

1 **Abstract**

2 **Background:** Climate change around the globe is impacting human and planetary health at
3 unprecedented rates. Nurses are well-positioned to act as climate leaders, given their critical role
4 globally.

5 **Problem:** Current and future nurses must work to mitigate climate-related health effects. It is
6 necessary that a planetary health approach is integrated into nursing education.

7 **Approach:** Curricular modifications, using the Planetary Health Education Framework, are
8 presented, which will promote awareness and understanding of climate health among future
9 nurses. The framework is grounded in equity, which is well-suited to nursing education, and can
10 be readily adapted into current nursing curricula.

11 **Outcomes:** Recommendations for nursing education are presented within the 5 domains of the
12 framework.

13 **Conclusions:** Future nurses are called on to be exemplary planetary health communicators,
14 educators, advocates, and leaders. The Planetary Health Education Framework promotes nursing
15 leadership in practice and in advocating for a climate-resistant future.

16 **Keywords:** climate change, global health, curriculum, education

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24 The world's climate is changing, largely because of human activities, ushering in changes
25 in weather conditions and other natural systems. The earth has warmed more than 1.2 degrees
26 compared to the pre-industrial period, and the global consensus is that climate change has a
27 significant, inequitable impact on human health.^{1,2} Increased levels of air pollution, extreme
28 weather events, increased precipitation or drought, and expansion of vector-borne diseases
29 (VBD) have the potential to create drastic health effects, particularly for those who are most
30 vulnerable.^{1,3} According to climatologists and researchers, climate change trends are expected to
31 continue, further increasing the threat of VBD for northern countries, such as Canada.^{4,5}

32 **Nursing and Climate Health**

33 Since the time of Florence Nightingale, nurses have been champions for environmental
34 health and climate action.² The nursing profession is well-positioned to act as climate change
35 leaders, given their important role globally. Nurses have a powerful and important role in
36 supporting climate change adaptation and mitigation through nursing practice, research,
37 education, advocacy, and policy.^{6,7} Leffers and Butterfield⁸ similarly stress the importance of
38 nursing involvement in both upstream and downstream climate policy advocacy and
39 development, sustainable practice, mitigation strategies, public education on climate change-
40 related risks and illnesses, and community-based initiatives.

41 As one of the largest health professions, nurses have an integral role in the mitigation of
42 climate-related health effects; however, several authors have indicated that nurses may lack
43 awareness of their role in addressing climate change and subsequent health effects.^{9,10} According
44 to Leffers et al,³ practicing nurses, nurse educators, and nursing students lack formal education
45 and resources to adequately prepare them for their role in mitigating climate change and
46 providing care to those living with climate-related health effects. It is necessary that nurses be

47 educated on climate-related threats and their potential impact on human health to fulfill their role
48 as climate action leaders and champions of social justice.^{11,12}

49 Given the integral role of current and future nurses in mitigating climate-related health
50 effects, it is essential that climate change content is integrated into nursing education. The
51 purpose of this article is to advocate for curricular modifications, using the Planetary Health
52 Education Framework,^{13,14} to improve awareness and understanding of climate health among
53 future nurses. A discussion follows addressing the relevant concepts on planetary health,
54 planetary nursing, and the Planetary Health Education Framework within nursing education.

55 **Planetary Health**

56 Planetary health has been rooted in Indigenous cultures for centuries, and the association
57 between human and planetary health among Indigenous peoples is a result of a close relationship
58 with the natural environment and generational knowledge transfer.¹⁵ The term became more
59 widely known in 2015, following the Rockefeller-Lancet Commission on Planetary Health.¹⁶
60 According to Whitmee et al,¹⁶ planetary health is founded on the notion that human health and
61 society depend on flourishing natural systems and the sustainable stewardship of those systems.
62 It is further defined as “the achievement of the highest attainable standard of health, wellbeing,
63 and equity worldwide through judicious attention to the human systems...within which humanity
64 can flourish.”¹⁶ The interdependence of human health and the environment is central to planetary
65 health.^{16,17} The elements of planetary health allow for opportunities for leadership and change
66 within the nursing profession – hence the term “planetary nursing.”

