

Heat, Health and Climate Change:

Session Defining Thresholds for Indoor Temperatures as Public Health Issue

Presented to Public Health 2019, Ottawa, ON

Tuesday, April 30, 2019

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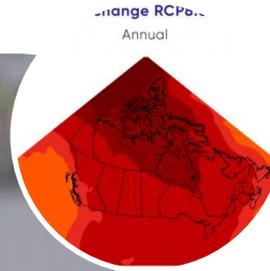


YOUR HEALTH AND SAFETY... OUR PRIORITY.

Heat, Health and Climate Change

1. Why is extreme heat an important public health issue?
2. Vulnerable populations in Canada
3. Recent heat health impacts in Canada
4. Future heat health Impacts in Canada
5. What can be done?
6. What's next?
7. Conclusions

1.1 Why is extreme heat an issue?

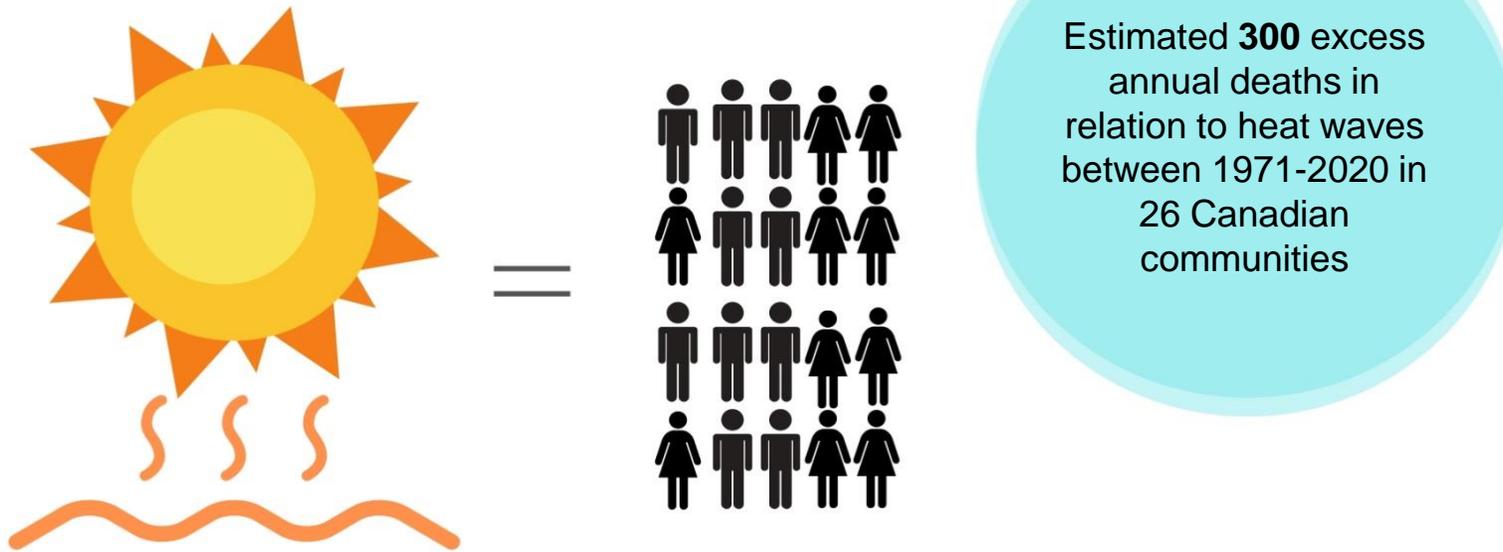


Climate change is projected to increase the frequency, intensity and duration of extreme heat events and associated health outcomes



However, effective adaptation can greatly reduce adverse health outcomes regardless of the climate future

1.2 Why does it matter to Canadians?



Extreme Heat is a leading cause of illness and death from weather-related hazards in Canada

Source: Y Guo, Gasparini, Li, S et al. (2018). *Quantifying excess deaths related to heatwaves under climate change scenarios: A multicountry time series modelling study & S.1 Appendix*. PLoS 15(7): e1002629. <https://doi.org/10.1371/journal.pmed.1002629>

2.0 Vulnerable populations in Canada



Source: Health Canada. Water, Air Climate Change Bureau. *Heat Alert and Response Systems to Protect Health : Best Practices Guidebook*. Ottawa: Health Canada, 2012.

