A Cross-Sectional Study on Indigenous Nurses' Knowledge and Perceptions toward Planetary Health Challenges

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Abstract

Planetary health challenges such as climate change and vector-borne diseases threaten human health and well-being. Health care professionals such as registered nurses play an integral role in supporting populations affected by planetary health challenges. The purpose of the larger cross-sectional study from which this paper is drawn was to investigate the knowledge, attitudes, and practices of registered nurses in Canada related to climate-sensitive vector-borne diseases. A national self-administered digital survey was distributed to practicing registered nurses in Canada. Of the 382 survey respondents, 35 respondents self-declared as Indigenous. This article presents findings involving the Indigenous participants, who reported greater knowledge, confidence, and preparedness regarding climate change and vector-borne diseases than nurses who did not report Indigeneity. This may be linked to intergenerational knowledge transfer, which supports the ability to observe and adapt to environmental changes, including shifting patterns of disease. We conclude that Indigenous nurses are uniquely positioned to lead the decolonization of the nursing profession by integrating Indigenous knowledge to prepare nurses for planetary health challenges and to advocate for a climate-resilient future.

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Introduction

Planetary health disruptions such as climate change highlight social and structural inequities within populations. Globally, communities that are least responsible for climate change are disproportionately affected by its adverse outcomes—a phenomenon known as climate injustice (Myers & Frumkin, 2020; Nicholas & Breakey, 2017). Social and structural inequities such as homelessness, racism, marginalization, colonialism, and lack of access to health care exacerbate climate-related health risks and climate injustice (Health Canada, 2022).

Indigenous Peoples have long recognized the importance of their knowledge systems and strong connections to the land in responding to and managing environmental change (Ford et al., 2020). First Nations, Inuit, and Métis communities in Canada are closely connected to natural ecosystems, where the geographical location of their communities causes them to experience the effects of rapid climate change and planetary decline to a greater extent than other Canadians (National Collaborating Centre for Indigenous Health [NCCIH], 2022). Indigenous Peoples and isolated northern communities are particularly impacted by climate injustice in Canada. The rising temperatures in Canada's northern regions are threatening food safety and water security, affecting Indigenous Peoples' livelihoods, relationship with the land, and well-being (NCCIH, 2022).

Climate change has been identified as a public health emergency in Canada, and health care professionals must take action to address climate related health challenges (Canadian Public Health Association [CPHA], 2021). Climatic factors such as warming temperatures have contributed to a wide range of health effects, including the expanding geographical distribution of vector-borne diseases (VBDs) in Canada, specifically West Nile virus (WNv) and Lyme disease (CPHA, 2021; PHAC, 2022).

Purpose of the Research

The overall research questions guiding the larger research study were:

1. What are the knowledge, attitudes, and practices (KAPs) of registered nurses (RNs) in Canada related to climate-sensitive VBDs, specifically Lyme disease and WNv?

2. Do KAPs toward climate-sensitive VBDs vary by position, education, practice area, age, years of practice, province/territory, urban/rural setting, and/or Indigeneity?

These research questions arose from Canada's evolving climate-related health challenges and the documented gap in nurses' knowledge and awareness. The purpose of this article is to present research findings on KAPs of Canadian Indigenous nurse participants concerning climate-sensitive VBDs, and the variance of KAPs toward VBDs by Indigeneity.

