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Dr. Rachel Asiniwasis is a dermatologist and early-career clinician-researcher with a special interest in inflammatory dermatoses, remote outreach, virtual care, skin of color, Indigenous health, dermatologic health disparities, and translational research. She has been practicing in her hometown of Regina since 2014, after graduating residency at the University of Toronto. Recently, she graduated with a Master's of Science in Health Sciences in clinical and translational research. She is Plains Cree and Saulteaux on her father's side, and provides outreach dermatology clinics in the form of virtual care, teledermatology and in-person to various remote and northern Indigenous communities around Saskatchewan.

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VIRTUAL DERMATOLOGIC CARE IN RURAL AND REMOTE CANADIAN INDIGENOUS COMMUNITIES: BALANCING COST, QUALITY AND ACCESS

Access to Dermatologic Care

According to Statistics Canada (2021), approximately 18% of Canadians live in rural and remote areas.[1] Although rural population growth is being outpaced by urban growth rates and is decreasing in some provinces, from 2016 to 2021 Canada's overall rural population growth increased by 0.4%, with the fastest growth observed in Nunavut and Prince Edward Island. Canada's three territories (Yukon, Northwest Territories and Nunavut), the Atlantic provinces, Manitoba, and Saskatchewan have higher proportions of rural representation than the national average. As skin specialists, dermatologists are most commonly based in urban centres. As a result, geographic disparity exists regarding equitable access to dermatologists for patients from rural and remote areas of Canada, which can result in increased skin disease morbidity.[2]

The degree of remoteness varies within Canada and can be classified by the index of remoteness value **(Figure 1)**, which is considered a fundamental determinant of health access. Examples of this include the fact that remote areas face relatively high shipping costs, and distance and proximity are substantial barriers to healthcare access.[1,3] Even minor distance travel requirements may be associated with early non-adherence to dermatologic care, as in the case of compliance with appointments for phototherapy.[4] Canadian Indigenous communities tend to be located in remote areas[1] and therefore are disproportionately impacted. The COVID-19 pandemic has created even larger gaps in healthcare access and have increased health disparities for rural and remote Canadian Indigenous communities.[5]

Skin Disease Among Rural and Remote Canadian Indigenous Peoples: Access and Cost Considerations

As Canada represents one of the largest countries globally, travelling long distances, sometimes even in the range of hundreds to thousands of kilometers, may be required for some rural and remote patients to attend their urban-based specialist appointment. Medical transportation creates a significant financial burden on the healthcare system for rural and remote Indigenous patients. For the 2020 to 2021 fiscal year,

