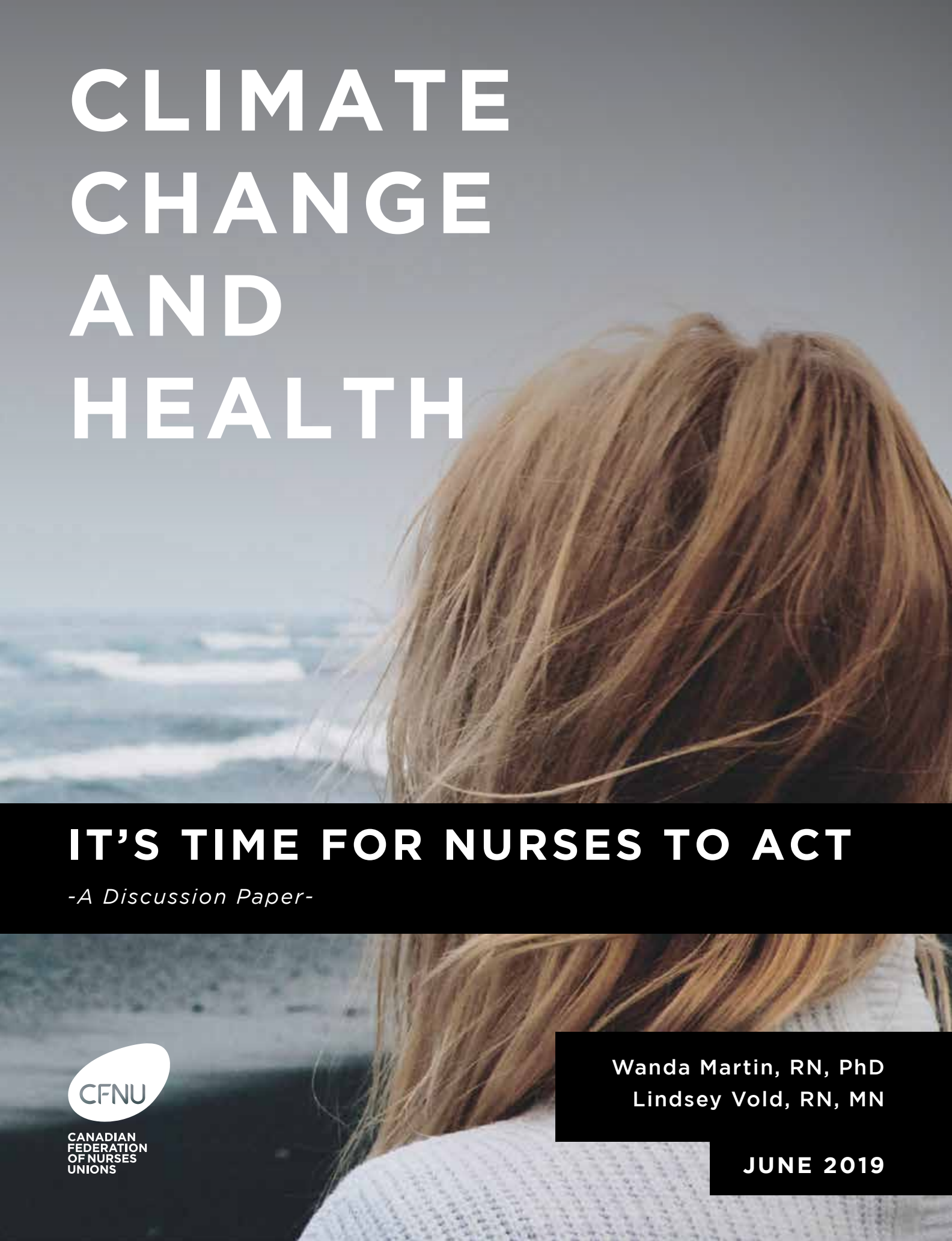


CLIMATE CHANGE AND HEALTH

IT'S TIME FOR NURSES TO ACT

-A Discussion Paper-

Wanda Martin, RN, PhD
Lindsey Vold, RN, MN

CANADIAN FEDERATION OF NURSES UNIONS

JUNE 2019

CANADIAN FEDERATION OF NURSES UNIONS (CFNU)

WE ARE CANADA'S NURSES.

We represent close to 200,000 frontline care providers and nursing students working in hospitals, long-term care facilities, community health care and our homes. We speak to all levels of government, other health care stakeholders and the public about evidence-based policy options to improve patient care, working conditions and our public health care system.

Published by
Canadian Federation of Nurses Unions
2841 Riverside Drive
Ottawa, ON K1V 8X7
613-526-4661

www.nursesunions.ca

Project team
Sebastian Ronderos-Morgan
Carol Reichert
Oxana Genina

Layout and graphics
Alyster Mahoney

ISBN
978-1-7753845-5-7

Printed & bound
Imprimerie Plantagenet Printing

Cover images
Tatjana Djakova (front)
Francesco Ungaro (back)

CONTENTS

Photo credit: Jaymantri

Photo credit: rawpixel

MESSAGE FROM LINDA SILAS

As nurses we instinctively know that patient health is closely tied to the patient's environment. This discussion paper on climate change and health urges nurses to consider the macro-level of our environment: planet Earth. Over the coming decades, our rapidly changing climate will pose the biggest threat to human health and well-being across every region of our planet.

According to the World Health Organization, **"…the health effects of a changing climate are likely to be overwhelmingly negative. Climate change affects social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter."** Canada will not escape these consequences. And as members of a global human community, climate crises affecting other parts of the world will have reverberations here at home.

Like all research on climate change, this discussion paper sheds light on the major challenges ahead for humanity and for health care as our global climate changes and average temperatures rise. This discussion paper also sets out concrete steps and actions that nurses and their unions can take to make a meaningful difference. As the Canadian Federation of Nurses Unions we can and must do more to advocate for economic and social transitions to reduce our greenhouse gas emissions and to pass on a healthier and more sustainable planet to our children and grandchildren. As well, we can and must do more to create resiliency within our health care communities and prepare effectively for the challenges to come as our climate changes. The recommendations in this discussion paper offer nurses a starting-off point for advocacy and leadership to tackle climate change.

I would like to thank Dr. Wanda Martin, RN, and her research assistant Lindsey Vold for their research and preparation of this report. I would also like to thank the CFNU team, including Sebastian Ronderos-Morgan and Carol Reichert, for their significant contributions to this work.

As the old saying goes, "think globally, act locally." This mantra encourages us to consider the health of the entire planet as we take meaningful actions in our own communities. It is my hope that this discussion paper will provide the tools and the information for Canada's nurses to continue to build upon this work.

IN SOLIDARITY,

Linda Silas
President
Canadian Federation of Nurses Unions

EXECUTIVE SUMMARY

The World Health Organization has called climate change the greatest challenge of the 21st century.[1] According to the Intergovernmental Panel on Climate Change (IPCC), humanity has 12 years left to take serious action on climate change to prevent a catastrophic 2 degrees Celsius minimum rise in temperatures by the end of the century.[2] Canada's changing climate report, released earlier this year, found that temperatures in this country are rising more than two times faster than global averages.[3] Therefore, it's evident that Canadians will be on the frontlines of our warming climate and will be required to address the health and health care challenges that will come with it.

As the Canadian health care system confronts the challenges of an aging population, constrained budgets and resource-intensive infrastructure, climate change will bring an added layer of grave and distinct challenges for nurses and others working in the health care system. Researchers predict that climate change-related impacts will affect all body systems, mental health, socioeconomic status and the built (human made) environment. **The health impacts of climate change will include:**

- **Higher rates of heat-stroke and stress;[4] [5]**
- **Increased allergens from more intense and prolonged pollen seasons, exacerbating asthma sufferers' health condition;[6]**
- **Displacement from wildfire and floods, accompanied by the mental distress of loss;[7] [8] [9]**
- **An acceleration in the spread of Lyme disease;[10] [11]**
- **Cardiorespiratory distress from air pollution due to wildfires;[12]**
- **Increased respiratory ailments due to intensifying ground-level ozone and air pollution;[13]**
- **Decreased access to, and availability of, food due to fluctuations in agricultural yields and food prices.**

Assessing vulnerability and resilience to the impacts of climate change is new for many health care providers. However, members of the Canadian Federation of Nurses Unions (CFNU) can prepare themselves and their health care communities to help patients in the context of the climate crisis ahead. Nurses can also become strong advocates for a sustainable and healthy future for our planet.

Nurses are one of the most trusted professions[14] able to assist communities to reduce greenhouse gasses and transition to a climate-friendly future in the name of improving our shared health. Everyone in Canada will be affected by climate change, with some groups facing more detrimental effects than others. Global and local actions are needed to reduce climate change-causing emissions and to build resilience and adaptation strategies.

The goal of this report, linking climate change to health and nursing, is to provide a resource for CFNU's nearly 200,000 nurses and nursing

student members, along with members of the public, as we learn about the links between climate change and health. This report first provides an overview of the climate change science, describing who is likely to be most affected. The report also summarizes the health impacts of climate change within the four elements framework of earth, air, fire and water. We conclude by elaborating on the emerging mental health issue of 'ecoanxiety'. The report focuses on the concrete connections between climate change and health through three case studies of extreme weather events in 2018 from Western, Central, and Atlantic Canada. The report concludes with seven recommendations for nurses that can be supported by their institutions, workplaces, associations and unions.

Children are going on strike worldwide because they fear the consequences that climate change will bring to their health and wellness within their lifetimes. Meanwhile, powerful political forces are campaigning to deny the science of climate change and prevent meaningful actions. It is our duty as nurses, as community members and as parents to use our full toolkit, including our ability to move quickly in the face of fast-moving threats to health, to work towards a response to climate change for today's patients and those of tomorrow. Working together we can build resilience toward a healthier future.

RECOMMENDATIONS TO NURSES

1. **Work with your employers, unions and associations to reduce emissions and to "green" your workplace.**
2. **Know about climate change science, and help educate patients and the general public about it.**
3. **Call for meaningful federal and provincial actions to reduce and eliminate climate change-causing emissions to ensure Canada leads the world in implementing its obligations under the UN Framework Convention on Climate Change (The Paris Accord).**
4. **Be aware and plan for the emerging needs of patients resulting from climate change and help them take action to support a healthy planet.**
5. **Be prepared for extreme weather events.**
6. **Promote active transportation and local healthy agriculture and food systems to reduce emissions.**

Photo credit: Martin Péchy

Photo credit: USGS

KEY MESSAGES

- Canada is warming at twice the global rate (with the North warming at three times the global rate). It will continue to warm in the future.
- Canada is warming at a faster rate because we have a larger land mass and a larger cryosphere (parts of the earth where water is frozen) in comparison to other countries.
- Because most of the warming in Canada is due to human activity, how much it continues to warm will depend on what Canadians do now.
- Unless we take real and meaningful actions on climate change at every level – in our everyday lives, workplaces, cities, provinces and our nation – Canada's temperatures will continue to rise to catastrophic levels that will include extreme temperatures over extended periods of time, more droughts, more flooding, threats to coastal communities from high water-level events, potential water supply shortages during summer months and more severe wildfires.
- Projected public health impacts include increases in heatstroke and stress, allergens, respiratory conditions (such as COPD, lung cancer and asthma), increases in the spread of insect-borne diseases (such as Lyme disease and West Nile virus), reduced access to and availability of food and fresh water, and the destruction of infrastructure and human displacement due to climate change-related events.

INTRODUCTION

Climate change is a global challenge that will affect how we live and how we manage our health care system. The repercussions of climate change on health are just beginning to enter the public consciousness, and nurses need to be prepared for changes that will affect their practice, their lives, and the lives of their patients and families.

Rising global temperatures put everyone's health at risk.[15] As nurses, we have a moral duty to prepare for the effects of a changing climate so we can work alongside our patients, clients and communities to build resilience. Nurses also have a moral duty to advocate for meaningful action on climate change by governments, to call for a solid plan to lower emissions and build a healthier and more sustainable society for our future.

According to leading international scientists, the world's nations have only 12 years left to dramatically reduce climate change-causing emissions if we hope to prevent a devastating global increase in temperatures of at least 2 degrees Celsius.[16] Given the scale of the threat that climate change poses to the health of humans and the environment for current and future generations, nurses have a role to play as leading voices demanding action.

In this report, we describe climate change and then outline the anticipated health issues, recommending what nurses can do to advocate for a transition to a green economy and health care system to prepare for this new era of public health.

WHAT IS CLIMATE CHANGE?

Humans are having a massive impact on the environment.[17] This has been occurring at an accelerated pace since the Industrial Revolution. As a result of modern conveniences and easy access to energy derived from burning fossil fuels, humans have increased the concentration of greenhouse gases, in particular carbon dioxide, in our atmosphere. This has affected the balance between the incoming solar rays and the outgoing infrared radiation. The end result is that our atmosphere retains more heat, causing our planet to warm.[18] The science can no longer be ignored: the human burning of fossil fuels (oil, coal, gasoline, natural gas, etc.) is driving up temperatures in our atmosphere, causing climate disruption and changing the livability and the health of the world around us. This is the story of climate change.

If we are able to reduce our greenhouse gas emissions and to capture some of the carbon that is in the atmosphere, we could keep the average rise in temperatures below 2 degrees Celsius from pre-industrial levels. This is the target that Canada agreed to, alongside 194 other countries, in the 2015 Paris Accord.[19] Nevertheless, even under this scenario, there would be considerable ecological and economic damage affecting the health of people in Canada and around the world.

The world's nations have only 12 years left to dramatically reduce climate change-causing emissions.

Photo credit: Pixabay

Given the challenge ahead of us, there is a sense of urgency to reduce our society's climate change footprint and to prepare for the challenges ahead. In 2018, the Intergovernmental Panel on Climate Change (IPCC) recommended a global target of no more than 1.5 degrees Celsius rise in temperature to reduce the severity of the risks to our health and survival.[20] [21] Regardless of what we are able to achieve in reversing the trend, we are already seeing the health effects of a changing climate today.

