



Climate + Health: Adaptation and Mitigation

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UBC Rural Rounds May 2022



Objectives

1. Identify the direct health impacts of climate change in rural BC
2. Describe the basics of heat related illness
3. Demonstrate how to be prepared for a Code Green
4. Illustrate steps that you can take to mitigate the damage from climate change



Disclosures

No financial interests

I support a number of humanitarian and environmental organizations

Territorial acknowledgment

Climate Change

The future is now



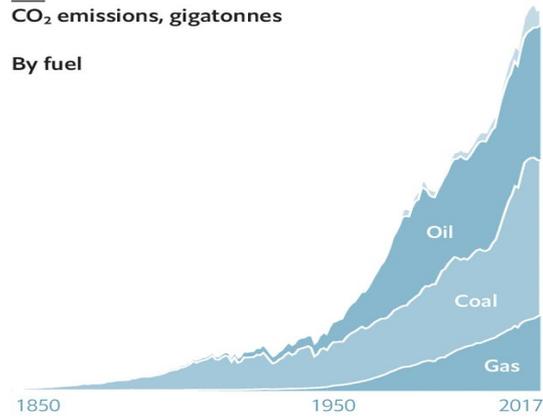
Yesterday's numbers

May. 24, 2022	421.27 ppm
May. 24, 2021	417.82 ppm
1 Year Change	3.45 ppm (0.83%)

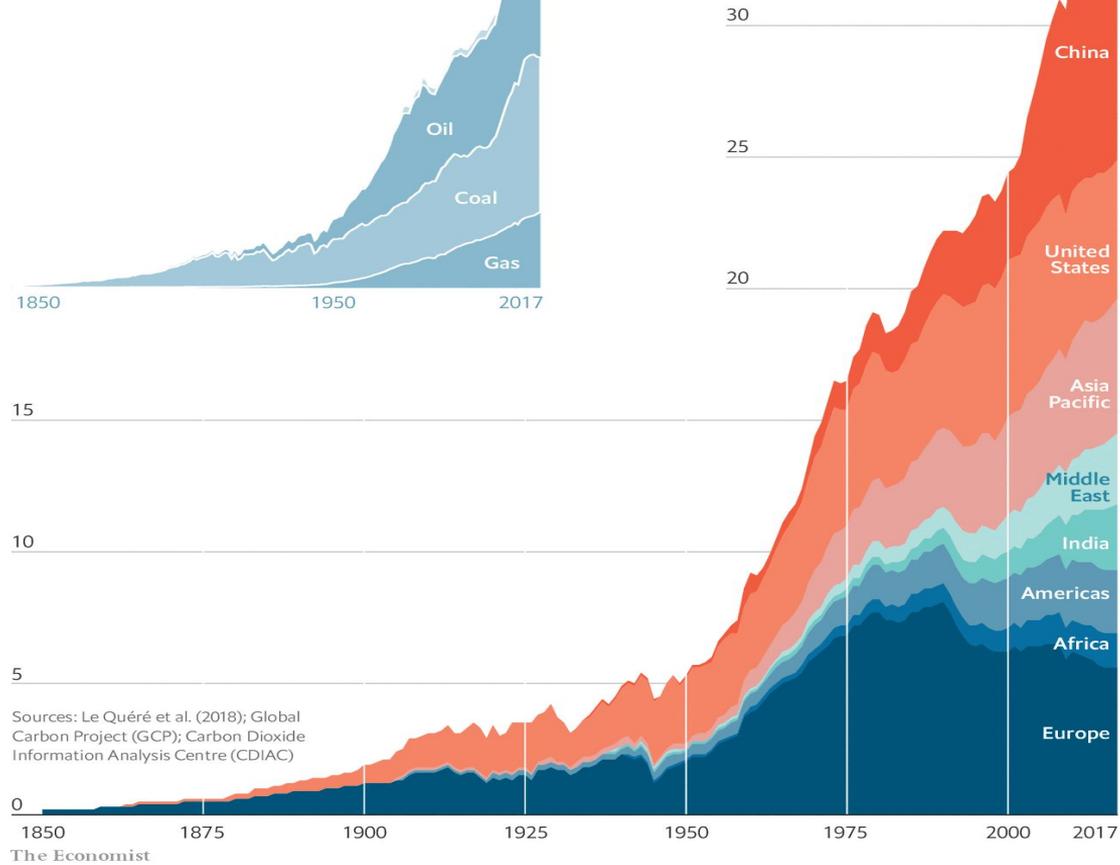
Last CO2 Earth update: 2:35:02 AM on May. 25, 2022, Hawaii local time (UTC -10)

