nations. *Peace, dignity and equality of a healthy planet*. Accessed October 24, 2023c at: <https://www.un.org/en/global-issues/climate-change>
15. Climate.Gov. What is Climate Science Literacy? Accessed October 24, 2023 at: <https://www.climate.gov/teaching/what-is-climate-science-literacy>
16. IPCC Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the IPCC Sixth Assessment Report. Accessed November 24, 2023 at: [AR6 Climate Change 2022: Mitigation of Climate Change – IPCC](https://www.ipcc.ch/report/ar6/wg3/)
17. Malik, A. et al. (2018). The carbon footprint of Australian health care. *Lancet Planet Health*. 2: e:27–35. DOI: [https://doi.org/10.1016/S2542-5196\(17\)30180-8](https://doi.org/10.1016/S2542-5196(17)30180-8)
18. Prabhakaran, P., Armstrong, F. & Karliner, J. (2023). Decarbonising the Healthcare Sector: A Roadmap for G20 Countries. T20 Policy Brief. Accessed November 24, 2023 at: <https://www.orfonline.org/research/decarbonising-the-healthcare-sector>



Glossary

| Term | Definition |
|---|--|
| Adaptation | In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects. |
| Adaptation strategies | An adaptation strategy is a program, project or approach that has been developed to respond to anticipated climate change impacts in a specific area of potential concern. |
| Anthropocene | A new geological epoch resulting from significant human-driven changes to the structure and functioning of the Earth system, including the climate system. |
| Antimicrobial stewardship | An ongoing effort by a health service organisations to optimise antimicrobial use among patients 'to improve patient outcomes, ensure cost-effective therapy and reduce adverse sequelae of antimicrobial use (including antimicrobial resistance). |
| Autonomy | Living one's life according to values or desires that are authentically one's own. |
| Beneficence | An ethical principle requiring healthcare professionals to engage in behaviours that benefit patients and others. |
| Change agent | A person that encourages people to change their behaviour or opinions. |
| Climate anxiety | Distress about climate change and its impacts on the landscape and human existence. |
| Climate change | A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. |
| Climate-related disasters | Extreme climate-related natural disasters including: (i) hydro-meteorological events (storms, floods, wet mass movements) and (ii) climatological events (extreme temperature, drought, wildfire). |
| Carbon footprint | Measure of the total amount of emissions of carbon dioxide (CO ₂) directly and indirectly caused by an activity over the lifecycle stages of a product. |
| Climate justice | Justice that links development and human rights to achieve a human-centred approach to addressing climate change, safeguarding the rights of the most vulnerable people and sharing the burdens and benefits of climate change and its impacts equitably and fairly. |
| Carbon neutral | Condition in which anthropogenic carbon dioxide (CO ₂) emissions associated with a subject are balanced by anthropogenic CO ₂ removals. |
| Climate resilience | Capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance. |
| Disaster | A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic, and environmental losses and impacts. |
| Disaster impact | The total effect, including negative effects (eg, economic losses) and positive effects (eg, economic gains), of a hazardous event or a disaster. The term includes economic, human, and environmental impacts, and may include death, injuries, disease, and other negative effects on human physical, mental, and social well-being. |
| Disaster risk | The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society, or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity. |
| Environmental determinants of health | Global, regional, national, and local environmental factors that influence human health, including physical, chemical, and biological factors external to a person, and all related behaviours. |
| Environmental sustainability | The responsibility to conserve natural resources and protect global ecosystems to support health & wellbeing. |
| Fossil fuels | Carbon-based fuels from fossil hydrocarbon deposits, including coal, oil and natural gas. |
| Global warming | An increase in global surface temperature relative to a baseline reference period, averaging over a period sufficient to remove interannual variations (e.g., 20 or 30 years). |
| Hazard | A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption, or environmental degradation. |

| Term | Definition |
|--|---|
| Hazardous event | The manifestation of a hazard in a particular place during a particular period of time. |
| Health co-benefits | Implementation of climate policies that lead to both cost savings and improvement in health. |
| Indigenous Peoples | Indigenous Peoples are distinct social and cultural groups that share collective ancestral ties to the lands and natural resources where they live, occupy or from which they have been displaced. The land and natural resources on which they depend are inextricably linked to their identities, cultures, livelihoods, as well as their physical and spiritual wellbeing. |
| Mitigation (of climate change) | A human intervention to reduce emissions or enhance the sinks of greenhouse gases. |
| Net Zero or net Zero CO₂ emissions | Condition in which anthropogenic carbon dioxide (CO ₂) emissions are balanced by anthropogenic CO ₂ removals over a specified period. |
| Net zero greenhouse gas emissions | Condition in which metric-weighted anthropogenic greenhouse gas (GHG) emissions are balanced by metric-weighted anthropogenic GHG removals over a specified period. |
| Net Zero targets | Commitment to 'cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance.' |
| Planetary boundaries | Nine interdependent processes that regulate the Earth's stability and resilience; they include climate change, biodiversity loss, land system change, freshwater use, nitrogen and phosphorus cycles, ocean acidification, stratospheric ozone depletion, atmospheric aerosol loading, and chemical pollution. |
| Planetary health | Planetary Health is a solutions-oriented, transdisciplinary field and social movement focused on analysing and addressing the impacts of human disruptions to Earth's natural systems on human health and all life on Earth. |
| Preparedness | Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities as contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises. |
| Resilience | The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management. |
| Risk | The combination of the probability of an event and its negative consequences. |
| Risk communication | A process of sharing information and advice about climate-related risks between various knowledge holders and decision-makers, including researchers, technicians, assessors, managers, practitioners, members of the public, authorities, media, interest groups, etc. |
| Social determinants of health | The social determinants of health (SDH) are the non-medical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. |
| Sustainable development | Development that meets the needs of the present without compromising the ability of future generations to meet their own needs and that balances social, economic and environmental concerns. |
| United Nations Sustainable Development Goals | The 17 global goals for development for all countries were established by the UN through a participatory process and elaborated in the 2030 Agenda for Sustainable Development, including ending poverty and hunger; ensuring health and well-being, education, gender equality, clean water and energy, and decent work; building and ensuring resilient and sustainable infrastructure, cities and consumption; reducing inequalities; protecting land and water ecosystems; promoting peace, justice and partnerships; and taking urgent action on climate change. |
| Waste segregation | The sorting and separation of waste types to facilitate recycling and correct onward disposal. |
| Weather extremes | Unusual weather events that are at the extremes of the historical distribution for a given area. |



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