

# Climate Change and the Health of Canadians: Impacts and Adaptation in Northern Ontario

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**Safe Environments Directorate**  
**Health Canada**

**Up North on Climate Conference**  
**Thunder Bay, ON**  
**April 25, 2018**



# Presentation Overview

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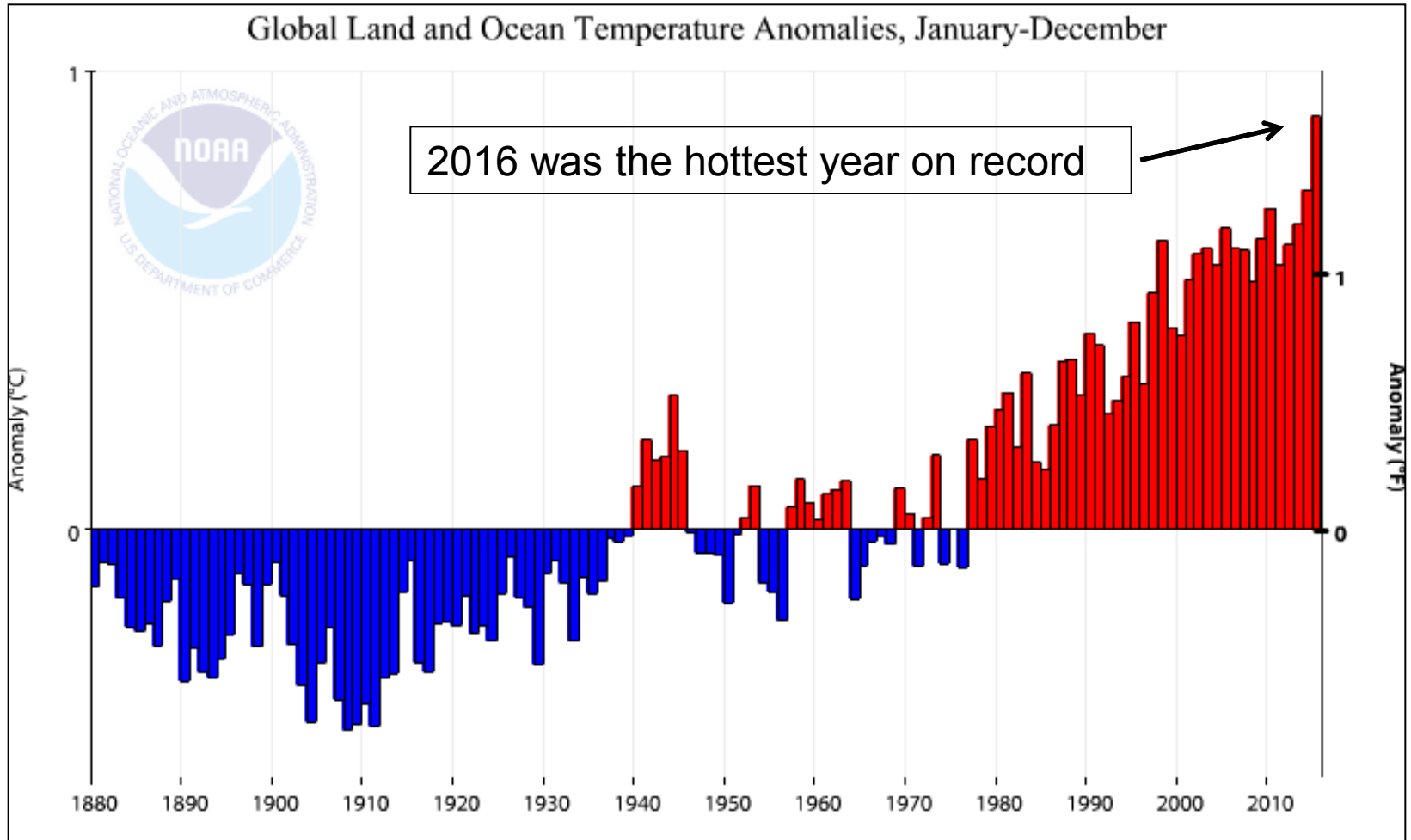
- Climate change risks to health
- Health risks and vulnerabilities for people in Northern Ontario
- Adapting to address climate change impacts
- Current activities to protect the health of Canadians



# CLIMATE CHANGE RISKS TO HEALTH

# Evidence of Climate Change - “Warming is unequivocal”

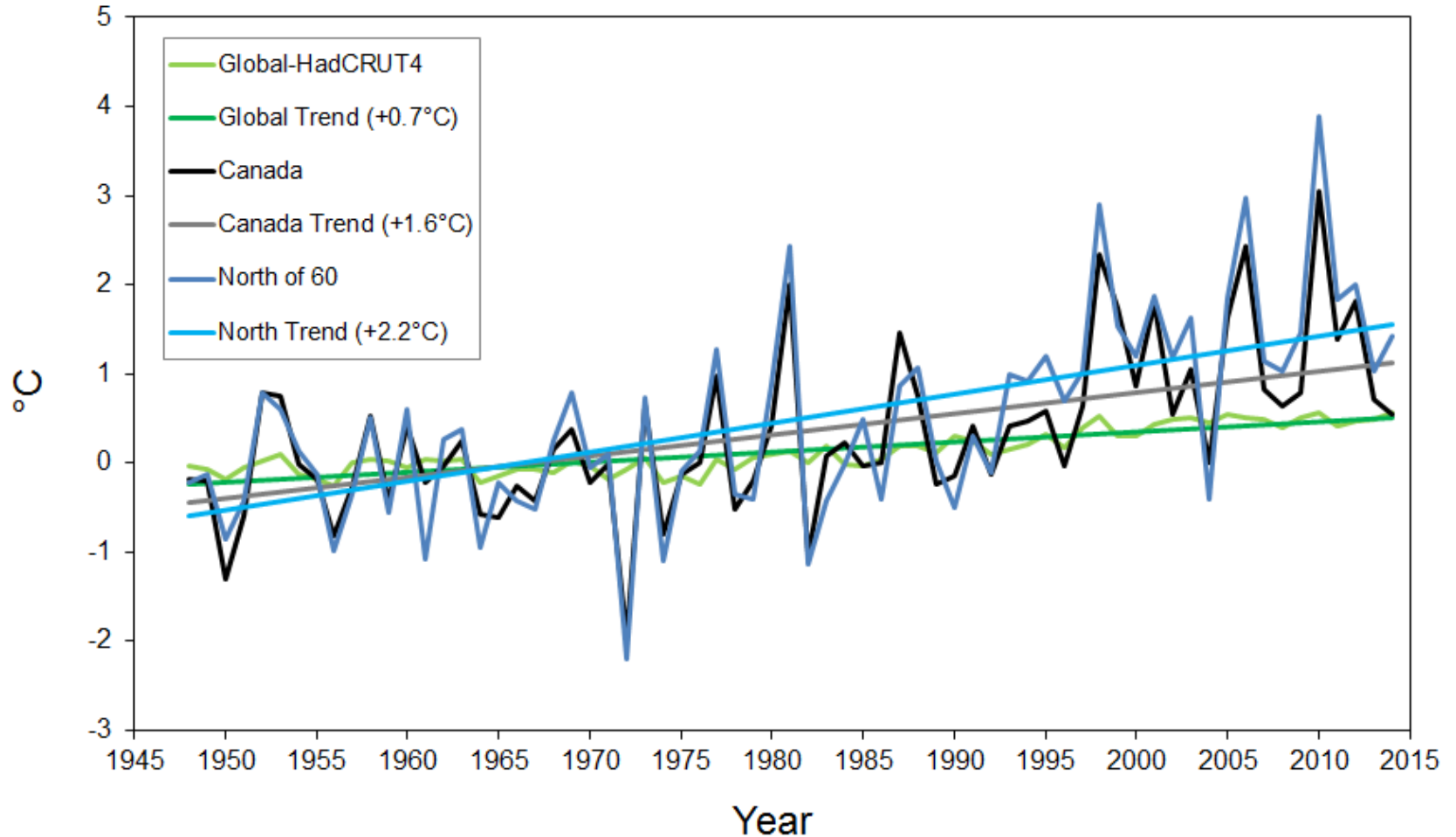
Global Land and Ocean Temperature Anomalies, January - December  
(Annual anomalies relative to 20<sup>th</sup> century)



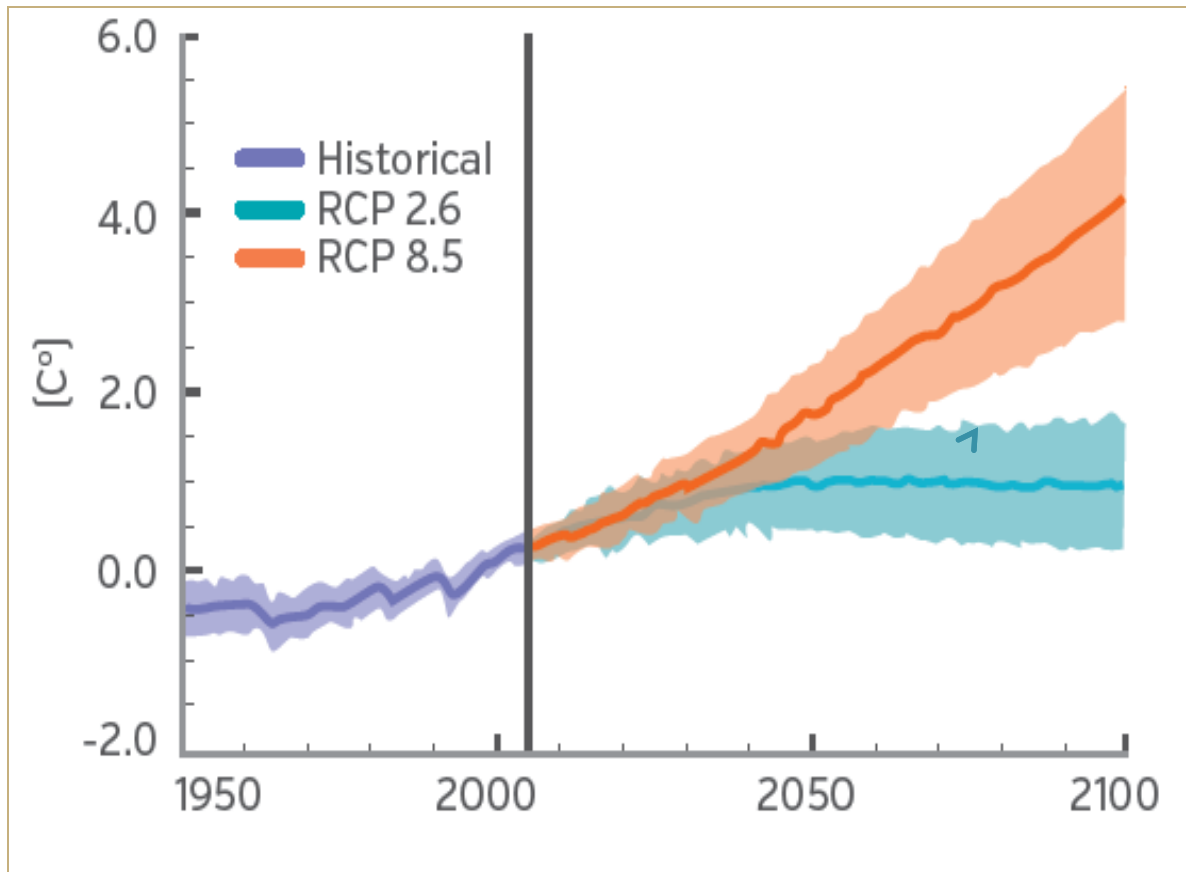
NOAA, 2017

# Canada is Warming Faster

Annual Global, National, and Northern Canada mean temperature departures and long-term trend, 1948-2014



