CFMS Health and Environment Adaptive Response Task Force (HEART)
Planetary Health Educational Competencies

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Introduction

The voice of the health profession is essential in driving forward progress on global climate and environmental change and realising the health benefits of this response.

This has been recognised globally by many health bodies and institutions, including the World Health Organization (WHO) and The Lancet and its Commission on Planetary Health. A decade ago, on World Health Day, the WHO Director-General stated that "Climate change will affect, in profoundly adverse ways, some of the most fundamental determinants of health" (Chan 2008).

In Canada, climate and environmental change has also gained attention as a public health issue of increasing concern. The Lancet 2017 Countdown Report for Canada described multiple impacts and indicators for climate and health, from food insecurity in the Arctic, to increased heat-related illness and respiratory disease, to stress and displacement from natural disasters such as floods and wildfires (Watts et al 2017; CPHA, 2017). The Canadian Medical Association (CMA) released a policy on Climate Change and Human Health in 2010, which included 14 recommendations for action on climate change to promote health (CMA, 2010). Furthermore, since 2012, the CMA has passed over 20 motions related to the environment and health.

Medical schools should consider integrating these competencies into their curricula.

Why does this matter for medical education? Future health practitioners will be at the front lines of dealing with the health consequences of climate change. Furthermore, physicians as public health advocates have a responsibility to understand the impacts of global environmental change on their patients. They must learn how to collaborate with stakeholders to promote public policy that benefits the health of the environment and of society. As stated in a recent paper, "Integrating climate change into medical education offers an opportunity for future doctors to develop skills and insights essential for clinical practice and a public health role in a climate-changing world" (Maxwell and Blashki, 2016).

Given the urgent nature of this issue, the Canadian Federation of Medical Students' Health and Environmental Adaptive Responsive Task Force has created this proposed list of climate change, sustainability and health educational competencies. It is our hope that medical school faculties will incorporate these objectives into their curricula, if not already covered.

Highlighted in red are suggested curriculum courses in which the topics could be incorporated, whether into pre-existing modules or as separate sessions.

A. Health Consequences and Specific Impacts

1. Displacement and vulnerable populations

CanMEDS Manager, Health Advocate

a. Elderly, children and specific vulnerabilities (Special populations, geriatrics, pediatrics, health of people with disabilities)
    i. Recognise that children and elderly are at increased risk of climate-related illness and injury. Risks to children include more severe forms of infectious diseases or undernutrition due to food insecurity. The elderly are at risk from extreme events, such as heat waves or floods, as they are often more isolated, less mobile, and less able to respond to stressors (IPCC, 2014, Chapter 11.3).
    ii. Understand that poverty mediates the health risks of environmental change. Poorer countries are most vulnerable to climate change, but wealthy countries like Canada are not immune. Within a country, populations and regions of low socioeconomic status – such as Indigenous populations and marginalized people in Canada – are at risk, due to both poor baseline health status and reduced access to both preventive and adaptive resources (IPCC, 2014, Chapter 11.3).
b. Climate refugees (Global health, refugee health)
    i. Realise that sudden or gradual changes in environmental conditions, such as land loss due to extreme events, will drive population displacement. By 2050, anywhere between 50 and 200 million people are predicted to move (permanently or temporarily), within or out of their countries (UNHCR, 2009).
    ii. Recognise and manage health risks for displaced and refugee populations, including: infectious diseases (such as malaria), malnutrition, sexually transmitted infections, and mental health problems (such as post-traumatic stress disorder) (IPCC, 2014, Chapter 11.8.4; McMichael et al, 2012).
c. Homeless populations (Population health, social determinants of health, poverty, inner city health)

i. Recognize that those living with homelessness are amongst the most vulnerable groups in developed countries and will be some of the first to experience the effects of climate change. Increased air pollution, severity of floods and storms, frequency of heat waves and change in distribution of viruses (such as the West Nile Virus) will impact the population. Air pollution-related mortality is predicted to have an increase of 20-30% by the year 2050, with most of the population being susceptible (Ramin et al., 2009).
ii. Identify strategies that could protect those who are homeless from these environmental changes, such as public policy for improved transportation and urban planning, and clinical funding for these patients (Ramin et al., 2011).

