

A photograph of a forest with tall, moss-covered trees and a dirt path. A person and a child are walking away from the camera on the path. The scene is misty and green.

Climate Change and Family Medicine

Health Impacts and How to Make a Difference

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@Melissa_Lem



Faculty/Presenter Disclosure

- **Faculty:** Melissa Lem, MD, CCFP, FCFP
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 - **Patents:** None
 - **Other:** Destination BC

Managing Potential Bias

Bias for this presentation has been managed as follows:

- Relationships do not affect my choices in presenting content
- Financial relationships are unrelated to presentation
- Not speaking about any products or medications

Greatest health threat or greatest opportunity?

Without action on climate change...

Air pollution

both contributes to, and is made worse by warming.

It now causes

1 in 8

of all deaths globally.

Each year, coal plant emissions in Europe lead to

18,200

early deaths, and cost an estimated

€42.8 billion

Flooding

will become more severe.

THE GLOBAL
CLIMATE & HEALTH
ALLIANCE

Obesity

is related to unhealthy diets, often high in red meat, and increasing car use.

One estimate for 2030 puts the number displaced in 4 US coastal areas at

12 million

If we act on climate change...

Creating and protecting

green spaces

reduces air pollution and so can prevent diseases like asthma, pneumonia, heart attacks and stroke.

Sustainable diets

has many benefits for physical and men's health, and reduces heat island effect.

Active travel
(walking & cycling)

could help to prevent many of the 3,200,000 early deaths caused by physical inactivity every year.



CLIMATE RISKS: 1.5°C VS 2°C GLOBAL WARMING

EXTREME WEATHER

100% increase in flood risk. | vs | 170% increase in flood risk.

SPECIES

6% of insects, 8% of plants and 4% of vertebrates will be affected. | vs | 18% of insects, 16% of plants and 8% of vertebrates will be affected.

WATER AVAILABILITY

350 million urban residents exposed to severe drought by 2100. | vs | 410 million urban residents exposed to severe drought by 2100.

ARCTIC SEA ICE

Ice-free summers in the Arctic at least once every 100 years. | vs | Ice-free summers in the Arctic at least once every 10 years.

PEOPLE

9% of the world's population (700 million people) will be exposed to extreme heat waves at least once every 20 years. | vs | 28% of the world's population (2 billion people) will be exposed to extreme heat waves at least once every 20 years.

SEA-LEVEL RISE

46 million people impacted by sea-level rise of 48cm by 2100. | vs | 49 million people impacted by sea-level rise of 56cm by 2100.

OCEANS

Lower risks to marine biodiversity, ecosystems and their ecological functions and services at 1.5°C compared to 2°C.

CORAL BLEACHING

70% of world's coral reefs are lost by 2100. | vs | Virtually all coral reefs are lost by 2100.

COSTS

Lower economic growth at 2°C than at 1.5°C for many countries, particularly low-income countries.

FOOD

Every half degree warming will consistently lead to lower yields and lower nutritional content in tropical regions.

WHO IS AT RISK OF CLIMATE CHANGE?

Children are the most vulnerable due to long exposure to environmental risks.

EVERYONE
EVERYWHERE

Countries with **weak health systems** will be least able to prepare and respond.





WHAT MAKES CANADIANS SICK?

50%

YOUR LIFE

INCOME
EARLY CHILDHOOD DEVELOPMENT
DISABILITY
EDUCATION
SOCIAL EXCLUSION
SOCIAL SAFETY NET
GENDER
EMPLOYMENT/WORKING CONDITIONS
RACE
ABORIGINAL STATUS
SAFE AND NUTRITIOUS FOOD
HOUSING/HOMELESSNESS
COMMUNITY BELONGING

25%

YOUR HEALTH CARE

ACCESS TO HEALTH CARE
HEALTH CARE SYSTEM
WAIT TIMES

15%

YOUR BIOLOGY

BIOLOGY
GENETICS

10%

YOUR ENVIRONMENT

AIR QUALITY
CIVIC INFRASTRUCTURE



THESE ARE CANADA'S SOCIAL DETERMINANTS OF HEALTH #SDOH

CLIMATE CHANGES HEALTH IN CANADA

Climate change is the biggest global
health threat of the 21st century.