CO₂ emissions, gigatonnes

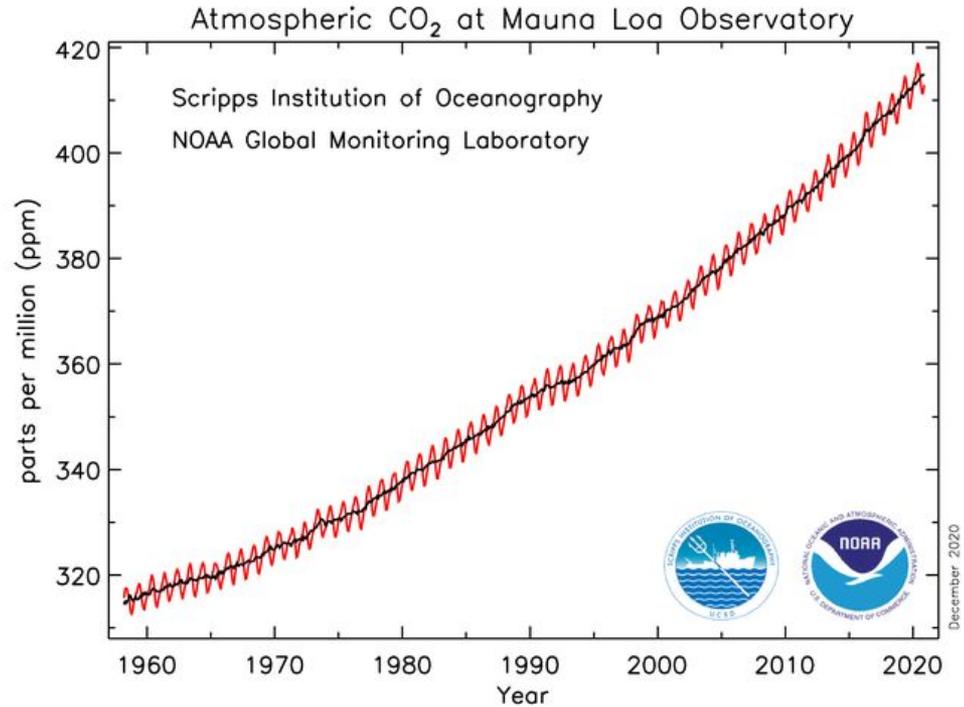
By fuel



By country/region



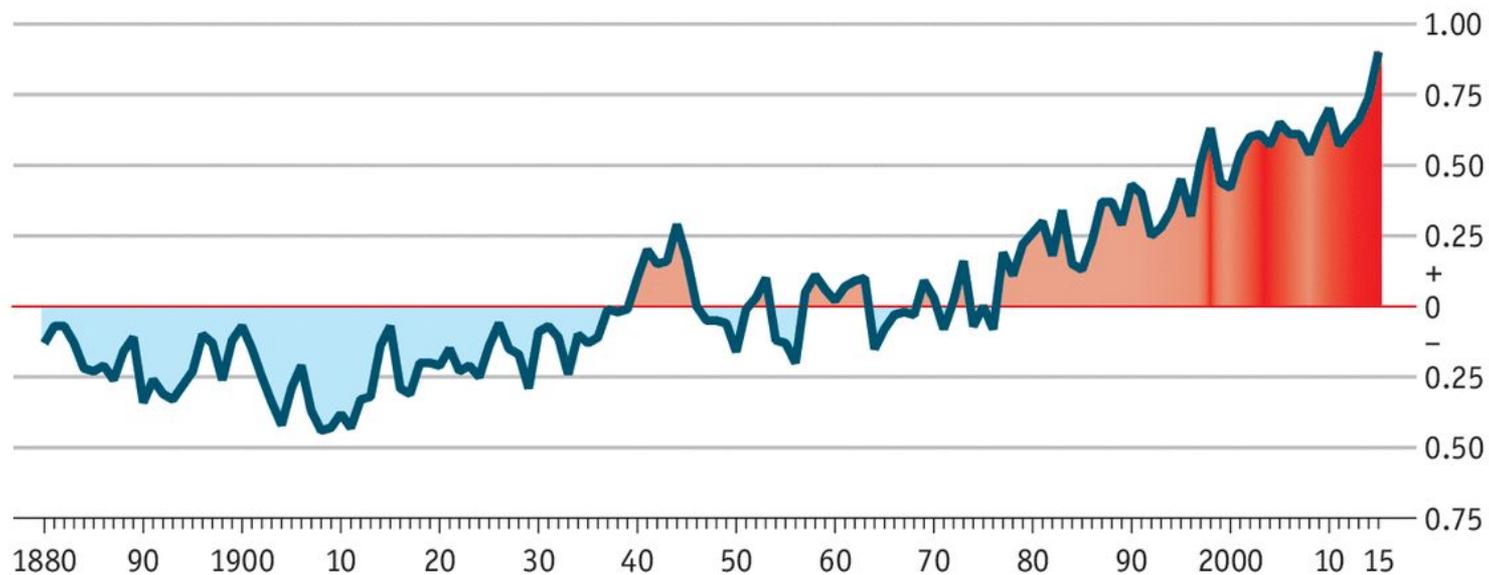
Capnography



Sizzling

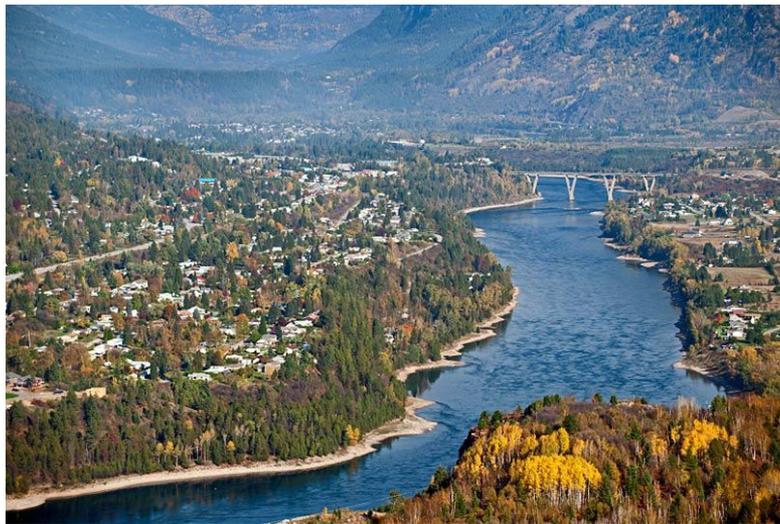
Global surface temperature, deviation from 20th-century average, °C

15 hottest years



Source: NOAA

**Climate emergency =
Health emergency**







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The Climate Emergency: Diagnosis and Management

Hosted by the Canadian Association of Physicians for the Environment

8.0 Mainpro+
8.0 MOC Section 1
Accreditation

Target Audience:
Physicians and all health care professionals, researchers, students and residents.