3.1 Recent Extreme Heat Events and Health Impacts in Canada

- British Columbia in 2009: 156 excess deaths attributable to heat (Kosatsky 2010)
- Montreal, Quebec in 2010: 106 excess deaths attributable to heat (Bustinza et al. 2013)

Province of Québec - Summer 2018



The 2018 summer season is the warmest in **146 years** of weather observations in southern Quebec.



86 deaths across the province during the extreme heat event of late June/early July 2018.



Statistically significant increase in crude **hospitalization rates** (all causes) in 3 health regions in Quebec.



Statistically significant increase in use of **ambulance rates**. These increases ranged from 11% to 23%.



Statistically significant increases in the gross **emergency admissions** rates in 2 health regions.

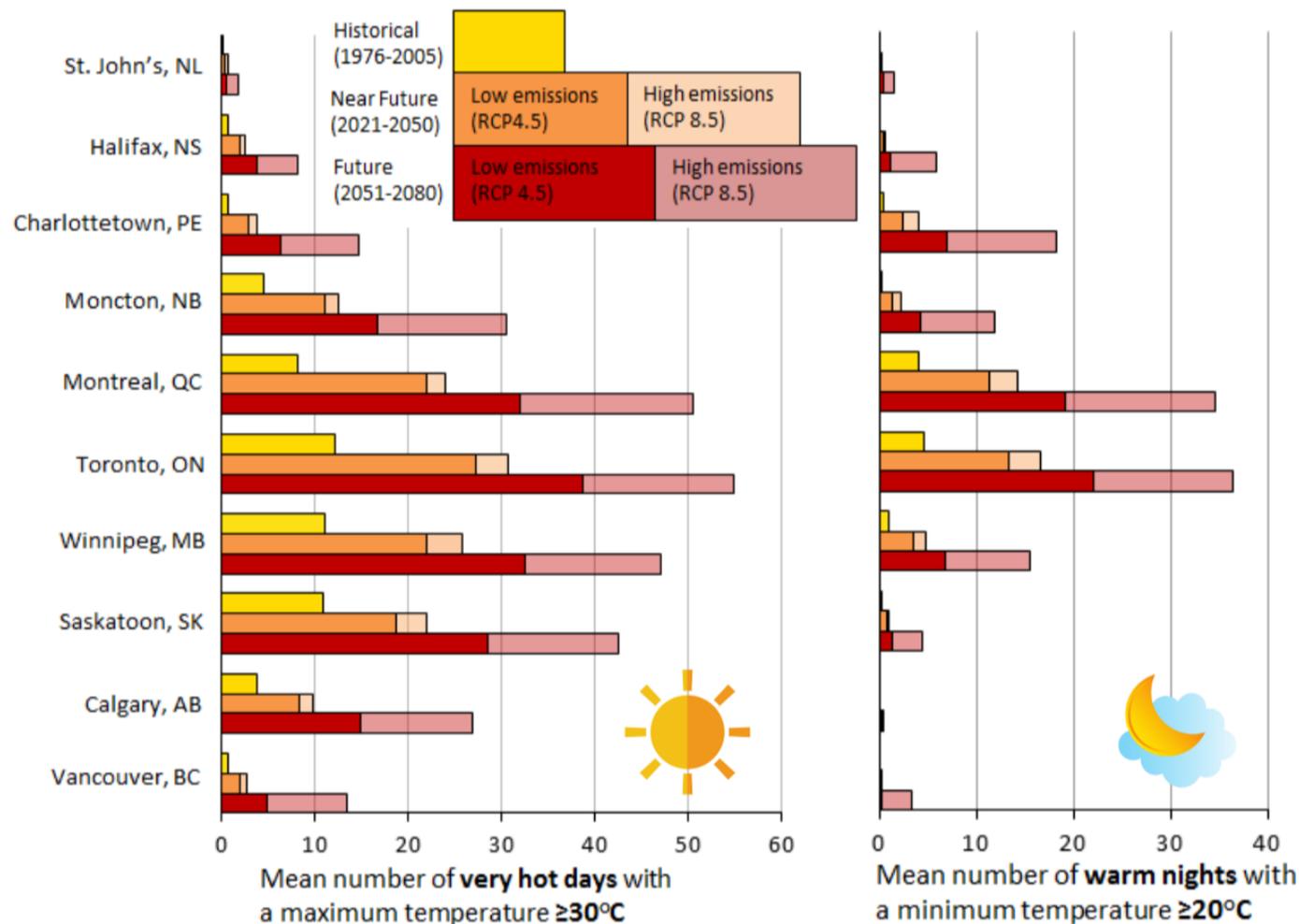
Source: INSPQ. 2019. Surveillance des impacts des vagues de chaleur extrême sur la santé au Québec à l'été 2018. <https://www.inspq.qc.ca/bise/surveillance-des-impacts-des-vagues-de-chaleur-extreme-sur-la-sante-au-quebec-l-ete-2018>