2. Food and water insecurity

CanMEDS Medical Expert, Scholar

a. Understand that climate change has multiple impacts on food security, nutrition and health, including: (Nutrition, refugee health, social determinants of health, poverty)
    i. Reductions in global food availability, resulting in increased risk of mortality associated with both reduced fruit and vegetable consumption as well as increased prevalence of underweight and undernutrition (Springmann et al, 2016; IPCC, 2014, Chapter 11.6).
    ii. Risks to food access, utilisation, and price stability (IPCC, 2014, Chapter 7; Wheeler & von Braun, 2013) (Poverty, Indigenous health)
    iii. Pre-existing food insecurity in remote regions of Canada, such as the Arctic, can be exacerbated by climate change (Beaumier & Ford, 2010) (Poverty, Indigenous health, health inequities)
b. Understand that stresses on global water supply will be exacerbated by extreme weather events associated with climate change (e.g. drought) (Refugee health, waterborne illnesses)
    i. Increases in frequency of droughts and floods will reduce freshwater resource quality and quantity, posing risks to safe drinking water, adequate hydration, and prevention of water-borne and diarrheal disease outbreaks (IPCC, 2014, Chapter 3; Levy et al, 2016; Cann et al, 2013).

3. Changing infectious disease burdens

CanMEDS Medical Expert, Scholar

a. Recognise that climate change contributes significantly to the emergence of infectious disease threats due to the expansion of geographic areas that are suitable for a wide range of vector-borne diseases. Changing habitat ranges also impact, food- and water-borne infections (Watts et al, 2017 [section 1.6]; IPCC, 2014, Chapter 11.5; Patz et al, 2005; Daszak et al, 2013) (Infectious diseases, outbreak management, global burden of disease)

b. Recognise the correlation between tick migration due to climate change and the spread of Lyme disease and other tick-borne illnesses in Canada (Ogden et al, 2006; Uminski et al, 2018) (Infectious diseases, Emergency/Urgent care medicine)
c. Recognize that climate change-related factors influence the range of West Nile virus and other mosquito-borne illnesses with evolving epidemiologic patterns (Paz, 2015; Liesnham & Juliano 2012; Doughty, 2017).(Infectious diseases, outbreak management, global burden of disease)
d. Recognize the effects of climate change and environmental variables on disease emergence, transmission and seasonal duration (an example being malaria) (Parham & Michael, 2009) (Infectious diseases)

4. Emergency disaster risk

CanMEDS Manager, Medical Expert

a. Recognise the health care professional's role in disaster management, the burden of disasters on the health system, and the impacts of extreme events on physical and mental health. Health systems play a part in early-disaster warning systems and in responding to climate-related disasters, such as wildfires or flooding. Natural disasters are occurring at greater frequency in Canada, partly due to effects of climate change (Watts et al, 2017, Maclean et al. 2016, Goldmann and Galea 2014, Gillett et al. 2004) (Refugee health, wilderness medicine, mental health- acute stress disorders)
b. Learn how to manage extreme temperature risks (e.g. hyperthermia, hypothermia) and understand the importance of heat-related risk warning systems (Canadian Environmental Health Atlas, 2017) (Geriatrics, pediatrics, family medicine)

5. Air pollution and health

CanMEDS Medical Expert, Scholar

a. Understand that air pollution (both household/indoor and ambient/outdoor) causes more deaths than any other environmental pollutant, and that it is most strongly linked to cardiorespiratory diseases, such as: hypertension, coronary artery disease, congestive heart failure, arrhythmias, asthma, COPD, and lung cancer (Forouzanfar et al, 2016; Government of Canada, 2017) (Respiratory system, specifically asthma)
b. Recognise that air pollution disproportionately affects those suffering from poverty. The vast majority of deaths due to air pollution occur in low- and middle-income countries, and household air pollution from burning solid fuels in traditional stoves particularly impacts women's and children's health (Landrigan et al, 2018) (Respiratory system, specifically asthma, poverty, social determinants of health, women's health, pediatrics)