Oct 30, 2020
Add to calendar 
View PDF



Broadcast starts: 0800 PDT
Online from Vancouver BC

Planetary Health

Human health linked directly
to healthy environment



"The pandemic is a reminder of the intimate and delicate relationship between people and planet. Any efforts to make our world safer are doomed to fail unless they address the critical interface between people and pathogens, and the existential threat of climate change, that is making our Earth less habitable"

WHO Director-General Dr Tedros Adhanom Ghebreyesus. Address to the 73rd World Health Assembly. May 18th 2020.



Other public health issues we pay attention to...

- Diabetes
- Smoking
- Substance Use Disorder
- Antibiotic resistance
- Pandemics



Healthcare impact

Healthcare industry responsible for 4.6% of Canada's GHG emissions

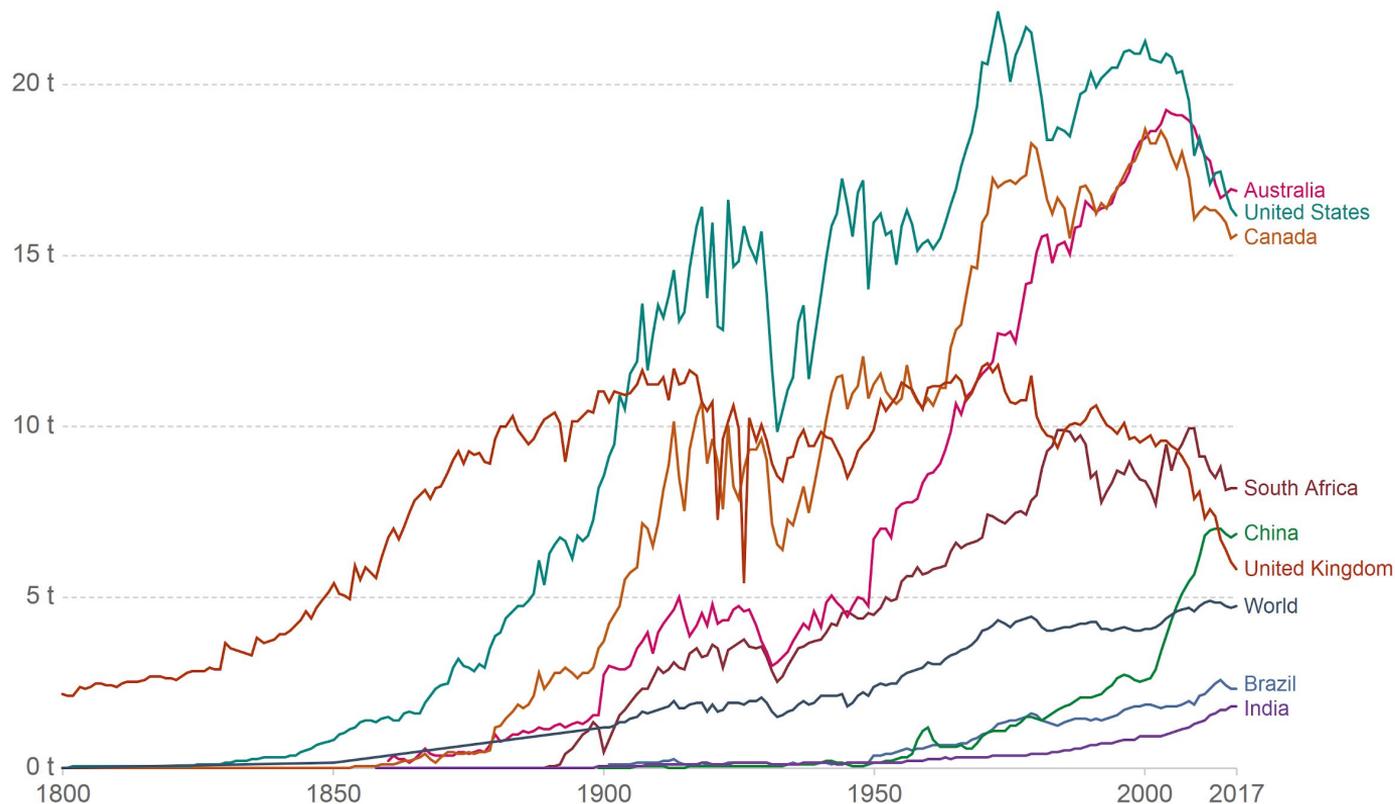
- 33 million tonnes of carbon dioxide equivalents
- >200 000 tonnes of other pollutants
- 23,000 disability-adjusted life years (DALYs) lost annually

Matthew J. Eckelman, Jodi D. Sherman, Andrea J. MacNeill PLOS Medicine: July 31, 2018

<https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002623>

Per capita CO₂ emissions

Carbon dioxide (CO₂) emissions from the burning of fossil fuels for energy and cement production. Land use change is not included.

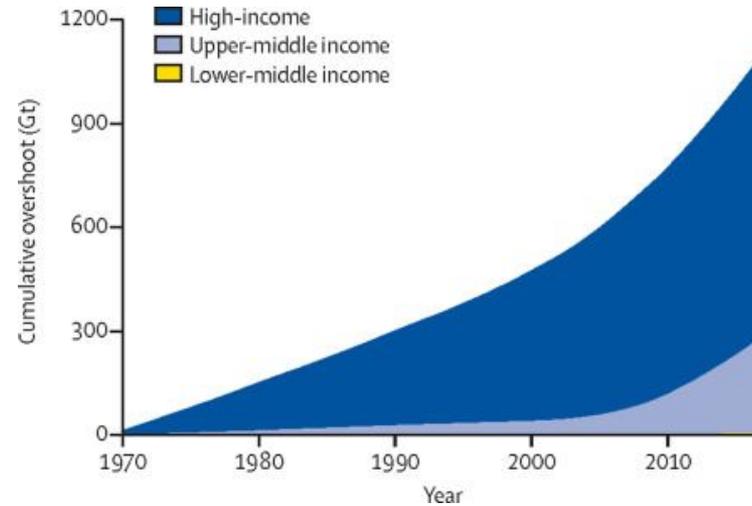


Source: Our World in Data based on the Global Carbon Project; Gapminder & UN

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

Note: CO₂ emissions are measured on a production basis, meaning they do not correct for emissions embedded in traded goods.