# Projected Global Average Surface Temperature Change



**We are  
locked into  
an additional  
0.7°C  
warming in  
the future**

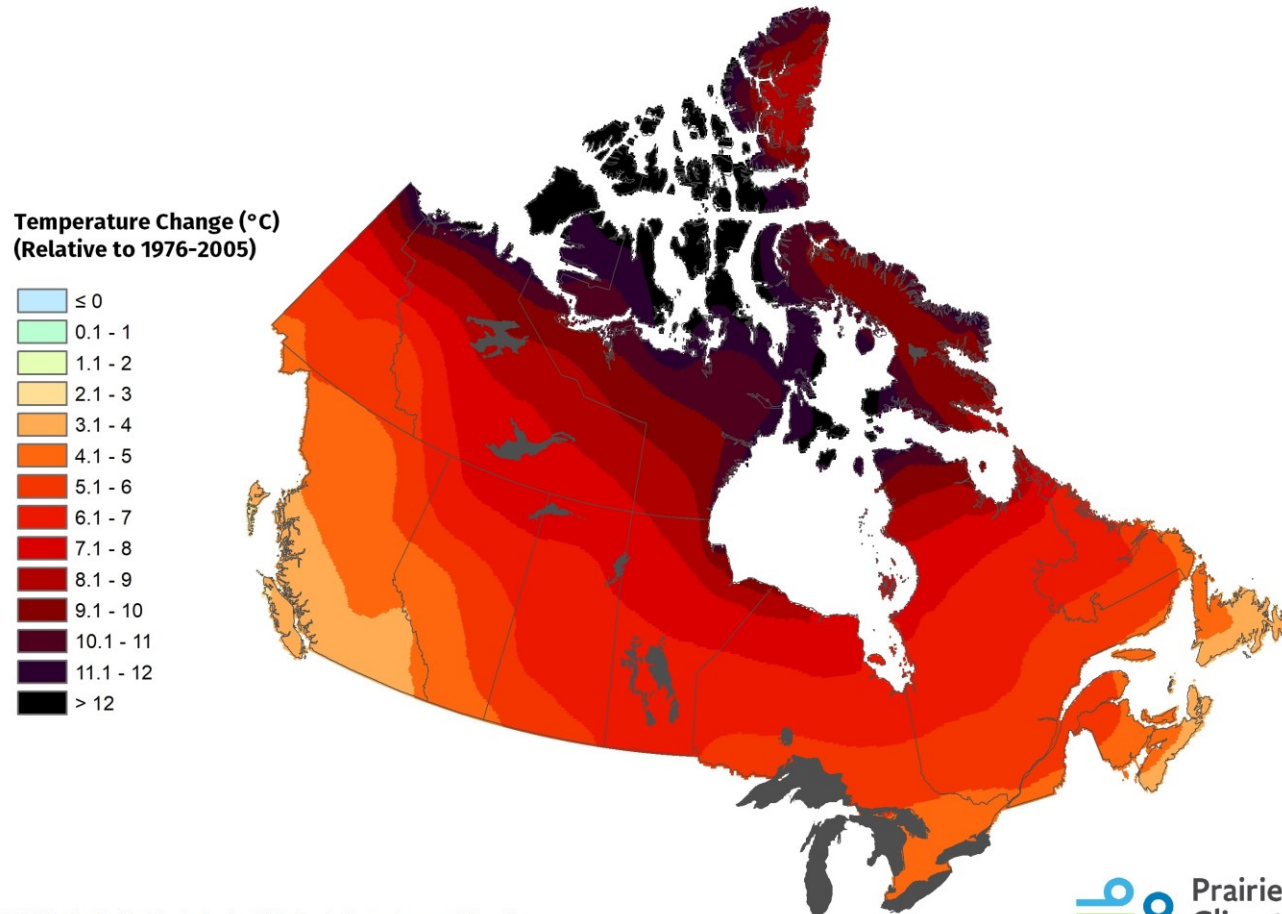
(IPCC, 2013)

***The current pace of environmental change is largely unprecedented in Earth's history (Schmidt, 2016)***

# Projected Warming in Northwestern Ontario

2051-2080 Projected Change in Mean Temperature: December

*Under the RCP8.5 scenario, relative to a baseline of 1976-2005*



© 2017 by the Prairie Climate Centre. Visit [climateatlas.ca](http://climateatlas.ca) for more information.  
Map Data: Ensemble of 12 CMIP5 models (BCSD Statistically Downscaled Climate Scenarios)  
provided by the Pacific Climate Impacts Consortium, University of Victoria ([pacificclimate.org](http://pacificclimate.org)).

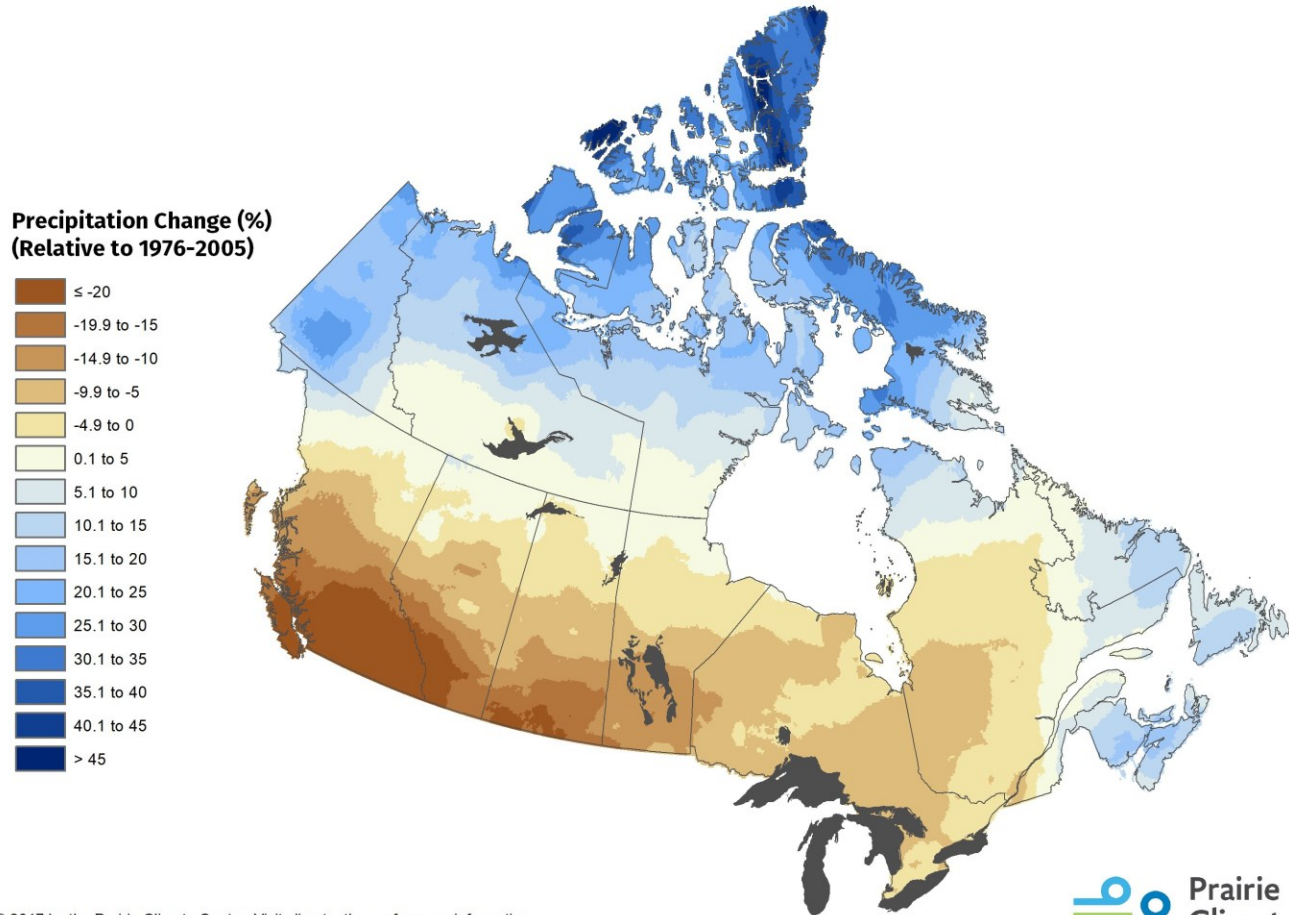
 **Prairie  
Climate Centre**  
From Risk to Resilience

<https://i0.wp.com/prairieclimatecentre.ca/wp-content/uploads/2017/10/2051-2080-RCP85-Mean-Temp-Delta-January.jpg>

# Projected Precipitation in Northwestern Ontario – Summer

## 2051-2080 Projected Change in Total Precipitation: August

*Under the RCP8.5 scenario, relative to a baseline of 1976-2005*



© 2017 by the Prairie Climate Centre. Visit [climateatlas.ca](http://climateatlas.ca) for more information.  
Map Data: Ensemble of 12 CMIP5 models (BCSD Statistically Downscaled Climate Scenarios)  
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 **Prairie  
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From Risk to Resilience

<https://i0.wp.com/prairieclimatecentre.ca/wp-content/uploads/2017/10/2051-2080-RCP85-Mean-Temp-Delta-January.jpg>



# A Call to Action for Health

**“The evidence is overwhelming:  
climate change endangers human  
health”**

Dr. Margaret Chan, Director General, WHO, 2014



# Future Global Health Impacts from Climate Change

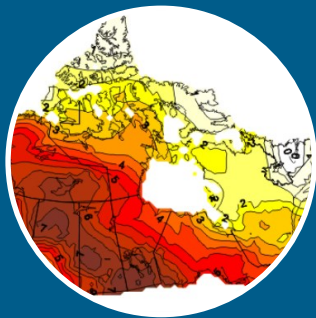
Heat waves and forest fires	→	<i>Very high confidence</i>
Reduced labour productivity	→	<i>High confidence</i>
Increased under-nutrition	→	<i>Very high confidence</i>
Foodborne diseases	→	<i>Very high confidence</i>
Water-borne diseases	→	<i>Very high confidence</i>
Vector-borne diseases	→	<i>Medium confidence</i>

