

## REVIEWS AND CLINICAL PRACTICE

# A Circumpolar Experience: How Social Determinants of Health, Climate Change, Grapes, and Medical Innovation are Related

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## ABSTRACT

This report shares my experience on an Arctic expedition with the *Students on Ice Foundation*. Social determinants of health (SDHs), including climate change, are considerably worse in Indigenous populations than in non-Indigenous populations and carry profoundly negative implications for Indigenous healthcare. Climate change has a more significant effect at the poles than anywhere else, compounding the effects of other SDHs and worsening Indigenous health outcomes. There are innovative ways in which SDHs and the effects of climate change can be mitigated and ways in which Indigenous healthcare can be improved, particularly with programs such as *Students on Ice*.

## RÉSUMÉ

Ce rapport de stage donne un survol sur l'expérience d'un étudiant en médecine de première année complétant un stage en rhumatologie pédiatrique par l'entremise de la Société canadienne de rhumatologie (SCR). Les étudiants peuvent faire demande pour travailler avec un rhumatologue afin d'avoir une opportunité de vivre un horaire alternant entre des soins externes et des soins hospitaliers, au cours de l'été. Ce stage est unique : il expose aux étudiants de médecine au préexternat des expériences d'apprentissage qui leur préparent pour l'externat et l'avenir. Il offre des opportunités pratiques ainsi qu'un aperçu de la recherche dans cette spécialité ; tout dans un établissement scolaire canadien mondialement connu.

Last summer, I was awarded a once-in-a-lifetime opportunity to embark on a polar expedition through Greenland and Nunavut. For two weeks, I lived on a ship with 127 youth from 20 countries and learned from over 90 world-renowned researchers, authors, artists, educators, and Elders. While this expedition was not one of a medical nature, it has revolutionized the way in which I will practise medicine. My expectations of this program run by *Students on Ice Foundation* were, at first glance, straightforward: foster meaningful relationships with Canada's Indigenous population; learn about the impact of climate change on the world; become more empowered to inspire positive environmental change; and develop professional international relationships with globally-minded individuals. Not only did this expedition exceed my expectations, it provided me with the resources to combine my passion for environmental preservation with my desire to advocate for Indigenous populations in healthcare settings. Reflecting on this expedition, I realize now that my expectations were not simple in the slightest. To understand the vibrant, beautiful, and complicated life that exists in our northern regions, one must be prepared, educated, and willing to ask difficult questions.

Eight nations rest, in part, above the 66° latitude of the Arctic Circle: Canada, The United States of America, Denmark (including Greenland and the Faroe Islands), Iceland, Finland, Norway, Sweden, and Russia (1). Together, these nations comprise the Circumpolar North and are unique in that they face challenges distinct to each other and not experienced by countries outside this region. Climate, extreme landmass distances, and high costs of living have transformed communities such as Pond Inlet, Nunavut, Canada (72.7° Latitude) and Resolute Bay, Nunavut, Canada (74.7° Latitude) into entirely different places from Ottawa, Ontario, Canada (45.4° Latitude). In fact, aside from sharing a national anthem and prime minister, they are probably more different than they are alike. As a medical student, I focused primarily on the healthcare practices and distribution of healthcare resources amongst these regions. For instance, during one of my community visits, I searched for the differences in the social determinants of health (SDH) between the relatively "large" community of 1,600 people in Pond Inlet, and the "large" community of 935,000 people in Ottawa. Every morning, as I sat at the ship's breakfast table with my eggs, toast, and fruit salad, I tried to predict what I would see each day and how I might feel. I was shocked every night with how wrong I was in my prediction.

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The social determinants of health (SDH) are well-known in the medical profession as the personal, social, economic, and environmental factors that play a large role in both individual and population health (2). They include factors such as income, culture, education, and access to healthcare. It has been repeatedly proven that Indigenous populations have more detrimental SDHs than non-Indigenous populations in Canada (2-7). For example, in 2016, the median annual income of a Nunavut resident was \$5,000 lower than that of a non-Nunavut resident (3). The rates of tuberculosis in any of the four Inuit regions in Canada is 300 times that in the rest of the country, and the life expectancy in the same regions is ten years lower than the national average (4-5). Only 29% of Inuit children earn a high school diploma, compared to 85% nationally (6). Compound these SDHs with years of cultural oppression and abuse during the colonization era, as well as Residential Schools, it is unfortunately no surprise that suicide rates amongst Indigenous people are six times the national average (7). Indigenous people have SDH differences that form more of an equality chasm than a gap. Living for two weeks immersed in Northern culture with Elders and Inuit students was the first time I experienced first-hand the human impact of these unsettling statistics. Food costs were astoundingly high (one bell pepper was \$17.59); I met 14-year-old students who have smoked cigarettes for years and teenagers who were pregnant; many Inuit knew someone who committed suicide; and every Inuit student and Elder had a scar from the BCG vaccine that is still required because tuberculosis is so rampant. These SDHs are present and visible and have a much greater impact than mere words and statistics can express. Don't be fooled—not every Northerner smokes and not every teenage female in Nunavut becomes pregnant. But if the saying is that “one is too many,” then what should be said about the thousands of disadvantaged Indigenous people?