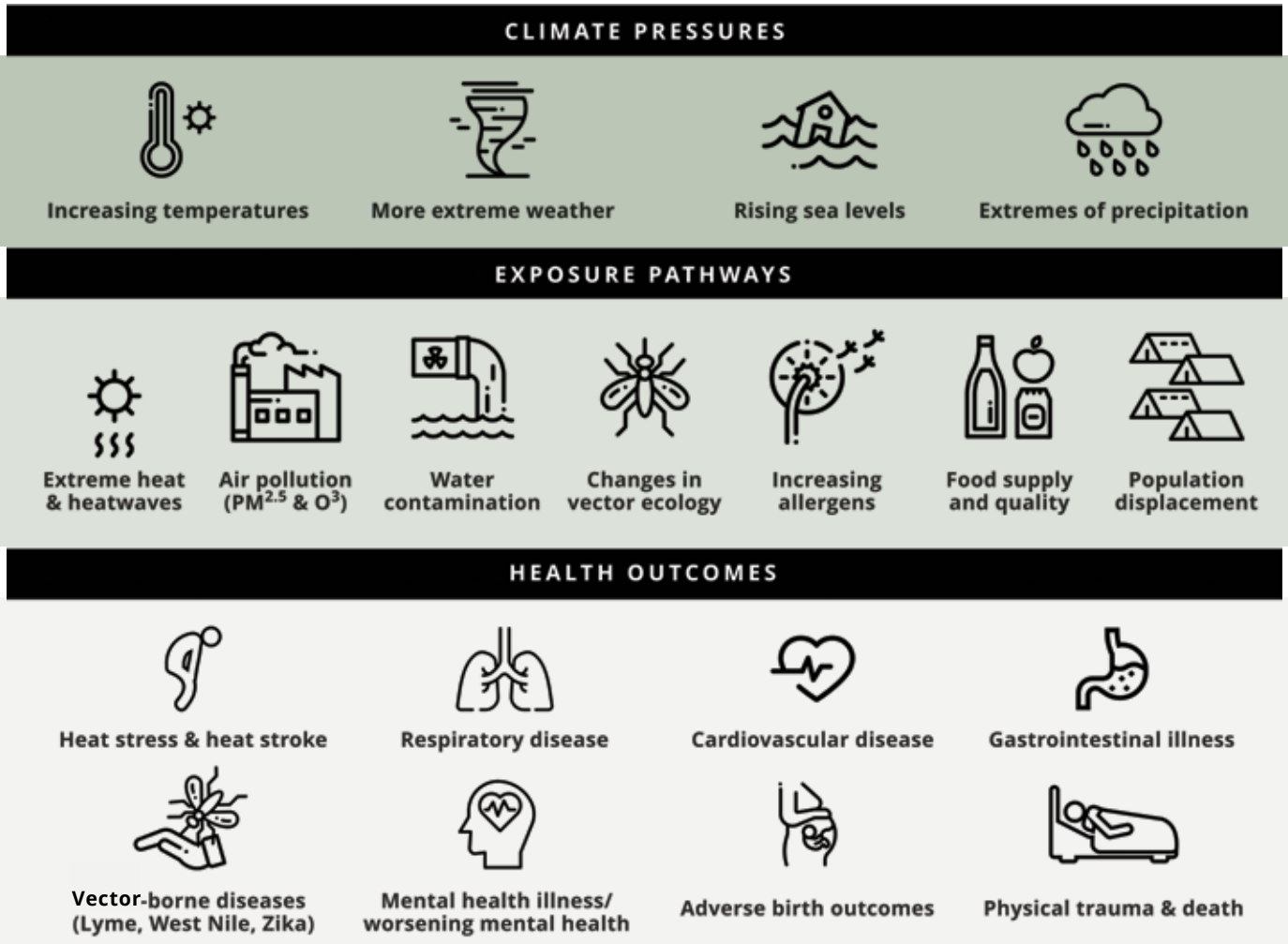
Globally and domestically, erratic and extreme weather patterns are having a profound impact on communities. Low-income countries, where people are already living in precarious situations, are being affected the most from droughts, floods and extreme weather as demonstrated in March 2019 by Cyclone Idai in Mozambique. In Canada, we are presently experiencing more severe forest fires and localized flooding, along with extreme seasonal temperatures and noticeably higher food prices.[I] [22] Health Canada estimated in 2017 that 9,500 deaths per year in Canada were attributable to poor air quality.[23] In that same year, British Columbia had the worst wildfire season on record (only to be surpassed by 2018), and in northern Alberta the fire that burned for three months released over 77 megatons of carbon. This is nearly half of the emissions that Canada needs to reduce to reach its targets.[24] Ragweed season has increased by 25 days in Winnipeg and by 24 days in Saskatoon.[25] Extreme heatwaves globally in 2018 also took nearly 100 lives in Quebec.[26] Floods and once-in-a-century storms are also becoming more frequent. In 2018, New Brunswick experienced the worst flood in decades, causing many people to lose their homes.[27] As carbon dioxide accumulates in the atmosphere, Canada's oceans are also becoming more acidic because of chemical reactions at the surface. This acidification is negatively affecting the ability of shellfish to build their shells, threatening vast fisheries across Canada.[28]

These are just a few examples of how climate change is currently directly impacting Canadian communities.

I Canada's food cost for the average Canadian family is expected to increase by $411 in 2019, rising to $12,157 per year, with the increasing cost of vegetables continuing to be an important factor (Canada Food Prices Report 2019).

WHO WILL BE MOST AFFECTED?

Climate change will affect everyone because extreme climactic events and a changing environment will be experienced everywhere. Nevertheless, our changing climate will disproportionately impact the most vulnerable groups in Canada (those who are socially, culturally or economically disadvantaged) as they have the least resources to prepare and respond to exposures and shock events such as erratic weather, floods or forest fires.[29] Children, people with chronic disease, people living in inadequate housing, those who struggle to pay their energy bills and those who are already suffering from food insecurity will be most affected. Indigenous peoples, disproportionately more vulnerable than other Canadians, will also face unique adaptation challenges.[30] As parts of the planet become increasingly unlivable, there will be climate refugees arriving in Canada. This will place additional pressure on resettlement agencies, our social safety nets and the health care system. Furthermore, there will continue to be significant impacts on those living in the north, as they are already experiencing landscape changes that affect their sense of self and their traditional way of life.[31] Vulnerable groups in Canadian society are already in the greatest need of nursing care, and now nurses will need to direct their skills to help build more resilient communities, and to become strong advocates demanding action on climate change to ensure a healthy future.



Howard, C., Rose, C., & Rivers, N. (2018). Lancet Countdown 2018 Report: Briefing for Canadian Policy Makers. *The Lancet*.

Climate change will affect everyone because extreme climactic events and a changing environment will be experienced everywhere.

Photo credit: Pixabay

FINDINGS

The health of planet Earth, humanity and the natural world are central to the issue of climate change. Our understanding of the health effects of climate change are informed by a growing global planetary health movement,[32] which provides research to improve our understanding of the future implications of climate change. In recognition of the natural world in which we live, this report categorizes the environmental threats of climate change into the classic elements' framework of earth, air, fire and water.[33] Within "earth" we include food systems, land use, vectors and infectious agents. "Air" includes smog, particulate matter, cardiovascular disease, asthma and allergies. Under "fire" we consider the effects of forest fires and heatwaves. And finally, within "water" we cover floods, waterborne illness, warming and acidifying oceans, rising sea levels and droughts. We conclude with a discussion on the mental health challenges surfacing in response to our changing climate.

EARTH

Much of the world's food production is traded on global markets, so Canada depends on many regions around the world for food production, just as other regions depend on us.[34] This global interconnectedness of food supply systems means that climate change affecting one part of the world will affect food supply and prices in another part and has the potential to undermine food security in Canada and around the world.

Climate change is causing extreme weather events, droughts and heat stress, which are undermining harvests.[35] Extreme weather events have reduced yields in Canadian agriculture by up to 50%. Agricultural producers in Saskatchewan recently faced a second consecutive dry year, making 2017 and 2018 the driest growing seasons in 135 years.[36] In Val Marie, Saskatchewan, producers received a third of their normal rainfall, meaning production was reduced to 32 bales per acre, a far cry from the 210 bales per acre farmers were able to

Photo credit: Jackson Jorvan

store the previous year.[37] Projections for the future climate in the Canadian prairies include hotter summers and longer droughts, which are expected to contribute to growing stress to agriculture. When there is precipitation, heavier downpours caused by a warmer atmosphere will further contribute to erosion of the vulnerable topsoil.[38] This trend towards droughts and deficits in soil moisture are also expected to intensify in British Columbia's interior in a high-emissions scenario.[39]

Heat stress can also have a detrimental impact on livestock, poultry and dairy production. Extreme heat, resulting in shortages of feed grain, and rising prices, have led to cattle and dairy producers selling off their cows prematurely.[40] However, existing agricultural practices around cattle and dairy are significant contributors to climate change, contributing about 20% of greenhouse gas emissions globally.[41] Livestock and meat production are considerably more energy-intensive forms of agriculture than non-meat-based options, and generate greater amounts of greenhouse gas emissions per unit of food. Methane, in particular, is a major by-product of meat production and has a greater warming effect on the atmosphere than carbon dioxide.[42] In addition to land use, deforestation, water shortages and agricultural pollution are part of the ecological impacts of farming, according to a recent report. It concludes reducing meat and dairy product consumption is "the single biggest way" to reduce your environmental impact on the planet.[43] Transitioning to more sustainable agriculture by shifting towards more vegetable protein sources also means a better diet for your health as recommended by the *Canada Food Guide*[44] and the *EAT-Lancet Commission Summary Report*.[45]

There is also a link between climate change, pollinators and food security.[46] In addition to the impact of changing weather patterns, a changing climate is contributing to a decline in pollinator insect

populations so vital to our agricultural systems. Bees are not able to collect the required pollen to survive because of the disruption of the seasonal timing of flowering plants, which is tied to climate change. Without insect pollinators, human production of fruits and many vegetable plants would be severely impacted.

While insect pollinators suffer, some insect species are thriving in the warmer climates. Earlier springs, longer and hotter summers, and milder winters are ideal conditions for the spread of disease-transmitting mosquitoes and ticks. West Nile virus and Lyme disease are two growing concerns in Canada as their vectors (mosquitos and ticks) spread into new regions of Canada and increase their populations.[47] Lyme disease cases in Canada more than doubled between 2016 and 2017, with 2,025 cases in 2017 (88% of the cases were in Ontario, Quebec and Nova Scotia).[48] There were 367 cases of West Nile virus in 2018 (primarily in Quebec and Ontario), up from 200 cases in 2017, and many more cases go unreported and potentially undiagnosed.[49]

There are other infectious agents that may proliferate globally due to increased temperature and flooding, such as dengue, malaria, hantavirus, salmonellosis, cholera and giardiasis.[50] As vector populations and weather patterns change because of a warming climate, these threats may spread outside their known endemic areas.

AIR

Climate change and air pollution, although not the same, have a common origin and are aggravated by the burning of fossil fuels. Air pollution is caused by atmospheric increases in carbon dioxide, nitrous oxide, ground ozone and particulate matter, as well as increased pollen counts for those with allergies. Ground ozone reacts with sunlight radiation to create smog, a