IPCC, 2014

# Health Impacts of Climate Change

*“Climate change...the defining issue for public health during this century”*

Dr. Margaret Chan, Director General, WHO, 2007



**Climate  
Change**



**Extreme  
Events**

**Gradual  
Change**



**Natural  
Environment**

**Built  
Environment**

**Social  
Environment**



**Determinants  
of Health**

Physical  
Environment  
Personal Health  
Practices  
Employment/Working  
Conditions  
Health and Social  
Services  
Social Networks  
Culture

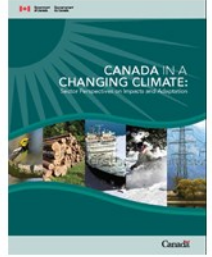


**Health  
Impacts**

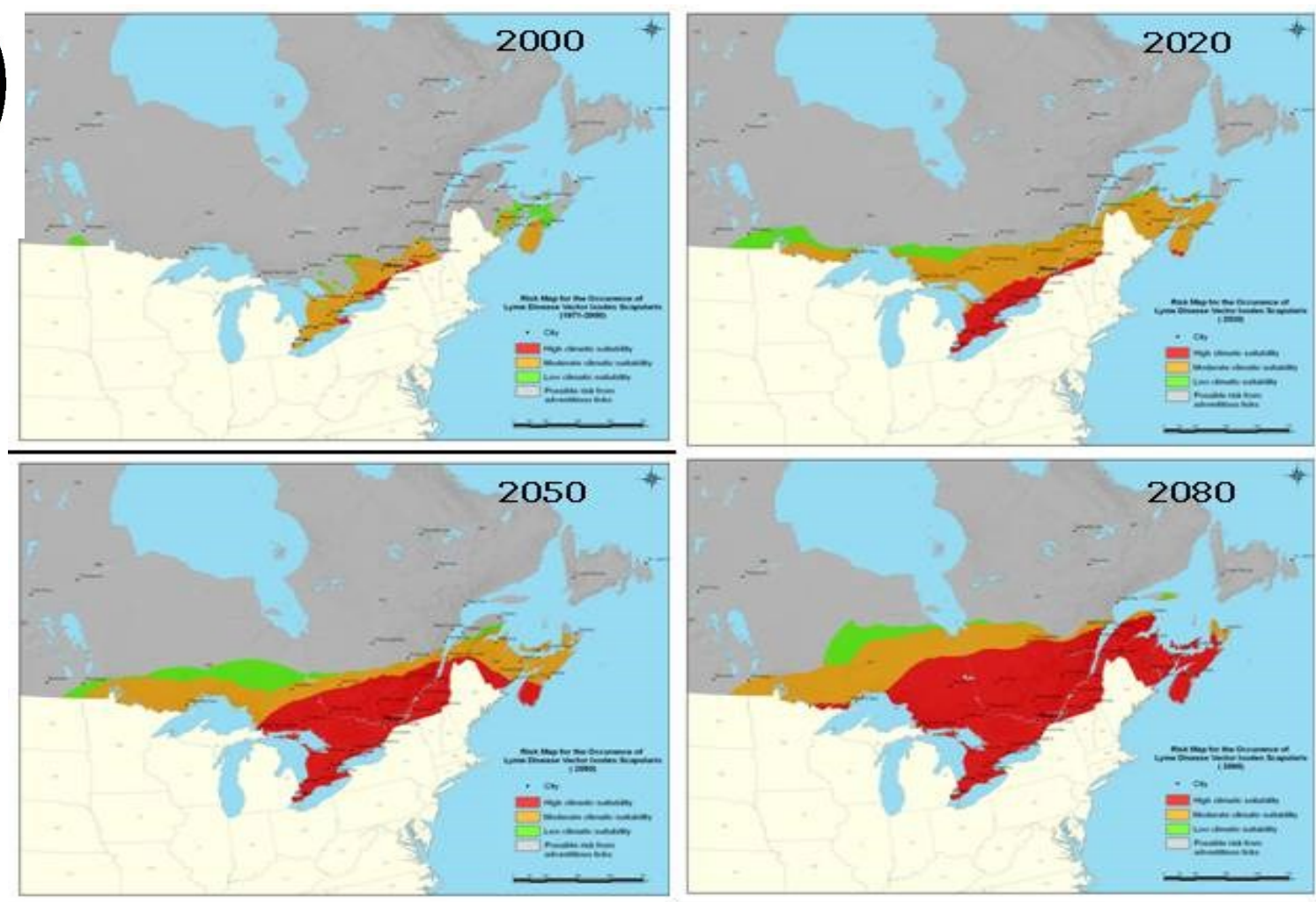
Temperature-related  
illnesses  
Vector-borne  
diseases  
Effects of water and  
food contamination  
Air pollution  
Extreme weather  
Food insecurity



# Health Risks in Canada from Climate Change

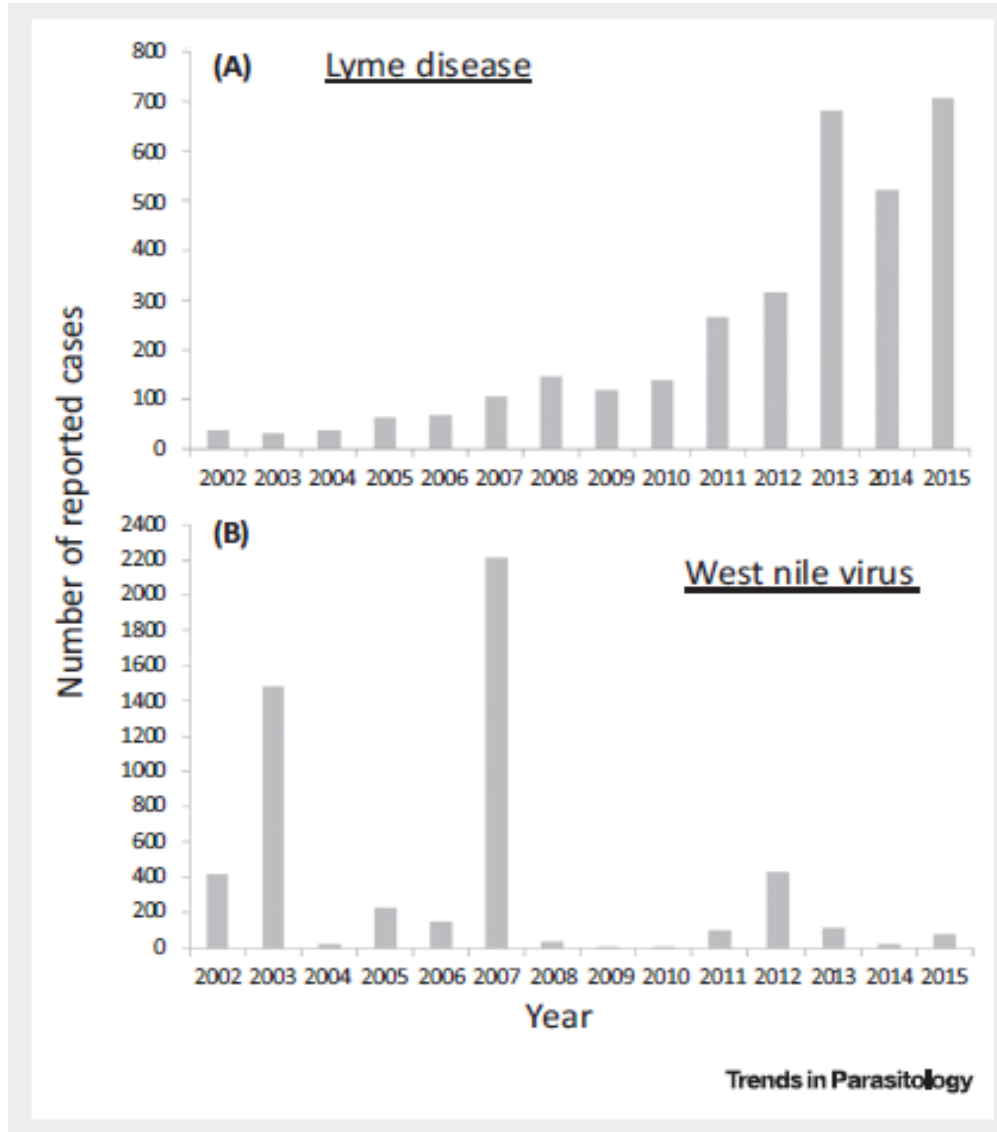


# Projected Risks from Lyme Disease to Canadians



Ogden et al., 2008

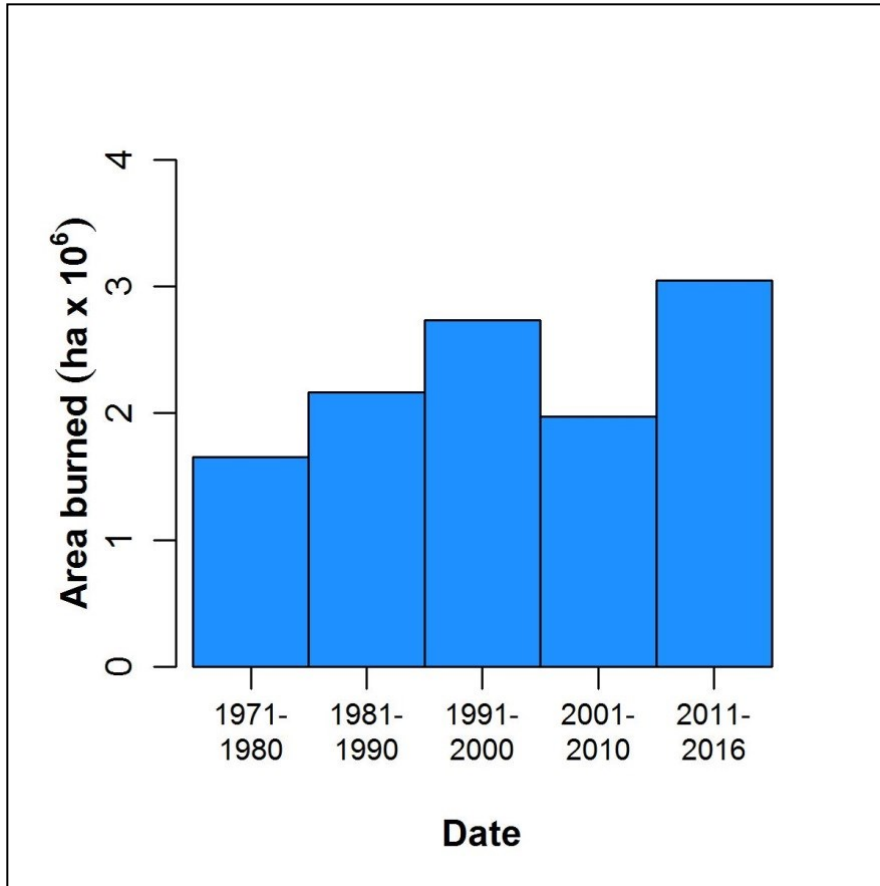
# Increased Risks from Lyme Disease to Canadians



Ogden and Lindsay, 2016

Number of Reported Cases of (A) Lyme Disease and (B) West Nile Virus in Canada between 2002 and 2015.