Background

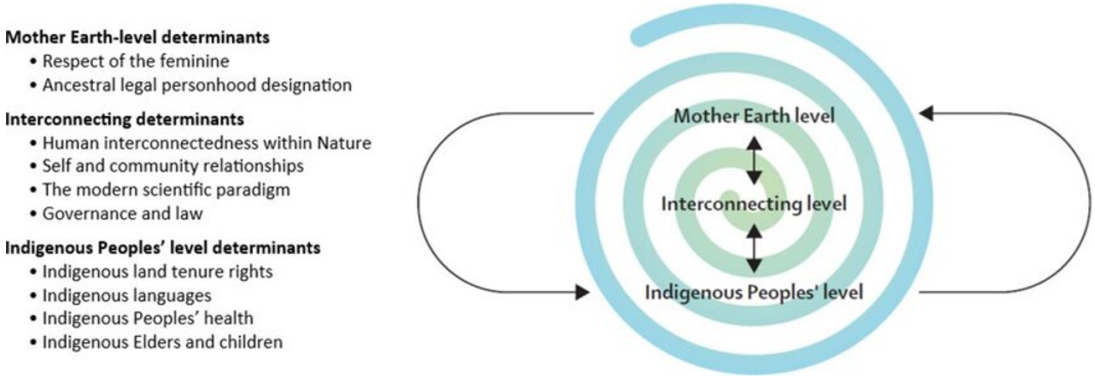
Indigenous Perspectives on Planetary Health

According to LeClair and Potter (2022), although mainstream health has recently acknowledged the importance of a planetary health perspective, the concept of planetary health has been rooted in Indigenous culture for centuries. Indigenous Peoples understand the links between human and planetary health as a result of strong relationships with the natural environment and successful generational knowledge transfer (Prescott & Logan, 2019). Indigenous Peoples have developed paradigms based on their explicit understanding of interconnection with nature, which are reflected in their values, traditions, and stewardship of natural systems (Guzman & Potter, 2021). Indigenous worldviews view planetary health as a philosophy for life and a collective responsibility to safeguard the natural environment (Ratima, 2019).

According to the Planetary Health Alliance (2024), there is a shared recognition that Indigenous knowledge is necessary for preserving and repairing Earth's natural systems. Nalau and colleagues (2018) found that an enhanced appreciation of Indigenous knowledge is apparent in planetary health and climate action; however, it is often symbolic and merged with Western scientific knowledge, which is not appropriate. Similarly, Redvers and colleagues (2020) state that the current understandings of planetary health are based on a predominantly Western construct embedded within traditional Indigenous knowledge systems, with no clear distinction between the health of the planet and the health of self.

Indigenous knowledge has often been overlooked in favor of Western perspectives in planetary health discourse. To address this imbalance, a group of Indigenous scholars, Elders, knowledge holders, and practitioners conceptualized the determinants of planetary health from an Indigenous perspective (see Figure 1), which includes ten primary determinants in three interconnected levels: Mother Earth–Level Determinants, Interconnecting Determinants, and Indigenous Peoples–Level Determinants (Redvers et al., 2022). These determinants of planetary health offer a holistic compass to assist the global community in moving forward to integrate planetary health in positive ways, to ensure sustainable health for both humans and our planet (Redvers et al., 2022). Nurses can restore relationships with Indigenous communities, advocating toward self-determination by the return of Indigenous lands, and privileging Indigenous knowledge in planetary health efforts (Jones et al., 2022). According to Redvers and colleagues (2020), formal recognition of Indigenous knowledge as a critical foundation of planetary health is necessary.

Figure 1
The interconnectedness of the determinants of planetary health



Note: Source: Redvers et al. (2022)

Climate-Related Health Challenges

The implications of climate change are increasingly visible in Canada, and are potentially contributing to vector expansion and incidence of disease (Bouchard et al., 2019; CPHA, 2021; Ludwig et al., 2019; Ogden et al., 2022). According to Nuttall (2022), Canada presents the most compelling evidence that climate change influences tick distribution and tick-borne diseases.

Nurses have a significant role to play in mitigating and addressing climate change and VBDs in practice, given their presence within the healthcare environment (Canadian Nurses Association [CNA], 2024; International Council of Nurses [ICN], 2018; Kalogirou et al., 2020). According to Kurth and Potter (2022), nurses must consider the multi-level effects of climate strain on health and provide the necessary leadership to ensure resilient health systems. Despite the roles they can play, in practice nurses lack awareness, knowledge, and resources to adequately address climate change and subsequent health threats (Kalogirou et al., 2020; Leffers et al., 2017; Martin & Vold, 2019).