67 **Planetary Nursing**

68 Nurses have a professional responsibility to promote health, prevent illness, injury, and
69 disease, and to protect health and the environment. As leaders and advocates for social justice

70 and health equity, nurses should ensure planetary health is a priority within the profession.^{17,18}
71 As populations evolve and global health is becoming more complex, nurses must expand their
72 focus from human health to embrace planetary health and sustainability.¹⁹ On a global level, this
73 involves a delicate balance to ensure that the health of global citizens does not take priority over
74 our planet by supporting planetary health advocacy strategies and policy implementation.²⁰

75 A shift from “global nursing,” which involves nurses’ role in global health efforts with a
76 focus on social determinants of health and cultural diversity, to “planetary nursing”, which
77 includes broader possibilities for engagement in planetary health initiatives, is needed¹⁹. This
78 shift to planetary nursing allows nurses to effectively engage in global health initiatives, such as
79 the United Nations 2030 Agenda for Sustainable Development.^{19,21} Planetary health incorporates
80 issues which were beyond the traditional scope of nursing practice, including climate change,
81 biodiversity loss, and changing ecosystems, including increases in vector-borne diseases and
82 epidemics.^{17,19,22} Given that the scope of nursing practice is continually evolving, it is essential
83 that planetary health become a focus for nursing education.

84 Nurses can make valuable contributions to planetary health, through educating the public
85 and healthcare professionals, promoting interdisciplinary healthcare, supporting conservation
86 initiatives, enhancing communication, advocating for vulnerable populations, engaging in
87 climate policy development, acting as role models in both personal and professional settings, and
88 in pursuing opportunities to advance planetary health.^{8,17,19} Kalogirou and colleagues⁹ advocate
89 for incorporating planetary health as a theoretical basis for nursing education, research, and
90 practice, to ensure the profession advances toward a climate-resilient future. Therefore, it is
91 proposed that the Planetary Health Education Framework be integrated into nursing programs to
92 ensure students can translate knowledge into nursing practice, research, and advocacy initiatives.

93 **Planetary Health Education Framework**

94 The Planetary Health Education Framework is an organized model for varied education
95 strategies and is well-suited for curriculum and course integration.^{13,14} The framework includes
96 five foundational domains which comprise the essence of planetary health knowledge, values,
97 and practice.^{13,14} The five domains are represented in an intertwined figure, which represents the
98 interdependent and interconnected nature of each domain. These domains include: 1)
99 interconnection within nature, 2) the Anthropocene and health, 3) equity and social justice, 4)
100 movement building and systems change, and 5) systems thinking and complexity.^{13,14}

101 The Planetary Health Education Framework includes an equity-centered approach, which
102 is valued in planetary nursing.²¹ While the use of the framework in various disciplines has not
103 yet been determined, it allows nurses to facilitate a transformative approach to ensure human
104 populations and ecosystems attain vitality.²¹ The framework can readily be adapted into current
105 nursing curricula to ensure students are prepared for future practice, where an understanding of
106 planetary health is essential. The following sections articulate how the various domains of the
107 framework can prepare future nurses for involvement in planetary health.

108 *Interconnection within Nature*

109 Understanding and reimagining the role of individuals within nature is foundational to
110 planetary health and includes reflection on why humans continue to overexploit nature at an
111 accelerated pace.^{13,14} Longstanding Western views that removed humans from the ecosystem are
112 deteriorating, as climate change, depletion of the Earth's resources, and implications of human
113 activity require immediate consideration of the interconnectivity of humans and the ecosystem.²³

114 Merging Indigenous and Western education and practice will benefit individuals,
115 communities, and our planet. This domain acknowledges Indigenous knowledge, which instills

116 an appreciation of the interconnection with nature and reciprocal stewardship.^{13,14,23} The *Two-*
117 *Eyed Seeing* approach would be a beneficial addition to nursing curricula, which appreciates the
118 strengths of Indigenous knowledge through one eye, while recognizing the strength of Western
119 knowledge and ways of knowing from the other eye.^{14,24} This approach would allow students to
120 appreciate culturally safe, trauma-informed care and understand how colonization and historical
121 injustices may place Indigenous populations at greater risk of climate-related health effects.

122 Planetary nursing intersects with this domain, where the focus shifts to the
123 interdependence of humans and the environment, encompassing planetary well-being.¹⁹ It is
124 imperative that this approach is integrated within nursing education, so future nurses are aware
125 of the complexities of the interconnectivity of humans and the ecosystem. Knowledge translation
126 of planetary health can be applied to nursing practice, research, and advocacy initiatives.²³
127 Education on sustainable health care, including planetary health, is necessary to prepare health
128 care professionals to advocate for policy change on planetary health initiatives.²⁵ Nurse educators
129 should be competent in integrating planetary health and sustainable healthcare practices, such as
130 waste and greenhouse gas emission reduction, within health curriculums, which will better
131 prepare the next generation of health professionals in achieving planetary health.^{27,25}

132 According to Myers,²⁶ health care professionals have important roles as educators and
133 advocates to achieve a sustainable path to planetary health and well-being. This was similarly
134 echoed by Astle et al²⁰ who assert that nurses in all areas of practice, education, administration,
135 and research need to become global citizens and explore innovative ways to care for the
136 environment in the same manner as we care for our patients. For instance, nurses in practice
137 environments can create or join a “green team” to implement sustainable changes within the

138 practice setting, such as energy and waste reduction.²⁷ Nurses must be prepared for roles in
139 planetary health to ensure the interconnection with nature is sustained.