6. Mental health

CanMEDS Scholar, Health Advocate

(Psychiatry, public health)

a. Recognize climate change-related extreme weather events and degrading landscapes directly contribute to mental health consequences such as post-traumatic stress disorder, major depressive disorder, anxiety, depression, substance use, and suicidal ideation (Berry, Bowen, & Kjellstrom, 2010; Hayes, Blashki, Wiseman, Burke, & Reifels, 2018).
b. Recognize that climate change has adverse impacts on the social determinants of health (e.g. housing security, peace, food & water security) thus has mental health consequences. (Anderson & Jané-Llopis, 2011; Berry et al., 2010; Doherty & Clayton, 2011; Hayes et al., 2018).
c. Recognize the mental health impacts of climate change disproportionally affect the homeless, Indigenous peoples, those with pre-existing mental illness, and marginalized populations in Canada, thus compounding existing social inequities (Berry et al., 2010; Doherty & Clayton, 2011; Hayes et al., 2018).
d. Understand that there can be existential emotional distress seen in association with fears about the changing climate, and develop an empathetic approach to discussions with patients. (Albrecht et al., 2007; Doherty & Clayton, 2011).

B. Preventing and Mitigating Health Effects

7. Climate and environmental advocacy

CanMEDS Health Advocate, Professional, Collaborator

(Public health, community medicine, family medicine; skills development in advocacy, communication, and leadership)

a. Understand that the role of doctors and medical students as advocates for patients' health extends to climate and environmental policy collaboration (Rudolph & Harrison, 2016; Crowley, 2016; CMA, 2010)
    i. Communicate with individual patients, communities and employers, where appropriate, concerning environmental risk assessments.
    ii. Develop the collaborative skills necessary to advocate for local, provincial or federal policies that benefit patients' health through improving environmental outcomes.
b. Understand the responsibility of the health professional to communicate the urgencies of climate change and the limitations of adaptation to our current temperature trajectory: "This delayed mitigation response puts the world on a high-end emissions trajectory that will result in global warming of 2.6–4.8°C by the end of the century"(Watts et al, 2017) a level of warming which "may be incompatible with an organised global community" (Watts, 2015). To the same degree as counselling patients around smoking cessation, physicians are responsible for strongly advocating for mitigation measures and evidence-based policy tools for mitigation.
    i. Communicate the health rationale for coal phase-out; carbon pricing (CMA motion passed); plant-rich, low-meat diets; active transport; and the need for

a societal low-carbon transition (Watts et al 2017, 2015; Whitmee et al 2015, CPHA 2017)

ii. Recognizing the importance of economics as a social determinant of health, and advocate for support and retraining of populations whose livelihoods are impacted by the transition to a low-carbon economy. If not carefully managed, this transition could result in socio-economic dislocation for certain regions and sectors with concurrent impacts on livelihoods and health (Spencer et al 2017; Pollin and Callaci 2016)

8. Ecological health promotion

CanMEDS Communicator, Collaborator, Health Advocate

(Health systems and policy, mental health, burden of disease)

a. Recognise upstream policies that promote both health and environmental well-being
    i. Understand how a socio-ecological approach can enhance health promotion activities. For instance, a healthy environment can promote human well-being through contact with nature (Maller et al, 2006).
b. Understand the health co-benefits of climate change adaptation and mitigation in interdisciplinary fields including transport, food production, energy and housing
    i. Recognise that sustainable development policies, such as active and public transport or energy-efficient housing, can also provide co-benefits in reducing the burden of illness (WHO, 2017)

9. Context specific practice / Remote and rural health

CanMEDS Medical Expert, Manager, Collaborator

(Community health, preparation for rural/northern medicine electives)

a. Understand the importance of integrating multidisciplinary information to manage complex climate-related conditions specific to a variety of contexts
    i. In urban areas, for example, doctors may need to promote awareness of respiratory health risks related to pollution, including particulates or ozone, or advise patients on how to prevent heat stress or illness exacerbations during heat waves (Maxwell and Blashki, 2016).
    ii. In isolated and remote contexts, doctors may need to address mental health issues related to disruption in land-based activities. In the Canadian North, climate change has already shown a negative influence on Inuit peoples' mental health (PHAC, 2014).