Cumulative Impact



The Lancet Planetary Health: National responsibility for ecological breakdown: a fair-shares assessment of resource use, 1970–2017 Jason Hickel, Daniel W O'Neill, Andrew L Fanning, Huzaifa Zoomkawala

Adaptation



Case #1- Unusual weather



76F- Diabetes, CVA, AFIB

- Weakness + nausea + vomiting
- No air conditioning
- Lives alone
- Temp 37.5, PR 115, RR 24, BP 120/82, SPO2-92%
- Alert and oriented

Diagnosis?





Diagnosis

Heat Stroke

- Elevated core body temp > 40.5C
- Not due to exertion
- CNS dysfunction
- Environmental heat load that cannot be dissipated

Heat Exhaustion

- Core temp 38-40.6C
- Exertional
- No CNS dysfunction



ER Management of Heat Related Illness

- Resuscitation- IV fluids and electrolyte management
- Evaporative cooling
- Monitor temperature accurately
- Keep going until normothermic

Extreme heat events are public health emergencies

Issue: BCMJ, vol. 63, No. 9, November 2021, Pages 366-367 BCCDC

By: Sarah B. Henderson, PhD Kathleen E. McLean, MPH Michael Lee, MSc Tom Kosatsky, MD, MPH



The average number of deaths per day in British Columbia is 110, ranging from 90 to 130 most days. On 29 June 2021, 380 people died across the province [Figure]. There were 1630 deaths in the 8 days from 25 June to 2 July, about 740 more than would be expected in a normal summer.



There is often a misperception that extreme heat is most dangerous for the very frail who are already near death, a group particularly impacted by the historic European heat wave in 2003.[1] However, we found that mortality during the 2021 heat dome doubled in every age group over 50, and we observed no decrease in mortality following the end of the hot weather [Figure]. This suggests that high temperatures simply killed hundreds of people who would probably still be alive had the weather conditions been more typical.



Many of these deaths will be further investigated by the BC Coroners Service (BCCS) in the months ahead.[2]



We already know from preliminary analyses of data from BC Vital Statistics that most of the excess deaths



occurred in residential settings, although there were increases in deaths in hospitals and long-term care

A+ A-

facilities as well. Many of the deaths in individual residences occurred in neighborhoods with lower socioeconomic status, where more people live alone and where there is less protection provided by



Extreme heat events are public health emergencies. Issue: BCMJ, vol. 63, No. 9, November 2021, Pages 366-367 BCCDC By: Sarah B. Henderson, PhD Kathleen E. McLean, MPH Michael Lee, MSc Tom Kosatsky, MD, MPH



Heat Dome 2021 Coroner's Report

- 595 died in the province
- 99% died in a home or hotel
- Not all patients hyperthermic
- Climate scientists did not predict this would happen so soon
- Highly unlikely without climate change

Heat-Related Deaths by Age Group, British Columbia, June 20 - July 29, 2021

Age Group	# of Deaths
<40	2
40-49	13
50-59	42
60-69	127
70-79	160
80-89	149
90+	76
Total	569

<https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/-1>

https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/heat_related_deaths_in_bc_knowledge_update.pdf-2