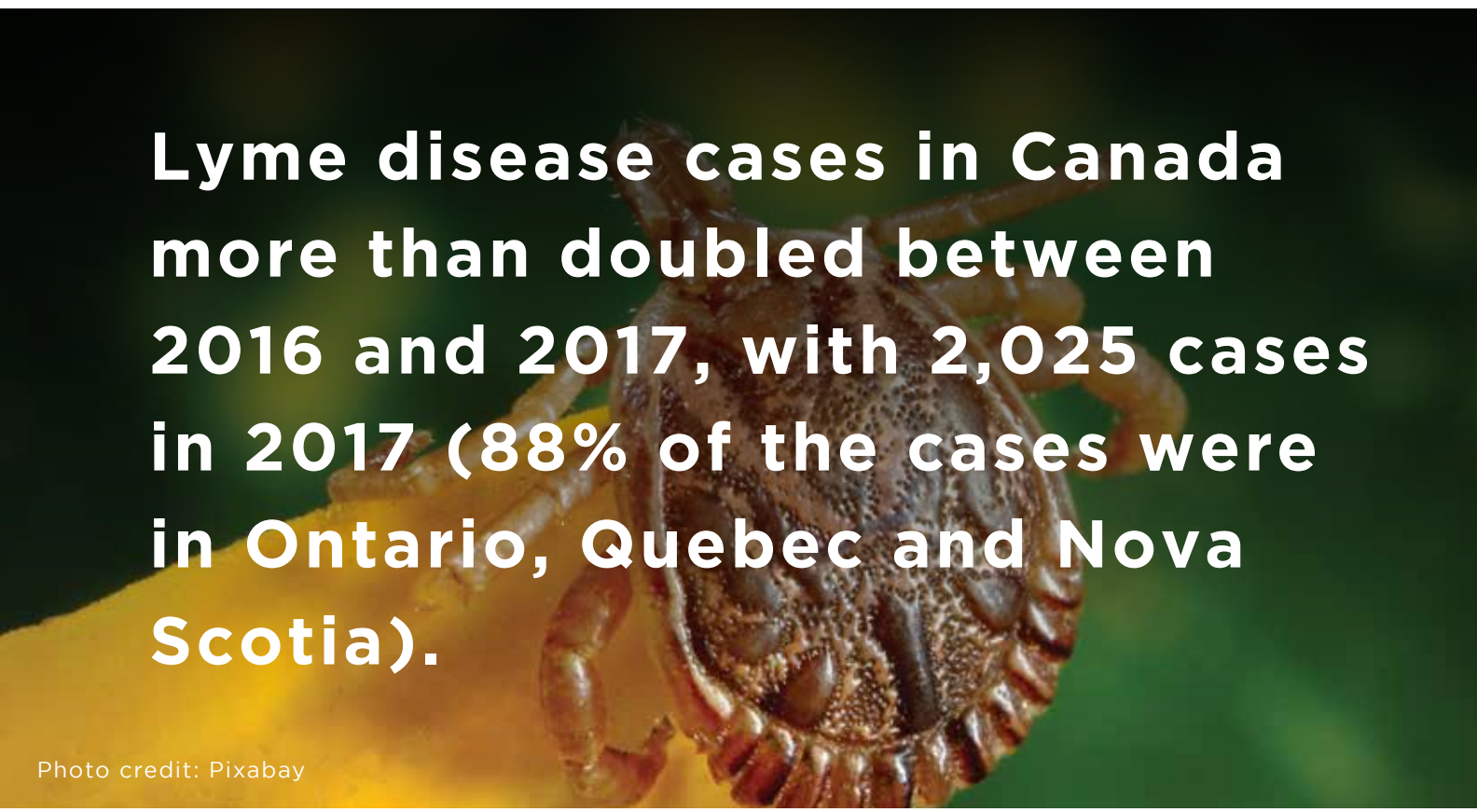
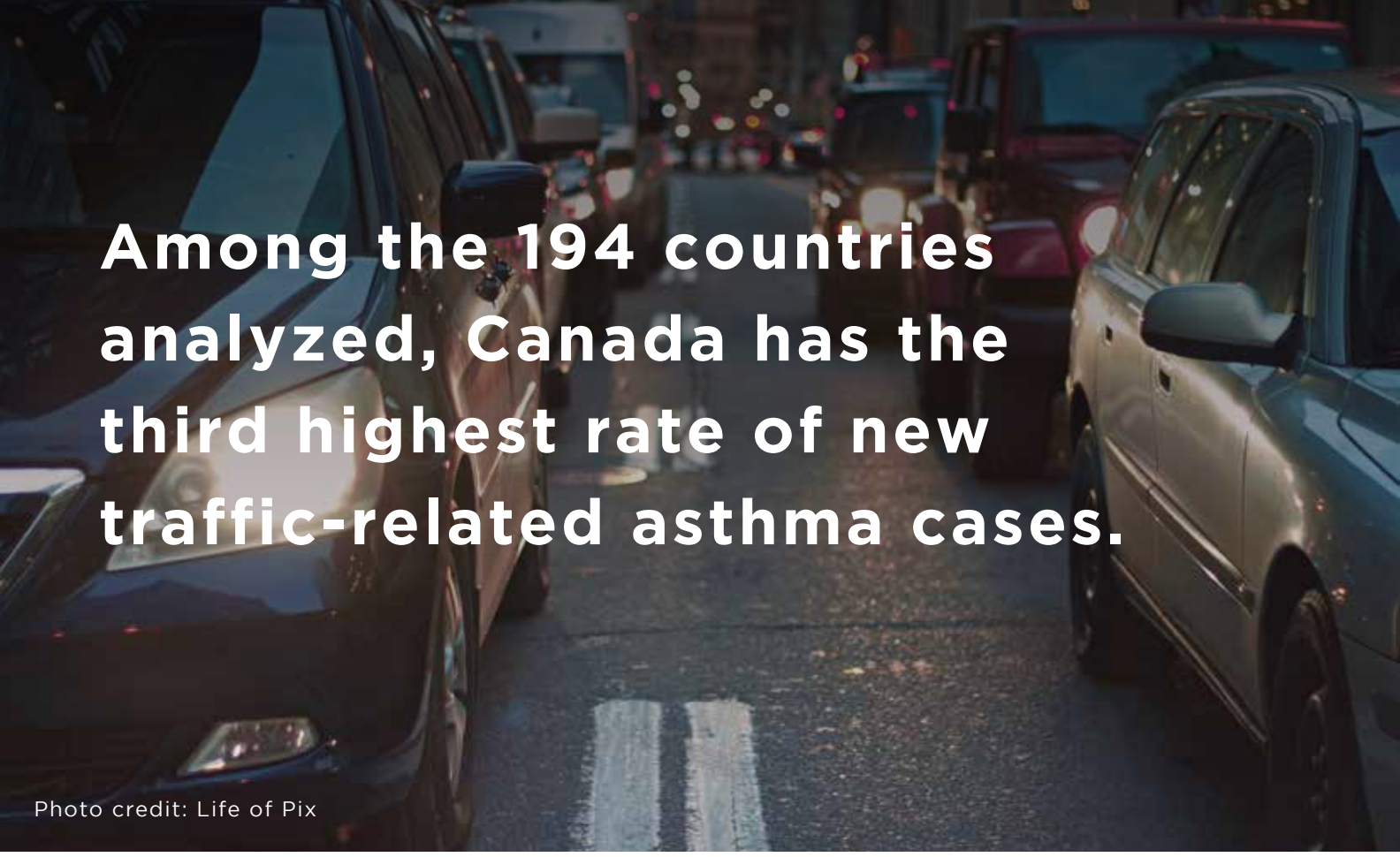


Photo credit: Pixabay



Among the 194 countries analyzed, Canada has the third highest rate of new traffic-related asthma cases.

Photo credit: Life of Pix

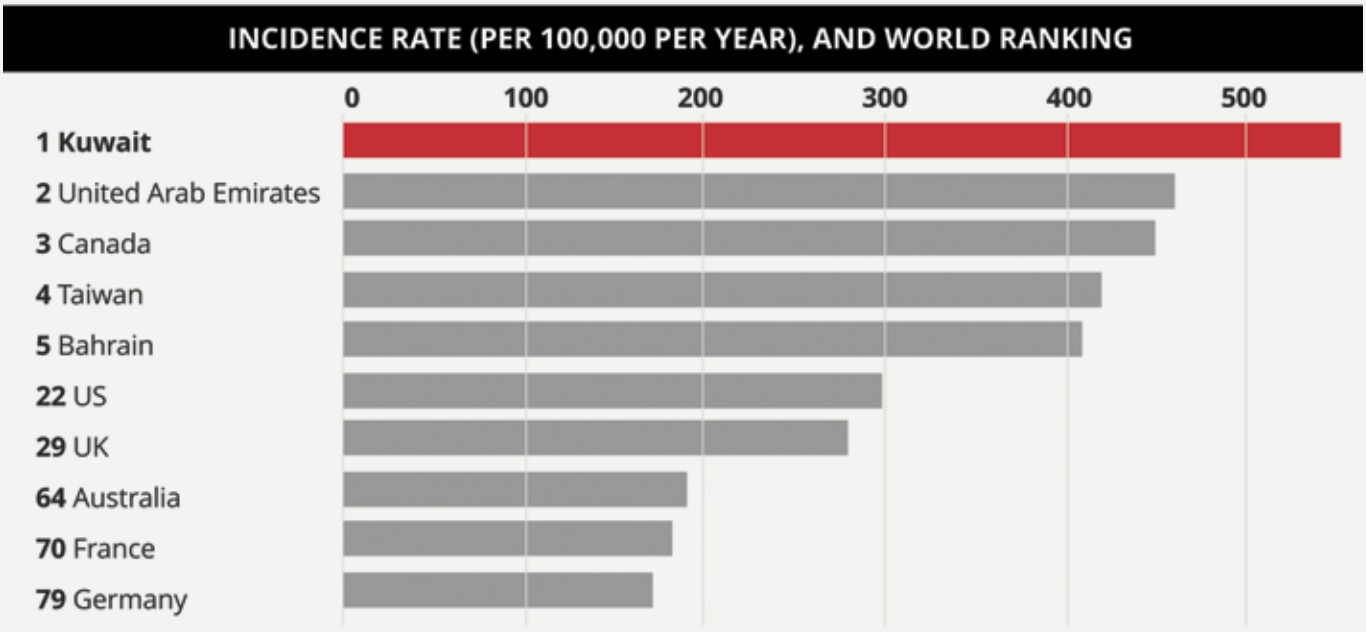
familiar sight for many city dwellers, especially during the summer.[51] Air pollution is often aggravated by hotter climates. Toronto Public Health predicts that climate change will cause a 20% increase in air pollution-related deaths in the city by 2050.[52]

Ground ozone[II] is a colorless and irritating gas that forms just above the earth's surface and looks like smog at ground level. Smog will likely increase with higher temperatures and with frequent stagnate air conditions. In the US, the Midwest is projected to have the greatest change in ozone-related premature deaths from 2000 to 2030.[53] With Ontario and Manitoba just across the border from the Midwestern states, millions of Canadians are implicated.

Fine particulate matter (PM) is another component of air pollution that can be seriously damaging to human health. Comprised of aerosols, smoke, fumes, dust, ash and pollen,[54] fine PM material is, by definition, smaller than 2.5 microns in diameter, allowing it to penetrate deep into our lungs. Prolonged exposure can cause serious chronic and acute health effects, including lung cancer, chronic obstructive pulmonary disease (COPD), cardiovascular disease, and the development and exacerbation of asthma[55] [56] Four million children develop asthma every year as a result of air pollution from cars and trucks, equivalent to 11,000 new cases a day, a recent landmark study has found. Among the 194 countries analyzed, Canada has the third highest rate of new traffic-related asthma cases.[57]

II Ground-level ozone is a "secondary" pollutant produced when two primary pollutants, nitrogen oxides and volatile organic compounds, react in sunlight and stagnant air. Nitrogen oxide comes from human activities like burning of oil, gasoline and coal, and volatile organic compounds derive from both human and non-human sources such as wildfires (Government of Canada).

RATE OF NEW TRAFFIC-RELATED ASTHMA CASES (194 NATIONS ANALYSED)



Guardian Graphic | Source: Achakulwisut et al., Lancet Planetary Health

Fine PM is of particular concern for the health of the elderly.[58] Generated primarily from the burning of fuels, PM pollution is interlinked with carbon dioxide pollution causing climate change. According to Health Canada,[59] reducing air pollution from human activities to acceptable levels would result in about 14,400 fewer annual deaths in Canada.

Almost 7% of Canadians suffer from respiratory allergies.[60] And a warming climate will likely cause airborne allergens to increase in certain regions.[61] Allergens include tree, grass and weed pollen. Reports indicate that birch peak pollen season could be extended by two to four weeks by 2020, compared to 2000.[62] Airborne allergens may also be exacerbated when ground ozone and particulate matter levels are high, as those affected by allergy-induced asthma are already struggling to breathe. In Canada, Saskatchewan has seen the greatest increase in the number of days for ragweed season from 1995 to 2011.[63]

FIRE

Extreme heat and droughts cause loss of life and livelihoods, and trigger severe wildfires. High temperatures can cause heatstroke and worsen many pre-existing conditions such as cardiovascular and respiratory diseases.[64] More intense forest fires put communities at risk and can result in disasters that devastate communities (e.g., Fort McMurray fire). Climate change is causing hotter and drier summers in western Canada, sparking record-breaking forest fire seasons in recent years.[65] The resulting evacuations increase the pressure on local health care services and hospitals.

In 2017 and 2018, tens of thousands of British Columbians in the interior of the province were forced to evacuate, sometimes spending weeks away from home. The Fort McMurray fire in 2016 resulted in a major evacuation, including the local hospital. The Fort McMurray hospital building had to be evacuated, moving 106 patients by bus, with

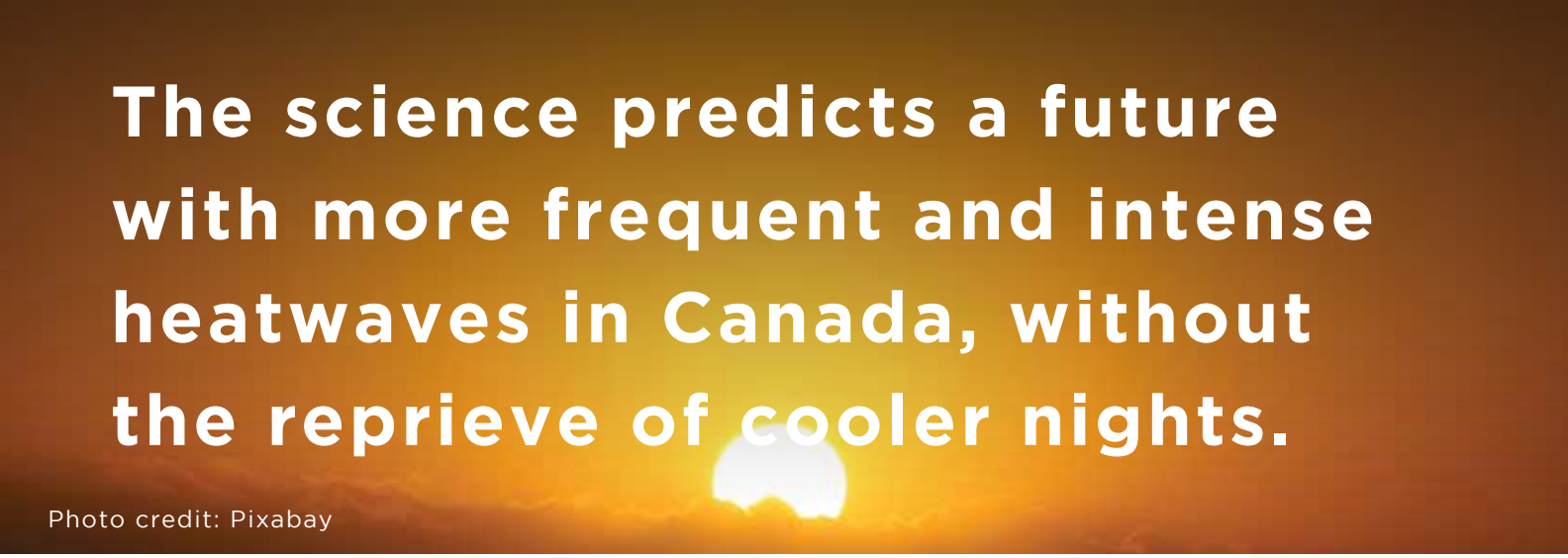


Photo credit: Pixabay

nurses and physicians on board to provide care.[66]

Extreme heat is damaging to people's health and livelihoods. During heatwaves, the body struggles to remain cool and maintain its normal temperature. Serious health symptoms can manifest after prolonged exposure to heat, physical effort and the dehydration caused by sweating. Children, the elderly and the chronically ill and low-income people are the most vulnerable to temperature regulation challenges during a heatwave. Symptoms of heatstroke, often exacerbated by high humidity, begin with headaches and muscular cramps, and can quickly intensify into difficulty breathing, convulsions, and deteriorated, or loss of, consciousness. Heatstroke can quickly occur and, if left untreated, can result in death.[67]

In 2017, it was estimated that 157 million people exposed to heatwaves missed 3.4 billion weeks of work.[68] Extreme heat can lead to decreased productivity amongst outdoor workers, negatively affect the learning of students and disrupt transportation, including flight cancellations.[69] The science predicts a future with more frequent and intense heatwaves in Canada, without the reprieve of cooler nights.[70]

Most of the costs related to extreme heat are human costs – lost lives, but cities are beginning to recognize the challenges ahead as they struggle to keep residents cool in heatwaves, which are more acute in urban landscapes. Some cities are even taking action to hold fossil fuel companies to account.[71] The urban heat island effect makes cities much warmer than surrounding rural areas by as much as 12 degrees difference because of the heat trapped in pavement and buildings.[72] With well over 80% of Canadians living in cities, the health effects of urban heat islands during heatwaves will become more severe.