10. Reproductive health and gender equity

CanMEDS Health Advocate, Collaborator

(Women's health, family medicine, social determinants of health)

a. Recognize that population growth influences the consumption of resources and emissions of climate-altering pollutants, and can cause increased strain on and degradation of land resources (Cohen, 2010)
b. Appreciate that over 200 million women worldwide express unmet needs for contraceptive services – in both high- and low-income countries. Low-income countries are disproportionately burdened by a lack of access to family planning and high vulnerability to the impacts of climate change (Potts & Henderson, 2012; Singh et al. 2014).
c. Advocate for the co-benefits of family planning as a climate change mitigation strategy, including increased birth spacing and decreasing family sizes (Smith et al. 2014). Understand that these impacts have the capacity to improve maternal and child health, decrease the vulnerability of families to severe weather events and crop failure, and dignify women with the opportunity to control their reproductive health.
d. Recognize that the compassionate promotion of voluntary contraceptive care and education within a rights-based, culturally appropriate framework offers a cost effective and health-promoting strategy to reduce greenhouse gases (Guillebaud, 2016).

11. Green health care

CanMEDS Professional, Manager, Collaborator

(Health systems, quality improvement)

a. Recognize the social responsibility within health care as stewards of the environment and that green health care means carbon neutral, sustainable and environmentally friendly health care provision
b. Learn that physicians play a role in accepting and facilitating transitions to green health care, which may include:
    i. Transportation - greater use of electric vehicles, public or group transportation between health care facilities as well as between the community and health care facilities
    ii. Energy - Move from reliance on fossil fuel energy to renewable sources of energy (solar, wind, hydro, geothermal, biomass, etc.) for the provision of heat and electricity for health care sites
    iii. Waste management - recycling, environmentally friendly materials/equipment, education around resource usage to reduce hospital waste. Consequences include air pollution due to imperfect incineration, landfill use and subsequent natural resource contamination, needle stick injuries and spread of infectious disease.
    Possible citation:
    iv. Product acquisition and consumption - hospitals and clinics purchase a large number of products integral to healthcare delivery, and the manufacturing, packaging, delivery, choice, and use of these products can be improved through acquisition and utilization policies.

(Global Green and Healthy Hospitals, 2018; Canadian Coalition for Green Health Care, 2016)

C. Indigenous Health Risks and Approaches

12. Indigenous health

CanMEDS Collaborator, Health Advocate

(Indigenous health course/sessions)

Recognize that there are specific climate- and environment-related health risks for Indigenous populations, as well as specific challenges for coping with them within existing health and social systems (Ford, 2012; Parkinson & Berner, 2009). In particular, students should:

a. Displacement & Vulnerable Populations: Understand that marked disparities exist in community well-being – as indicated by levels of education, income, housing and labour force – between Indigenous and non-Indigenous communities in Canada (Indigenous and Northern Affairs Canada, 2015), and that Indigenous children comprise a particularly vulnerable group (Macdonald & Wilson, 2013). This translates into overall poorer health outcomes – as evidenced by a lower life expectancy at birth – and greater vulnerability to the health-related impacts of environmental harms (Government of Canada, 2018). Further, changes in sea-levels and permafrost/ice stability threaten to displace Northern Indigenous communities and weaken existing community infrastructure (Furgal & Seguin 2006).
b. Food & Water Insecurity: Realize that many Indigenous communities experience long-term Drinking Water Advisories (DWAs) and that the number of DWAs in Canada has increased over the past decade (Thompson, Post & McBean, 2017). Know that Indigenous households face a high prevalence of food insecurity (Skinner, Hanning & Tsuji, 2012), a challenge that is greatly exacerbated by environmental factors including weather (for air/road transport of food) and changing hunting conditions (Beaumier & Ford, 2010).
c. Changing Infectious Disease Burdens: Recognize how changes in infectious disease burdens due to increased temperatures and insect, food and water-borne infective agents would affect Indigenous communities. Understand how this pertains to water treatment infrastructure and traditional food storage and preparation practices (Ford J. 2010).
d. Emergency Disaster Risk: Know that many Indigenous communities in Canada lack adequate 911 and emergency response services, leaving them poorly-equipped to handle climate-related weather disasters – like wildfires – and prolonging community recovery times (Collier 2015, Mew et al. 2016).
e. Land Use & Resource Development: Understand that Indigenous communities disproportionately experience the burden of industrial developments on their lands (Huseman & Short, 2012; Booth & Skelton, 2010). In many cases, Indigenous communities have been neglected to unusable land with restricted access to environmental resources and necessary infrastructure. This has resulted in limited opportunities for economic, social, and cultural activities that determine good health for Indigenous communities (Richmond et al, 2005; Huseman & Short, 2012).
f. Ecological Health Promotion: Honour Indigenous cultural practices and ways of being. Acknowledge the role of Indigenous connection to land, and related expertise,