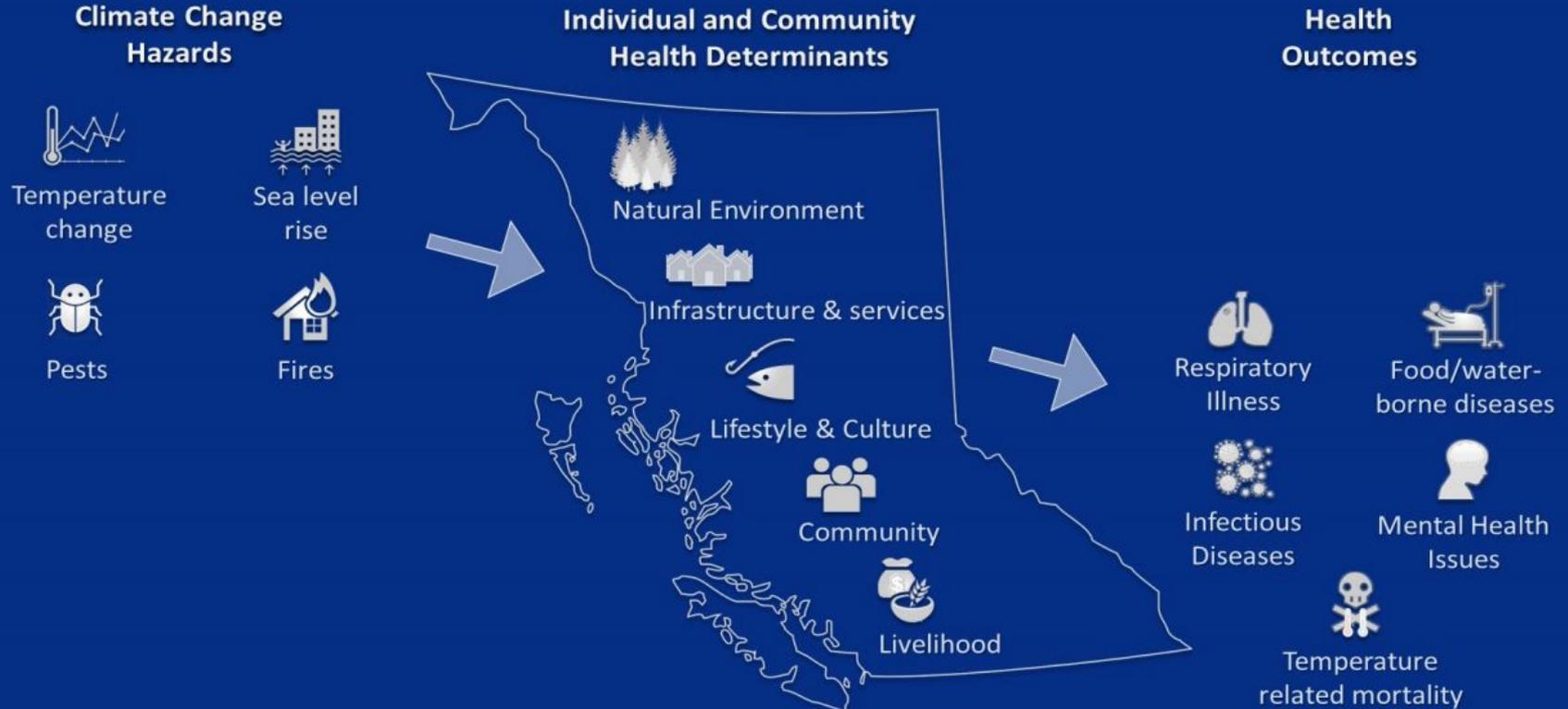


Preparation + Prevention

- Simple equipment for the ER
- Patient education
- Community engagement

Climate Impacts

Health Impacts of Climate Change



CLIMATE CHANGE ITS IMPACT ON HEALTH IN CANADA

"Climate change is the greatest threat
to global health in the 21st century."

— WHO¹

ARCTIC WARMING

Warming at 3x Global Rate²
affecting Northern food security³
and impacting mental health⁴



WILDFIRE-RELATED ASTHMA⁵ & EVACUATION

Nearly 1,000 patients forced to
evacuate health care facilities in
Alberta and BC interior.^{6,7}
Evacuees suffered anxiety and
PTSD.⁸

FLOOD-RELATED DAMAGE

Health care facilities closed
due to 2013 Alberta floods.⁹

DROUGHTS¹⁰

Uneven impact on crops¹¹ and
socioeconomic stress.¹²

ALLERGIES

Longer and more
severe pollen
seasons.¹³

TICK-BORNE DISEASE

Three times as many cases
of Lyme disease in Ontario
in 2017 than the 2012-
2016 average.¹⁴