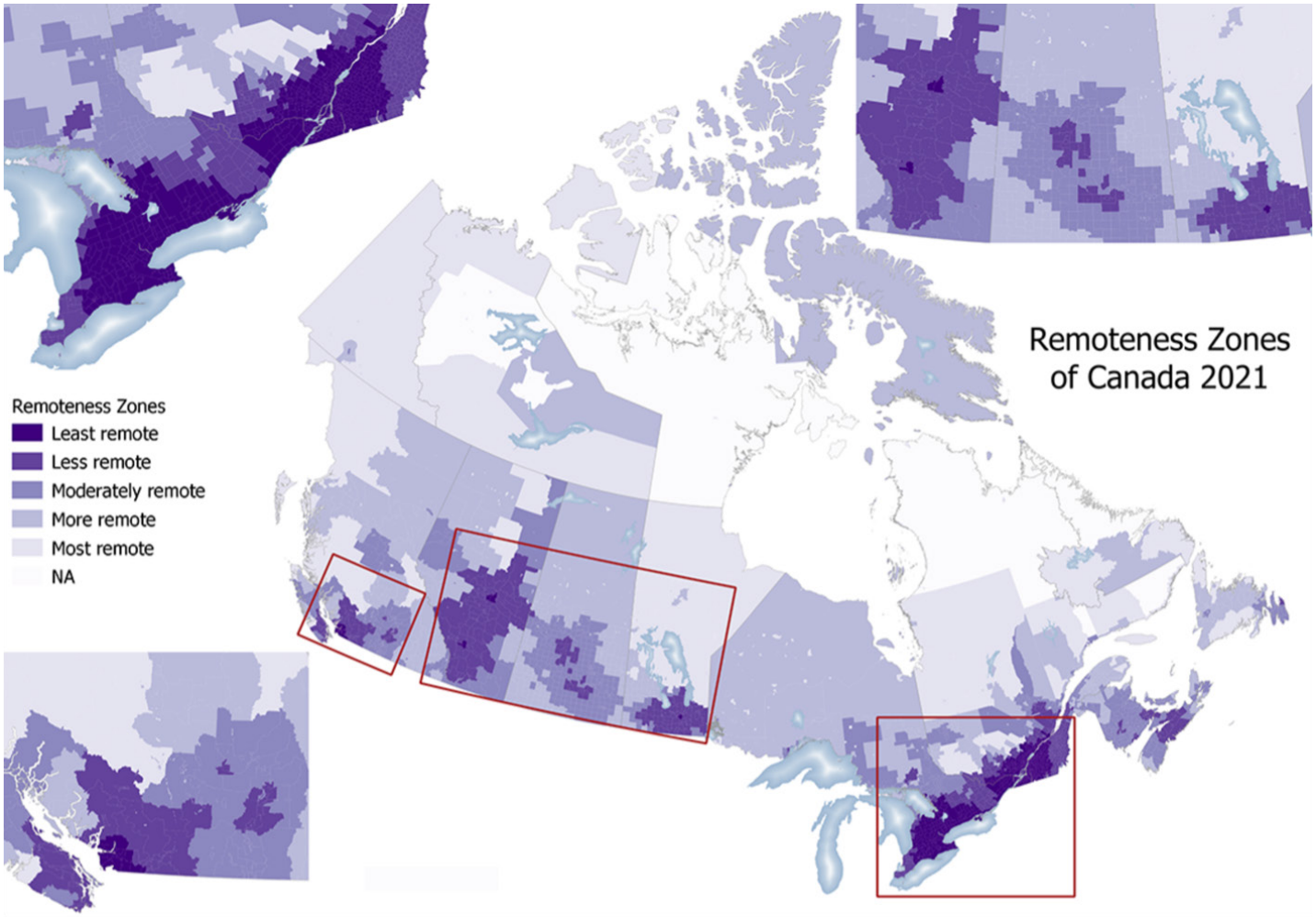

***Figure 1**. Remoteness Zones of Canada, 2021. Source: Statistics Canada (2022).*[18]

medical transportation accounted for more than one-third of federal Non-Insured Health Benefits (NIHB) expenditures for status Indigenous Canadians, amounting to $525 million **(Figure 2)**, second only to pharmaceutical expenses at 37%.[6] According to a 2016-2017 analysis, these costs increased by $108 million over those of 2021.[7] Given that as much as 60% of the Canadian Indigenous population (First Nations, Metis and Inuit) resides in rural and remote areas,[8] the important question to consider is whether or not virtual care is a potential solution to addressing these proximity, cost and travel barriers.

The pathway to implementing effective virtual care in dermatology is not straightforward when considering the barriers faced by rural and remote Indigenous communities. A provincial[9] and national[10] cross-sectional survey of front-line healthcare practitioners (HCPs) who diagnose and manage skin disease in northern and rural Canadian Indigenous communities identified considerable barriers to patient care in terms of costs, transportation, long wait times to consult with specialists or general practitioners (GPs), and proximity to healthcare services. Such barriers were consistent with those identified regarding general healthcare access in First Nations regional and national surveys.[11,12]

The barriers to accessing dermatologic care for rural Indigenous peoples of Canada and North America is an area in need of further study. In the United States, a mixed-methods study by Morenz et al (2019)[13] analyzed geographic and socioeconomic barriers to access for Native American peoples living in rural areas with limited access to specialist care. Outcomes included average driving distances from rural federal Indian Health Services (IHS) or tribal health centres to the closest dermatology clinic, insurance coverage, and availability of teledermatology programs collaborating within IHS or tribal healthcare facilities. Among the dermatology clinics (n=27) surveyed through open-source mapping in the IHS or tribal facility service area, the mean driving distance from rural IHS/tribal healthcare facilities to the nearest dermatology clinic was 109 km (range 48-167 km). Two-thirds (62%) of facilities lacked access to a dermatology clinic within a 56 km radius, and 32% within a 145 km radius. No dermatologists were