140 *The Anthropocene and Health*

141 The focus of this domain is the awareness of how anthropogenic events, including
142 climate change, influences health outcomes. This requires understanding of health promotion and
143 disease prevention at various health levels.^{13,14} The Anthropocene is a concept describing the
144 massive disruption of the Earth's system processes, resulting from the expanding human
145 ecological footprint.^{13,14} According to Myers,²⁶ rapid increases in the global human population
146 and per-capita consumption have negatively influenced our planet; whereas Whitmee and
147 colleagues¹⁶ feel that as overall human health and life expectancy has increased, the health of the
148 Earth's natural systems has decreased. Human activities are severely changing the Earth, through
149 environmental impacts, such as biodiversity loss and climate change.²⁸

150 Nurses can develop competencies in identifying how anthropogenic changes to natural
151 systems influence health outcomes.^{19,21} Nurses should consider the multilevel effects of climate
152 change strain and the ecological footprint on health and provide the necessary leadership to
153 ensure resilient and sustainable health systems.^{17,22} Nurse educators must ensure that students
154 understand how humans are disrupting the earth's system processes, leading to climate change,
155 climate-related health outcomes, increases in infectious disease spread, and other natural system
156 disruptions.^{26,28}

157 Nurses have been directed to enhance mitigation efforts to support populations adapt to
158 changes resulting from planetary disruption.¹⁹ Leveling knowledge within nursing curricula on
159 health promotion and disease prevention will enable students to understand factors that affect
160 health outcomes, and how the health of our planet relates to human health. To prepare for

161 practice, nurses require a robust educational foundation on anthropogenic events, which will
162 promote understanding of the links between environmental disruption and human health.¹⁹

163 *Systems Thinking and Complexity*

164 Systems thinking strives to relate elements to each other within some conception of a
165 whole entity, and is necessary to understand how various planetary health elements interact and
166 merge as part of complex structures.¹³ The goal within this domain is to collaboratively design
167 and implement transformative solutions to planetary health challenges using systems thinking.
168 Within nursing education, students can develop self-awareness and critical reflection to
169 acknowledge their own biases and epistemological groundings to appreciate the evolving nature
170 of knowledge.^{13,14}

171 Planetary nursing promotes planetary action and an appreciation of the interdependence
172 of environment, animals, and humans, creating a holistic concept of One Mind – One Health –
173 One Planet.¹⁸ Nurses should facilitate partnerships with multidisciplinary leaders beyond the
174 traditional healthcare system, which will support a nursing lens to health capacity building and
175 planetary health efforts.¹⁹ Additionally, nursing programs should strive to engage in
176 interprofessional and interdisciplinary education. Students ought to be encouraged to identify
177 sustainability issues within the health care system, including medical supply chain shortages and
178 waste, and articulate innovative solutions to alleviate these issues to ensure sustainable health
179 care practices and optimal patient outcomes.²⁷

180 Resilient and sustainable development are critical for achieving planetary health.²⁸

181 Nursing students must appreciate how they can be proactive planetary health leaders, working
182 with local, national, and international partners to advocate for sustainable policies. The United
183 Nations 2030 Agenda for Sustainable Development offers opportunities for nurses to engage in

184 planetary health in practice. There are opportunities for nurses within the Sustainable
185 Development Goals (SDG) framework to address the mitigation, adaptation, and resilience to
186 climate change in the practice setting,²⁹ which will promote positive health outcomes on both a
187 local and global level. Nursing curricula should be revised to include SDG content to strengthen
188 future nurses' recognition as global citizens.³⁰

189 *Equity and Social Justice*

190 Environmental and health impacts of our changing planet are not equally distributed
191 across population, species, or geographies. It is a known fact that the high and upper-middle-
192 income countries around the world are responsible for most carbon emissions, however, the
193 burdens of climate change are disproportionately felt by vulnerable populations, including low-
194 income countries, and Indigenous Peoples.¹³ Furthermore, settler-colonialism, racism,
195 neoliberalism, patriarchy, white supremacy and historical and political injustices have
196 contributed to a damaged environment and marginalization of populations.^{14,21}