Toronto, Ontario- Summer 2018

Temperatures exceeded 30°C for 21 days compared to 30-year average of 12.2 days/year until 2005

Source: Perrotta, K. 2019. *Call to action on climate change and health*. CPHA Webinar Series. <https://www.cpha.ca/call-action-climate-change-and-health>

4.1 Future changes in key heat indicators due to climate change

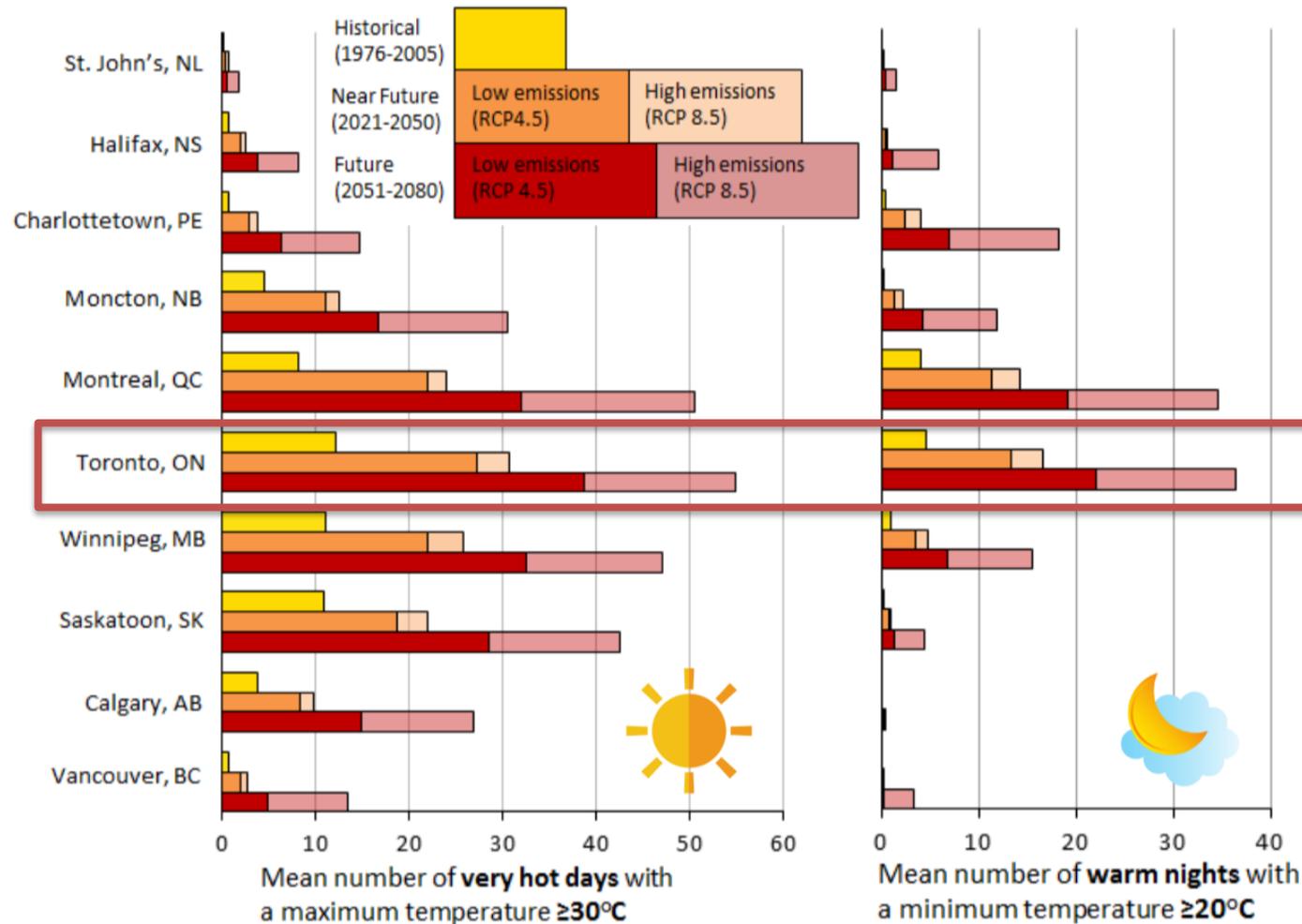