—Lancet¹

IMPACTS ON AVAILABILITY OF TRADITIONAL FOODS² AND MENTAL HEALTH³ IN THE NORTH

Due to arctic warming (3x Global Rate)⁴.

WILDFIRE-RELATED ASTHMA⁵ & EVACUATION

Healthcare facilities evacuated:
• Fort McMurray: 105 patients^{6,7}
• Interior BC 2017: 880 patients^{8,9}
Anxiety & PTSD following
evacuation.¹⁰

FLOOD-RELATED DEATHS AND DAMAGE

2013 Alberta flood¹¹:
• 5 deaths¹²
• Healthcare facilities
closed due to flooding.¹³

DROUGHTS^{14,15}

Uneven impact on crops.¹⁶
Socioeconomic stress.¹⁷

ALLERGIES

Increased severity &
duration of pollen
seasons.¹⁸

TICK-BORNE DISEASE

2017: 3x higher rate
Lyme Disease in
Ontario than 2012-
2016 average.¹⁹

HEAT-RELATED ILLNESS²⁰

66 people died in
Montreal during 2018
heat wave.^{21,22}

DISPLACEMENT

Climate change-
exacerbated drought
and famine was one
factor in Syrian refugee
crisis.²⁴

RELOCATION & STRESS FROM COASTAL EROSION

P.E.I. homes at risk.²³

1-Costello, The Lancet, 2009; 2-Rosol R, IJCH, 2016; 3-Cunsolo A, Ellis N, Nature CC 2018; 4-Canada's Changing Climate 2019; 5-Yao J et al, 2016; 6-Harrphire, G, CBC 2016; 7-Kirchmeier-Young M 2017; 8-BC Int. Health 2017; 9-Kirchmeier-Young M et al, Am Geo Un, 2018; 10-Alberta Health, 2016; 11-Toufel B et al 2017; 12-CBC Alberta Flood 2013; 13-United Nurses of Alberta 2013; 14-Yusa A, et al, Int J Env Res P H, 2015; 15- Smoyer-Tomic KE, et al, Ecohealth 2004; 16- Agriculture and Agri-Food Canada, 2015; 17- Cryderman K, 2018; 18- Ziska LH, The Lancet P-H 2019; 19- Nelder MP, 2018; 20-Howard, C et al. The Lancet Countdown Policy Brief for Canada 2018; 21-Montreal P-H, 2019; 22- Vogel MM et al, Am Geo Union, 2019; 23-Fenech, A, 2014; 24-Kelley, C, et al, 2015

BC: Asthma & Evacuations from Wildfires

- Record-breaking BC wildfires 2017-2018
 - Area burned 7-11x larger than without climate change¹
 - Drier, hotter summers = drier soils, vegetation
 - Every 1°C ↑ lightning strikes by 12%
 - Spreading pests like mountain pine beetle
- Ambulance calls for cardiac, respiratory events ↑ after 1 hour of smoke exposure, T2DM within 48 hours²
- Higher rates of PTSD, anxiety, depression in wildfire evacuees³
- Increased risk:
 - Children, elderly, pregnant women, patients with diabetes, heart + chronic lung disease
- **Action: Ensure patients are educated about AQHI, portable HEPA air purifiers, up-to-date Asthma/COPD Action plans**



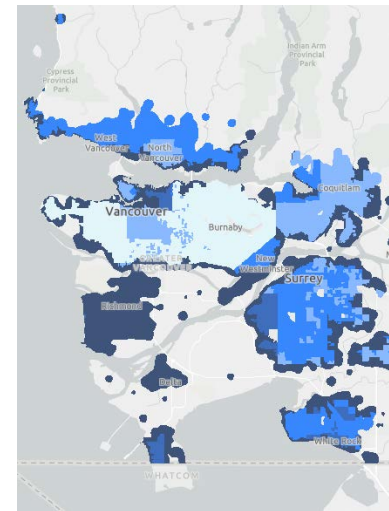
¹ [Kirchmeier-Young, MC et al, Earth's Future 2019; 7\(1\):2.](#)

² [Yao, J et al, Environ Health Perspect 2020; 128\(6\):067006.](#)

³ [Brown, MRG et al, Front Psychiatry; 2019; 10:623](#)