HEAT-RELATED ILLNESS

The 2018 heat wave in
southern Quebec linked to 66
deaths.¹⁵

DISPLACEMENT

Climate-related drought
and famine contribute to
Syrian refugee crisis.¹⁶

RELOCATION & STRESS FROM COASTAL EROSION

Threatens homes in P.E.I.¹⁷

ASSOCIATION
MÉDICALE
CANADIENNE

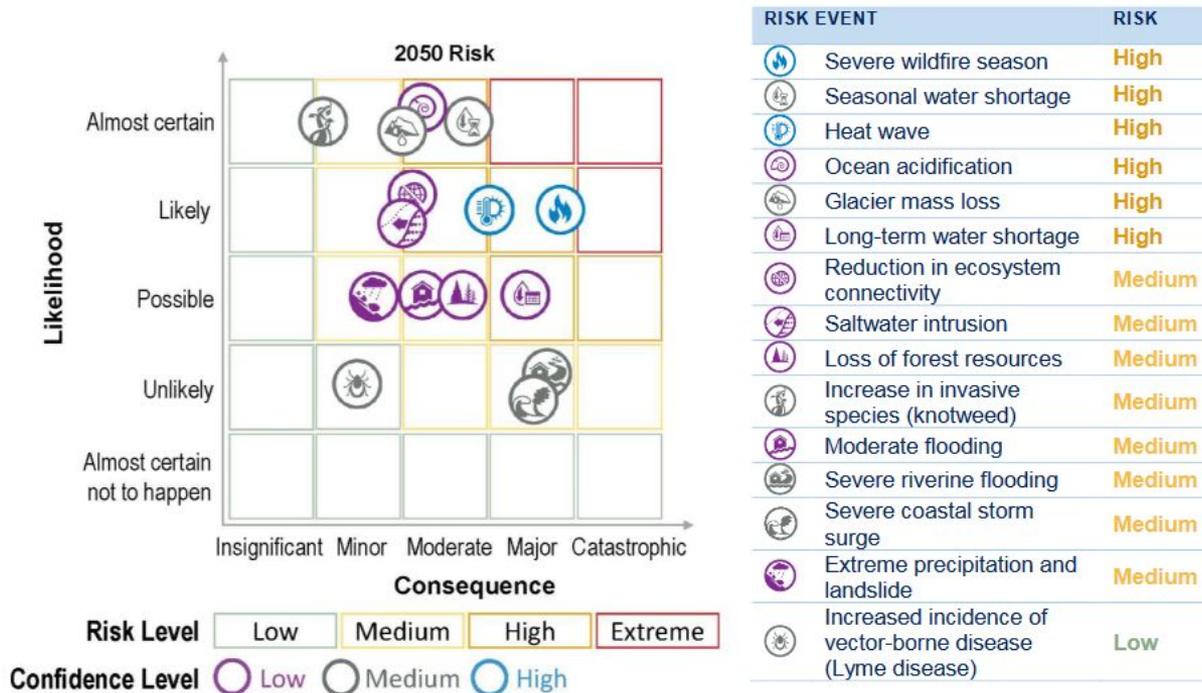


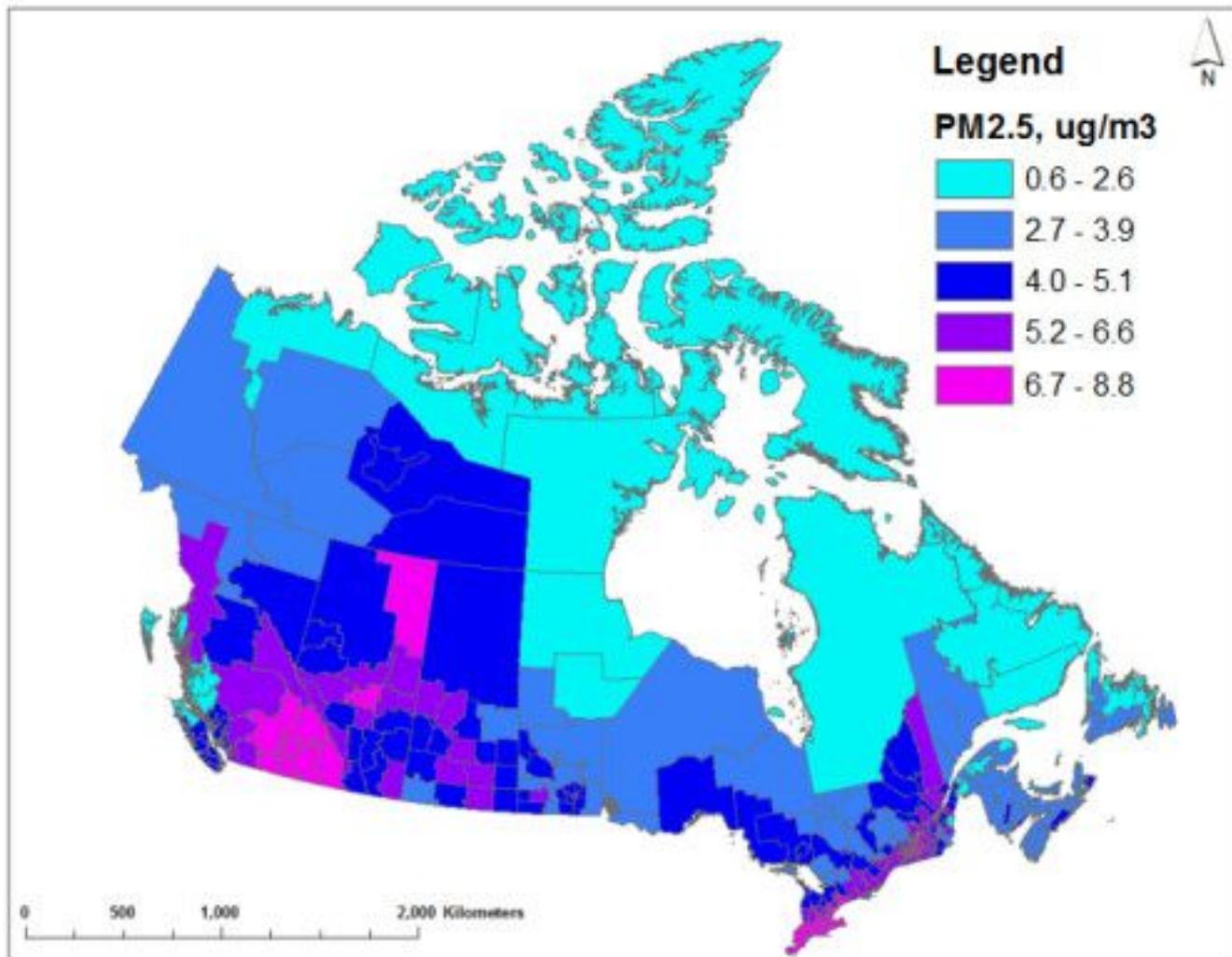
CANADIAN
MEDICAL
ASSOCIATION

¹ WHO (2015). ² Gov of Can, Canada's Changing Climate Report. ³ Paul et al. UCH (2016). ⁴ Carleton et al, Nature CLC, 2018. ⁵ Paul et al. UCH (2016). ⁶ Champagne CMC (2016). ⁷ Richardson Young, P et al. CLC (2017). ⁸ BC for Health (2018). ⁹ Richardson Young, P et al. AMCC (2018). ¹⁰ Alberta Health (2018). ¹¹ Parnes et al (2013). ¹² Paul et al. UCH (2016). ¹³ Truyen Thien et al. EcolHealth (2016). ¹⁴ Gov of Can CC on Ag (2018). ¹⁵ Gylesius SGA (2018). ¹⁶ Dobson et al (2015). ¹⁷ P. Miller. CCFR (2018).

CLIMATE RISKS TO BC

The following provides an overview of the risk assessment findings for 15 illustrative scenarios of climate risks to B.C. A summary of findings for each of the risk events is presented in more detail in the appendices.