Over the next 30 years, the number of very hot days and warm nights in a year is expected to more than double in some parts of Canada by 2050 and triple by 2080.

Source: Maria Malik and Rebecca Stranberg. 2019. *Canadian Population Centres - Key Heat Indicators*. Health Canada, Ottawa, ON.

Datasource: Climate Atlas of Canada. <https://climateatlas.ca/>

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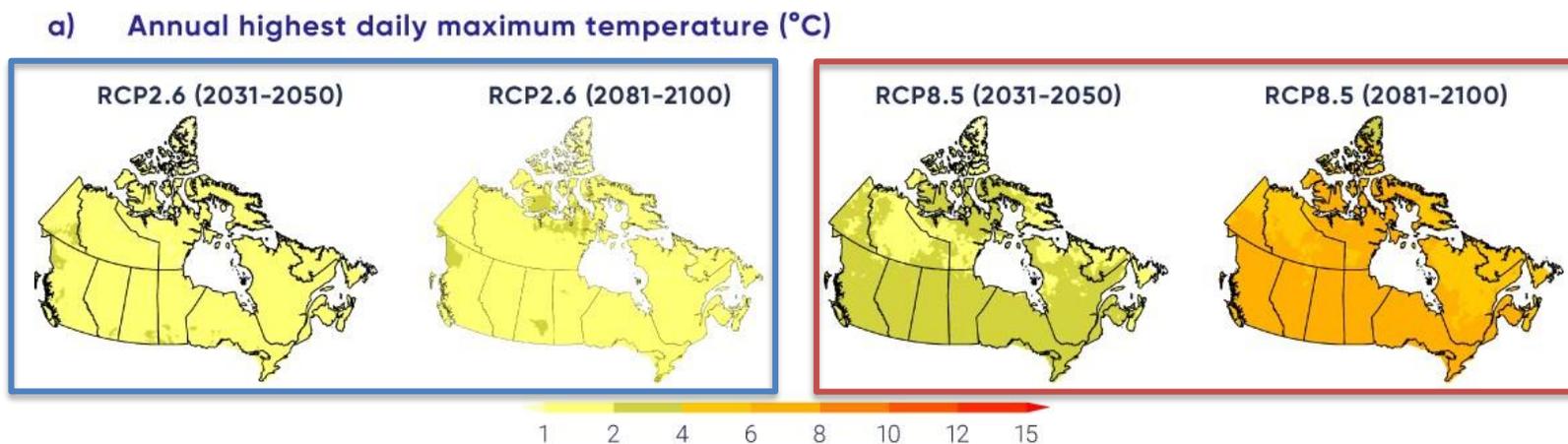