# Canadian Fire Statistics



The number of wildfires in Canada has doubled since the 1970s

Mike Flannigan, 2016

# Fire Disasters in Canada



- Northern Ontario, 2011
- Quebec, 2013
- British Columbia 2014, 2017
- North West Territories, 2014
- Saskatchewan, 2015
- Alberta – Fort McMurray 2015

***“Global smoke related fatalities estimated at 339,000 per year”  
(Johnston et al., 2012)***



# Wildfire Health Impacts

- Respiratory effects
- Cardiovascular effects
- Burns
- Heat induced illness
- Ophthalmic effects
- Psychological effects

<p><b>DIRECT IMPACTS</b></p>	<p><b>Respiratory effects</b> Asthma exacerbations New cases of asthma or respiratory disease Respiratory symptoms and deteriorating lung function Dyspnoea, cough, chest tightness, wheeze and sputum production Chronic respiratory issues</p> <p><b>Cardiovascular effects</b> Heart disease Cardiovascular mortality/ cardiac failure Dehydration</p>	<p><b>Burns</b> Direct burns Burn-related casualties Organ failure Inhalational burns</p> <p><b>Heat induced illness</b> Heat stroke, heat exhaustion Cardiovascular mortality</p> <p><b>Ophthalmic effects</b> Eye irritation Reduced visibility Corneal abrasions</p>	<p><b>Psychological effects</b> Anxiety Mental exhaustion Stress from lives lost and impacts to livelihoods, homes and communities Depression (including major) Post traumatic stress disorder Somatisation Hostility Paranoia Chronic psychiatric morbidity Paediatric psychological morbidity</p>
<p><b>INDIRECT IMPACTS</b></p>	<ul style="list-style-type: none"> <li>— Trauma during evacuations</li> <li>— Increased demand on health services</li> <li>— Inability of patients with chronic health conditions to access health care facilities</li> <li>— Diseases associated with water and land pollution</li> </ul>		

Paterson et al., 2016

# Forest Fire Impacts in Northern Ontario

## Box 2: Health Impacts of Forest Fires that Affected Northern Ontario in July, 2011

On July 6, 2011, a lightning storm sparked a series of forest fires that rapidly spread across northwestern Ontario, lasting for over two weeks (120 fires were reported on July 20). Many First Nations communities were directly threatened by the fires and those at increased risk of suffering from smoke inhalation were ordered to evacuate, as were communities impacted by power outages, food shortages, and a lack of food storage capacity. In total, 3292 people were evacuated from 8 First Nations communities including the entire communities of Keewaywin and Koocheching First Nations. Residents were relocated to 14 communities as far away as Southern Ontario and Manitoba. Evacuation and displacement from extreme weather events and related hazards can have negative psychosocial impacts on communities (Wilk et al. 2014).

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Source: Public Safety Canada 2013

Ebi et al., 2016

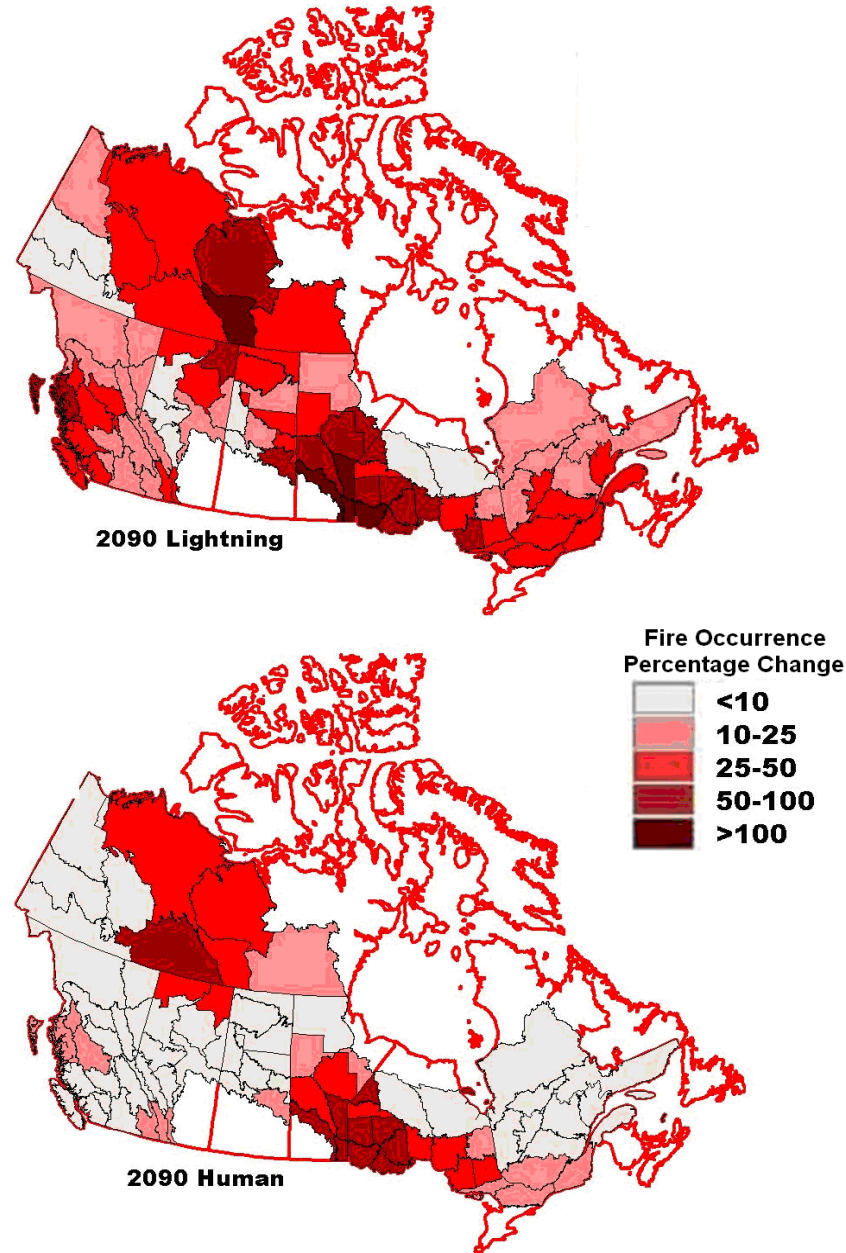
# Future Fire Occurrence in Canada

- Changes in climate (including warmer temperatures, changes in precipitation, atmospheric moisture, wind, and cloudiness) affect wildfires
- Direct, indirect, and interactive effects of weather/climate, fuels, and people will determine future fire activity

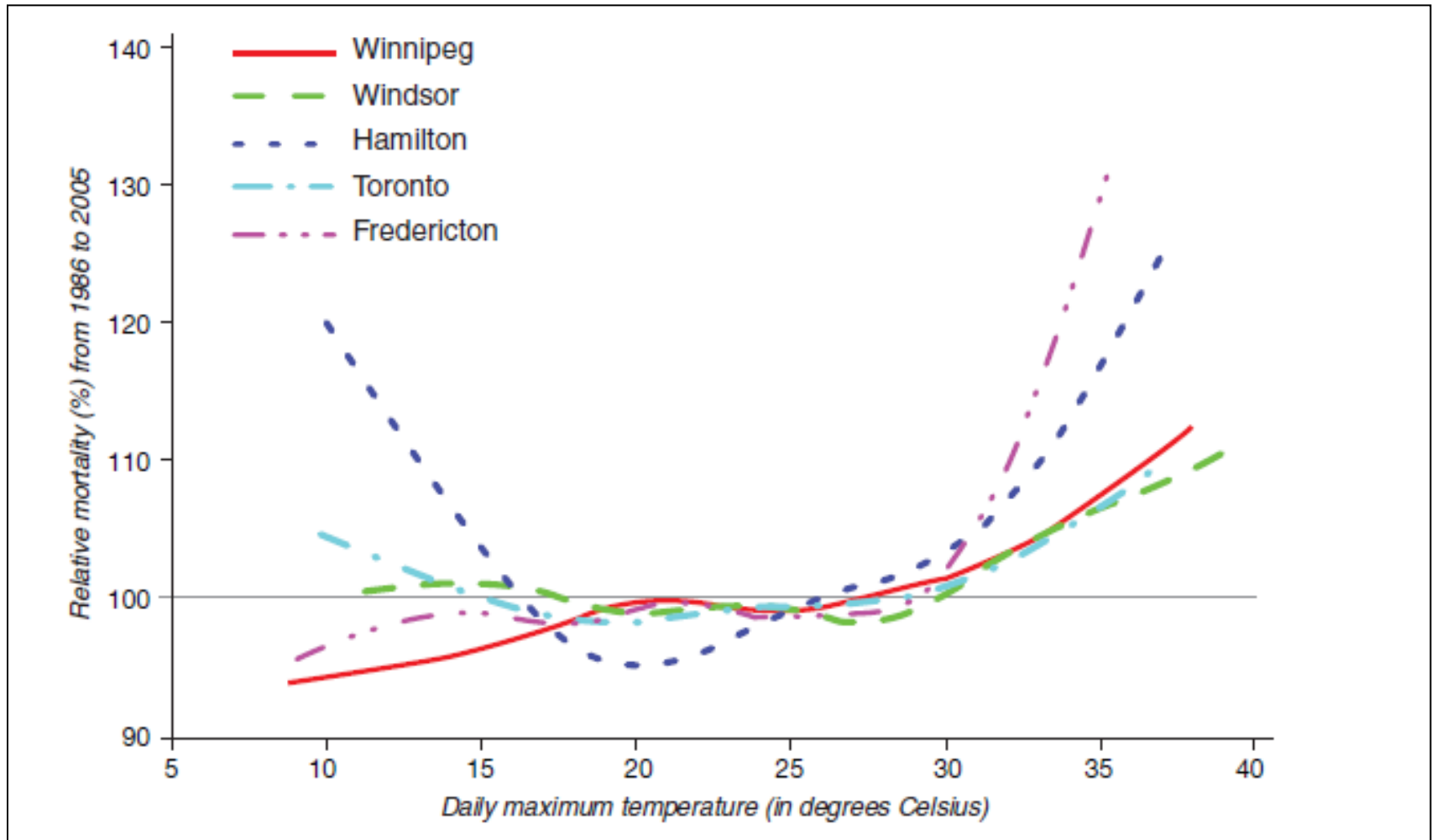
Mike Flannigan, 2016

Flannigan, M.D., Krawchuk, M.A., de Groot, W.J., Wotton, B.M. and Gowman, L.M. (2009). Implications of changing climate for global wildland fire. *International Journal of Wildland Fire*, 18, 483-507.