WATER

Warming air temperatures and increased carbon dioxide in the atmosphere, caused by climate change, are creating significant changes to weather patterns, the availability of fresh water and the health of our oceans.

Warmer temperatures will cause more intense short-term precipitation in some regions, causing flash flooding and erosion. The melting glaciers, rapid snow melts and more frequent downpours could have devastating effects in Canada. We are seeing the impacts already. In 2013, the floods in Alberta displaced over 100,000 people and caused an estimated $1.7 billion in damages. It was the most damaging flood ever recorded in the province.[73] Floods can also spread disease by increasing waterborne pathogens by up to 70%,[74] spreading bacteria, protozoa and viruses, along with agricultural waste, raw sewage and chemicals.[75] Increases in water

temperatures also increase algae growth and produce higher concentrations of toxic blue-green algae[76] killing off aquatic life.

Other regions of the globe will experience worsening droughts, water scarcity and desertification. Climate change will impact our global drinking water supply in many ways, depleting this finite resource. Rising sea levels will increase the salinity of our fresh water supplies.[77] Over the medium term, shrinking glaciers will deplete fresh water reserves for significant regions of the planet, in particular drier regions such as the Canadian Prairies.

The Canadian coastal provinces face an additional challenge – rising sea levels. Canada's urban waterfronts may face a 20-centimeter rise by 2050, and potential predictions are up to one meter by 2100. The rate and extent of damage from rising water is unknown, but the effect is not something that will change quickly even if we do meet the global targets for reducing emissions. The rising sea level will result in a higher storm surge, causing more frequent inland flooding as more severe weather occurs, particularly on the East Coast of Canada.[78] The coast of southern Atlantic Canada will experience the largest local sea level rise in Canada because of the added effect of sinking land areas.[79] Inland flooding will displace people and cause a loss of valuable land, including fertile agricultural lands. In cities like Vancouver, with high-density populations, municipalities may find it difficult to respond to a disaster event as the sea level could rise by more than 50 cm.[80] [81]

In addition, ocean acidification results from greenhouse gas emissions entering, dissolving and reacting with water.[82] The resulting chemical reaction creates carbonic acid which acidifies the ocean, jeopardizing sea life and food supplies. Ocean acidity reduces the availability of calcium carbonate for shell formation and affects organisms that are essential to support the marine food chain.[83] While some marine life may adapt overtime, others may decline or disappear.

Researchers report that changing water temperatures, deoxygenation, and increasing amounts of plastics and ocean pollution are putting marine ecosystems under severe stress.[84] The unpredictability of ocean food stock and current declines in the shellfish market on the Pacific coast leaves the aquaculture industry bracing for change.[85]

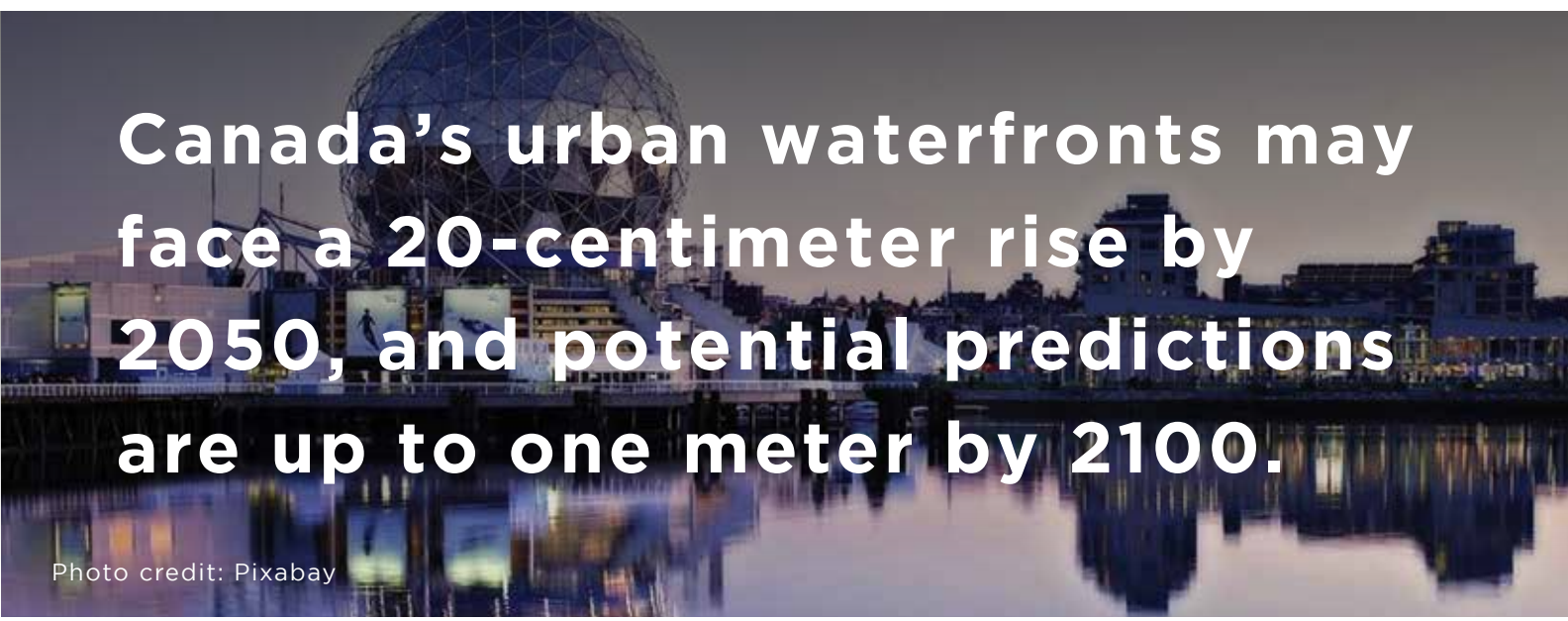


Photo credit: Pixabay

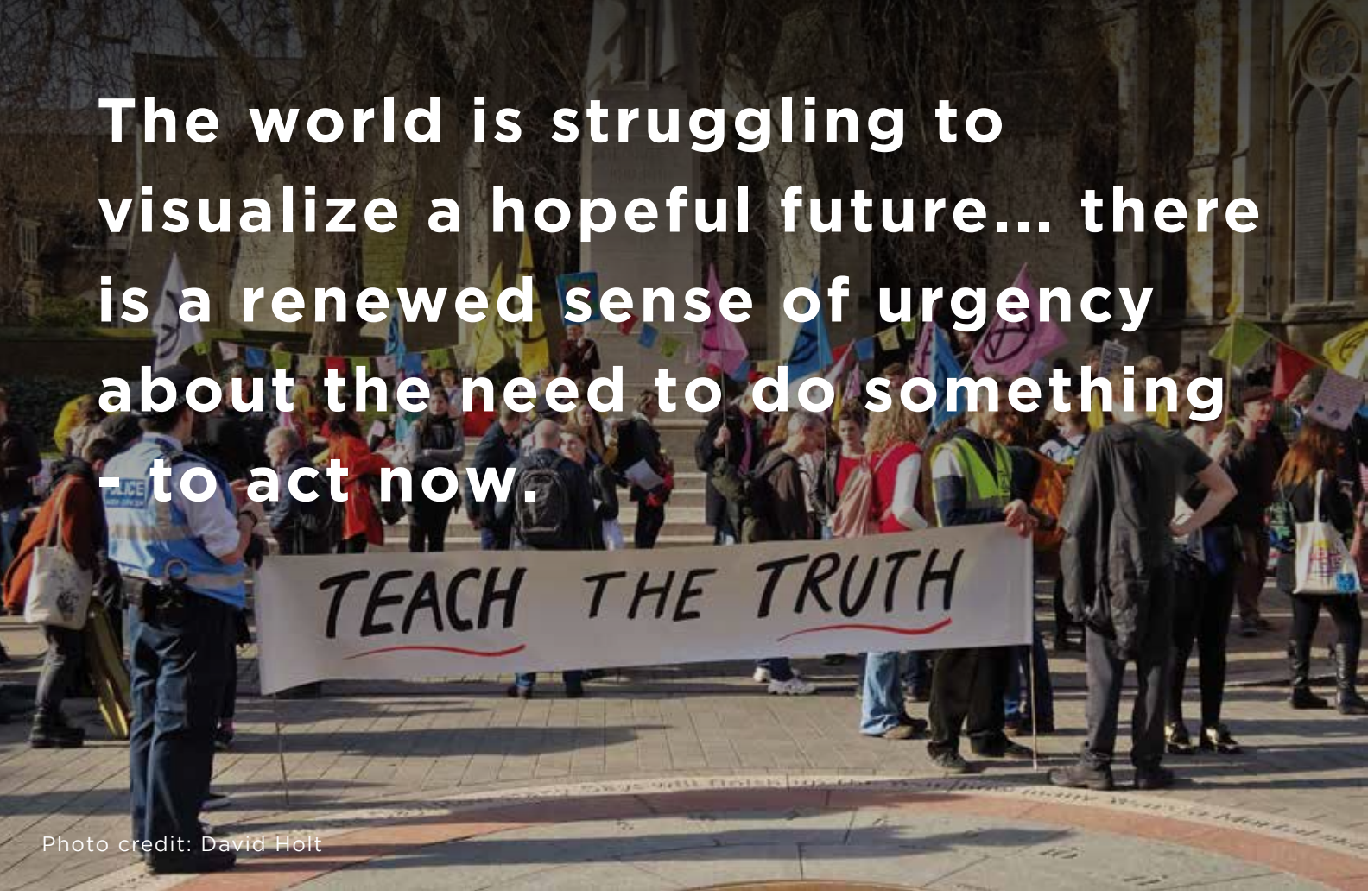


Photo credit: David Holt

The world is struggling to visualize a hopeful future... there is a renewed sense of urgency about the need to do something – to act now.

THE EMERGING ISSUE OF ECOANXIETY

Under the looming threats of climate change, an emerging sense of imminent and inescapable crisis is gripping the emotional and social well-being of our communities.[86] Environmental philosopher Glenn Albrecht and colleagues have started to document the psychological burden of climate change on the mental health of people, manifesting in a number of syndromes such as 'ecoanxiety', 'ecoparalysis' and 'solastalgia'. Ecoanxiety is the anxiety experienced from being surrounded by the complex and threatening problems associated with climate change. Ecoparalysis is the feeling of hopelessness – of being incapable of effective action to mitigate climate change. Solastalgia refers to the feelings of distress and isolation because of the gradual loss of one's home environment, which sometimes includes climate change-related displacement.[87] [88] This vocabulary provides a way of articulating human emotional, spiritual and psychological reactions to the current climate crisis.

The growing climate kids' movement, which was highlighted in a famous speech by 14-year-old Greta Thunberg before world leaders during the 24th UN Framework Conference on Climate Change in 2018, is an expression of ecoanxiety. There have been multiple student protests around the world, and there is a renewed sense of urgency in news stories about the need to do something – to act now. Society is in a precarious position as we realize the full cost of industrialization, rapid growth and extended life span. The world is struggling to visualize a hopeful future. As a society we must face the fact that we have created a public health emergency.

MAKING THE LINK ACROSS CANADA

The effects of climate change are a global challenge. Canada will face, and is already experiencing, some serious challenges such as forest fires, floods and extreme heat. The following three case studies illustrate the widespread societal and health outcomes across Canada, resulting from recent natural disasters caused by climate change.

CASE STUDY 1: WESTERN CANADA FOREST FIRES AND SMOKE

Extreme forest fire seasons in Canada are becoming an annual summer tradition. From the hundreds of forest fires burning in the Northwest Territories in 2014 to the swaths of smoke from British Columbian infernos which reached across western Canada over the past few years, forest fires are becoming all too familiar for Canadians and for hospitals coping with respiratory distress. As temperatures rise and droughts worsen, it is likely that we will see more intense, and longer-lasting, forest fires. The immediate health effects of forest fire smoke are well known: shortness of breath, headaches, increased coughing and eye irritation, to name a few. Those with underlying respiratory conditions – the very young and older adults – are the most vulnerable. Fires put an increased demand on emergency departments and hospital services, as well as on evacuation protocols.

In 2018, Vancouver was listed as having the fifth-worst air quality in the world because of widespread wildfires in British Columbia.[89] In some regions of BC the air quality was double what is considered to be hazardous to human health.[90] During the 2003 catastrophic fire season in BC, communities in southern BC recorded a 46% to 78% increase in physician

Photo credit: Sebastian Ronderos-Morgan

Photo credit: Sebastian Ronderos-Morgan

visits for respiratory-related conditions.[91] In 2018 – a record-breaking year for air quality advisories in the province – local authorities in the Vancouver area reported a 120% increase in daily physician visits and an 80% increase in the number of asthma prescriptions dispensed.[92] Choking forest fire smoke has been responsible for an increasing number of emergency room visits, primary care provider visits and respiratory hospitalizations for conditions such as asthma and COPD.[93] The widespread and worsening effects of forest fires are obvious to anyone living in the Western provinces over the past few years.

In 2018 in Saskatchewan, a 3,000-hectare wildfire forced hundreds to flee from their homes. Communities, like Southend, had to evacuate their homes and begin the 600-kilometre journey to Saskatchewan's largest city, Saskatoon. While helicopters and ground crews fought the flames, families were placed in temporary shelters in a soccer centre. The Red Cross, Ministry of Social Services, health and justice officials as well as the City of Saskatoon collaborated to coordinate services and provide basic amenities.[94]

For rural Canadians, separation from the land and from land-based food systems can also contribute to mental and emotional stress. Southend Saskatchewan, a community with a large Indigenous population and those who engage in land-based activities, experienced disrupted livelihoods which impact their economic stability and spiritual well-being.

Wildfires are becoming a normal summer event in Western Canada. There are children growing up today who will associate summer with smoke and restricted outdoor activity because of lengthening air quality advisories.