197 The Planetary Health Education Framework includes an ethical component, which
198 promotes equity and climate justice, giving populations and ecosystems the opportunity to
199 achieve their full potential.^{13,31,32} To attain equity and justice, systemic disparities, such as
200 power, wealth, opportunity, or health status must be considered, so no population is negatively
201 affected by disproportionate burdens of environmental impacts while others thrive.¹³ Nursing
202 students must learn to promote social justice by addressing socioeconomic inequities which exist
203 in the practice setting, as well as advocating for climate justice and promoting policies that
204 protect vulnerable populations both locally and globally.³³ This perception was shared by LeClair
205 et al.³¹ who believe that as climate injustices intensify, nurses need to be prepared in planetary
206 health to better protect the environments that humans inhabit.

207 Attention can be placed within nursing education on the health and wellbeing of
208 populations most vulnerable to poor health, to promote basic human rights, including access to
209 education, medical technologies, reduction in poverty, and increases in life expectancy.¹³
210 Guiding principles, such as the Ottawa Charter for Health Promotion, can be easily integrated
211 within nursing curricula to provide students with resources necessary to address planetary health
212 ethics.¹³ Students can learn to promote equity by prioritizing the needs of most-affected
213 populations, which includes supporting resilience, strengths-based approaches, and the capacity
214 to anticipate and mitigate risks. Nurses require cultural humility, empathy, and the promotion of
215 inclusive and diverse participation in defining solutions.¹³ A recognition of one's power,
216 influence, and bias, with a responsibility to use these privileges to prioritize the needs of
217 vulnerable populations, will promote justice and equity.^{13,14}

218 Nurse educators must commit to identifying priorities for action and implementing
219 practices that address the root causes of these injustices, to ensure future nurses are able to
220 prioritize the needs of the most vulnerable in professional practice. Nurse educators can promote
221 climate equity, justice, and morality among future nurses by centralizing health equity in climate
222 action and advocating for nurses' involvement in achieving the SDGs globally.²

223 *Movement Building and Systems Change*

224 To help solve the planetary health crisis, movement building is required. Movement
225 building involves inclusive relationships, effective communication, and transformational
226 partnerships.^{13,14} Effective movements are needed to support systems change and transition to a
227 just and equitable future, including the necessary skills, knowledge, and attitudes of learners to
228 reduce apathy, increase engagements, and create momentum for change.^{13,14} Implementing
229 planetary health education can serve to address the current environmental and health challenges,

230 which can encourage communities to work towards well-being, justice, and a healthier
231 planet.^{13,14} This requires nurses to facilitate partnerships with multisector leaders to ensure a
232 holistic nursing lens on capacity building and planetary health is achieved.^{17,19} Nursing students
233 should learn how to engage in networking, which can connect them to other disciplines,
234 geographies, and generations.¹³ Prescott and Logan¹⁵ similarly affirm that planetary health
235 successes can be achieved by interprofessional healthcare partnerships.

236 Planetary health education for health professionals should be enhanced, which will create
237 a more informed and appropriately skilled health workforce that is better equipped to use
238 evidence to foster change.^{14,34} Nursing students require the appropriate skills to create
239 momentum and ensure a sustainable future. Skills in communication and advocacy are necessary
240 to facilitate multisectoral partnerships and climate policy development. Climate change and
241 planetary health content should be considered for all accredited nursing education programs, so
242 the future nurses are prepared to deal with the planetary health crisis.²

243 Planetary health is a complex field, which focuses on planetary systems and health.¹⁵
244 There are global calls to action and numerous opportunities for nurses to engage in and advance
245 planetary health; however, it is difficult for nurses to transform the current model of nursing,
246 moving from illness care to planetary health care.²² Furthermore, empowering future nurses to
247 engage in advocacy and promotion of planetary health can be challenging and nurse educators
248 are tasked with ensuring students receive appropriate information on planetary health which can
249 be applied to practice and used to advance health policy on various levels.²⁰

250 **Conclusion**

251 The Planetary Health Education Framework is an ideal framework for nursing education
252 and can be readily incorporated into current nursing curricula to help to ensure students are

253 prepared for future practice, where an understanding of planetary health and planetary nursing is
254 essential. Recommendations for the incorporation of the five domains of the framework into
255 nursing curricula were discussed, highlighting the necessity for future nurses to be exemplary
256 planetary health communicators, collaborators, educators, facilitators, advocates, and leaders.
257 The Planetary Health Education Framework can support nurses in leading change in nursing
258 practice and advocating for a climate-resistant future.

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