Wotton, B.M., Nock, C.A. and Flannigan, M.D. (2010). Forest fire occurrence and climate change in Canada. *International Journal of Wildland Fire*, 19, 253-271.



# Temperature/Mortality Relationships in Select Cities



Health Canada, 2012

# Extreme Heat in Canadian Communities

A 2009 extreme heat event in British Columbia contributed to 156 excess deaths in the province's lower mainland area.  
(Kosatsky, 2010)



An extreme heat event in 2010 in Quebec resulted in an estimated excess of 280 deaths (Bustinza et al., 2013)



# Catastrophic Health Impacts Can Occur Where Health Systems are not Prepared

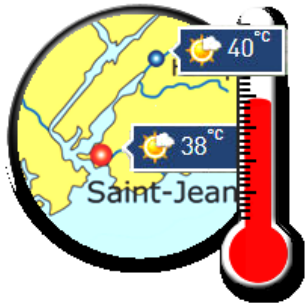
Russian Heat Wave 2010  
> 55,000 deaths



European Heat Wave 2003  
> 70,000 deaths



# Extreme Heat



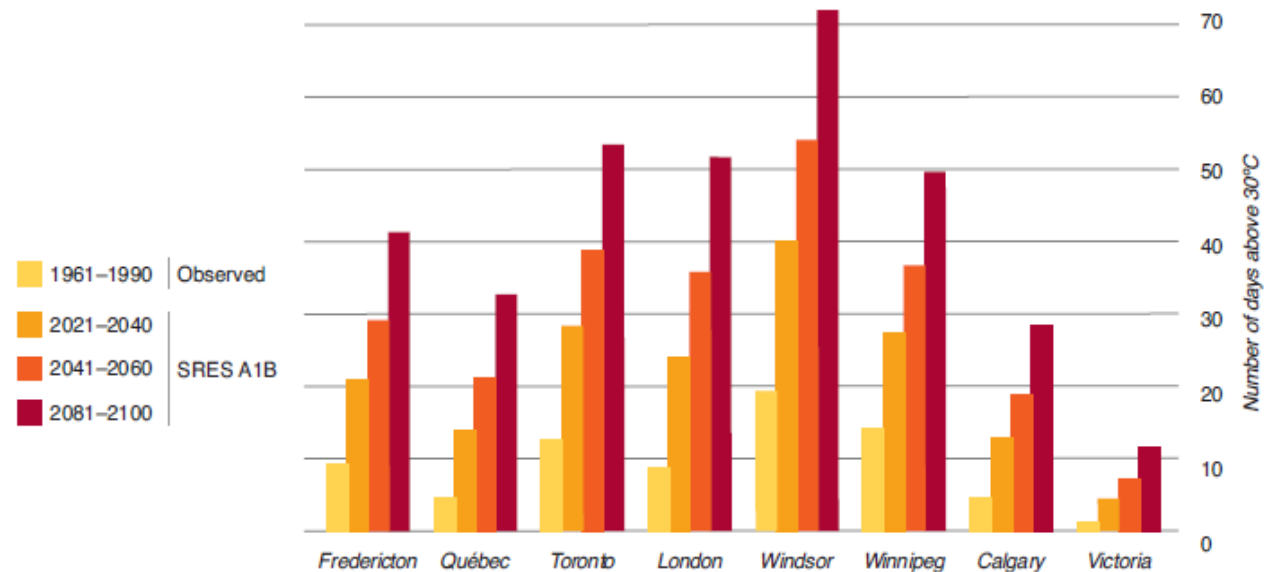
*“As the climate changes, the frequency, intensity and duration of these event are expected to increase, as are their related adverse health effects” – Health Canada, 2011*

## At-risk groups include:

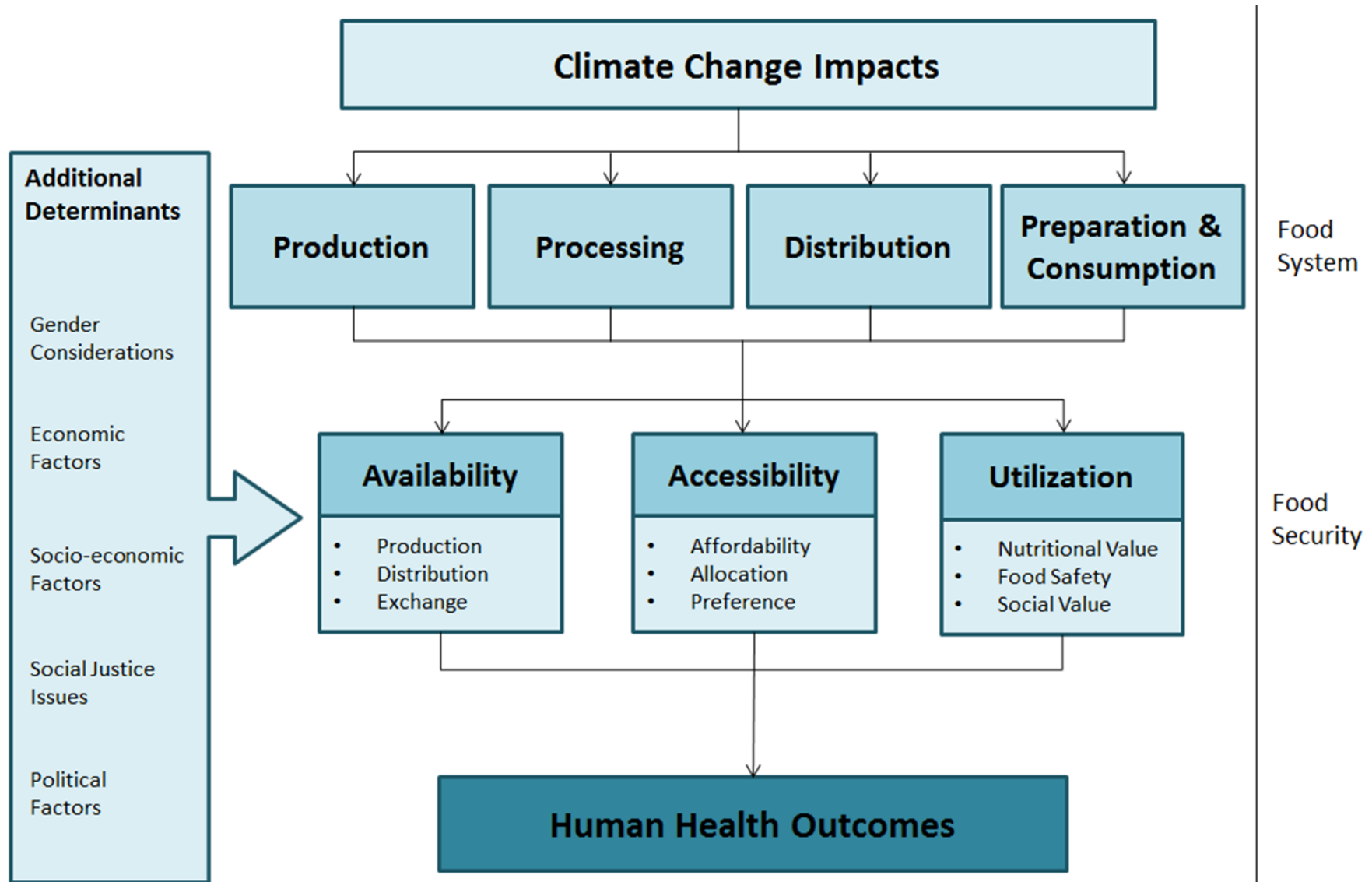
- Older Adults
- Infants and young children
- People with chronic illness
- The physically active
- Low socio-economic status
- Newcomers to Canada and transient populations

**Figure 1: Current and projected number of days exceeding 30°C/86°F for Canadian cities**

*The number of hot days for each city is based on the observed temperature data between 1961 and 1990, and projected for 2021–2040, 2041–2060 and 2081–2100.*