Nurses must acknowledge the perspectives of Indigenous Peoples and those with lived experience of VBDs. Respecting and honouring the holistic relationship Indigenous Peoples have to the land is crucial (Brand et al., 2023; Martin & Kaminski, 2021). Given that the natural environment is critical for Indigenous communities and their health, they have a strong interest in environmental justice and climate resilience (Redvers et al., 2023). Traditional Indigenous knowledge can reorient nursing priorities to value holistic and sustainable environmental practices (Bourque Bearskin et al., 2020). Furthermore, according to Sanderson and colleagues (2020), shared traditional ecological knowledge helps Indigenous Peoples understand how climate change impacts health.

Some authors posit that climate change is directly linked to colonialism, resulting from environmental changes inflicted on Indigenous Peoples over time (Jones, 2019; Whyte, 2017). Nurses are called to acknowledge historical events and the continued effects of colonialism in health care settings, and to act by creating effective responses to mitigate climate change and subsequent VBDs. This response can be achieved by demonstrating cultural safety and honouring the Truth and Reconciliation Commission of Canada's (2015) *Calls to Action*. Additionally, the National Collaborating Centre for Indigenous Health (2022) recommends cooperative action across structural, systemic, and service sectors, which includes policy development, programs and services, engagement activities,

and cultural safety training for nurses. As advocates for health equity and social justice, nurses have a role in addressing socio-economic inequities and shifting the unequal power distribution that contributes to climate vulnerabilities for Indigenous communities (LeClair et al., 2022; Nicholas & Breakey, 2017; Waldron, 2021).

Methods

A quantitative cross-sectional survey research design, guided by planetary health as its theoretical framework, was used to answer the research questions. Positioning the KAPs of RNs with regards to climate-driven VBDs offered an assessment of the extent to which nurses are practicing within a planetary health mindset, using the planetary health framework introduced by Myers (2017).

Ethical approval was obtained through the Research Ethics Office at the University of Alberta. A cover letter outlining the study purpose and informed consent was included in the survey. Participants remained anonymous; however, unidentifiable demographic information was collected. Participants were required to consent to the survey before submitting responses.

Cross-sectional surveys are well aligned with KAP surveys, which are effective in establishing baseline data, including knowledge, attitudes, beliefs, and behaviours on a particular topic, especially when research is lacking on the subject or a novel situation arises (Andrade et al., 2020). Knowledge is defined as understanding of any given topic—that is, what is known. Attitude is defined as feelings and any preconceived ideas toward a topic/subject—that is, what is believed. Practice is defined as the ways in which one demonstrates their knowledge and attitude through their actions—that is, what is done in the context of the topic of interest (Andrade, 2020).

Despite the advantages of cross-sectional research, it is limited by its inability to establish causality and its reliance on data collected at a single point in time. Additionally, potential sampling and response biases may limit the generalisability of the findings to the broader population.

Data Collection

Permission was granted by Kircher and colleagues (2022) to adapt their original KAP survey on climate change and health. To align with the objectives of this study, the original survey items were adapted to focus specifically on VBDs. The adapted survey tool included 50 items, which were divided into four sections: (1) Demographics; (2) Knowledge of VBDs; (3) Attitudes toward VBDs; and (4) Practices, Experiences, and Resources. Questions included five-point Likert-scale items, as well as single (agree-disagree-unsure) or multiple response questions, depending on the nature of the question.

Cronbach's alpha coefficients were calculated to assess the internal consistency of the survey items. The knowledge-related Likert-scale items yielded a Cronbach's alpha of 0.934, while the attitude items produced a value of 0.822. For all ordinal items in the survey, the alpha was 0.894, indicating strong internal reliability across measures.

To support external validity, targeted recruitment strategies were employed to obtain a sufficient and diverse sample of practicing RNs across Canada. Content validity was established through pilot testing with eight content experts from various regions, who provided evaluative feedback on the survey items. Construct validity was assessed via factor analysis. For the 22 items extracted, the overall Cronbach's alpha was 0.922. Within this structure, the Personal Preparedness factor (15 items) had an alpha of 0.944, and the Professional Preparedness factor (7 items) had an alpha of 0.839—both reflecting strong internal consistency. These findings support the survey's reliability and validity for measuring knowledge, attitudes, and preparedness related to climate-sensitive VBDs.