BC: Floods, Droughts and Food Security

- Climate change = 1-in-500-year flood event of the Fraser River 5x more likely by 2050, affecting > 30% of BC's population
 - Disruption of airport, food transport chains from the US
- “Let go” areas in City of Vancouver by 2100:
 - Sp. Banks, Locarno, Musqueam, False Creek, River District
- High risk of water shortages every < 2 years by 2050
 - Affect drinking H2O, ecosystems, agriculture, tourism
- Glacier area will ↓ 30-50% by 2050
 - Reduced river-water for agriculture, power, industry
- Increased risk:
 - Flood: Lower Mainland, coastal areas; Drought: S-C BC
- **Action: Encourage local food gardening, water storage**



BC: Heat-Related Illness

- Extreme heat events ↑ mortality since 2009
- BC warming faster than the rest of the world
 - Heat deaths in S. Canada ↑ 100% by 2050
 - Average BC temp ↑ up to 4.5°C by 2100
- Geographical mortality predictions:
 - Highest absolute in Lower Mainland
 - Highest relative in Coast, North
 - Lower than expected in Dry Plateau
- Increased risk:
 - children, elderly, socially isolated, lower SES
- **Action: Identify and counsel at-risk patients re: heat safety**

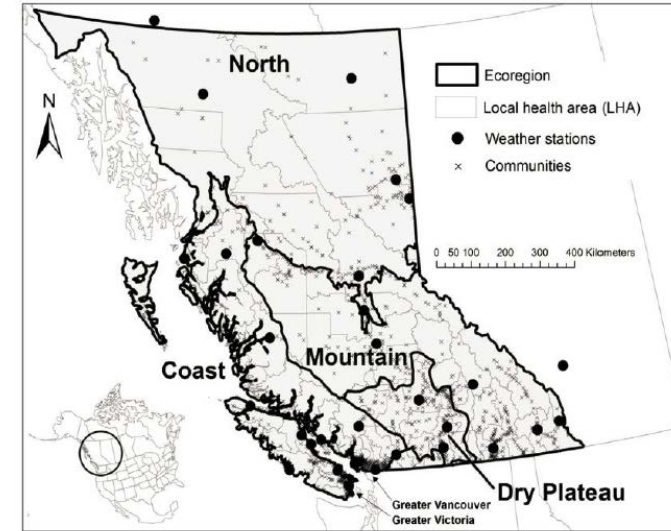


Figure 3. Ecoregions of BC [1]

BC: Impacts on Traditional Foods & Territories

- Climate-change-related declines in marine species traditionally harvested by Coastal First Nations:
 - ↓ essential nutrient intake 21-31% by 2050⁴
- Resource extraction projects disrupt access to traditional lands, practices
 - CGL Pipeline development through Wet'suwet'en Territory disrupted access to Unist'ot'en Healing Centre⁵



Photo Credit: Amber Bracken/The Narwhal

⁴ [Marushka, L et al, PLoS ONE 2019; 14\(2\): e0211473.](https://doi.org/10.1371/journal.pone.0211473)

⁵ <https://thenarwhal.ca/in-photos-wetsuweten-matriarchs-arrested-as-ramp-enforce-coastal-gaslink-pipeline-injunction/>

BC: Allergies

- Environmental exposure to aeroallergens, air pollution increases allergies, asthma⁶
- Vancouver: slight increase in total pollen counts over the last 22 years vs. dramatic increases in Toronto, Montreal
 - we already have a long pollen season (Jan-Aug vs. March-Aug)
 - Higher temperatures extend pollen season
 - Ragweed 2x pollen production in higher CO2
- **Action: Have a high index of suspicion re: allergies with respiratory, rash complaints**



⁶ [Sierra-Heredia, C et al, Int J Environ Res Public Health 2018; 15\(8\):1577.](#)

BC: Tick-Borne Diseases

- Good news: Lyme Disease rates lower, more stable than US and eastern Canada
 - Tick species carrying Lyme in BC are different (*I. pacificus* and *I. angustus* < carriage of *I. scapularis* in eastern Canada)
 - Ixodes ticks present in highly-populated southern and central BC; range expansion will not greatly ↑ # exposed people
- Rapid expansion of Lyme disease unlikely by 2050
- **Action: Educate ourselves and patients on Lyme Disease symptoms, treatment and prevention**