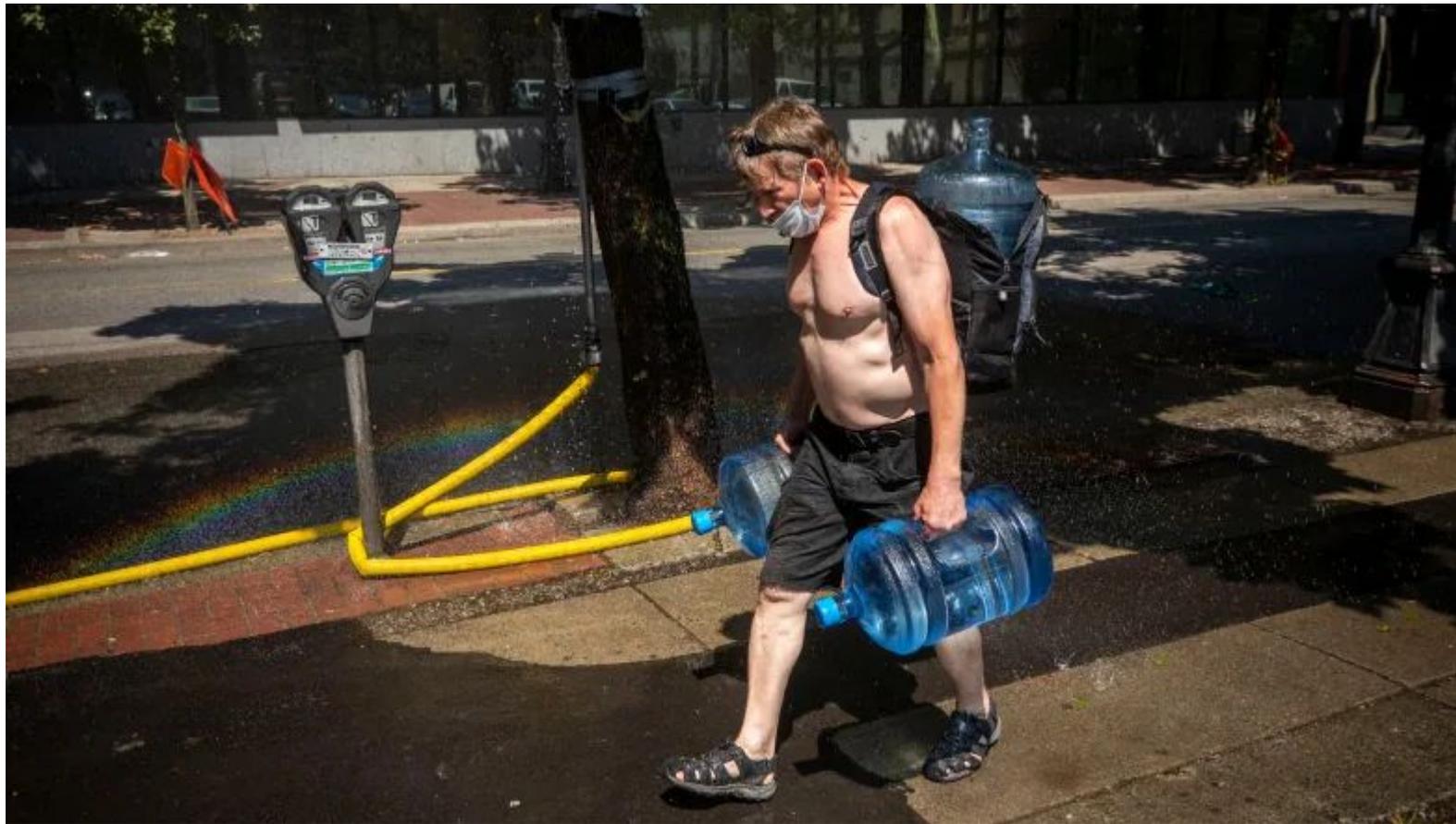


Indirect effects

- Economic
- Transport
- Food insecurity
- Migration













Case #2- Orange Sky Code Green







Long term care evacuation

- 2 LTC facilities/120 beds
- Code Green initiated

What is your role?

Where do patients go?

How do they get there?

Code Green

- Last ones out
- Plans are always inadequate



Section 5: Code Green – Evacuation

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Mitigation

Case #3 Asthma: Exacerbating or Exacerbated?



30F- Prescription review

- Wants to be prepared for “Fire Season”
- Fluticasone 250 MDI BID
- Salbutamol MDI 1-2 puffs q4H prn



MDIs are GHGs

- MDI propellant was switched from CFCs after Montreal Protocol banned (Ozone depleters+GHG), replaced with HFA propellants (GHGs)
- British Thoracic Society recommends switching to non-propellant inhalers when they are thought to be equally effective
- Fewer errors overall with Dry Powdered inhalers

Wilkinson AJK, Braggins R, Steinbach I, *et al* Costs of switching to low global warming potential inhalers. An economic and carbon footprint analysis of NHS prescription data in England. *BMJ Open* 2019;**9**:e028763. doi: 10.1136/bmjopen-2018-028763

29.  Sanchis J, Gich I, Pedersen S, *et al*. Systematic review of errors in inhaler use: has patient technique improved over time? *Chest* 2016;**150**:394–406.doi:10.1016/j.chest.2016.03.041 [CrossRef](#) [PubMed](#) [Google Scholar](#)

Letters

Dry powder inhalers are environmentally preferable to metered-dose inhalers

Kimberly Wintemute and Fiona Miller

[CMAJ](#) July 20, 2020 192 (29) E846; DOI: <https://doi.org/10.1503/cmaj.75949>

Article

[Responses](#)

[Metrics](#)

[PDF](#)

In their *CMAJ* commentary, Drs. Beauchesne and Lemiere outlined the key practice changes recommended in the 2019 Global Initiative for Asthma report.¹

As they noted, available evidence supports a pragmatic approach to inhaler therapy for patients older than 12 years with mild asthma: the as-needed use of the budesonide–formoterol combination inhaler.

This shift could also be good for the environment.

Metered-dose inhalers are an important contributor to health care's climate footprint. They contain high levels of hydrofluorocarbons that, when released into the atmosphere, act as potent greenhouse gases. Metered-dose inhalers are estimated to contribute 3.1% of the carbon

In this issue



[CMAJ](#)

Vol. 192, Issue 29
20 Jul 2020

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Article tools



Consider DPI devices

By following current guidelines and prescribing dry powder inhalers or respimat devices, we can improve or maintain asthma care while reducing climate pollution.