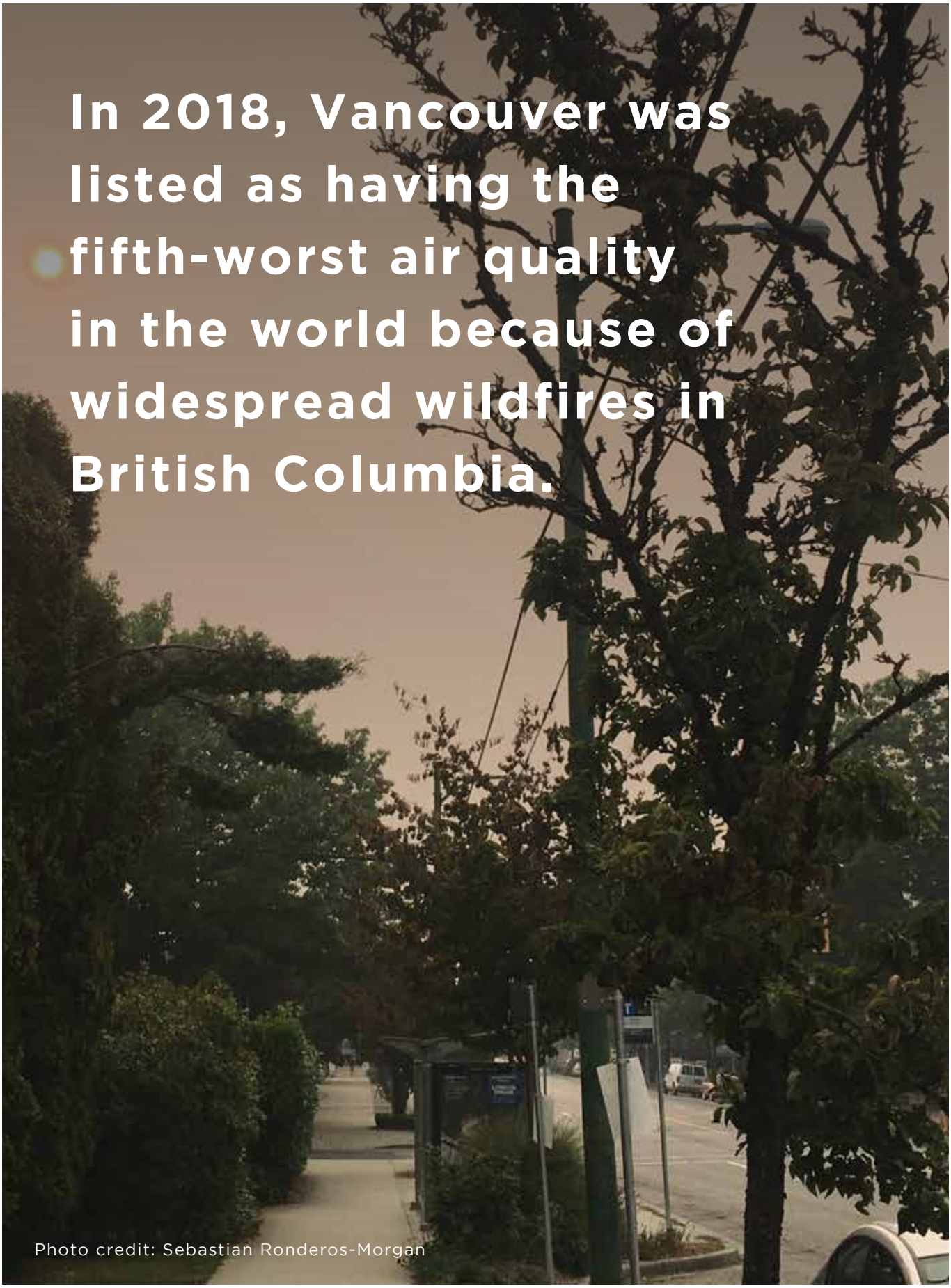
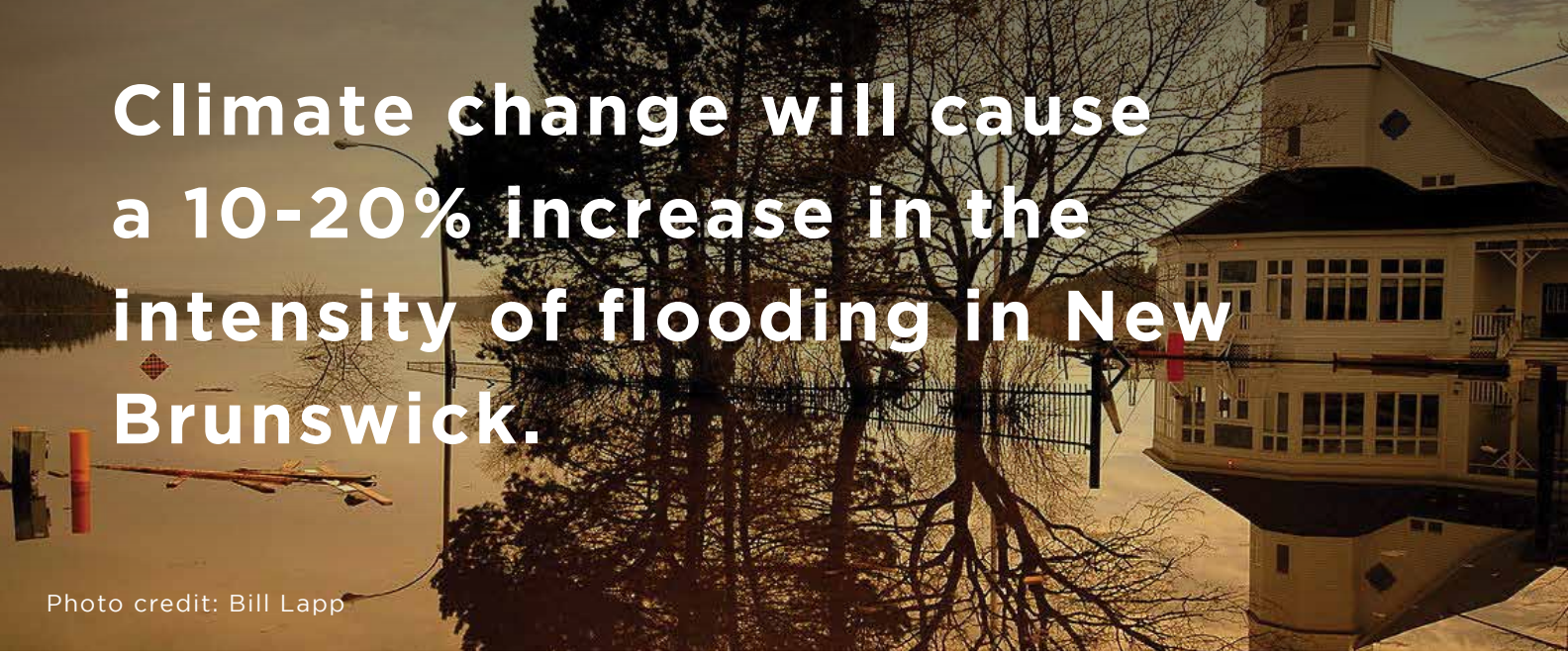


Photo credit: Sebastian Ronderos-Morgan



Climate change will cause a 10-20% increase in the intensity of flooding in New Brunswick.

Photo credit: Bill Lapp

CASE STUDY 2: ATLANTIC CANADA FLOODING

Since 2011, New Brunswick has experienced a three-fold increase in the number of disaster financial assistance programs triggered by flooding.[95]

In January 2018, a mixture of rain, unseasonably warm temperatures and melting snow combined to increase water levels to record highs across New Brunswick, causing widespread flooding and power outages. Thousands of New Brunswickers were without power, some were isolated due to destroyed bridges, and residents of the Musquash area were evacuated from their homes because of threats to the stability of a nearby dam.[96] In the immediate aftermath of the flooding, the Government of New Brunswick mobilized emergency assistance to test water and restore power to 20,000 residents. Nearly a thousand people were evacuated from their homes as waters rose to over 5.5 meters above their normal level in the Saint John region.[97] The Department of Justice and Public Safety estimated recovery costs at $9.6 million because of the extensive damage to private and public infrastructure.[98] Water damage leads to mold in homes, psychological distress, loss of income and property. The physical, mental and financial distress is often overwhelming.

Fiddleheads are a seasonal favourite, harvested each year from the riverbeds in New Brunswick. The spring following the flooding, the Regional Medical Health Officer declared that fiddleheads were unfit for consumptions because of the risk of contamination from raw sewage, fuels and chemicals leaked into rivers.[99] This resulted in an economic loss to many local pickers who depend on seasonal work for sustainable livelihoods, and a cultural loss for those who have a spring tradition of gathering fiddleheads. It also represents a threat that flooding events pose to agriculture and local jobs.

Regrettably, Canadian scientists forecast that climate change will cause a 10-20% increase in the intensity of flooding in New Brunswick over the course of this century.[100] This will be exacerbated by rising sea levels in Atlantic Canada, contributing to more inland flooding of rivers. Rising sea levels in Atlantic Canada are being hastened by the waterbed effect, land levels slowly sink into the Atlantic Ocean because of post-glaciation shifts in the earth's crust. For the Halifax waterfront, it means a quadrupling in the number of floods as sea levels rise 20 centimetres over current levels by mid-century.[101]

CASE STUDY 3: CENTRAL CANADA EXTREME HEATWAVE

The summer of 2018 was the third warmest on record.[102] Scorching heat spanned the globe, from Japan to Russia and the United States. Canada was no exception. In southern Canada an early hot summer beginning in May persisted relentlessly into September.[103]

Photo credit:
Staff Sgt. Sheila deVera

Southeastern Ontario and southern Quebec experienced the most intense heatwave in years between late June and the first week of July 2018. In Quebec, in the first week of July more than 90 people died from heat-related health issues as average temperatures soared to 45 degrees Celsius with the humidex.[104] [105] With a humidex of 47 degrees in Ottawa, it was the second-warmest Canada Day on record. In Montreal authorities reported a 30% increase in emergency calls during that blistering week of heat.[106]

Exposure to heat can cause existing conditions to worsen, such as cardiovascular disease and respiratory disease, and can cause heatstroke.[107] Excessive heat can lead to edema, heat rash, cramps, fainting and exhaustion.[108] Left untreated, heatstroke can even damage internal organs. The people most at risk are older, live in poverty, lack education and live in high population-density urban neighbourhoods with low incomes.[109]

In 1995, the Chicago heatwave claimed more than 700 people, requiring refrigerated trucks to handle the overflow of bodies.[110] In 2003, European heatwaves resulted in thousands of deaths.[111] These natural disasters provide lessons for us as we move into an uncertain future.

Photo credit: rawpixel

REGIONAL CHARTS[112] – HIGH-CARBON FUTURE

	Average hottest temperature of the year		Average number of +30°C days per year	
	Recent past	High-carbon future 2051-2080	Recent past	High-carbon future 2051-2080
Vancouver	29.3	34.0	1.2	13
Calgary	31.8	36.5	4	27
Regina	35.3	40.7	16	50
Winnipeg	34.5	39.3	11	47
Toronto	33.5	38.4	12	55
Ottawa	33.1	37.7	10	49
Fredericton	33.0	37.0	7	36
Halifax	29.8	33.4	0.6	8.1
Charlottetown	29.8	34.1	1	16.2
St. John's	28.1	31.0	0.1	1.7
Yellowknife	28.7	32.2	0.3	3.8

	Average coldest temperature of the year		Average number of days with frost per year	
	Recent past	High-carbon future 2051-2080	Recent past	High-carbon future 2051-2080
Vancouver	-7.9	-3.1	32	6
Calgary	-33.1	-26.6	194	145
Regina	-37.3	-30.9	196	158
Winnipeg	-36.0	-29.8	189	149
Toronto	-22.6	-16.7	132	78
Ottawa	-30.7	-24.9	160	114
Fredericton	-29.5	-24.6	173	118
Halifax	-22.0	-17.6	145	91
Charlottetown	-24.1	-18.4	156	97
St. John's	-17.9	-13.4	154	92
Yellowknife	-43.6	-37.3	227	192

MAKING THE CASE FOR CHANGE

WHY NURSES AND THEIR NURSES UNIONS SHOULD TAKE ACTION

The three case studies presented here are just the beginning of a potentially devastating tale of the health effects of climate change in Canada. There are numerous other examples of the broad health impacts of climate change from coast to coast to coast, as well as globally. Canada's nurses can expect to witness increasing illness across Canada, directly and indirectly linked to climate change. All body systems are predicted to be affected, in addition to mental health, socioeconomic status and the built environment. While nurses are increasingly aware of the importance of the social determinants of health, we must now go one layer deeper to consider the ecological determinants of health. Above all, nurses must be equipped to educate patients and clients about the health risks of climate change and work upstream to prevent health crises before they occur.[113] Our community is only as healthy as the ecological system upon which life depends.

As previously noted, ecoanxiety can be a paralyzing force, however, despair and inaction cannot be options. Just as nurses advocate for vaccinations to reduce the spread of infectious diseases, so too must nurses advocate for meaningful action by governments and corporations to transition our economy into a healthier and more sustainable future.

Working alongside different stakeholders, Canada's nurses can engage in feasible, actionable and committed strategies to build pathways towards a better and healthier future for our communities, country and planet.