BC: Relocation and Displacement

- Significant internal displacement from wildfires, coastal sea-level rise, drought
- Canada admitted the largest number of world's resettled refugees in 2018 (28,100 out of 92,400)
- “Best estimates suggest that hundreds of millions of people could be on the move in the coming decades due to the impacts of climate change”
 - 2006-2010 drought in Syria was one catalyst to the ongoing war that began in 2011
- **Action: Educate ourselves on refugee health**



COVID-19 and Climate Change

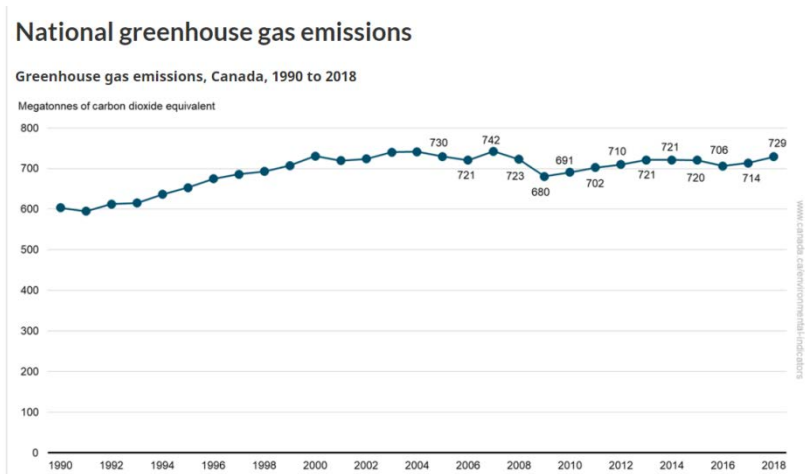
- Climate change is a risk amplifier
- Heat stress, wildfires, air pollution
 - increase inflammation
 - affect virtually all social determinants of health
 - increase burden on health-care system already taxed by COVID-19, opioid crisis



Photo Credit: Jennifer Gauthier/Reuters

Carbon Emissions in Canada

- Canada's GHG emissions have steadily ↑ since 2008

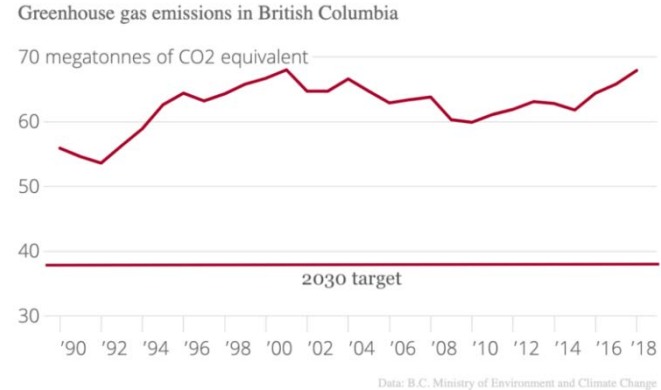


- So far \$12.8 billion committed to support fossil-fuel industry, \$6.4 billion into renewable energy in Canadian COVID-19 pandemic response⁸

⁸ <https://www.energypolicytracker.org/country/canada>

Carbon Emissions in BC

- BC's carbon emissions
↑ 10% in the last 3 years⁹
 - Target announced in 2008:
40% below 2007 by 2030
- Most GHGs produced by energy sector
 - Expansion of LNG/fracking industry = significant role
 - LNG not a transition fuel; methane = super-pollutant
with 84x warming potential of CO₂ over 20 years

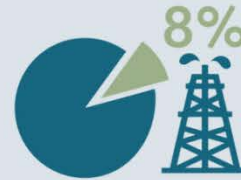


⁸ <https://unfccc.int/documents/224829>

The U.S. healthcare sector is the **second most intensive** commercial user of energy with inpatient hospitals as the **fourth largest energy user** sector overall.



Plastic manufacturing is estimated to use **8% of global oil** production annually.



Of the U.S. greenhouse gas emissions contributed by hospitals, **14%** is from the purchases of **healthcare goods and services**.

Hospitals in the U.S. produce more than **4.67 million tons of waste** each year; **30%** from operating rooms.



It is estimated that **one million tons** of the annual waste from the U.S. healthcare system can be attributed to plastic packaging and plastic products.