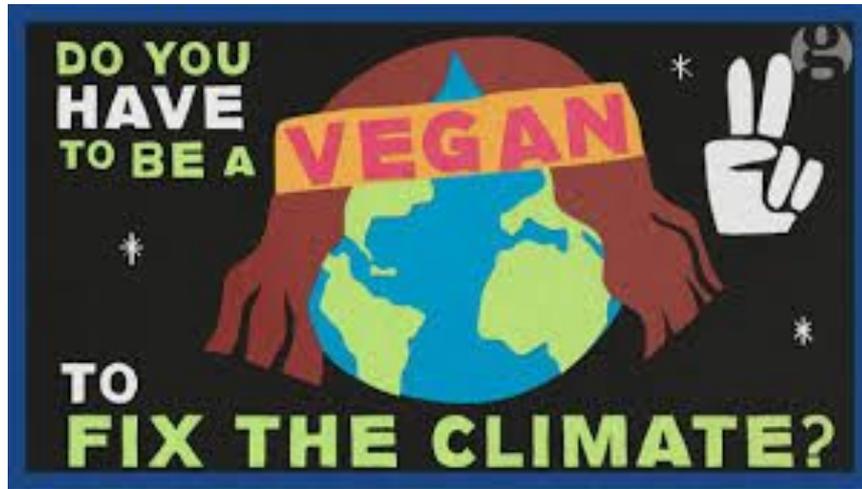
Case #4- Cows Ruminating



55F- DM2, HTN

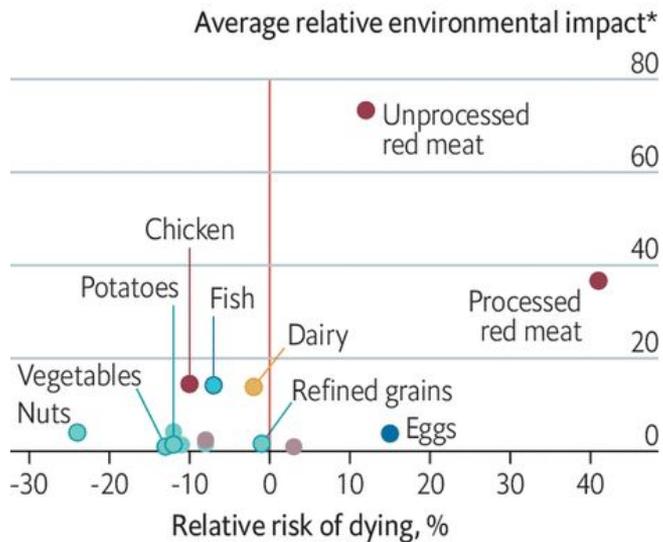
- Requesting advice on her diet
- Concerned about MI as father had one at her age

Food + Climate + Health



High-steak diets

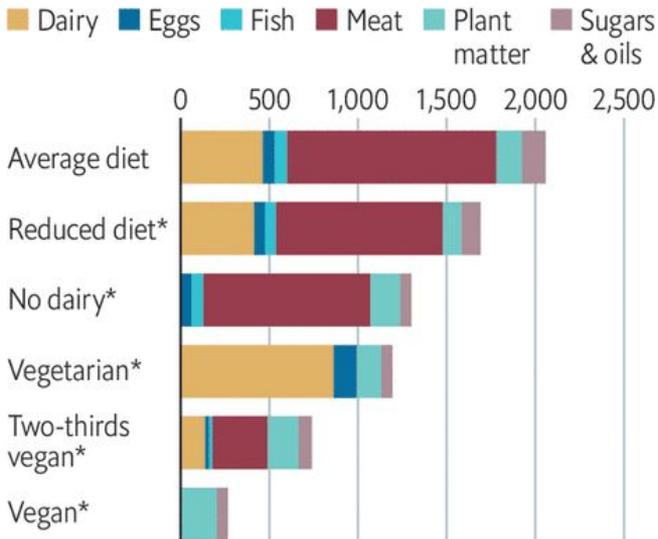
Health and environmental impact of one extra serving per day



Sources: "Multiple health and environmental impacts of foods", by Clark et al., PNAS; "Country-specific dietary shifts to mitigate climate and water crises", by Kim et al., Global Environmental Change

United States, greenhouse-gas footprint

kg of CO₂ equivalent per person per year



*Vegetables=1 †Simulated diet, to reach 2,300 calories per day



Veganism not required

By following national guidelines, we can recommend a diet that will provide health benefits to individual patients as well as long term public health benefits.

Case #5- How to Be Healthy on a Sick Planet



41M- GP

- Worried about impact of upcoming wildfire season
- Should he move his family somewhere safer?
- Feelings of guilt

What Can I Do?



Eco Anxiety

- Solastalgia
- Climate Grief
- Despair



Unprecedented Challenge

- No simple solution
- A slow emergency
- No simple story to tell

Climate Deniers Are Not the Problem

- This problem needs action from the middle
- The road to hell is paved with recycling bins and light bulbs
- Hypocrisy is the price of admission



COVID Lessons

- We are all in this together
- We can radically alter our lifestyle/economy/medical practice if we recognize the threat



You Are Special

- Physicians are in a unique position
- We are some of the only wealthy/powerful people in society that are exposed to the reality of our community
- We are the most trusted profession by the public
- The public can understand climate change through a health perspective



Advocacy



**The Canadian Coalition
for Green Health Care**
**Coalition canadienne pour
un système de santé écologique**

2019 Carbon Neutral Action Report



GreenCare

Our Work Our Progress Resources Our Stories About Us Contact [Take Action](#)

B.C.'s health-care network for environmentally sustainable and resilient care

For the health of people, place and planet

CAPE Canadian Association of Physicians for the Environment

Association Canadienne des Médecins pour l'Environnement ACME

Action

BRITTNY ANDERSON

MLA, NELSON-CRESTON

COLUMN: Support for seniors needed during climate change

Nelson's Dr. Marian Berry writes about the mental health impact on seniors

BLACK PRESS SUBMITTED / Mar. 9, 2022 12:00 p.m. / OPINION

FE FACILITY
ENGAGEMENT
KOOTENAY LAKE HOSPITAL



KLH Insider

MAY/JUNE 2022 | ISSUE 9

KLH Switches to Sevoflurane for Planetary Health





Take Home Points

1. Identify the direct health impacts of climate change in rural BC
 - a. Heat and wildfires are #1 direct health impact in BC
2. Describe the basics of heat stroke and heat exhaustion
 - a. Many patients with heat related illness will not have heat stroke
3. Demonstrate how to be prepared for a Code Green
 - a. Personal evacuation plan is essential
4. Illustrate steps that you can take to mitigate the damage from climate change
 - a. Join advocacy efforts
 - b. Get involved with hospital initiatives
 - c. Prescribe DPIs + Plant Based Diet