Respondent-driven (network) sampling was used to recruit practicing RNs across Canada. Eligible participants were required to be actively practicing as an RN in Canada, hold valid registration with their respective provincial or territorial regulatory body, and be able to read English, as the survey was administered in English via Qualtrics™. Recruitment took place from August to December 2023. Invitations were emailed on three occasions to all Canadian provincial and territorial nursing associations and regulatory bodies, national nursing organizations, and nursing interest groups. Additionally, research announcements were shared via Facebook and Instagram, targeting five national RN networks across three recruitment waves during the same period.

A total of 859 responses were received for the national survey. Following the removal of bot entries, incomplete surveys, and responses containing only demographic data, 382 valid responses remained for analysis. Of the 382 eligible survey responses, 35 (9.2%) respondents self-declared as Indigenous (First Nations, Métis, or Inuit). Based on the G*Power calculation, a sample size of 324 was needed in this study to ensure adequate power to conduct a one-way analysis of variance (ANOVA) between six independent means.

Data were analyzed using IBM SPSS Statistics. Descriptive statistics were computed to summarize survey responses, and statistical significance was set at $p < .05$. The Shapiro-Wilk test confirmed that Likert-scale items met assumptions of normality, permitting the use of parametric tests (one-way ANOVA) for comparisons across demographic groups. Non-parametric tests (Kruskal-Wallis and chi-square) were applied to survey items classified as ordinal or nominal.

Results

Results indicated that most nurses who declared Indigeneity worked as front-line care providers, and a significant portion were also nurse educators. Most had a baccalaureate degree, and several had a master's degree or PhD. The greatest number of Indigenous respondents were from Alberta, British Columbia, Ontario, and Quebec. (See Table 1 for demographic results.)

Table 1
Demographic characteristics of participants

Characteristics	**Indigenous Participants (n = 35)**	**Non-Indigenous Participants (n = 347)**
Primary Position		
Front-line provider/staff nurse	22	237
Nurse educator	11	52
Nurse manager	2	15
Other		43
Highest Level of Education		
Diploma	2	32
Baccalaureate degree	22	233
Master's degree	9	62
PhD	2	15

Other		5
Current Primary Practice Area		
Critical care	2	20
Educational institution	11	24
Geriatrics	1	20
Home health	4	19
Medical-surgical	4	41
Mental health	3	12
Obstetrics	1	11
Occupational health	1	11
Oncology	2	5
Pediatrics	1	13
Primary care	1	16
Public health	2	49
School nursing	1	3
Other*	1	62
Age		
20-29	5	72
30-39	13	103
40-49	11	81
50-59	3	72
60+	3	19
Years of Practice as a Registered Nurse		
Less than 5	5	65
5-10	9	71
11-20	14	101
21-30	1	56
31-40	2	43
41 or more	4	11
Province or Territory of Registration		
British Columbia	8	73
Alberta	12	113
Saskatchewan	3	42

Ontario	4	31
Quebec	4	10
Maritime provinces	4	65
Territories and Nunavut		5
Where do you live?		
Urban setting	31	235
Rural setting	4	109

*Free text response

Knowledge of Vector-Borne Diseases

The second section of the survey assessed knowledge of Canada's most common climate-sensitive VBDs: Lyme disease and WNv. Nurses who self-identified as Indigenous reported significantly greater knowledge of both diseases, as well as higher overall knowledge of climate change, compared to non-Indigenous participants. They also placed significantly greater priority on increasing their knowledge of VBDs (see Table 2).