The healthcare system uses vast quantities of **energy-intensive** goods and services which require significant energy inputs for their manufacturing.

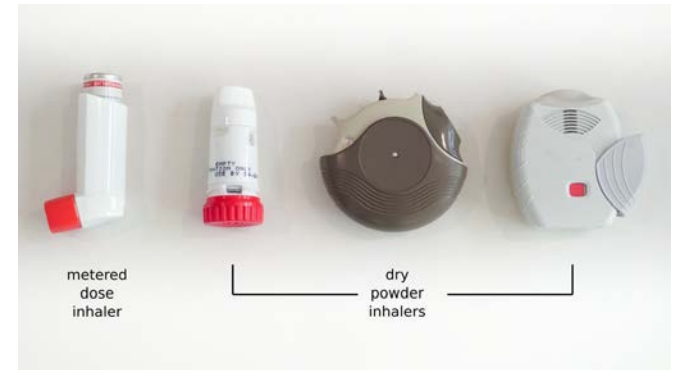


In one day, the healthcare sector creates **29 pounds of waste** per staffed bed.

Source: <http://newgensurgical.com/scbi/>

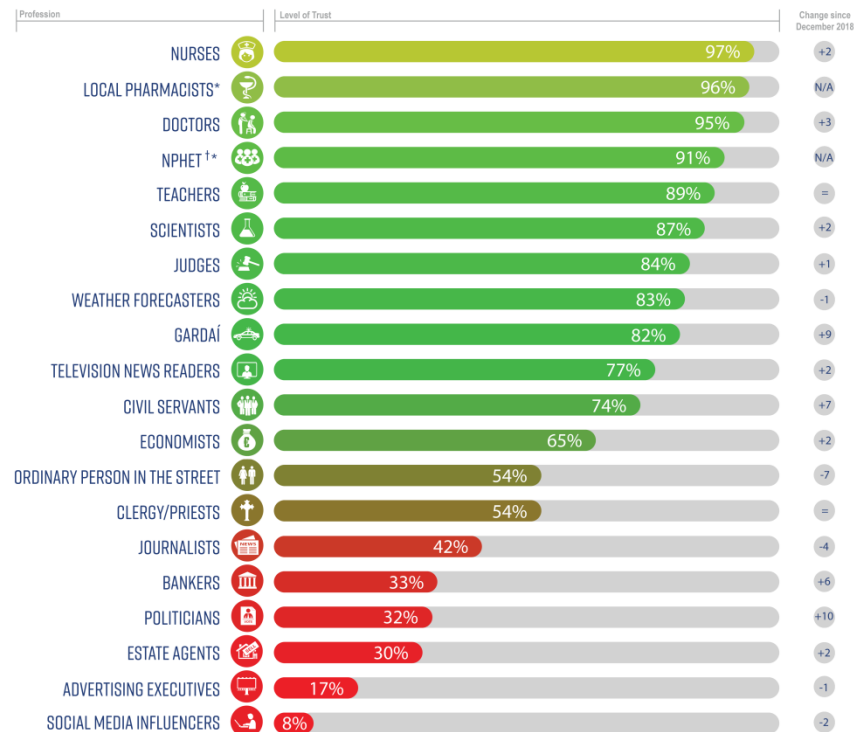
Quick Practice Greening Tips

- Prescribe dry-powder inhalers instead of metered-dose inhalers
 - norflurane = 1,430 times more potent than CO₂
 - each DPI saves the equivalent of 150-400kg of CO₂/year
 - similar to the carbon footprint reduction of cutting meat from your diet
- Choose Wisely
- Unsubscribe from paper journals
- Leverage EMR to cut down on paper
- Reduce single-use items
 - launder, autoclave instead



VERACITY INDEX 2020 - WHO DO WE TRUST THE MOST?

Q. NOW I WILL READ YOU A LIST OF DIFFERENT TYPES OF PEOPLE. FOR EACH WOULD YOU TELL ME IF YOU GENERALLY TRUST THEM TO TELL THE TRUTH, OR NOT?



* New in 2020

† National Public Health Emergency Team

Powered by: Ipsos MRBI Omnipoll

Omnipoll is a telephone omnibus survey which interviews a fresh sample of 1,000 adults aged 15+ every two weeks. For this survey we interviewed 1,000 adults aged 15+ between 14th – 24th May 2020.