that has an important role in protecting the health of humans and our natural surroundings.

Sources

Introduction

Chan M. Message from WHO Director-General. World Health Day. 2008 Apr 7. Accessed at: http://www.who.int/world-health-day/dg_message/en/

Watts N et al. The *Lancet* Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. The Lancet. 2017 Oct 30 [ePub ahead of print].

CMA. Climate Change and Human Health. Canadian Medical Association Policy. 2010. Accessed at: http://policybase.cma.ca/dbtw-wpd/Policypdf/PD10-07.pdf

Maxwell J, Blashki G. Teaching About Climate Change in Medical Education: An Opportunity. Journal of Public Health Research. 2016 April 26; 5(1): 673. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4856872/

1. Displacement and vulnerable populations

UNHCR. Climate change, migration, and displacement: impacts, vulnerability, and adaptation options. Submission to the 5th Session of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention, by the International Organization for Migration, United Nations High Commissioner for Refugees, and United Nations University. 6 February 2009. Accessed at http://www.unhcr.org/protection/environment/4a1e51eb0/climate-change-migration-displacement-impacts-vulnerability-adaptation.htm

McMichael C, et al. An ill wind? Climate change, migration, and health. Environmental Health Perspectives. 2012 May; 120(5): 646-54.

Ramin B. & Svoboda T., Health of the Homeless and Climate Change. Journal of Urban Health: Bulletin of the New York Academy of Medicine. 2009; 86(4): 654-64.

Ramin B., Health of the Homeless and Climate Change – Research Summary. 2011, March. Accessed at: http://homelesshub.ca/sites/default/files/ClimateChange_Summary.pdf

2. Food and water insecurity

Springmann et al. Global and regional health effects of future food production under climate change: a modelling study. The Lancet. 7 May 2016; 387(10031): 1937-1946.

Wheeler T & von Braun J. Climate change impacts on global food security. Science. 2013 Aug 2; 341(6145): 508-13.

Beaumier M & Ford J. Food insecurity among Inuit women exacerbated by socioeconomic stresses and climate change. Canadian Journal of Public Health. 2010 May-Jun; 101(3): 196-201.

Levy et al. Untangling the impacts of climate change on waterborne diseases: A systematic review of relationships between diarrheal diseases and temperature, rainfall, flooding, and drought. Environmental Science Technology. 2016 May 17; 50(10): 4905-4922.

Cann et al. Extreme water-related weather events and waterborne disease. Epidemiology and Infection. 2013 Apr; 141(4): 671-686.

3. Changing infectious disease burdens

Watts N et al. The *Lancet* Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. The Lancet. 2017 Oct 30 [ePub ahead of print].

IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Accessed at https://www.ipcc.ch/report/ar5/wg2/

Patz J et al. Impact of regional climate change on human health. Nature. 2005 Nov 17; 438: 310-317.

Daszak P, Zambrana-Torrelio C, Bogich TL, Fernandez M, Epstein JH, Murray KA, Hamilton H. Interdisciplinary approaches to understanding disease emergence: the past, present, and future drivers of Nipah virus emergence. Proc Natl Acad Sci U S A. 2013 Feb 26;110 Suppl 1:3681-8. doi: 10.1073/pnas.1201243109. Epub 2012 Aug 30.

Ogden N et al. Climate change and the potential for range expansion of the Lyme disease vector *Ixodes scapularis* in Canada. International Journal for Parasitology. 2006 Jan; 36(1): 63-70.