# Climate Change Impacts on Food Insecurity

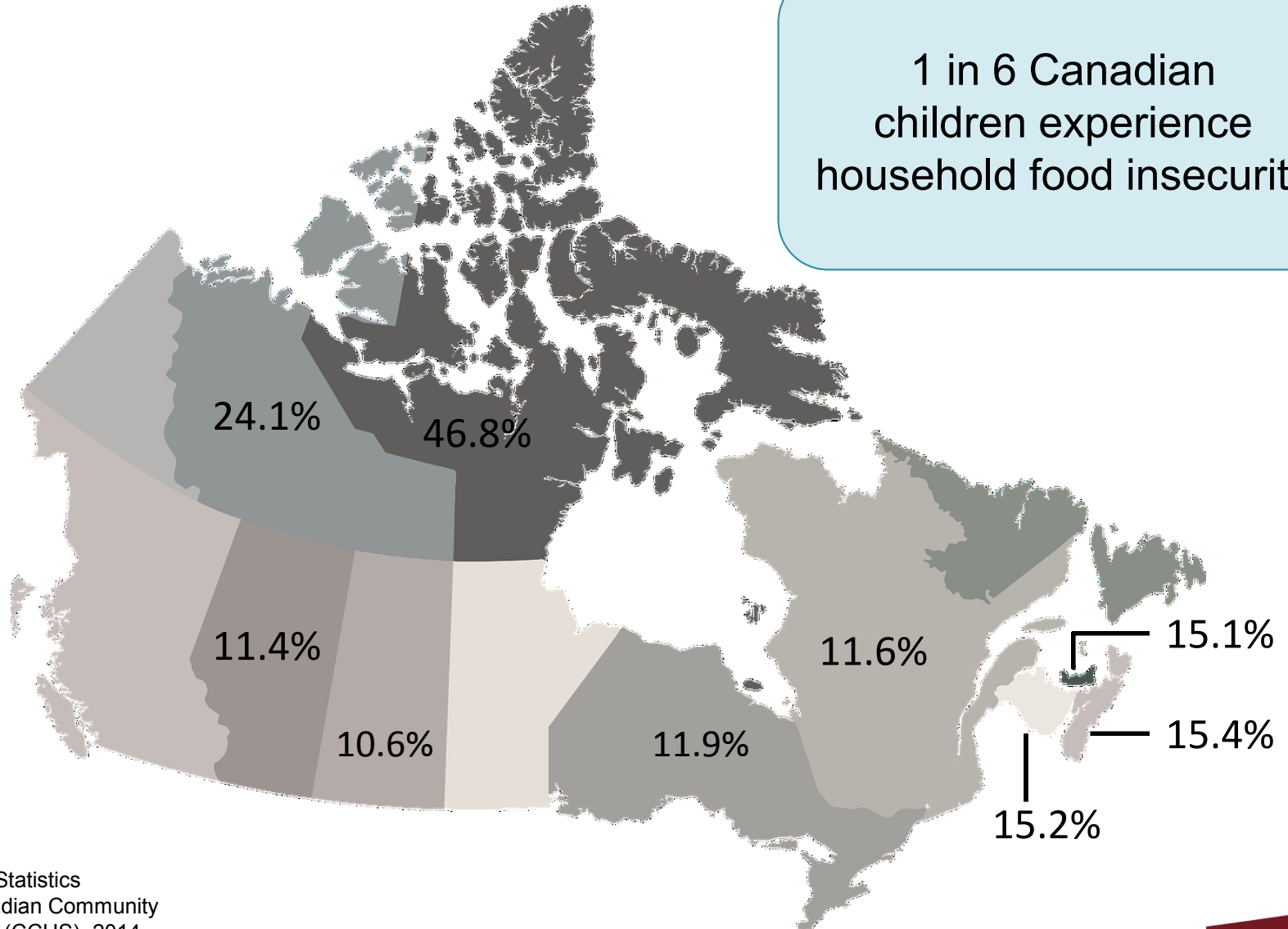


Schnitter, 2017



# Food Security in Canada

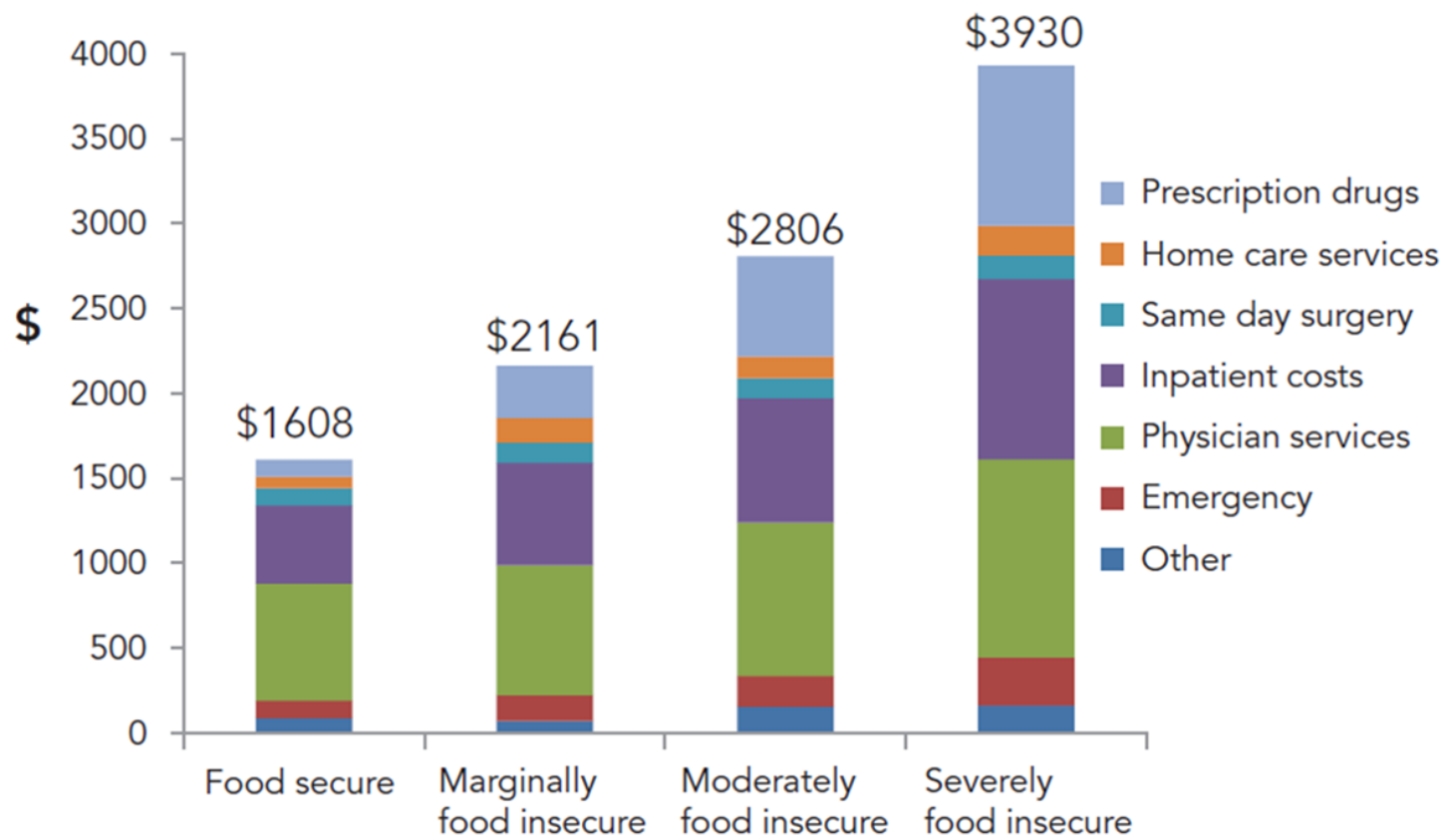
1 in 6 Canadian children experience household food insecurity



Data Source: Statistics Canada, Canadian Community Health Survey (CCHS), 2014

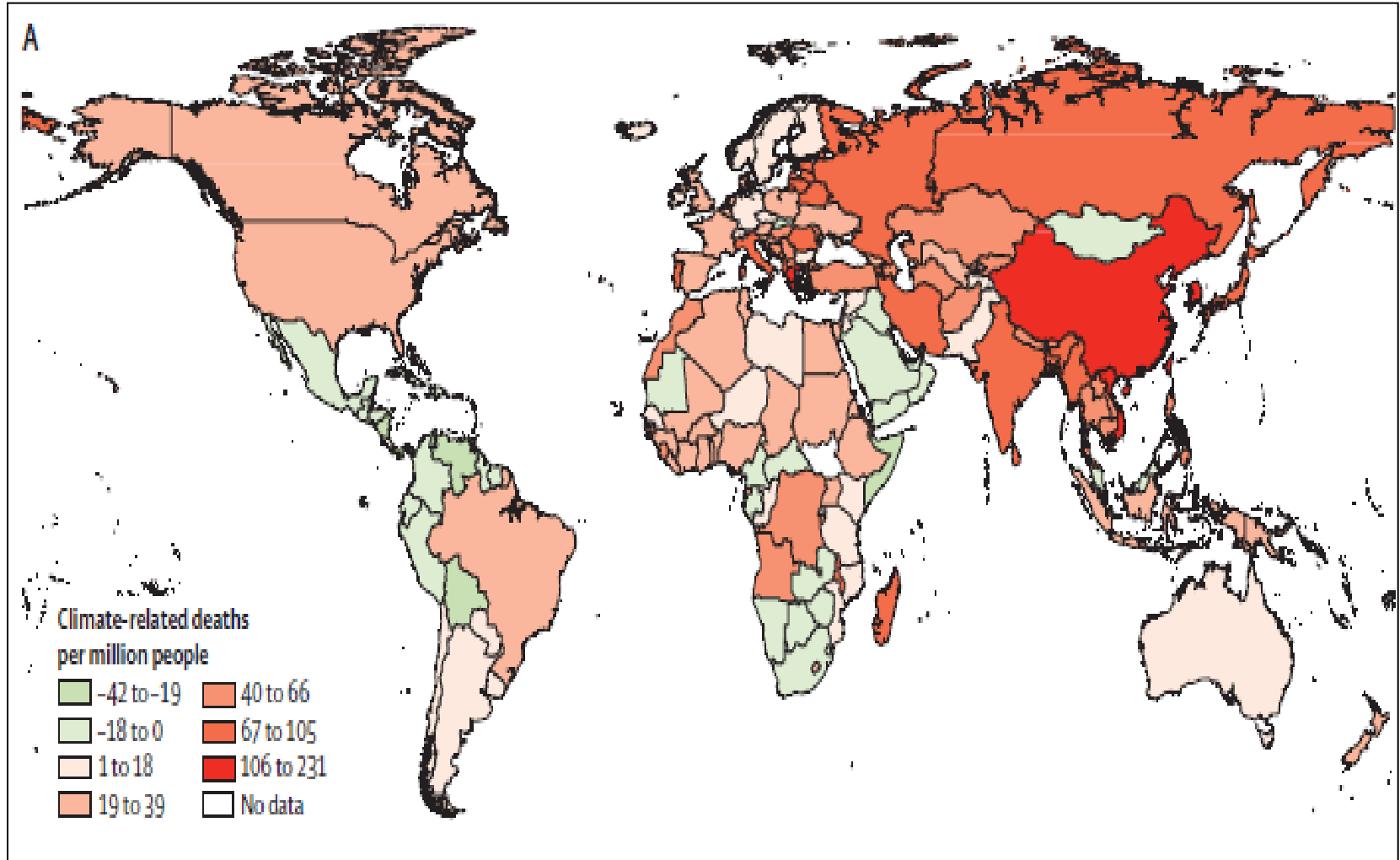
# Food Security and Human Health

Average health care costs incurred over 12 months by Ontario adults (18-64 years of age), by household food insecurity status<sup>7</sup>