For further information on Omnipoll please contact:

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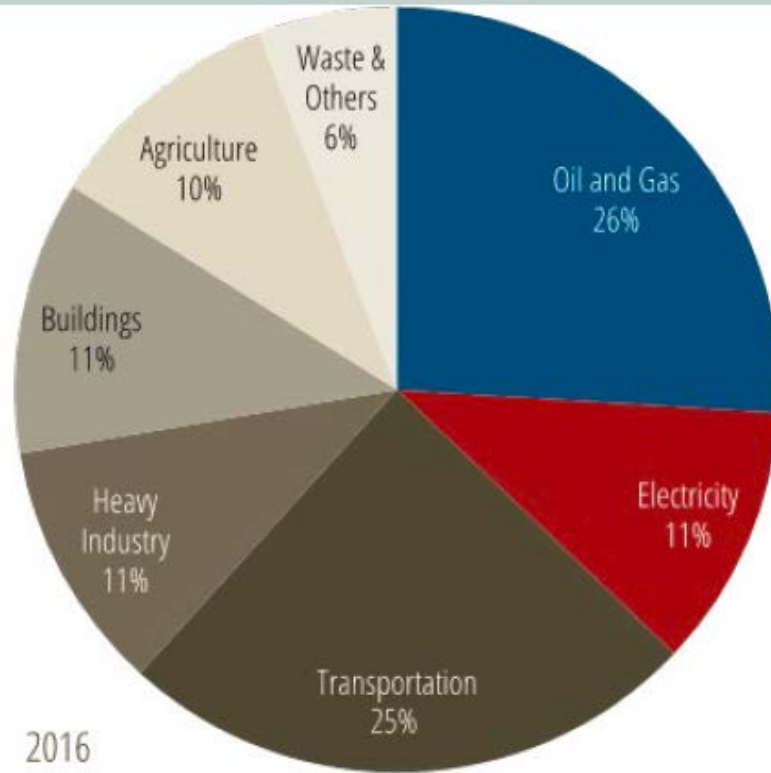
Will Nunn
will.nunn@ipsos.com
Phone +353 (0)1 4389000

Health as an Effective Message

- Lessons from climate change research:
 - 342 US parents questioned about their greatest concerns re: global environmental issues
 - 3 different forms of environmental concern:
 - Biospheric (concern for nature, eg. marine life)
 - Social-altruistic (concern for other people, eg. my kids)
 - Egoistic (concern for oneself, eg. my lifestyle)
 - Social-altruistic and Egoistic people weren't swayed by polar bears and coral reefs
 - Focusing on personal and family health impacts in public policy messaging = more motivating to change behaviour



Credit: www.wwf.org.uk



2016

Figure 4: National greenhouse gas emissions by economic sector, 2016. Graphic provided by Pembina.



Dr. Courtney Howard

Yellowknife, NWT

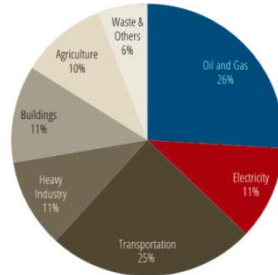
- CAPE Past President
- Political advocate
 - divestment
 - carbon pricing
 - active transport
 - plant-rich diets
 - coal phase-out
 - hydraulic fracturing
 - wildfires
 - mental health impacts of climate change



Dr. Samantha Green

Toronto, ON

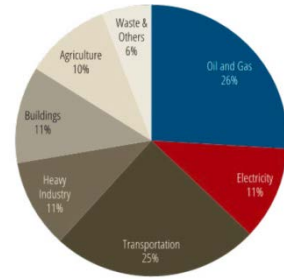
- Co-founder of Doctors for Safe Cycling
- Advocated for pilot bike lane on Bloor St. to become permanent
- Public education/media
 - separated bike lanes ↓ risk of serious injury & death by 90%
- Developing proposal for Prescribe-A-Bike program with Toronto Bike Share