Uminski K, Kadkhoda K, Houston BL, Lopez A, MacKenzie LJ, Lindsay R, Walkty A, Embil J, Zarychanski R. Anaplasmosis: An emerging tick-borne disease of importance in Canada. *IDCases.* 2018 Nov 28;14:e00472. doi: 10.1016/j.idcr.2018.e00472.

Paz S., Climate Change Impacts on West Nile Virus transmission in a global context. *Phil. Trans. R. Soc. B.* 2015, 370.

Leisnmham P, Juliano, SA. Impacts of climate, land use, and biological invasion on the ecology of immature *Aedes* mosquitoes: Implications for La Crosse emergence. Ecohealth. 2012 Jun; 9(2): 217–228.

Doughty CT, Yawetz S, Lyons J. Emerging Causes of Arbovirus Encephalitis in North America: Powassan, Chikungunya, and Zika Viruses*. Curr Neurol Neurosci Rep.* 2017 Feb;17(2):12. doi: 10.1007/s11910-017-0724-3.

Parham PE, Michael E. Modeling the effects of weather and climate change on malaria transmission. *Environmental health perspectives*. 2009 Dec; 118(5): 620-6. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866676/

4. Emergency disaster risk

Watts N et al. The *Lancet* Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. The Lancet. 2017 Oct 30 [ePub ahead of print].

Maclean JC, Popovici I, French MT. Are natural disasters in early childhood associated with mental health and substance use disorders as an adult? Soc Sci Med. 2016 Feb;151:78–91.

Goldmann E, Galea S. Mental health consequences of disasters. Annu Rev Public Health. 2014;35:169–83.

Gillett NP, Weaver AJ, Zwiers FW, Flannigan MD. Detecting the effect of climate change on Canadian forest fires. Geophys Res Lett [Internet]. 2004;31(18). https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2004GL020876. Accessed 2019 Jan 29
Canadian Environmental Health Atlas. Understanding Our Environment is Key to Promoting Health and Preventing Disease. Heat Waves. Social Sciences and Humanities Research Council of Canada and Canadian Institutes for Health Research. http://www.ehatlas.ca/climate-change/heat-waves. Accessed 2018 Feb 7.

5. Air pollution and health

Forouzanfar M et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet. 2016 Oct 8; 388(10053): 1659-1724.

Government of Canada. Health effects of air pollution. Updated 2017 Nov 16. Accessed at: https://www.canada.ca/en/health-canada/services/air-quality/health-effects-indoor-air-pollution.html

Landrigan P et al. The Lancet Commission on pollution and health. The Lancet. 2018 Feb 3; 391(10119): 462-512.

6. Mental health

Albrecht, G., Sartore, G. M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., … Pollard, G. (2007). Solastalgia: The distress caused by environmental change. Australasian Psychiatry, 15(SUPPL. 1), 95–98. https://doi.org/10.1080/10398560701701288

Anderson, P., & Jané-Llopis, E. (2011). Mental health and global well-being. Health Promotion International, 26(SUPPL. 1), 147–155. https://doi.org/10.1093/heapro/dar060

Berry, H. L., Bowen, K., & Kjellstrom, T. (2010). Climate change and mental health: A causal pathways framework. International Journal of Public Health, 55(2), 123–132. https://doi.org/10.1007/s00038-009-0112-0

Doherty, T. J., & Clayton, S. (2011). The Psychological Impacts of Global Climate Change. American Psychologist, 66(4), 265–276. https://doi.org/10.1037/a0023141

Hayes, K., Blashki, G., Wiseman, J., Burke, S., & Reifels, L. (2018). Climate change and mental health: Risks, impacts and priority actions. International Journal of Mental Health Systems, 12(1), 1–12. https://doi.org/10.1186/s13033-018-0210-6

7. Climate and environmental advocacy

Rudolph L, Harrison C. A Physician's Guide to Climate Change, Health and Equity. Center for Climate Change & Health. 2016. Accessed at: http://climatehealthconnect.org/wp-content/uploads/2016/09/FullGuideTEMP.pdf

Crowley, R. Climate Change and Health: A Position Paper of the American College of Physicians. Annals of Internal Medicine. 2016 May 3. 166(12): 905-906. Accessed at:

http://annals.org/aim/fullarticle/2513976/climate-change-health-position-paper-american-college-physicians

Canadian Medical Association. Climate Change and Human Health. CMA Policy. 2010. Accessed at: http://policybase.cma.ca/dbtw-wpd/Policypdf/PD10-07.pdf

Watts N et al. The *Lancet* Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. The Lancet. 2017 Oct 30 [ePub ahead of print].