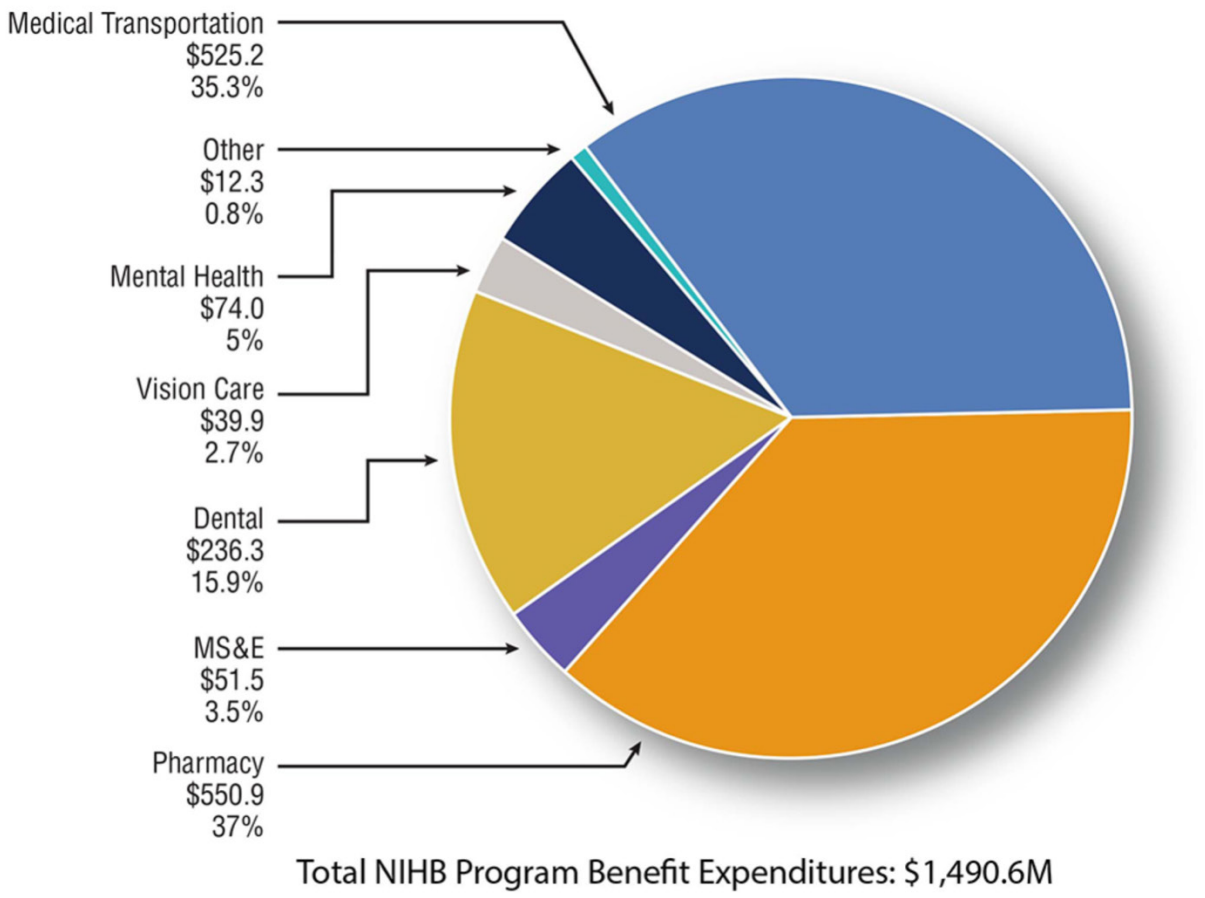

Figure 2. *Total NIHB Program Benefit Expenditures.*[19]

identified as being able to travel to these rural sites for on-site care, although one site in Montana had a satellite dermatology clinic held on the Flathead reservation bi-monthly. With regard to tele-dermatology, only 27/303 (9%) of rural IHS or tribal healthcare facilities reported receiving tele-dermatology services, with the majority operating with asynchronous store-and-forward models. The study authors concluded that distance and lack of access to dermatologic services were considerable barriers for rural Indigenous peoples. They proposed tele-dermatology as a novel solution in minimizing access disparities. Given the geography and size of Canada, it is of the author's opinion that this distance-access disparity for rural and remote Indigenous peoples is likely multi-fold higher than that experienced in the United States; however, formal studies confirming this are lacking. Long driving distances for specialist care is costly for rural patients. Examples of this include driving time, absence from work or domestic duties, and vehicle and fuel costs. Some patients may not have access to personal or public transportation to allow them to attend their appointment; additionally, road conditions may be weather-dependent.[13]

Can Virtual Care Provide Solutions?