Data Source: Tarasuk et al., 2015  
Graph: PROOF, 2015

# Climate Change Impacts on Food



Springmann et al., 2016

***Projected 529 000 climate-related deaths worldwide by 2050***

# Mental Health Impacts of Climate Change

- 1 in 300 year flood
- 1932 people remained evacuated 2 years after the flood

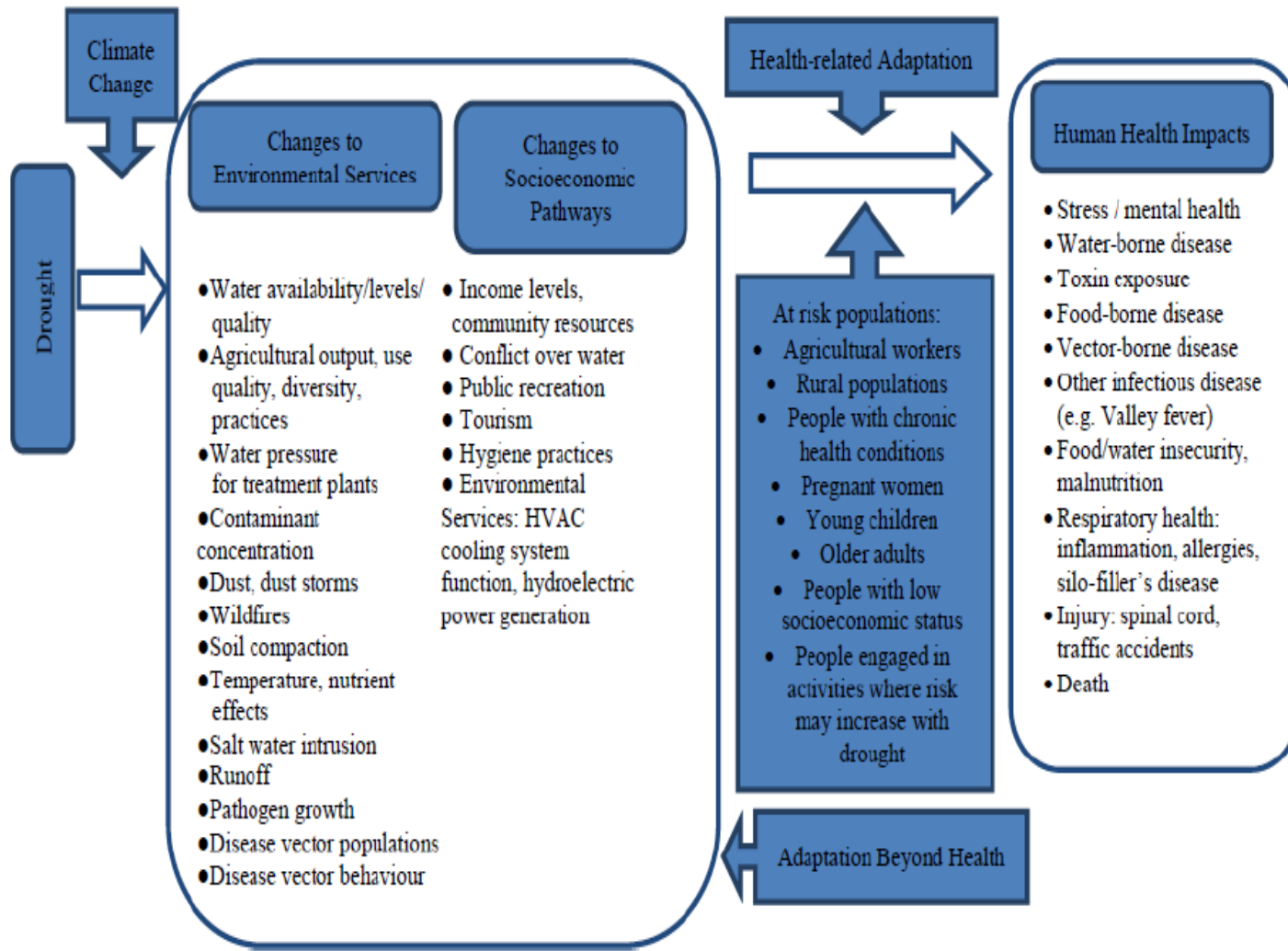
Psychosocial impacts included:

- Increases in alcohol and drug use
- Increases in family violence
- Depression
- Anxiety
- Sleep disruption

## Manitoba Flood 2011

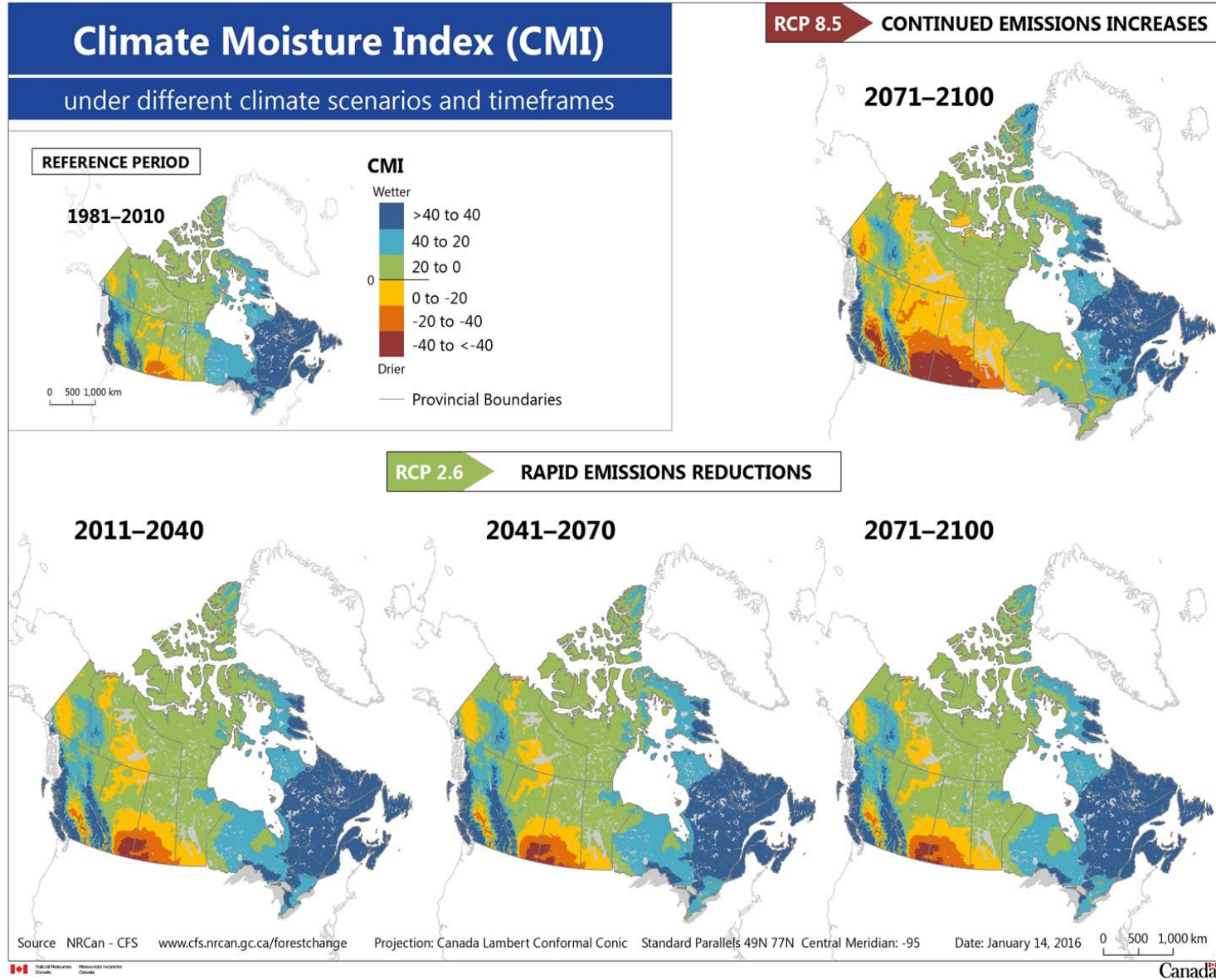


# Pathways Through Which Drought Impacts Health in the Context of Climate Change

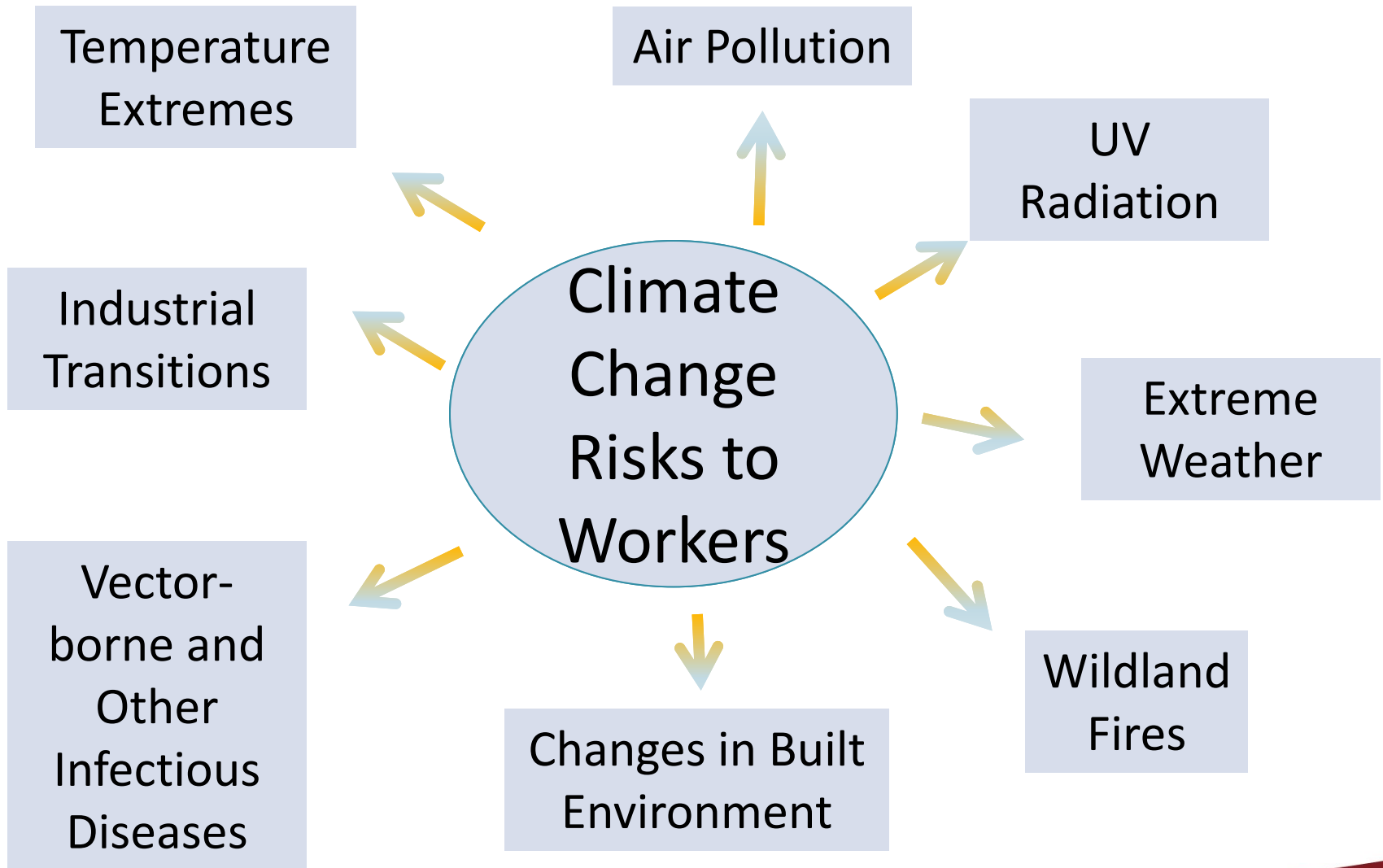


Yusa et al., 2015

# Projected Drought in Northern Ontario



# Climate Change and Occupational Health



Shulte and Chun, 2009

# Canadian Health Care Facility Impacts from Climate Hazards



Source: Canadian Coalition for Green Health Care



# Complex Emergencies and Disasters

## 2011: Wildfires and then Floods in Slave Lake

One-third of the homes and businesses in Slave Lake (about 400 structures) were incinerated in the wildfires in May 2011. Total damage was \$700 Million. Three weeks after the fire storm 17 consecutive days of rain caused widespread flooding as did another deluge July 7-9.