Watts N et al. Health and climate change: policy responses to protect public health. The Lancet. 2015 Nov 7; 386(10006): 1861-1914.

Whitmee S et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation – *Lancet* Commission on planetary health. The Lancet. 2015 Nov 14; 385(10007): 1973-2028.

CPHA. Lancet Countdown 2017 Report: Briefing for Canadian Policymakers. Lancet Countdown and Canadian Public Health Association. Accessed at: https://www.cpha.ca/launch-canada-specific-lancet-countdown-report

Spencer T et al. The 1.5C target and coal sector transition: at the limits of societal feasibility. Climate Policy. 2017 Dec 04; 18(3): 335-351. Accessed at: https://www.tandfonline.com/doi/full/10.1080/14693062.2017.1386540

Pollin R and Callaci B. The economics of just transition: a framework for supporting fossil fuel-dependent workers and communities in the United States. Political Economy Research Institute Working Paper. 2016 Oct 13. Accessed at: https://www.peri.umass.edu/publication/item/762-the-economics-of-just-transition-a-framework-for-supporting-fossil-fuel-dependent-workers-and-communities-in-the-united-states

8. Ecological health promotion

Maller C, et al. Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. Health Promotion International. 2006 Mar; 21(1): 45-54. Accessed at https://academic.oup.com/heapro/article/21/1/45/646436

WHO. Health and sustainable development. Improving health, reducing health and climate risks; and Environmental health in the Sustainable Development Goals: Preventing disease through action across the SDG spectrum. 2017. Accessed at http://www.who.int/sustainable-development/about/en/ and http://www.who.int/sustainable-development/sdg-briefs/en/

9. Context specific practice / Remote and rural health

Maxwell J, Blashki G. Teaching About Climate Change in Medical Education: An Opportunity. Journal of Public Health Research. 2016 April 26; 5(1): 673. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4856872/

PHAC. The Chief Public Health Officer's Report on the State of Public Health in Canada 2014 – Public health in a changing climate. 2014. Accessed at https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/chief-

public-health-officer-report-on-state-public-health-canada-2014-public-health-future/public-health-in-a-changing-climate.html.

10. Reproductive health and gender equity

Cohen, J.E., 2010: Population and climate change. *Proceedings of the American Philosophical Society*, 154(2), 158-182. Accessed at: https://www.ncbi.nlm.nih.gov/pubmed/21553595

Potts, M. and C.E. Henderson, 2012: Global warming and reproductive health. *International Journal of Gynecology & Obstetrics*, 119, 564-567. Accessed at: http://www.khubmarriage18.org/sites/default/files/148.pdf

Singh S, Darroch J, Ashford L., 2014: Adding it up: the costs and benefits of investing in sexual and reproductive health. Guttmacher Institute and UNFPA, 2014. http://www.guttmacher.org/pubs/AddingItUp2014.pdf

Smith KR, Woodward A, Campbell-Lendrum D, et al., 2014: Human health: impacts, adaptation, and co-benefits. Section 11.9.2: access to reproductive health services. Cambridge University Press, 2014:740-2. Accessed at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap11_FINAL.pdf

Guillebaud, J., 2016: Voluntary family planning to minimize and mitigate climate change. *British Medical Journal*, BMJ 2016;353:i2102. Accessed at: http://www.bmj.com/content/353/bmj.i2102

11. Green health care

Global Green and Healthy Hospitals. The GGHH agenda and the 10 goals for Green Healthcare. Health Care Without Harm. Accessed at: http://www.greenhospitals.net/sustainability-goals/ . Accessed 2018 Feb 7.

Canadian Coalition for Green Health Care. Climate Change Resiliency Mentoring. Accessed at: http://greenhealthcare.ca/mentoring/. Updated 2016 Oct 21. Accessed 2018 Feb 7.