Interestingly, one of the SDHs is physical environment. Iqaluit, Nunavut's capital, is a more southerly community in the territory, meaning many are much farther north and significantly colder. No trees grow north of the Arctic Circle because of its tundra ecosystem, and there is a thick layer of permafrost, making it impossible for fruits and vegetables to grow. Additionally, climate change is taking its toll at the poles more than anywhere else (8). As sea ice melts, more water becomes exposed to the sun, absorbing more heat, thus melting more ice, and exposing more water. It is a vicious cycle. Many global climate models have even predicted that, for the first time, the Arctic will be ice-free for at least part of the year

by the end of the 21st century (8). Indigenous communities have relied on hunting as a main food source for centuries; caribou, seal, whale, polar bear, and goose, to name a few, are staples in the Indigenous diet. Northern animals have evolved to survive icy and snowy habitats, but they, too, are seeing the effects of global warming. Polar bears have less time to hunt on sea ice and expend more energy trying to swim to and from sources of food than ever before; walrus, which usually scrounge the ocean floor for food, have had to retreat to shore because the ice is beyond their reach; caribou are changing their migration patterns as seasonal patterns shift (9). Animal behaviour change means that the Indigenous people must either adapt their age-old hunting practices to match the new requirements of their prey or face worsening food insecurity.

Aboard the ship, Nancy Etok, a teacher from Kuujuaq, Quebec, stated in a workshop, “Our traditional food is becoming harder to come by. Hunters are away for longer times, in more unfamiliar places, and bringing back less food than ever before, if they do come back at all. When we can't eat our traditional food, we lose not only physical satiety, but a sense of cultural fullness. So much of our self-worth is rooted in foods that we grew up on that climate change is terrifying for all of us” (10). The dire climate situation has resulted in a rapid increase in research proving its negative effects on Indigenous health. A recent exploratory study determined that climate change has negatively affected the fresh water quality and quantity in Nunatsiavut, the Inuit region of Labrador (11). Another study proves that climate change is affecting Inuit access to harvest grounds, which impacts food supply and downstream health effects (12). Several other studies have demonstrated that changes in weather, ice stability, and wildlife and vegetation patterns are adversely impacting Indigenous mental health because of a loss of cultural identity (13-15). For a population that already has a stark suicide risk, the added stress of climate change only compounds a worsening problem (7). On my trip's final day, I remember eating my toast, eggs, and fruit salad, now conscious of the fact that the grapes alone would cost someone living at the same latitude \$15. I felt inspired to amalgamate everything I had learned in political workshops, small group discussions, and cultural group activities to educate my peers on established initiatives that help mitigate these dire circumstances, while also brainstorming new solutions.

After disembarking the ship for the last time on the shores of Greenland—which should have been Resolute Bay, Nunavut,

but we were, ironically, diverted because of changing sea ice patterns—I took one final breath of cool summer air, far fresher than the city air to which I am accustomed, and began the next step of my journey: bringing my knowledge home. I thought back to one workshop, where an Indigenous rights activist speaking about climate change had tears in her eyes after stating she has not been able to find caribou in over two years, and knew I would dedicate my efforts to people like her. While the solutions to Indigenous health equality are far from simple, there are still countless opportunities for innovation in a multitude of disciplines. A recent study published by Lancet suggested that trying to mitigate climate change will be the single best thing governments can do for healthcare (16). Perhaps solutions lie again in education: school curricula, from primary to post-secondary, can start including climate change in their learning objectives, with projects dedicated to improving carbon footprints and school recycling programs. The United Nations established a list of 17 sustainable development goals (SDGs) in 2015 that aim to address gaps in poverty, literacy, finances, climate, and inequality worldwide (17); what is required to help reach these goals is inspired, creative people willing to advocate for change. On my trip, for example, I had the opportunity to meet Dominique Souris of Waterloo, Ontario, during an on-shore small-group discussion about the SDGs. Dominique felt so passionate about these SDGs that she founded an environmental advocacy company that empowers young adults to become leaders for the environment in their community. Dominique's organization, Youth Climate Lab, has earned her a place as one of Canada's Top 30 Under 30 Sustainability Leaders. From another perspective, the University of Ottawa Medical School integrates Indigenous health lectures into part of its curriculum (18); other programs should implement this, or even invite Indigenous guest speakers to their classes to describe their daily challenges first-hand. Additionally, while some hospital programs fly doctors to remote Northern regions as part of their residency training, medical students may benefit from having this opportunity earlier in their training, as I had, to be exposed to medicine in the North. On an individual level, mitigating climate change starts with diligent recycling or taking public transportation to run errands instead of driving. Personally, I now have more motivation to invest in medical software that will allow a paperless practice. Each exceptionally vast domain of innovative expertise provides the opportunity for public engagement, youth involvement, and consultation with Indigenous populations to collaborate innovatively to better the health of our nation.

Perhaps the beginning lies (or floats) in programs such as *Students on Ice*. Without this program, I would not have been inspired to investigate and think about all that I have, and my perspectives on how profound the SDHs are, including climate change, would be entirely different. It is *Students on Ice* where I could achieve my goals of fostering meaningful discussions, and meeting and learning from International youth and world-renowned staff. It is also where I learned that, despite every ounce of adversity, the Arctic remains incredibly beautiful, founded on thousands of years of culture and traditions. I made a dogsled harness from scratch with a Colorado researcher who is a self-taught Inuktitut speaker; I studied Arctic flowers with Elders and the Curator of Botany at the Canadian Museum of Nature; I stitched a ball from caribou skin with Nunavut's top stitcher; I paddled a traditional sealskin kayak with a Canadian gold-medal Olympian; and I whale-watched with the Canadian Commissioner of the Environment and Sustainable Development. The best part is we were united by the dream of making a difference. My greatest fear is that one day these lands will no longer exist as they do today, preventing others from sharing similar experiences. I remain optimistic in believing that all healthcare professionals (and all people, for that matter) will seek opportunities to advocate for equality and justice for all and will view every \$4 kilogram of grapes at the grocery store with new humility and gratitude. If one should get lost along the way, he or she simply needs to seek the northern lights to illuminate the path.

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