Table 2
Significant ANOVA results for knowledge survey items by Indigeneity

Survey Item	**F (df)**	**Group Comparisons**
I feel knowledgeable about climate change and subsequent health implications	$F(2, 378) = 4.21^{*}$	Indigenous (M = 2.23, SD = 1.24) Non-Indigenous (M = 2.82, SD = 1.19)
Increasing my knowledge of climate-sensitive VBDs is a priority for me	$F(2, 25.97) = 10.43^{***}$	Indigenous (M = 1.80, SD = 0.80) Non-Indigenous (M = 2.57, SD = 1.05)
Total knowledge score	$F(2, 48.28) = 10.76^{***}$	Indigenous (M = 45.51, SD = 15.62) Non-Indigenous (M = 35.77, SD = 10.47)
Total Lyme disease knowledge score	$F(2, 370) = 11.16^{***}$	Indigenous (M = 18.26, SD = 6.08) Non-Indigenous (M = 14.09, SD = 5.00)
Total West Nile virus knowledge score	$F(2, 48.59) = 8.96^{***}$	Indigenous (M = 16.57, SD = 7.62) Non-Indigenous (M = 12.17, SD = 4.83)

Note: $^{*}p<.05$; $^{**}p<0.1$; $^{***}p<.001$

Non-parametric tests (see Table 3) showed that Indigenous nurses were significantly more likely to have completed formal education and to consider climate change a factor in Lyme disease and West Nile virus care.

Table 3
Significant chi-square and Kruskal-Wallis results of knowledge items by Indigeneity

Survey Item	Test Type	χ^2(df, N)	Significant Pairwise Comparisons
Consideration of climate change in Lyme disease care	Kruskal-Wallis	$\chi^2(2, 381) = 6.53^*$	Indigenous vs. Non-Indigenous*
Consideration of climate change in West Nile virus care	Kruskal-Wallis	$\chi^2(2, 381) = 10.86^{**}$	Indigenous vs. Non-Indigenous**
Completion of formal education on VBDs	Chi-square	$\chi^2(2, 370) = 65.00^{***}$	Indigenous vs. Non-Indigenous*** Non-Indigenous vs. Prefer not to answer**

*Note: *p<.05; **p<0.1; ***p<.001*

Attitudes Toward Climate-Driven Vector-Borne Diseases

The third section of the survey assessed perceptions of risk for climate-sensitive VBDs and degree of confidence in addressing concerns related to these diseases. Nurses who declared Indigeneity reported statistically greater preparedness to address climate change and VBDs in practice compared to those who did not declare Indigeneity. Indigenous nurses reported significantly greater confidence in counseling patients about climate change, health, and VBDs compared to non-Indigenous respondents.

Indigenous nurses were significantly more likely to agree that Indigenous Canadians face disproportionate climate-related health impacts and to value advocacy for social justice in addressing VBD risks. Overall, their attitude scores were significantly higher than those of non-Indigenous respondents (see Table 4).

Table 4
Significant ANOVA results for attitude survey items by Indigeneity

Survey Item	F (df)	Group Comparisons
I feel well prepared to address climate-sensitive VBDs with patients/clients, families, groups, communities, and populations.	$F(2, 50.00) = 10.98^{***}$	Indigenous (M = 2.63, SD = 1.52) Non-Indigenous (M = 3.65, SD = 1.14)
I feel confident counseling patients, families, groups, communities, and populations about climate change and health.	$F(2, 379) = 15.41^{***}$	Indigenous (M = 2.37, SD = 1.37) Non-Indigenous (M = 3.53, SD = 1.19)

I feel confident counseling patients, families, groups, communities, and populations about climate-sensitive VBDs.	$F(2, 47.08) = 11.84^{***}$	Indigenous (M = 2.69, SD = 1.59) Non-Indigenous (M = 3.83, SD = 1.11)
Nurses should play an active role in discussing climate-sensitive VBDs with their patients/clients, families, groups, communities, and populations.	$F(2, 379) = 6.18^{**}$	Indigenous (M = 1.51, SD = 0.66) Non-Indigenous (M = 1.94, SD = 0.91)
Indigenous Canadians disproportionately experience negative health effects from climate change.	$F(2, 379) = 5.43^{**}$	Indigenous (M = 1.63, SD = 0.84) Non-Indigenous (M = 2.75, SD = 1.14)
It is important for healthcare professionals to advocate for social justice by addressing socioeconomic inequities which exist among populations that are at risk of VBDs.	$F(2, 16.91) = 11.13^{***}$	Indigenous (M = 1.26, SD = 0.51) Non-Indigenous (M = 2.67, SD = 1.16)
Total attitude score	$F(2, 379) = 12.61^{***}$	Indigenous (M = 17.77, SD = 6.49) Non-Indigenous (M = 22.60, SD = 5.89)