12. Indigenous health

Booth, A L and N W Skelton 2010. First Nations' access and rights to resources. *Uncertainty and Conflict: Resource and Environmental Management in Canada*, ed. B Mitchell, pp. 80–103. Toronto: Oxford University Press.

Beaumier M. & Ford J. 2010. Food Insecurity among Inuit Women Exacerbated by Socioeconomic Stresses and Climate Change. Canadian Journal of Public Health. May/June 2010. 101(3) 196-201 Accessed at https://www-jstor-org.login.ezproxy.library.ualberta.ca/stable/pdf/41995440.pdf?refreqid=excelsior%3A867441117f224a045974af9675a9a1b3

Collier B. 2015. Emergency Management on First Nations Reserves. November 2015. Accessed at https://lop.parl.ca/Content/LOP/ResearchPublications/2015-58-e.html

Ford J. Indigenous Health and Climate Change. American Journal of Public Health. July 2012; 102(7): 1260-1266. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3477984/

Ford J. Vulnerability of Aboriginal health systems to climate change. Global Environmental Change. May 2010; 20(4): 668-680
Accessed at http://www.jamesford.ca/wp-content/uploads/2010/06/in-press-version.pdf

Furgal C. and Seguin J. Climate Change, Health and Vulnerability in Canadian Northern Aboriginal Communities. Environmental Health Perspectives. December 2006 114(12): 1964-1970. Accessed at https://www.jstor.org/stable/pdf/4119614.pdf

Government of Canada. Diseases that affect First Nations and Inuit Communities. August 2018. Accessed at https://www.canada.ca/en/indigenous-services-canada/services/first-nations-inuit-health/diseases-health-conditions.html

Huseman J, Short D. A slow industrial genocide': tar sands and the indigenous peoples of northern Alberta. The International Journal of Human Rights. Jan 2012; 16(1): 216-237. Accessed at http://www.tandfonline.com/doi/full/10.1080/13642987.2011.649593

Indigenous and Northern Affairs Canada. The Community and Well-being Index: Report on Trends in First Nations Communities, 1981-2011. April 2015
Accessed at https://www.aadnc-aandc.gc.ca/eng/1345816651029/1345816742083

Macdonald D., Wilson D. Poverty of Prosperity – Indigenous Children in Canada. June 2013
Accessed at
https://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2013/06/Poverty_or_Prosperity_Indigenous_Children.pdf

Mew et. al 2015. Emergency Response Systems and Services in Remote First Nations Communities in Northern Ontario: An Environmental Scan. April 2016. Accessed at:
https://www.nosm.ca/wp-content/uploads/2018/04/Mew_et_al_2016_Emergency-Systems-First-Nations_Northern-Health-Research-Conference-Rotated.pdf

Parkinson A, Berner J. Climate change and impacts on human health in the Arctic: an international workshop on emerging threats and the response of Arctic communities to climate change. International Journal of Circumpolar Health. 2009 Feb 1; 68(1): 84-91.
Accessed at http://www.tandfonline.com/doi/abs/10.3402/ijch.v68i1.18295

Richmond C, et al. The political ecology of health: perceptions of environment, economy, health and well-being among 'Namgis First Nation.' Health and Place. 2005 December; 11(4) 349-365.
Accessed at https://www.sciencedirect.com/science/article/pii/S1353829204000449

Skinner K., Hanning R. & Tsuji L. Prevalence and severity of household food insecurity of First Nations people living in an on-reserve, sub-Arctic community within the Mushkegowuk Territory. Public Health Nutrition. 17(1) 31-39 Accessed at: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/F24C6BDAF1AB356688922970075CAFD8/S1368980013001705a.pdf/div-class-title-prevalence-and-severity-of-household-food-insecurity-of-first-nations-people-living-in-an-on-reserve-sub-arctic-community-within-the-mushkegowuk-territory-div.pdf

Thompson E., Post Y., & McBean E. (2017) A decade of drinking water advisories: Historical evidence of frequency, duration and causes, Canadian Water Resources Journal / Revue canadienne des ressources hydriques. 42(4): 378-390. Accessed at
https://www.tandfonline.com/doi/pdf/10.1080/07011784.2017.1387609?needAccess=true