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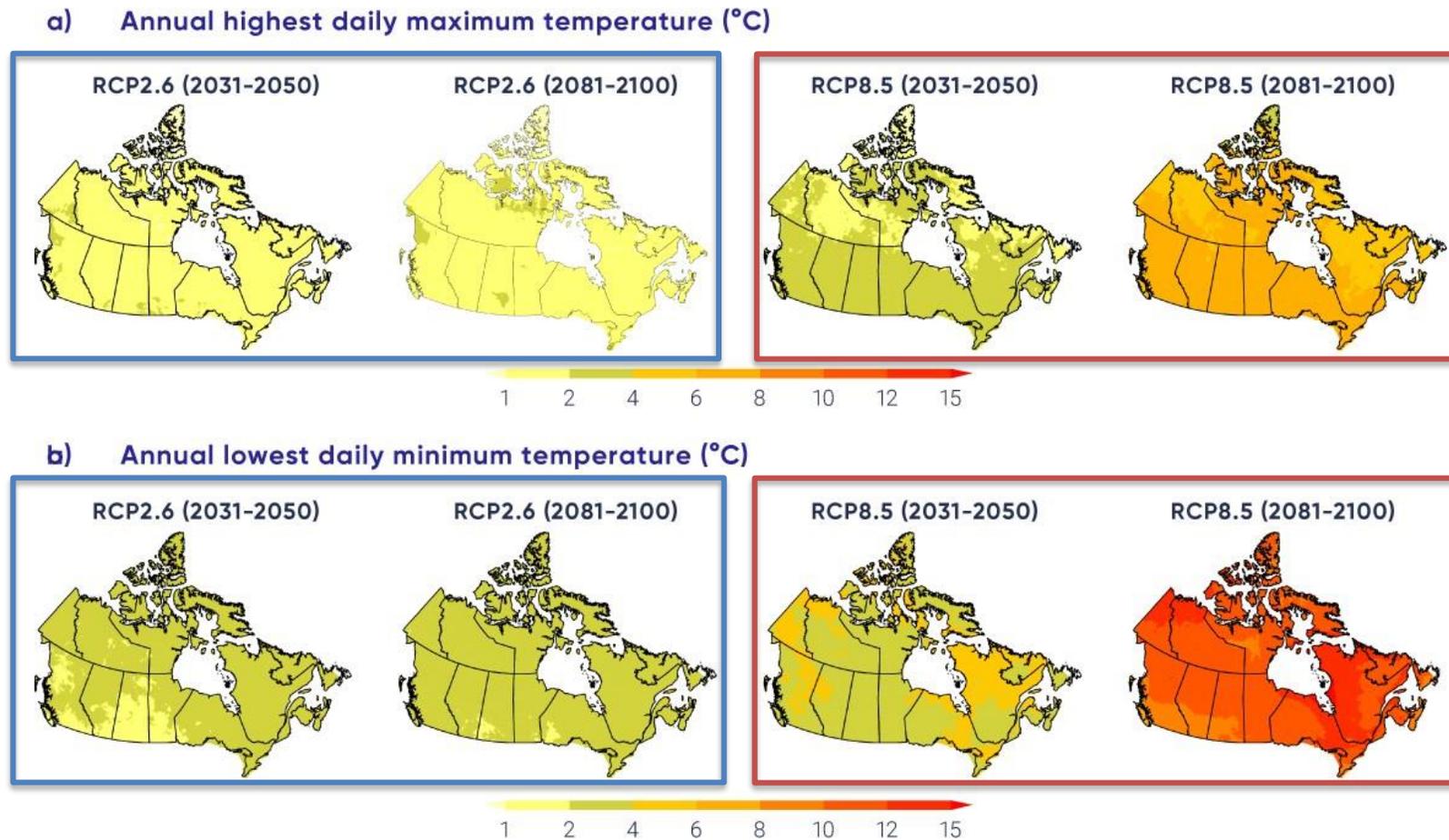
Datasource: Climate Atlas of Canada. <https://climateatlas.ca/>

4.1 Future changes in key heat indicators due to climate change



Source: *Figure 4.11: Future projections for selected temperature indices (extremes)*
(CCCR 2019. <https://changingclimate.ca/CCCR2019/graphics/>)

4.1 Future changes in key heat indicators due to climate change



Source: Figure 4.11: Future projections for selected temperature indices (extremes)
(CCCR 2019. <https://changingclimate.ca/CCCR2019/graphics/>)

4.2 Future heat health impacts in Canada: How climate change will affect Extreme Heat Events (EHEs)

These characteristics of Extreme Heat Events are modelled to increase due to climate change