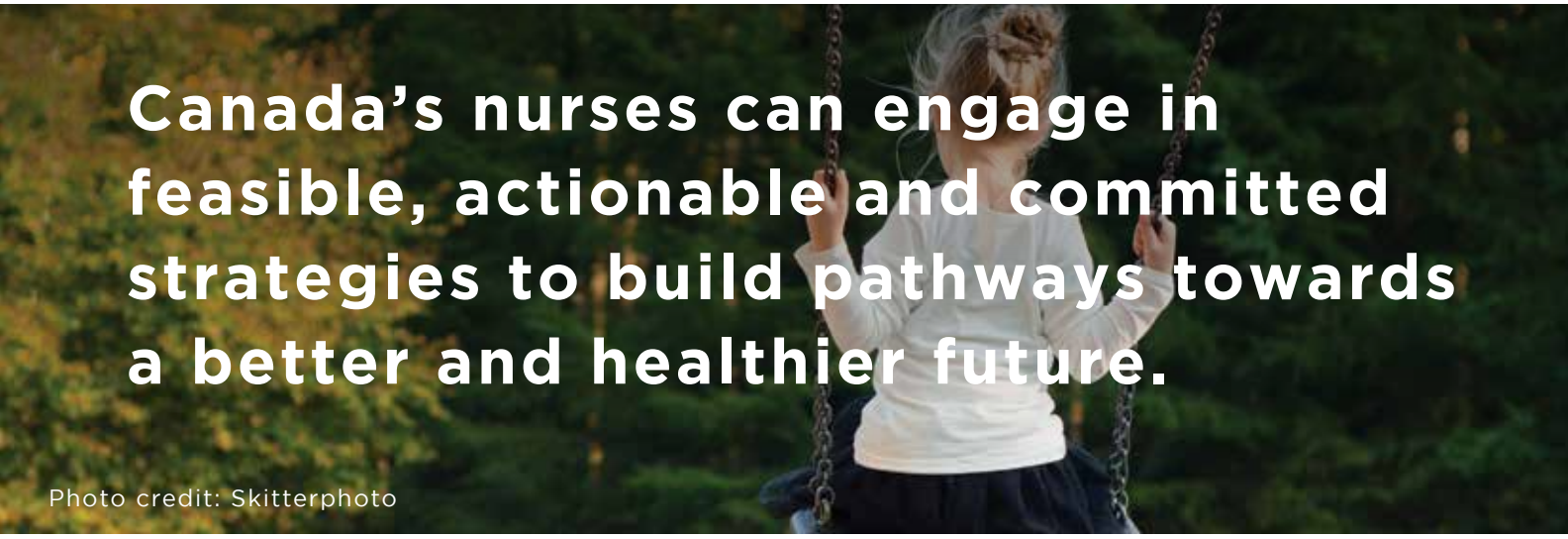


Photo credit: Skitterphoto

HOW NURSES CAN TAKE ACTION

Below we outline several recommendations for what nurses and nurses unions can do to tackle climate change and prepare for this new era of health care. Nursing educational institutions, unions, associations and health care workplaces have a role and responsibility in facilitating and supporting these recommendations. The following recommendations are non-exhaustive and provide nurses and nurses unions with a starting-off point for meaningful actions to take in their lives, their practice, their workplaces, their communities and their country.

1. Work with your employers, unions and associations to reduce emissions and to 'green' your workplace.

1.1. Join the Canadian Coalition for Green Health Care (http://greenhealthcare.ca/). The website provides numerous resources for workplace action.

1.2. Form 'green teams' in your workplaces to petition for green procurement. Green procurement involves demanding better purchasing decisions that reduce carbon footprints and encourage sustainable sourcing in contracts and tendering processes.

1.3. Learn about environmental impact assessments and other resources which you can find from the National Collaborating Centre for Environmental Health and how they can be deployed in your workplaces (http://www.ncceh.ca/content/health-impact-assessment-environmental-health-methods-tools-and-policy-change).

1.4. Promote the divestment of pension plans from high-emission sectors and the investment in clean technologies and low-emission sectors.

2. Know about climate change science, and help educate patients and the general public about it.

2.1. Individual nurses can learn how to counsel patients and clients about climate change and the corresponding health impacts so that patients and clients can take concrete information about climate change and apply it to daily life. Specifically, nurses can emphasize prevention of, and preparation for, the effects of climate events. Nurses can educate clients in individual counseling sessions, through social and traditional media and with patient educational material.[114] This includes preparation for patient experiences of ecoanxiety by being equipped to offer local ways for patients to take action and provide hope.

2.2. Campaign for the ecological determinants of health to be included in nursing education to prepare future generations of nurses, who will see the greatest effects of climate change. Nursing education should support a basic level of climate change literacy. Specific links between climate change and human health should be included in curricula as this education will assist nurses in their clinical practice.

3. Call for meaningful federal and provincial actions to reduce and eliminate climate change-causing emissions to ensure Canada leads the world in implementing its obligations under the UN Framework Convention on Climate Change (the Paris Accord).

3.1. Nurses can use their trusted and privileged positions to mobilize the public and other health professionals to tackle the climate crisis. Using real-world examples from their experience brings forth concrete examples of the health impacts of climate change.

3.2. Advocate for serious climate action from politicians of all political parties within the frame of climate change and health.

3.3. Advocate to ensure that any plan to reduce or eliminate emissions in high-emission industrial sectors includes and requires a just transition and equitable treatment for workers in those sectors to maintain quality of life and good job opportunities.

3.4. Support the coal phase-out target for Canada by 2030. Coal-powered electricity can be replaced by non-emitting sources, and any gap can be made up by lowest-emitting natural gas technology in a system designed to minimize methane emissions.

3.5. Support carbon pricing as a means to encourage behaviour change across society and the economy, recognizing the true economic and health cost of air pollution and climate change emissions.

3.6. Promote transitioning away from fossil fuels towards renewable energy. Though lucrative, investing now in the fossil fuel industry will have serious downstream costs that we, our children and our grandchildren will have to bear. By investing in renewal energy rather than in fossil fuels we are committing to a healthier future.

4. Be aware and plan for the emerging patient needs resulting from climate change and help them take action to support a healthy planet.

4.1. In conjunction with local health and government officials and affiliated organizations, nurses can play a key role in identifying the most vulnerable demographic and geographic areas in relation to the changing climate. Nurses can collaborate with other professionals and experts to promote monitoring of current and future threats, with special attention given to targeted populations.[115]

4.2. As nurses, become knowledgeable about climate change, and remember to assess patients and clients for influences outside of the domain of biological health. Be aware and factor in the impacts of upstream climate change-related determinants of health.

4.3. Nurses can assess their clients for the psychological burden of climate change. This includes the effects of ecoanxiety, ecoparalysis and solastalgia.[116] [117] [118] Nurses can validate their patient's experiences by naming and acknowledging their patient's mental health burdens and providing them with hope. This includes creating a toolkit of strategies that nurses can provide patients with to help them mitigate and adapt to climate change.

4.4. Be aware and prepare your workplaces for future influxes of climate refugees coming to Canada. This population may have experienced trauma or extreme environmental conditions and taken risks to enter this country.

Photo credit: Pixabay

5. Be prepared for extreme weather events.

5.1. Ensure your health care workplace has evacuation and emergency response protocols in place. Is your facility ready in the case of extreme weather events? Check on the policies and inform your colleagues. Be prepared for calling in support workers, when needed. Preparing for surge capacity begins with education and awareness about the most likely climate change risks in the region and workplace, and who those risks will mostly impact.[119]

6. Promote active transportation and local healthy agriculture and food systems that reduce emissions.

6.1. Promote workplace infrastructure that allows for active transportation like cycling or public transportation which are both beneficial for your own health, and also reduce carbon use.[120]

6.2. Working with dietitian colleagues, nurses can advocate and promote healthy eating literacy, including more vegetables and whole fruit, less red meat and processed foods, and less packaging.[121] Both the new Canada Food Guide and the EAT-Lancet Commission Summary Report encourage more plant-based protein, which is good for our health and for a healthy planet.

6.3. Advocate for local suppliers of food and other products that contribute to a reduction in carbon demands and pollution, and benefit the local economy.[122]

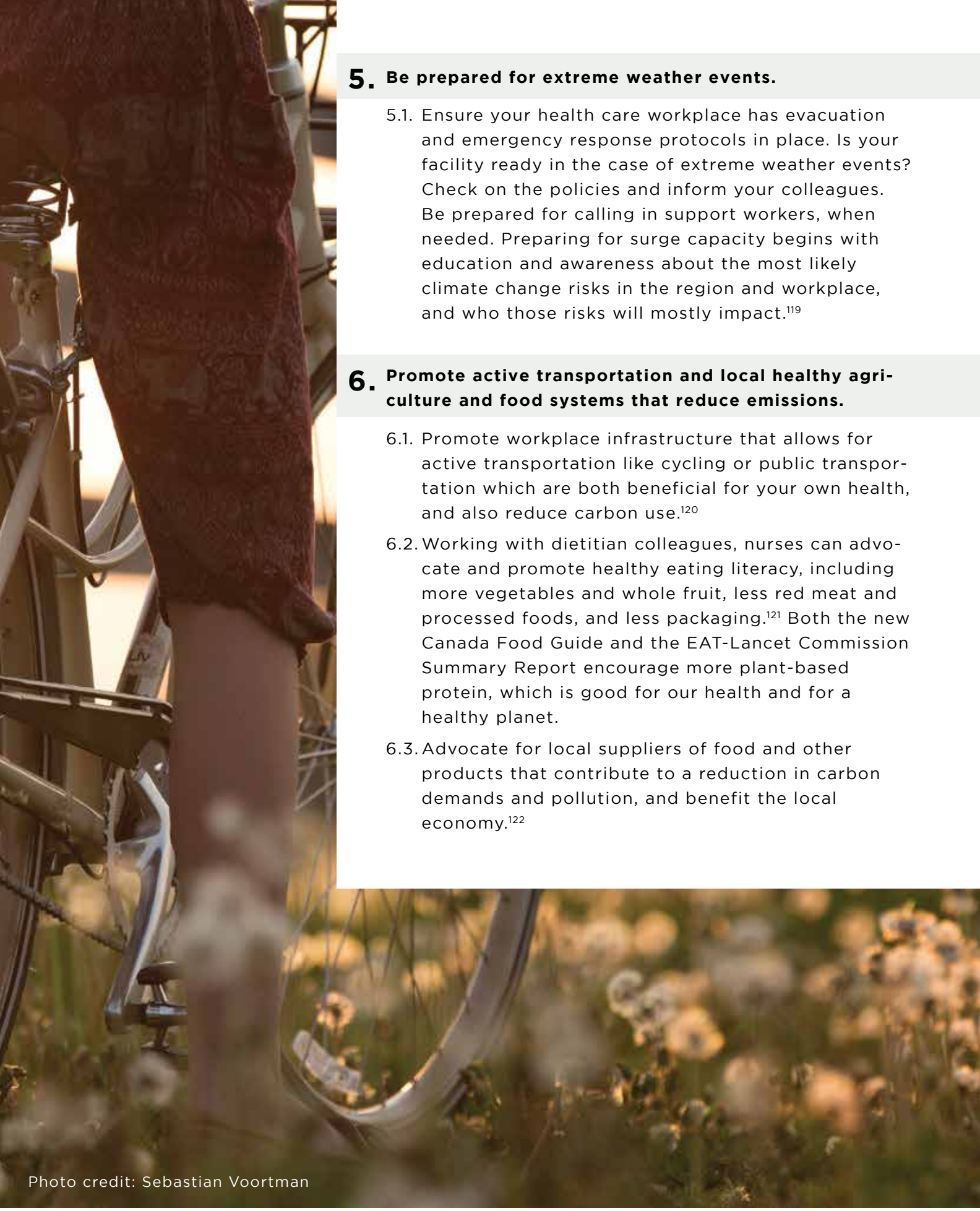


Photo credit: Sebastian Voortman

CONCLUSION

We have 12 years to take meaningful action to prevent global warming from reaching 2°C. The IPCC (2018) stated that we need to cut climate emissions by 45% by 2030, moving to zero emissions by 2050. Our governments have a tremendous responsibility; we have an obligation to support them in the policies for a healthy planet and healthy communities. Canada is warming at twice the rate of the rest of world, and we must be prepared.[123] The Canadian Federation of Nurses Unions and its Member Organizations recognize the journey to mitigate the effects of climate change and prepare for the health consequences won't be an easy one. However, as trusted advocates in our communities and workplaces, Canada's nurses have the power to make a meaningful difference that will last generations. Working together we can build a resilient and healthy future for everyone.


IT'S TIME
FOR
NURSES
TO TAKE
ACTION ON
CLIMATE
CHANGE.

REFERENCES

1 Ebi, K., Campbell-Lendrum, D. & Wyns, A. (2018). *The 1.5 Health Report – Synthesis on Health and Climate Science in the IPCC SR1.5.* World Health Organization. Retrieved from https://www.who.int/globalchange/181008_the_1_5_healthreport.pdf

2 Intergovernmental Panel on Climate Change (IPCC). (2018). *Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments.* Author. Retrieved from https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

3 Bush, E. (Ed), Lemmen, D.S. (Eds). (2019). *Canada's Changing Climate Report.* Ottawa: Government of Canada. Retrieved from https://changingclimate.ca/CCCR2019/downloads/

4 Berry, P., Clarke, K., Fleury, M.D., & Parker, S. (2014). Chapter 7 "Human health" in *Canada in a changing climate: Sector perspectives on impacts and adaptation* by F.J. Warren & D.S. Lemmen (Eds), Ottawa: Natural Resources Canada.

5 Toronto Public Health. (2015). *A Climate of Concern: Climate Change and Health Strategy for Toronto.* Retrieved from https://www.toronto.ca/legdocs/mmis/2015/hl/bgrd/backgroundfile-81509.pdf

6 Berry, P., Clarke, K., Fleury, M.D., & Parker, S. (2014).

7 Cherry, N. & Haynes, W. (2017). Effects of the Fort McMurray wildfires on the health of evacuated workers: follow-up of 2 cohorts. *Canadian Medical Association Journal Open*, 5(3), E638-E45.

8 Dodd, W., Scott, P., Howard, C., Rose, C., Scott, C., Cunsolo, A. et al. (2018). Lived experience of a record wildfire season in the Northwest Territories, Canada. *Canadian Journal of Public Health.* Jun;109(3):327-337.

9 McCue, D. (2018). Growing 'ecological grief' is the mental health cost of climate change. *CBC.* Retrieved from https://www.cbc.ca/radio/checkup/growing-ecological-grief-is-the-mentalhealth-cost-of-climate-change-1.4871666

10 Ebi, K., Campbell-Lendrum, D. & Wyns, A. (2018).

11 Ogden, N. H. et al. (2008). Risk maps for range expansion of the Lyme disease vector, Ixodes scapularis, in Canada now and with climate change. *International Journal of Health Geographics*, 7(1), 24.

12 Henderson, S.B. & Johnston, F.H. (2012). Measures of forest fire smoke exposure and their associations with respiratory health outcomes. *Current Opinion in Allergy and Clinical Immunology,* 12(3), 221-7.

13 Berry, P., Clarke, K., Fleury, M.D., & Parker, S. (2014).

14 Stone, A. (2019). Nurses Ranked 'Most Trusted Profession' in 2019. *ONS*

Voice. Retrieved from https://voice.ons.org/advocacy/nurses-ranked-most-trusted-profession-in-2019

15 Watts, N. et al. (2018). The 2018 report of the Lancet countdown on health and climate change: shaping the health of nations for centuries to come. *The Lancet,* 392(10163), 2479-2514.

16 Intergovernmental Panel on Climate Change (IPCC). (2018).

17 Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A.G., de Souza Dias, B.F. et al. (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-Lancet Commission on planetary health. *The Lancet*, 386(10007), 1973-2028.