Note: $^{*}p<.05$; $^{**}p<0.1$; $^{***}p<.001$

Practices, Experiences, and Resources

The final section of the survey examined participants' clinical experiences and practices related to VBDs, as well as access to relevant resources. Nonparametric analyses indicated that Indigenous nurses were significantly more likely to engage in discussions about climate change, health, and VBDs with patients compared to non-Indigenous respondents. Moreover, Indigenous nurses reported statistically higher frequency of encountering patients with VBDs in their practice. Interest in continuing education was significantly greater among Indigenous nurses relative to participants who preferred not to disclose their Indigeneity ($p<0.05$). Additionally, Indigenous nurses reported significantly greater personal experience with VBDs than their non-Indigenous counterparts ($p<0.001$). Results are presented in Table 5.

Table 5
Significant chi-square and Kruskal-Wallis results on practices and experiences by Indigeneity

Survey Item	Test Type	χ^2(df, N)	Significant Pairwise Comparisons
Proportion of patients discussed climate change impact on health	Kruskal-Wallis	$\chi^2(2, 382) = 6.15^{*}$	Indigenous vs. Non-Indigenous*
Proportion of patients discussed climate-sensitive VBDs impact	Kruskal-Wallis	$\chi^2(2, 382) = 12.12^{**}$	Indigenous vs. Non-Indigenous***
Frequency of encountering clients with climate-sensitive VBDs	Kruskal-Wallis	$\chi^2(2, 382) = 7.63^{*}$	Indigenous vs. Non-Indigenous*
Received specific information about climate-sensitive VBDs for practice	Chi-Square	$\chi^2(4, 361) = 43.6^{***}$	Indigenous vs. Non-Indigenous***
Personal experience with VBDs outside clinical setting	Chi-Square	$\chi^2(4, 363) = 32.06^{***}$	Indigenous vs. Non-Indigenous***
Interest in continuing education on climate-sensitive VBDs	Chi-Square	$\chi^2(4, 48) = 13.39^{*}$	Indigenous vs. Non-Indigenous***

Note: $^{*}p<.05$; $^{**}p<0.1$; $^{***}p<.001$. Kruskal–Wallis used for ordinal outcomes, Chi-square for nominal.

Limitations

While this study adhered to rigorous research and ethical standards, several limitations warrant consideration. First, the findings are specific to one group of HCPs—RNs—in a single country. Although conducted with Canadian RNs, it is possible that perceptions among other HCPs are comparable, given the global relevance of climate-driven VBDs.

Second, the sample size was relatively small, with only a modest proportion of eligible Canadian RNs participating despite extensive recruitment efforts employing multiple strategies. While p-values were reported for group comparisons, caution is warranted in interpreting statistical significance due to the small sample size of certain subgroups. In small samples, the risk of both Type I and Type II errors increases, and the assumptions underlying inferential statistics may not be fully met. Therefore, rather than drawing definitive conclusions based solely on statistical significance, p-values are presented to illustrate potential differences between groups. These findings should be interpreted as exploratory, warranting further investigation with larger samples.