Dr. Danielle Marentette

Powell River, BC

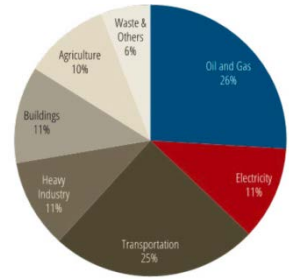


- Plant-based diet advocate
- Patient sessions in kitchen with Nutritionist and Certified Plant-Based Chef
 - learn why and how to transition to a plant-based diet
 - Monthly potluck, Facebook group
- Results:
 - Weight loss
 - Discontinuing/decreasing medications for: hypertension, diabetes, acid reflux, hypothyroidism, RA, asthma, chronic pain
 - assisted living patient no longer uses his walker, middle-aged woman who got on a plane to travel for the first time in 30 years
- Many develop awareness and concern for the environmental and animal welfare benefits





Dr. Ulrike Meyer Dawson Creek, BC



- Anti-fracking advocate
 - speaking tours
 - media interviews
- Recently awarded \$30,000 UBC family practice grant to study the effects of fracking on local health

IN-DEPTH

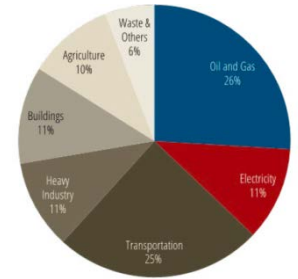
Potential health impacts of fracking in B.C. worry Dawson Creek physicians

'I have some patients whose symptoms I can't explain,' physician Ulrike Meyer says, describing nosebleeds, rare cancers and respiratory illness



Dr. Myles Sargeant

Hamilton, ON



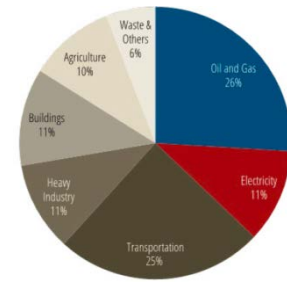
- Co-founder of
 - Plants native trees in areas of need in Hamilton to improve long-term health of all those living in our community
 - eg. hospitals, long-term care facilities
 - Organizes tree planting events for his addictions patients
- Environment and Climate Change Canada recommends minimum 30% tree cover; Hamilton has 19%
 - Need to plant 1 million trees to get there





Dr. Eugenie Waters

Ottawa, ON



- Personal eco-anxiety / grief crisis
 - Took action by transitioning her household using zero-waste principles
- Joined 4 other women (3 are FPs) to start Ottawa Reduces
 - community initiative to reduce single-use plastics and reduce waste by engaging local businesses and customers (@reduitottawareduces on IG, Ottawa Reduces on FB)
 - > 35 businesses, > 1500 social media followers
 - “green team” waste sorting at 2 festivals
 - 8 zero-waste workshops with various groups (eg. Rotary Club, community centres, Ottawa Tool Library)
 - > 30 volunteers, scaling up

Why Connecting to Nature is Good for the Planet

- Health care is a major contributor to global CO₂ emissions¹
- Urban nature makes cities healthier²
- **“Nature is ‘one of the most effective ways’ of combatting climate change and should be part of every country’s climate strategy” - Inger Andersen, Executive Director of the UN Environment Programme ([UNEP](#))³**
- Adults who are more nature-connected behave in more pro-environmental ways; children who have more nature experiences are more likely to become adult environmentalists⁴

¹ <https://noharm-global.org/documents/health-care-climate-footprint-report>

² <https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect>

³ <https://news.un.org/en/story/2019/09/1046752>

⁴ [Wells NM, Lekies KS. Children Youth Environ. 2006;16\(1\):1-24.](#)

Connect to Better Health Through Nature

Get Started

Make nature part of your
treatment plan.

From diabetes and heart disease to anxiety and
depression, research shows that connecting to
nature is a powerful way to improve your health.

A prescription worth filling.



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of Physicians
for the Environment

Association Canadienne
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ACME

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a safe and healthy future.

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🕒 8.0 MOC Section 1, Mainpro+

📅 Friday, October 30, 2020

📍 Online
From Vancouver, BC

👤 Physicians and all health care
professionals, researchers, students and
residents

Take-Home Pearls

- The impact of climate change on the natural, built and social factors that underlie our health-care system are increasingly disrupting our ability to care for patients in Canada and British Columbia.
- Physicians and other health-care providers have a unique and powerful role to play in fighting climate change.
- Physicians and other health-care providers can take immediate, effective actions in their own practice settings to reduce their greenhouse gas emissions and the contribution of the healthcare industry to climate change.