18 Mora, C., Spirandelli, D., Franklin, E. C., Lynham, J., Kantar, M. B., Miles, W., ... & Barba, E. W. (2018). Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions. *Nature Climate Change,* 8(12), 1062.

19 Howard, C., Rose, C., & Rivers, N. (2018). Lancet Countdown 2018 Report: Briefing for Canadian Policy Makers. *The Lancet*. Retrieved from https://cape.ca/wp-content/ploads/2018/11/2018-Lancet-Countdown-Policy-Brief-Canada.pdf

20 Ebi, K., Campbell-Lendrum, D. & Wyns, A. (2018).

21 Intergovernmental Panel on Climate Change (IPCC). (2018).

22 Dalhousie University & the University of Guelph. (2019). *Canada's Food Price Report 2019.* Retrieved from https://www.dal.ca/faculty/management/news-events/canada-s-food-price-report.html

23 Health Canada. (2017). *Health impacts of air pollution in Canada: An estimate of premature mortality*. Author. Retrieved from http://publications.gc.ca/collections/collection_2018/sc-hc/H144-51-2017-eng.pdf.

24 O'Malley, I. (2018). Canada in 2030: Frequent, more intense wildfires a reality. *The Weather Network.* Retrieved from https://www.theweathernetwork.com/news/articles/canada-in-2030-alberta-british-columbia-wildfires-heatwave-drought-lightning-climate-change/108193

25 Ziska, L., Knowlton, K., Rogers, C., National Allergy Bureau, Aerobiology Research Laboratories, Canada. (2016). Update to data originally published in: Ziska, L. et al. (2011). Recent warming by latitude associated with increased length of ragweed pollen season in Central North America. *Proceedings of the National Academy of Sciences of the United States of America 108*, 4248–4251. Retrieved from https://www.epa.gov/climate-indicators/climate-change-indicators-ragweed-pollen-season#ref8

26 Laframboise, K. (2018). Deadly heat wave blamed for up to 70 deaths in Quebec. *Global News.* Retrieved from https://globalnews.ca/

REFERENCES CONTINUED

news/4321912/quebec-heat-wave-70-deaths-2018/

27 Tutton, M. (2018). Scientist says record floods show that New Brunswick must adapt to changing world. *Global News.* Retrieved from https://globalnews.ca/news/4191172/scientist-says-record-floods-nb/

28 Fisheries and Oceans Canada. Video: Ocean Acidification from Human Activities. Retrieved from http://www.dfo-mpo.gc.ca/videos/acidic-acides-eng.html

29 Boylan, S. et al. (2018). A conceptual framework for climate change, health and wellbeing in NSW, Australia. *Public health research & practice, 28*(4). Retrieved from: https://apo.org.au/sites/default/files/resource-files/2018/12/apo-nid208951-1105976.pdf

30 Ford, J.D. et al. (2018). Preparing for the health impacts of climate change in Indigenous communities: The role of community-based adaptation. *Global Environmental Change*, 49, 129-139.

31 Government of the Northwest Territories. (2015). *Climate Observations in the Northwest Territories* (1957-2012): Inuvik, Norman Wells, Yellowknife, Fort Smith. Retrieved from https://www.enr.gov.nt.ca/sites/enr/files/page_3_nwt-climate-observations_06-13-2015_vf_1_0.pdf

32 United Nations Climate Change. Planetary Health. Retrieved from https://unfccc.int/climate-action/momentum-for-change/planetary-health

33 Macauley, D. (2010). *Elemental Philosophy: Earth, Air, Fire, and Water as Environmental Ideas.* Suny Press.

34 Clapp, J. (2017). Food self-sufficiency: Making sense of it, and when it makes sense. *Food Policy, 66*, 88-96.

35 Government of Canada. (2015). Agriculture and Agri-Foods Canada. Retrieved from http://www.agr.gc.ca/eng/home/?id=1395690825741

36 Government of Canada. (2019). Canada's Top 10 Weather Stories of 2018. Environment and Natural Resources. January 10, 2019. Retrieved from https://www.canada.ca/en/environment-climate-change/services/top-ten-weather-stories/2018.html#toc1

37 Ibid.

38 Wheaton, E. (2018). Heat, drought and climate change already affecting agriculture. *Saskatoon Starphoenix*. Retrieved from https://thestarphoenix.com/opinion/letters/wheaton-heat-drought-and-climate-change-already-affecting-agriculture

39 Bush, E. (ED), Lemmen, D.S.(Ed). (2019).

40 Ibid.

41 Ebi, K., Campbell-Lendrum, D. & Wyns, A. (2018).

42 Ibid.

43 Carrington, D. (2018). Avoiding meat and dairy is the single biggest way to reduce your impact on the earth. *The Guardian*. May 31, 2018. Retrieved from https://www.theguardian.com/environment/2018/may/31/avoiding-meat-and-dairy-is-single-biggest-way-to-reduce-your-impact-on-earth

44 Government of Canada. (2019). *Canada Food Guide.* Retrieved from https://food-guide.canada.ca/en/

45 Willett, W. et al. (2019). Food in the Anthropocene: the EAT- Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447-492. doi:10.1016/S0140-6736(18)31788-4

46 Marshman, J., Blay-Palmer, A., & Landman, K. (2019). Anthropocene Crisis: Climate Change, Pollinators and Food Security. *Environments*, 6(2), 22.

47 Wu, X., Lu, Y., Zhou, S., Chen, L., & Xu, B. (2016). Impact of climate change on human infectious diseases: Empirical evidence and human adaptation. *Environment International*, 86, 14-23.

48 Government of Canada. (2018). Surveillance of Lyme Disease. Retrieved from https://www.canada.ca/en/public-health/services/diseases/lyme-disease/surveillance-lyme-disease.html

49 Government of Canada (2018). Surveillance of West Nile Virus. Retrieved from https://www.canada.ca/en/public-health/services/diseases/west-nile-virus/surveillance-west-nile-virus.html

50 Wu, X., Lu, Y., Zhou, S., Chen, L., & Xu, B. (2016).

51 Fann, N. et al. (2016). Air quality impacts. In: *The impacts of climate change on human health in the United States: a scientific assessment.* US Global Change Research Program, Washington, DC, pp 69–98.

52 Campbell, M., Cheng, C. (2005). *Differential and combined impacts of winter and summer weather and air pollution due to global warming on human mortality in south-central Canada.* Ottawa: Health Canada, HPRP File No. 6795-15-2001/4400011;

53 Ibid.

54 Government of Ontario: Air Quality Ontario. (n.d.). Fine Particulate Matter. Retrieved from: http://www.airqualityontario.com/science/pollutants/particulates.php

55 Ibid.

56 Health Canada. (2017).

57 Carrington, Damian. (2019). Vehicle pollution 'results in 4m child asthma cases a year'. *The Guardian.* April 10, 2019. Retrieved from https://www.theguardian.com/environment/2019/apr/10/vehicle-pollution-results-in-4m-child-asthma-cases-a-year?CMP=Share_AndroidApp_Gmail

58 Fann N et al. (2016).

REFERENCES CONTINUED

59 Health Canada. (2017).

60 Statistics Canada (2018). Canadian Community Health Survey for Asthma 2017. Retrieved from https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310009608

61 Fann, N. et al. (2016).

62 Ibid.

63 Ziska, L., K. Knowlton, C. Rogers, National Allergy Bureau, Aerobiology Research Laboratories, Canada. (2016).

64 Woods, A. (2018). More than 90 deaths now linked to heat wave in Quebec. Retrieved from https://www.thestar.com/news/canada/2018/07/18/89-deaths-now-linked-to-heat-wave-in-quebec.html

65 Climate Atlas of Canada. Forest Fires and Climate Change. Retrieved from: https://climateatlas.ca/forest-fires-and-climate-change

66 Charnalia, A. (2016). Amid flames, fears for their families, Fort McMurray nurses and doctors moved patients to safety. *Edmonton Journal.* May 10, 2016. Retrieved from: https://edmontonjournal.com/health/health-heroes-led-patients-to-safety-from-fort-mcmurray-hospital

67 Government of Quebec. (n.d.). The Effects of Heat. Retrieved from: https://www.quebec.ca/en/health/advice-and-prevention/health-and-environment/the-effects-of-oppressive-and-extreme-heat/

68 Howard, C., Rose, C., & Rivers, N. (2018).

69 Climate Liability News. (2018). Costs of Extreme Heat are Huge but Hard to Quantify. Author. August 9, 2018. Retrieved from: https://www.climateliabilitynews.org/2018/08/09/extreme-heat-climate-costs-liability/

70 Climate Atlas of Canada. (n.d.). Canadian Cities and Climate Change. Retrieved from: https://climateatlas.ca/canadian-cities-and-climate-change

71 Climate Liability News. (2018).

72 Climate Atlas of Canada. (n.d.). Urban Heat Island Effect. Retrieved from https://climateatlas.ca/urban-heat-island-effect

73 Insurance Bureau of Canada. www.ibc.ca

74 Gholami-Borujen, F. (2018). A Review of the Effects of Climate Change with an Emphasis on Burden of Waterborne Diseases. Iranian Journal of Health Sciences, 6(4), 47-56.

75 Mansour, S. A. (2013). Impact of climate change on air and water borne diseases. *Air and Water Borne Diseases*, 3, e126. Retrieved from http://dx.doi.org/10.4172/2167-7719.1000e126

76 Gholami-Borujeni, F., Zazouli, M.A., Fallahi, S. (2018)

77 Ibid.

78 McClearn, M. (2018). Rising Seas and Climate Change: Everything you need to know. *Globe and Mail.* March

14, 2018. Retrieved from: https://www.theglobeandmail.com/canada/article-sea-change-primer/

79 Bush, E. (Ed), Lemmen, D.S. (Ed). (2019).

80 Owrangi, A. M., Lannigan, R., & Simonovic, S. P. (2015). Mapping climate change-caused health risk for integrated city resilience modeling. *Natural Hazards*, 77(1), 67-88.

81 Bush, E. (Ed), Lemmen, D.S. (Ed). (2019).

82 Azetsu-Scott, K. (2018). Ocean Acidification in Canadian Waters. In: *The Future of Ocean Governance and Capacity Development* (pp.227-231). Brill Nijhoff.Retrieved from https://doi.org/10.1163/9789004380271_038

83 http://www.dfo-mpo.gc.ca/videos/acidic-acides-eng.html

84 Ibid.

85 Clements, J. C., & Chopin, T. (2017). Ocean acidification and marine aquaculture in North America: potential impacts and mitigation strategies. *Reviews in Aquaculture,* 9(4), 326-341.

86 Fritze, J. G., Blashki, G. A., Burke, S., & Wiseman, J. (2008). Hope, despair and transformation: climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems*, 2(1), 13.

87 Albrecht, G. et al. (2007). Solastalgia: the distress caused by environmental change. *Australasian Psychiatry*, 15(sup1), S95-S98.

88 Albrecht, G. (2011). Chronic environmental change: Emerging 'psychoterratic' syndromes. In *Climate change and human well-being* (pp. 43-56). Springer, New York, NY.

89 Crawford, T. (2019). B.C. cities among worst for air quality in 2018, wildfires to blame: report. *The Vancouver Sun.* March 6, 2019. Retrieved from https://vancouversun.com/news/local-news/b-c-cities-among-worst-for-air-quality-in-2018-wildfires-to-blame-report

90 Ibid.

91 Moore, D., Copes, R., Fisk, R., Joy, R., Chan, K., & Brauer, M. (2003). Population Health Effects of Air Quality Changes Due to Forest Fires in British Columbia in 2003: Estimates from Physician-visit Billing Data. *Canadian Journal of Public Health,* 97(2), 105-108.

92 Fayerman, P. (2018). B.C. Wildfires 2018: medical issues surge as air quality advisory becomes longest on record. *Vancouver Sun*. August 21, 2018. Retrieved from: https://vancouversun.com/news/local-news/wildfires-2018-medical-issues-surge-as-air-quality-advisory-becomes-longest-on-record

93 Campbell, M., Cheng, C. Differential and combined impacts of winter and summer weather and air pollution due to global warming on human mortality in south-central Canada. Ottawa: Health Canada, HPRP File No.

REFERENCES CONTINUED

6795-15-2001/4400011; 2005.

94 MacVicar, A. (2018). Wildfire forces over 700 to evacuate from Southend, *Global News.* June 21, 2018. Retrieved from https://globalnews.ca/news/4286758/wildfire-evacuate-south-end-saskatchewan/

95 New Brunswick Department of Environment and Local Government. (2014). New Brunswick Flood Risk Reduction Strategy. Retrieved from https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Flooding-Inondations/NBFloodRiskReductionStrategy.pdf

96 Fraser, E. & Gill, J. (2018). Property owners hurt by flood given special line to report damage. CBC. January 15, 2018. Retrieved from https://www.cbc.ca/news/canada/new-brunswick/flood-cleanup-continues-monday-1.4487037.

97 Canadian Press. (May 4, 2018). By the numbers: New Brunswick's record setting flood. *Global News.* Retrieved from: https://globalnews.ca/news/4187955/by-the-numbers-new-brunswicks-record-setting-flood-2/

98 Gill, J. (2018). New Brunswick government offers assistance to January flood victims. *CBC.* February 15, 2018. Retrieved from https://www.cbc.ca/news/canada/new-brunswick/new-brunswick-assistance-flood-1.4536430.

99 Fowler, S. (2018). Floodwaters may have contaminated much of this season's fiddleheads. *CBC.* May 4, 2018. Retrieved from https://www.cbc.ca/news/canada/new-brunswick/nb-flood-fiddleheads-unsafe-contaminated-1.4656021.

100 Turkkan, N., El-Jabi, N., Caissie, D. (2011). *Floods and Droughts under Different Climate Change Scenarios in New Brunswick.* DFO. Retrieved from http://www.dfo-mpo.gc.ca/Library/343700.pdf

101 Bush, E. (Ed), Lemmen, D.S. (Ed). (2019).

102 Government of Canada. (2019). Canada's Top Weather Stories of 2018. Retrieved from https://www.canada.ca/en/environment-climate-change/services/top-ten-weather-stories/2018.html

103 MacLennan, I. (2018). 2018 Top 10 Weather Events: Environment Canada. *Bayshore Broadcasting News.* Retrieved from: http://www.bayshorebroadcasting.ca/news_item.php?NewsID=106702

104 Woods, A. (2018).

105 O'Malley, I. (2018).

106 Kassam, A. (2018). Canada heatwave: more than 30 deaths reported as extreme weather continues. *The Guardian.* July 5, 2018. Retrieved from: https://www.theguardian.com/world/2018/jul/05/canada-heatwave-montreal-deaths

107 Heaviside, C., Macintyre, H., & Vardoulakis, S. (2017). The urban heat island: Implications for health in a changing environment. *Current environmental*

health reports, 4(3), 296-305.