Little data exists on the role of virtual care and the delivery of dermatologic care for Canadian Indigenous peoples. The aforementioned national survey[10] of HCPs (n=50) explored the impact of the COVID-19 pandemic, and the role of virtual care for optimized management of skin disease in rural and remote Canadian Indigenous populations. The majority of participants (>70%) agreed or strongly agreed that virtual care holds potential in addressing travel barriers; may make dermatologic care more accessible; can be useful for follow-up and coordination of care with allied health professionals; and can be cost-effective compared to seeing patients in person. The majority of practitioners also identified that increasing in-person dermatologist visits to remote communities; creating dermatologic educational programs for HCPs embedded in a culturally sensitive context; staffing an employee or nurse who can assist with care coordination; and increasing the practitioners' virtual presence may help improve care. Despite the potential roles for virtual care, barriers and concerns were also identified by study participants, which included asynchronous store-and-forward photograph quality; inadequate

infrastructure; patient inability to use or sustain virtual care; and lack of human contact or in-person physical examination. In terms of infrastructural barriers, the Canadian federal government's "High-Speed Access for All: Canada's Connectivity Strategy" report has revealed that, whereas 97% of urban homes have access to 50/10 Mbps internet speed (required for adequate access to telehealth services), only 37% of rural households and 24% of Indigenous community households have this access.[14]

The 2019 study by Morenz et al [13] also proposed extended solutions, such as academic medical centre partnerships with Indigenous healthcare facilities which may further benefit patient access and education. For example, a novel tele-dermatology partnership between the Navajo Nation and Brigham and Women's Hospital in Boston, Massachusetts engaged urban dermatologists to travel and train local staff in skin disease management. The American Academy of Dermatology (AAD) supports rotations for dermatology residents at IHS health facilities in Arizona to assist with education and management.[15] Enhancing front-line rural healthcare facilities and staffing resources (e.g., nursing stations, nurse practitioners, GPs) and practitioners' diagnostic and treatment skills in dermatology, in combination with access to specialists as needed, may provide long-term solutions.[13] Increasing mandatory rural rotations and virtual care exposure for dermatology residents, mentorship by rural dermatologists, and the development of rural dermatology educational resources may be additional solutions.

Currently, just over half of dermatology programs in Canada offer direct educational experience in Indigenous communities and community healthcare.[2] In the international context, Australia's rural and remote Indigenous populations face similar geographical distribution and healthcare disparities compared to Canadian and American Indigenous peoples. A systematic review conducted by Kozera et al (2016) demonstrated the value of tele-dermatology for both practitioners and patients for dermatologic care among rural Australian Indigenous peoples, although validated tools and further primary studies are needed to support this finding.[16]

Conclusion

Compared to the general population, Canadian Indigenous peoples disproportionately reside in rural and remote locations. However, the majority of dermatology centres are located in urban centres. In light of access-related costs and other barriers experienced by rural populations when seeking dermatologic care, virtual care may be a potential, and vital, solution to the healthcare challenges faced by Canadian Indigenous communities. Further regional primary studies are needed, employing a cost-quality-access lens, as well as Indigenous leadership and community engagement using Indigenous-oriented translational research methodologies. An example of this is the OCAP (Ownership, Control, Access and Possession) principles.[17] Virtual care may also carry benefits beyond patient care, e.g., potential educational and interdisciplinary initiatives. Additionally, further groundwork at the residency level is needed to allow future dermatologists to experience the realities of rural dermatology and Indigenous health. A shift toward innovative solutions in our current unprecedented era of medical technology will provide unique solutions for individuals facing health disparities and will optimize the dermatologic health of all Canadians.

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