Discussion

Study findings revealed that Indigenous nurses reported higher self-assessed knowledge of climate change and VBDs, alongside greater awareness, confidence, preparedness, and practice-based experiences related to VBDs. Notably, there was a difference in knowledge of climate change and its health impacts between nurses who identified as Indigenous and those who did not declare Indigeneity. These findings may reflect the expertise of Indigenous Peoples on planetary health issues. According to Redvers and colleagues (2023), despite historically being framed within literature through a deficit lens, with a focus on colonization, racism, and structural inequalities, Indigenous Peoples possess many strengths in addressing the global climate crisis. Indigenous Peoples have observed and adapted to changing environments since time immemorial, and intergenerational Indigenous knowledge systems allow them to continue to navigate, respond, and adapt to current climate and environmental changes (Climate Atlas of Canada, n.d.; NCCIH, 2022).

Indigenous Nurses' Knowledge of VBDs

Indigenous nurses demonstrated higher overall knowledge of both Lyme disease and WNv compared to non-Indigenous respondents. Additionally, those who identified as Indigenous reported greater personal experience with VBDs. This finding can possibly be attributed to First Nations, Inuit, and Métis Peoples' increased exposure to VBDs (NCCIH, 2022). Ford and colleagues (2020) acknowledge that Indigenous Peoples' relationship with place is important, as it provides a foundation for identity and knowledge through which environmental changes are experienced and understood.

According to Redvers and colleagues (2023), Indigenous Peoples experience many climate-related health impacts, among them rising temperatures that create favorable conditions for the increase in infectious diseases, including VBDs. The NCCIH (2022) affirms that the health impacts of climate change increase First Nations, Inuit, and Metis Peoples' risk for and exposure to VBDs. Therefore, the enhanced knowledge of Indigenous nurses on VBDs may be attributed to their increased risk and exposure, as well as intergenerational knowledge transfer among Indigenous Peoples, which has provided them with the knowledge to observe, respond, and adapt to climate change and environmental concerns (NCCIH, 2022).

This increased knowledge may translate into their roles in practice, where a significant number of respondents who declared Indigeneity worked as nurse educators in educational institutions (31.4%). As educators, Indigenous nurses can share their personal, cultural, and professional knowledge and expertise on climate change and climate-related health impacts with future nurses, providing a rich and meaningful educational experience for nursing students. This study finding demonstrates the importance of decolonizing nursing education and valuing Indigenous perspectives on current planetary health challenges (Jones et al., 2022). Indigenous nurse educators can situate their perspectives and knowledge on climate change and VBDs and lead discussions on holism, sustainability, climate justice, stewardship, relationality, and reciprocity (Bourque-Bearskin et al., 2020; Van Bewer et al., 2020).

Practice Preparedness and Confidence

Indigenous nurses reported significantly greater personal experience with VBDs compared to participants who did not declare Indigeneity. This may be attributed to the importance of Indigenous Peoples' relationship with place (Ford et al., 2020). Furthermore, Indigenous Peoples' traditional collective ways of knowing and living are passed down through generations, enabling them to observe, respond, and adapt to climate change and climate-related infectious diseases (NCCIH, 2022).

Indigenous nurses reported that they discussed climate change and health with patients significantly more often compared to participants who did not declare Indigeneity. Indigenous Peoples' knowledge about climate change enables them to provide important teaching about environmental and planetary stewardship to reduce climate change effects (NCCIH, 2022). Nurses who declared Indigeneity reported greater preparedness to address VBDs with patients. According to Sanderson and colleagues (2020), Indigenous Peoples have solutions to climate-related health, and our healthcare system must be more inclusive of Indigenous knowledge on climate change adaptation. Therefore, given this finding, it is not surprising that Indigenous nurses felt more prepared to address VBDs with patients in the practice setting.

Significant differences in formal and continuing education about VBDs were observed between nurses who identified as Indigenous and those who did not. Notably, Indigenous nurses demonstrated significantly higher knowledge levels, suggesting that formal education—as well as the proportion of Indigenous respondents who were nurse educators—may have contributed to their enhanced knowledge scores.