108 Graham, D. A., Vanos, J. K., Kenny, N. A., & Brown, R. D. (2016). The relationship between neighbourhood tree canopy cover and heat-related ambulance calls during extreme heat events in Toronto, Canada. *Urban Forestry & Urban Greening,* 20, 180-18.

109 Heaviside, C., Macintyre, H., & Vardoulakis, S. (2017). The urban heat island: Implications for health in a changing environment. *Current environmental health reports,* 4(3), 296-305.

110 Rubin, B. & Gorner, J. (2015). Fatal heat wave 20 years ago changed Chicago's emergency response. *Chicago Tribune.* July 15, 2015. Retrieved from: https://www.chicagotribune.com/news/ct-chicago-heat-wave-20-years-later-met-20150715-story.html

111 Robine, J.-M., Cheung, S.L.K., Le Roy, S., Van Oyen, H., Griffiths, C., Michel, J.-P. et al. (2008). Death toll exceeded 70,000 in Europe during the summer of 2003. *C R Biol.* 2008;331:171–8.

112 Prairie Climate Centre. Climate Change and Canada's Cities. Climate Atlas of Canada. Retrieved from https://climateatlas.ca/sites/default/files/cityreports/CityReport_Canada.pdf

113 Bekemeier, B. (2008). Upstream nursing practice and research. *Applied Nursing Research,* 21(1), 50–52. Retrieved from doi:10.1016/j.apnr.2007.11.002

114 Sayre, L., Rhazi, N., Carpenter, H., & Hughes, N. L. (2010). Climate change and human health: the role of nurses in confronting the issue. *Nursing Administration Quarterly*, 34(4), 334-342.

115 Sayre, L., Rhazi, N., Carpenter, H., & Hughes, N. L. (2010).

116 Albrecht et al. (2007).

117 Albrecht et al. (2011).

118 Willox, A.C., Harper, S.L., Ford, J.D., Landman, K., Houle, K., & Edge, V.L. (2012) "From this place and of this place:" climate change, sense of place, and health in Nunatsiavut, Canada. *Social Science and Medicine,* 75(3), 538–47.

119 Sayre, L., Rhazi, N., Carpenter, H., & Hughes, N. L. (2010).

120 Barna, S., Goodman, B., & Mortimer, F. (2012). The health effects of climate change: What does a nurse need to know? *Nurse Education Today,* 32(7), 765-771.

121 Ibid.

122 Ibid.

123 CBC News. (2019). Canada warming at twice the global rate leaked report finds. *CBC.* April 4, 2019. Retrieved from: https://www.cbc.ca/news/technology/canada-warming-at-twice-the-global-rate-leaked-report-finds-1.5079765

APPENDIX A

MESSAGE FROM LINDA SILAS

(FRANÇAIS)

En qualité d'infirmières et d'infirmiers, nous savons instinctivement que la santé du patient est étroitement liée à son environnement. Ce document de discussion, sur les changements climatiques et la santé, recommande vivement au personnel infirmier de considérer notre environnement au niveau macro de la planète Terre. Au cours des prochaines décennies, les fluctuations rapides du climat représenteront la plus grande menace à la santé et au bien-être des êtres humains dans toutes les régions de notre planète.

Selon l'Organisation mondiale de la santé, les effets du réchauffement climatique sur la santé risquent dans l'ensemble d'être très largement négatifs : « **Le changement climatique influe sur les déterminants sociaux et environnementaux de la santé : air pur, eau potable, nourriture en quantité suffisante, sécurité du logement. »** Et le Canada n'y échappera pas. En tant que membres de la communauté humaine, les crises engendrées par le climat ailleurs dans le monde auront aussi des incidences ici au pays.

Comme toute étude sur le changement climatique, ce document de discussion met en lumière les défis majeurs auxquels l'humanité, et les soins de santé, seront confrontés en raison des changements climatiques et des élévations des températures moyennes à l'échelle de la planète. Ce document de discussion propose aussi, au personnel infirmier et à leur syndicat, des mesures concrètes pour faire une différence significative. Parce que nous sommes la Fédération canadienne des syndicats d'infirmières et d'infirmiers, nous pouvons, et devons, revendiquer des changements économiques et sociaux pour réduire nos émissions de gaz à effet de serre, et léguer une planète plus saine et plus viable à nos enfants et petits-enfants. Aussi, nous pouvons, et devons, faire davantage pour créer la résilience au sein des communautés de soins de santé, et nous préparer efficacement à surmonter les défis futurs engendrés par les changements climatiques. Les recommandations comprises dans le document de discussion offrent, aux infirmières et aux infirmiers, un point de départ pour assumer un leadership et lutter contre les changements climatiques.

Je tiens à remercier Wanda Martin, Ph. D., IA, et Lindsey Vold, adjointe de recherche, pour la recherche préliminaire et la rédaction de ce rapport. J'aimerais aussi

remercier l'équipe de la FCSII, y compris Sebastian Ronderos-Morgan et Carol Reichert, pour leur importante contribution à ce travail.

Comme le dit le vieux dicton, « Penser globalement, agir localement ». Ce mantra nous encourage à penser à la santé de toute la planète au moment de poser des gestes concrets dans nos propres collectivités. J'espère que ce document de discussion fournira, aux infirmières et aux infirmiers, les outils et les informations nécessaires pour les motiver à poursuivre ce travail.

EN SOLIDARITÉ,

Linda Silas
Présidente
Fédération canadienne des syndicats d'infermières et infermier

APPENDIX B

EXECUTIVE SUMMARY

(FRANÇAIS)

D'après l'Organisation mondiale de la santé, le changement climatique représente le plus grand défi du 21e siècle. Selon le Groupe d'experts intergouvernemental sur l'évolution du climat (GIEC), l'humanité a 12 ans pour prendre des mesures sérieuses par rapport au climat changeant et, ainsi, éviter une élévation catastrophique de 2 degrés Celsius, minimum, avant la fin du siècle. Le Rapport sur le climat changeant au Canada, publié plus tôt cette année, indique que les températures au pays augmentent plus de deux fois plus rapidement que les moyennes mondiales. Il est donc évident que la population canadienne sera aux premières lignes du réchauffement climatique et devra surmonter les défis en matière de santé et de soins de santé qui s'ensuivront.

Pendant que le système de soins de santé du Canada est confronté aux défis engendrés par la population vieillissante, par les budgets restreints et les infrastructures exigeant de nombreuses ressources, les changements climatiques vont venir ajouter une autre couche de défis graves et distincts que devront relever le personnel infirmier et autre personnel au sein du système de soins de santé. Selon les prédictions des chercheurs, les impacts liés au changement climatique affecteront tous les systèmes et appareils de l'organisme, la santé mentale, le statut socioéconomique, et l'environnement bâti. **Les répercussions du changement climatique sur la santé comprendront :**

- **Taux plus élevés de coups de chaleur et de stress;**
- **Augmentation des allergènes en raison de saisons polliniques plus intenses et plus longues, ce qui intensifiera les problèmes chez les personnes souffrant d'asthme;**
- **Déplacement humain en raison des incendies de forêts et des inondations, accompagné de la détresse psychologique liée au deuil;**
- **Propagation accélérée de la maladie de Lyme;**
- **Détresse cardiorespiratoire en raison de la pollution de l'air engendrée par les incendies de forêts;**
- **Augmentation des problèmes respiratoires en raison de l'intensification de l'ozone au sol et de la pollution de l'air;**
- **Nourriture moins accessible ou disponible en raison des fluctuations du rendement agricole et du prix des aliments.**

Évaluer la vulnérabilité et la résilience aux impacts des changements climatiques est nouveau pour plusieurs fournisseurs de soins de santé. Toutefois, les membres de la Fédération canadienne des syndicats d'infirmières et d'infirmiers (FCSII) peuvent se préparer – et préparer la communauté des soins de santé – à aider les patients en vue de l'imminente crise du climat. Les infirmières et les infirmiers peuvent aussi revendiquer fermement un avenir viable et sain pour la planète.

La profession infirmière est l'une des professions les

plus dignes de confiance. C'est pourquoi le personnel infirmier peut aider les collectivités à réduire les gaz à effet de serre et à faire la transition vers un avenir respectueux de l'environnement, afin d'améliorer la santé de tous. Toutes les personnes au Canada seront touchées par les changements climatiques, et certains groupes subiront des effets plus dévastateurs que d'autres. Il faut agir à l'échelle mondiale et locale pour réduire les émissions engendrant les changements climatiques, et pour élaborer des stratégies en matière de résilience et d'adaptation.

L'objectif de ce rapport, faisant le lien entre le changement climatique, la santé et les soins de santé, est de fournir une ressource à près de 200 000 infirmières, infirmiers, étudiantes et étudiants en sciences infirmières, qui sont membres de la FCSII, ainsi qu'aux membres du public, pendant que nous prenons connaissance des liens entre le changement climatique et la santé. Le rapport offre un aperçu de la science entourant le changement climatique, et précise qui sera probablement le plus touché. Le rapport résume aussi les répercussions du changement climatique sur la santé dans le cadre des quatre éléments, notamment terre, air, feu et eau. Exposé plus en détails est un problème émergeant de santé mentale, soit l'éco-anxiété. Le rapport met l'accent sur les liens concrets entre le changement climatique et la santé par l'intermédiaire de trois épisodes de climat extrême observés en 2018 dans l'Ouest et le centre du Canada, ainsi qu'au Canada atlantique. Pour conclure, le rapport fait sept recommandations ciblant le personnel infirmier et pouvant recevoir l'appui de leur établissement, milieu de travail, association et syndicat.

Dans le monde entier, des enfants font la grève parce qu'ils ont peur des conséquences qu'aura le changement climatique sur leur santé et leur mieux-être au cours de leur vie. Pendant ce temps, des forces politiques puissantes font campagne pour nier la science entourant le changement climatique et empêcher les mesures concrètes. En qualité d'infirmières et d'infirmiers, de membres de la collectivité, et de parents, nous avons l'obligation d'utiliser notre trousse à outils complète, y compris notre capacité à agir rapidement par rapport aux menaces imminentes à la santé, et nous devons trouver des solutions au changement climatique dans l'intérêt des patients d'aujourd'hui et ceux de demain. En travaillant ensemble, nous pouvons devenir plus résilients et assurer un avenir plus sain.

Photo Credit: rawpixel

RECOMMENDATIONS À L'INTENTION DU PERSONNEL INFIRMIER

1. Collaborer avec votre employeur, syndicat ou association pour réduire les émissions et pour « verdir » votre milieu de travail.
2. Prendre connaissance de la science entourant le changement climatique, et contribuer à sensibiliser les patients et le public en général à cet égard.
3. Demander des mesures concrètes à l'échelle fédérale et provinciale afin de réduire les émissions engendrant les changements climatiques, et assurer que le Canada devienne chef de file et respecte ses obligations en vertu de la Convention-cadre des Nations unies sur les changements climatiques (Accord de Paris).
4. Être conscient et préparé par rapport aux besoins émergeants des patients en raison des changements climatiques, et les aider à passer à l'action pour créer une planète en santé.
5. Être préparé aux épisodes de climat extrême.
6. Promouvoir le transport actif, l'agriculture locale verte et les systèmes alimentaires respectueux de l'environnement afin de réduire les émissions.

MESSAGES CLÉS

- Le Canada se réchauffe deux fois plus vite que le reste de la planète (le Nord se réchauffe trois fois plus vite que la moyenne mondiale). Et il va se réchauffer davantage dans l'avenir.
- Le Canada se réchauffe plus vite parce que nous avons davantage de terres émergées et une plus grande cryosphère (parties de la terre où l'eau est gelée) comparativement à d'autres pays.
- Les activités humaines contribuent, de façon dominante, au réchauffement climatique au Canada, mais jusqu'à quel point il va continuer à se réchauffer dépend de ce que la population canadienne fera maintenant.
- Si nous ne prenons pas de mesures concrètes et significatives par rapport au changement climatique, et à tous les niveaux – dans nos vies quotidiennes, milieux de travail, villes, provinces et au pays – les températures vont continuer d'augmenter au Canada pour atteindre des niveaux catastrophiques, notamment des températures extrêmes d'une durée prolongée et entraînant : sécheresse, inondations, collectivités côtières menacées par des élévations du niveau de la mer, pénuries potentielles d'eau pendant les mois d'été et plus graves incendies de forêts.
- Les répercussions projetées sur la santé publique comprennent une augmentation des coups de chaleur et du stress, des allergènes, des problèmes respiratoires (par exemple MPOC, cancer du poumon, asthme), augmentation des maladies transmises par les insectes (par exemple maladie de Lyme, virus du Nil occidental), accès limité à la nourriture ou disponibilité de nourriture et d'eau douce, destruction des infrastructures et déplacement humain en raison d'événements liés aux changements climatiques.

Photo Credit: Pixabay


IL EST TEMPS
QUE LE
PERSONNEL
INFIRMIER AGIT
CONTRE LES
CHANGEMENTS
CLIMATIQUES.

AUTHORS

WANDA MARTIN, RN, PHD
LINDSEY VOLD, RN, MN

Wanda Martin, RN, is an Assistant Professor in the College of Nursing at the University of Saskatchewan. Her research focuses on climate change and resilience, particularly in urban agriculture and health equity. Along with her nursing Ph.D. student, Lindsey Vold, Dr. Martin is working in East Africa on the role of non-governmental organizations in addressing malnutrition from a planetary health perspective. She is the past president of the Saskatchewan Public Health Association and a board member for the Canadian Association of Nurses for the Environment.

Photo Credit: Stefan Stefancik


CFNU
CANADIAN
FEDERATION
OF NURSES
UNIONS

NURSESUNIONS.CA

CFNU

CANADIAN FEDERATION
OF NURSES UNIONS

LA FÉDÉRATION CANADIENNE
DES SYNDICATS D'INFIRMIÈRES
ET INFIRMIERS