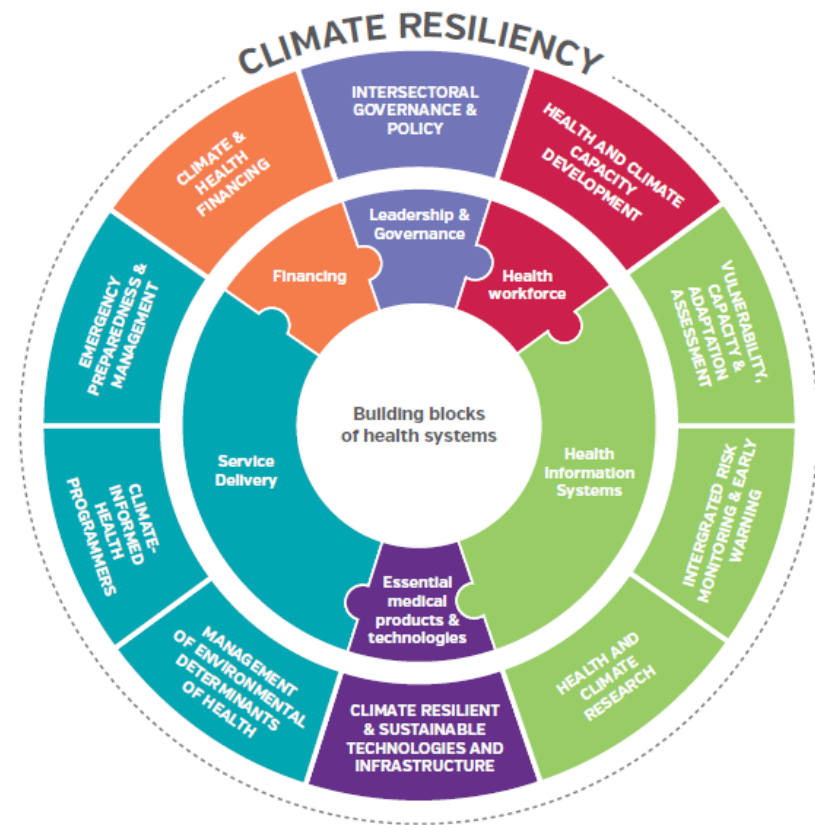
# **ADAPTING TO ADDRESS CLIMATE CHANGE IMPACTS**

Climate change will be ***the defining issue for health systems*** in the 21st century, interacting with all social determinants of health.

WHO, 2015

# Increasing Resiliency of Health Systems

- Climate-informed health planning
- Health and climate capacity development
- Emergency preparedness and management
- Vulnerability, capacity and adaptation assessment
- Integrated risk monitoring and early warning



WHO, 2015

# Climate change is transforming environmental health decision making due to:

- Dynamic and complex disease risks (e.g., vector-borne diseases)
- Multiple uncertainties – particularly around management of indirect health effects (e.g., food insecurity)
- Increase probability of “surprises” that can severely impact health (e.g., cascading or complex emergencies)
- Risks of “involuntary” adaptation



**Source:** National Institute of Environmental Health Sciences


# Adapting to Climate Change

## EM Action With and Without “Adaptation”

<b>EM Action</b>
Hazard Risk Vulnerability Assessment
Disaster mitigation
Disaster planning
Table top exercises
Surveillance
Response and recovery
Increasing planning capacity



<b>EM + Adaptation</b>
HRVA integrating climate change + CC assessments
Disaster mitigation informed by CC drivers (e.g, UHI)
Disaster plans – informed by CC (eg., simultaneous events)
TTX with CC scenario
Monitoring new health risks
Activate surge capacity
Partners with CC knowledge, staff aware of CC risks

A photograph showing the aftermath of a wildfire. In the foreground, a metal swing set stands on a dirt path. The background is filled with the charred remains of houses and trees, with a thick layer of smoke or haze hanging in the air.

**“It is clear that there are several health impacts that we will not be able to respond to”**

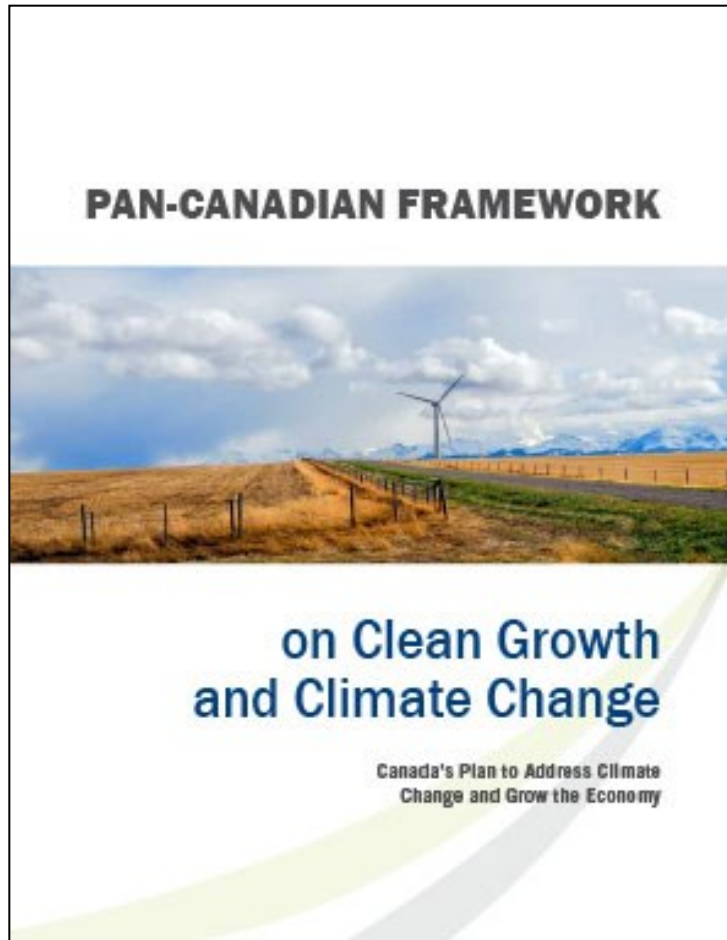
Lancet Commission, 2015

***How can we push the limits of health adaptation in Canada?***

# **CURRENT ACTIVITIES TO PROTECT CANADIANS**



# Pan-Canadian Framework on Clean Growth and Climate Change



## Protecting and improving human health and well-being

1. Addressing climate change-related health risks
  - Extreme heat events
  - Infectious diseases
  - Adaptation investments - surveillance and monitoring, risk assessments, modelling, laboratory diagnostics, health professional education and public awareness activities.
2. Supporting healthy Indigenous communities

<https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>

# Climate Change and Innovation Bureau

## Heat Health Program

*Protecting Canadians  
From Extreme Heat*

## Policy, Outreach, and Capacity Building

*Understanding  
Health Risks and  
Building Capacity in  
the Health Sector*

## Data, Monitoring, Surveillance, and Forecasting

*Providing Data and  
Evidence for  
Decision-Making*



HEALTHCARE  
CLIMATE CHANGE  
RESILIENCY  
PROJECT

## Health Care Climate Change Resiliency Mentoring

### Purpose

- Increase awareness of the impacts of climate change on health care facilities in Canada
- Enable health care facility officials to assess resiliency to climate change using the 'Checklist' mentored by health care 'experts'
- Train health care climate change champions
- Provide references and best practices to help health care facilities become more resilient to climate change

### Outcomes to date

- 9 participants from first cohort have introduced the 'Checklist' at their sites
- 2<sup>nd</sup> cohort starting in the fall 2017
- Further info: <http://greenhealthcare.ca/climate-change/>



THE CANADIAN  
COALITION FOR  
GREEN HEALTH CARE



COALITION CANADIENNE  
POUR UN SYSTÈME  
DE SANTÉ ÉCOLOGIQUE

## Canada in a Changing Climate: Advancing Our Knowledge for Action



The impacts of climate change are already being felt across Canada. Ongoing climate change poses significant risks to communities, health and well-being, our economy and the natural environment. Meeting the challenges posed by climate change means both reducing emissions to limit the amount of change, as well as adapting to the observed and anticipated impacts, in order to build resilience.

*Canada in a Changing Climate: Advancing our Knowledge for Action* is a series of authoritative science and information products about how Canada's climate is changing, the impacts of these changes and how we are adapting to reduce risk.

Assessment products will serve as a resource for Canadians, raising awareness of the key issues facing our country and providing information to support sound adaptation decisions and actions.

[Learn more about the assessment process](#)

[Look ahead at what products you can expect to see](#)

[Share Your Views on Canada's Assessment](#)

## National Climate Change and Health Technical Assessment 2021

# Resources from Health Canada

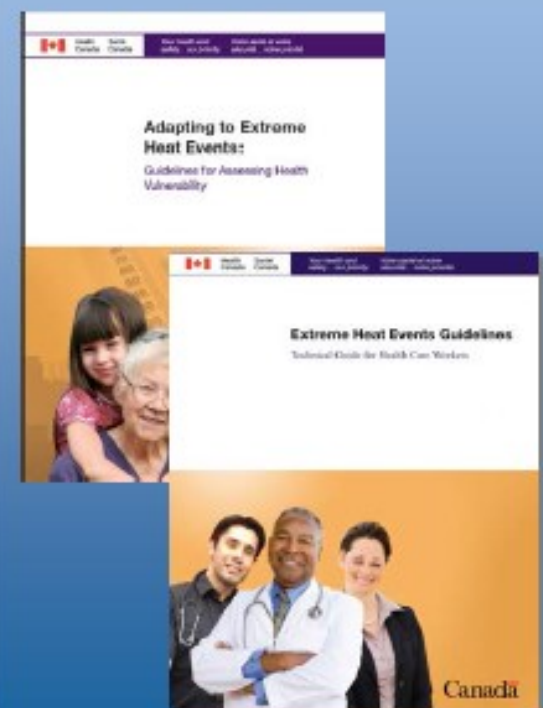
## Communicating with the public



## HARS Best Practices



## Heat Adaptation Guidelines



<http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/index-eng.php>

## Steps taken in past year to protect from climate change health impacts

Base: Believe in climate change

	Phone only (n=1379)	Phone & Online (n=1751)
<b>Any protective steps</b>	<b>38%</b>	<b>37%</b>
Better eating habits/gardening	8%	8%
Use more sunscreen	7%	6%
Recycling	7%	6%
Increase home's energy efficiency	6%	5%
Watch weather more closely	5%	5%
Drive less	3%	3%
Flu shot/immunization	2%	2%
Installed air conditioning	2%	2%
Have an emergency plan/kit	1%	1%
Prepare for storms	1%	1%
Vigilant for ticks on person/pets	1%	1%
Other mentions	10%	11%
None	62%	63%

<http://epe.lac-bac.gc.ca/100/200/301/pwgsc-tpsgc/por-ef/health/2017/095-16-e/report-rapport-eng.html>

# THANK YOU

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