Nurses' Professional Role with Equity-Denied Populations

Most Indigenous nurses in this study agreed that Indigenous Canadians disproportionately experience adverse health effects from climate change. As emphasized by Brand and colleagues (2023) and Martin and Kaminski (2021), it is essential for nurses to recognize and value the knowledge and expertise of Indigenous Peoples regarding climate change and planetary health. This includes respecting and honouring the holistic and relational connection Indigenous Peoples maintain with the land. Such understanding fosters a deeper awareness of how social determinants of health, historical injustices, and public policies shape vulnerability to VBDs and influence health outcomes among equity-denied populations, including Indigenous communities (CASN, 2020).

Recommendations

To address the ongoing marginalization of Indigenous ways of being, knowing, and doing in nursing education and practice (Bourque Bearskin et al., 2020; Van Bewer et al., 2020), it is recommended that nursing programs intentionally integrate Indigenous traditional knowledge through sustained partnerships with Indigenous Elders, Knowledge Keepers, and nurses. Co-creation of curriculum content, joint teaching initiatives, and interprofessional learning opportunities should be prioritized to foster mutual understanding and cultural safety. Furthermore, both Indigenous and non-Indigenous nurses should be supported to work collaboratively in advocating for the health, well-being, and human rights of Indigenous Peoples within healthcare systems.

Education on climate-sensitive VBDs should be prioritized across all areas of nursing practice, with particular emphasis on integrating Indigenous knowledge systems that reflect holistic understandings of planetary health. Indigenous nurses are uniquely positioned to lead the profession in advancing the decolonization of nursing knowledge. As Chinn (2022) emphasizes, engaging in decolonization enables nurses to critically examine dominant health paradigms and work toward achieving social justice. Collaboration with the Canadian Indigenous Nurses Association (2019) is essential, as their mission calls for partnerships with communities, health professionals, and government institutions to address Indigenous health nursing priorities within the Canadian healthcare system. Such collaboration aims to improve the health and well-being of Indigenous Peoples in Canada through culturally safe and community-driven approaches.

Nurse educators should strive to decolonize nursing curricula and situate the topics of planetary health, climate change, and VBDs in Indigenous perspectives. A broader understanding of planetary

health is necessary, where Indigenous values and knowledge are acknowledged rather than silenced (Jones et al., 2022). Indigenous perspectives and knowledge on climate change and related health effects provide numerous opportunities for nursing education, including discussions around holism, sustainability, climate justice, stewardship, relationality, and reciprocity (Bourque-Bearskin et al., 2020; Van Bewer et al., 2020). The Aboriginal Nurses Association of Canada (2009) has outlined competencies for nursing education in Canada, where students are called to "demonstrate ways to acknowledge and value Indigenous knowledge with respect to the health and wellness of First Nation, Inuit, and Metis clients, families, and communities" (p. 13).

Integration of Indigenous knowledge and practices into nursing curricula is necessary to ensure future nurses can respond and adapt to environmental changes in Canada. In addition to a focus on the social determinants of health in nursing curricula, we recommend that the determinants of planetary health from an Indigenous perspective should take priority in nursing education programs. These determinants provide a means to practically lead sustainable health for both humans and the planet (Redvers et al., 2022). Incorporating the determinants of planetary health from an Indigenous perspective into nursing education will allow students to appreciate the interconnectedness of human and planetary health and appreciate both Indigenous and Western ways of knowing in planetary health action (Jones et al., 2022).

Conclusion

Climate-driven VBDs represent an emerging public health issue in Canada, affecting overall population health. This article has presented Indigenous nurses' KAPs involving Lyme disease and WNv. The findings indicate that Indigenous respondents demonstrated greater knowledge of climate change and VBDs, along with heightened awareness, confidence, preparedness, and practical experience in addressing VBDs. This elevated knowledge and confidence may, in part, stem from the intergenerational transmission of Indigenous knowledge systems, which have long equipped Indigenous Peoples with the capacity to adapt to environmental and planetary health challenges. Indigenous nurses are uniquely positioned to lead efforts in decolonizing nursing knowledge by integrating Indigenous worldviews into education and practice—thereby equipping all nurses to respond more effectively to VBDs and to engage in broader advocacy for planetary health.

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