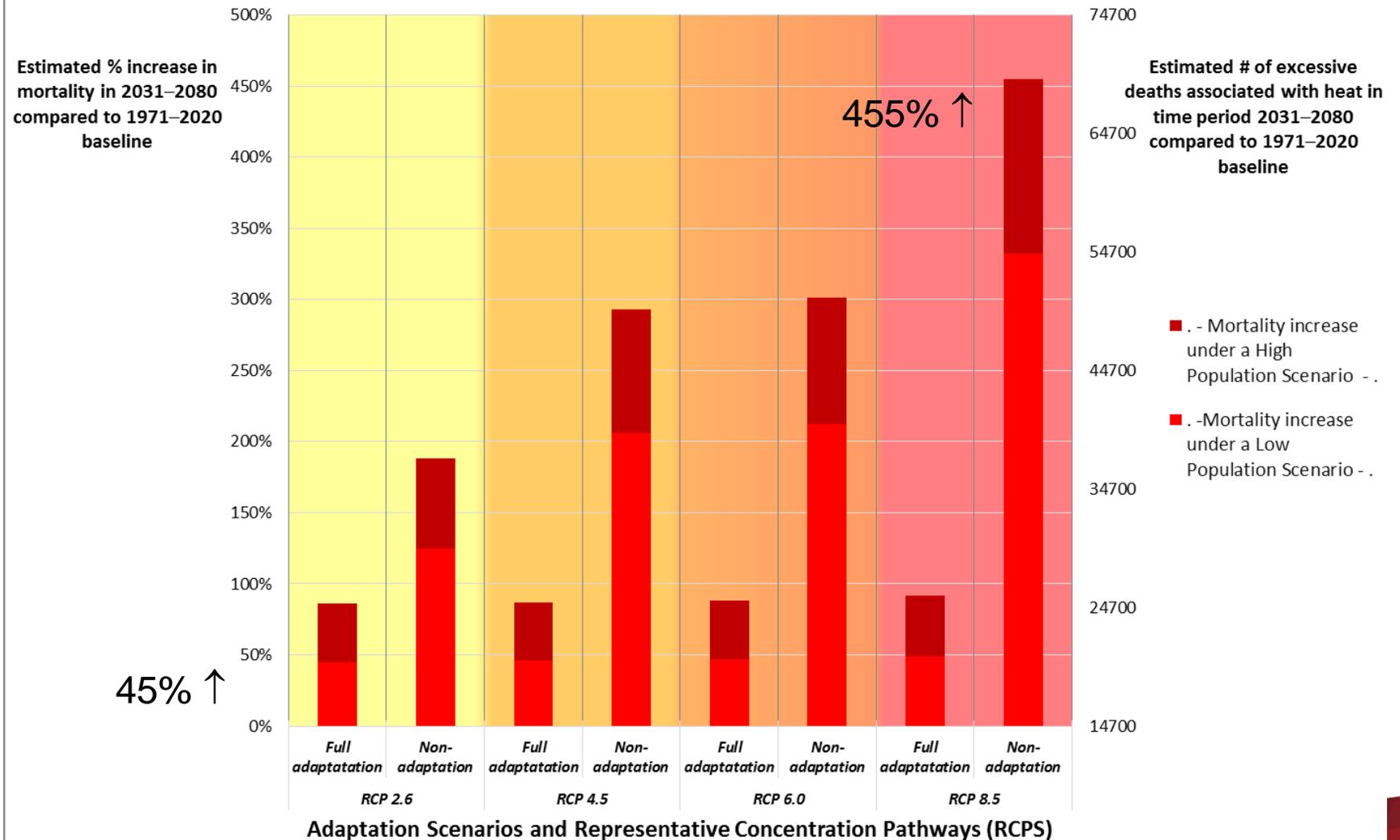


- Frequency
- Intensity
- Duration
- Geographic Range
- Heat Season

4.2 Future Mortality associated with heat waves (Extreme Heat Events)

Under different climate change, adaptation, and population scenarios between 2031-2080, as compared to the baseline value from 1971-2020

Adapted from : Guo Y, Gasparrini A, Li S, et al.. [Quantifying excess deaths related to heatwaves under climate change scenarios: A multi-country study.](#) *PLOS Medicine* 2018a;15(7):e1002629



“Tackling climate change could be the greatest global health opportunity of the 21st century”

Lancet Commission on Climate and Health, 2015

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Heat related illness and death is preventable

“Tackling climate change could be the greatest global health opportunity of the 21st century”

Lancet Commission on Climate and Health, 2015

There are a wide range of adaptation options that can reduce the risks of climate change (high confidence)

IPCC, 2018

Heat related illness and death is preventable



5.1 Adaptation is key



Individual

(information provision, public education)



Interpersonal

(information sharing, communication)



Institutional

(engagement, strengthening community infrastructure)



Environmental

(urban planning, natural and built environment)



Community

(institutional policies, partnership working, quality standards)



Public Policy

(improvement of health services, resource management)

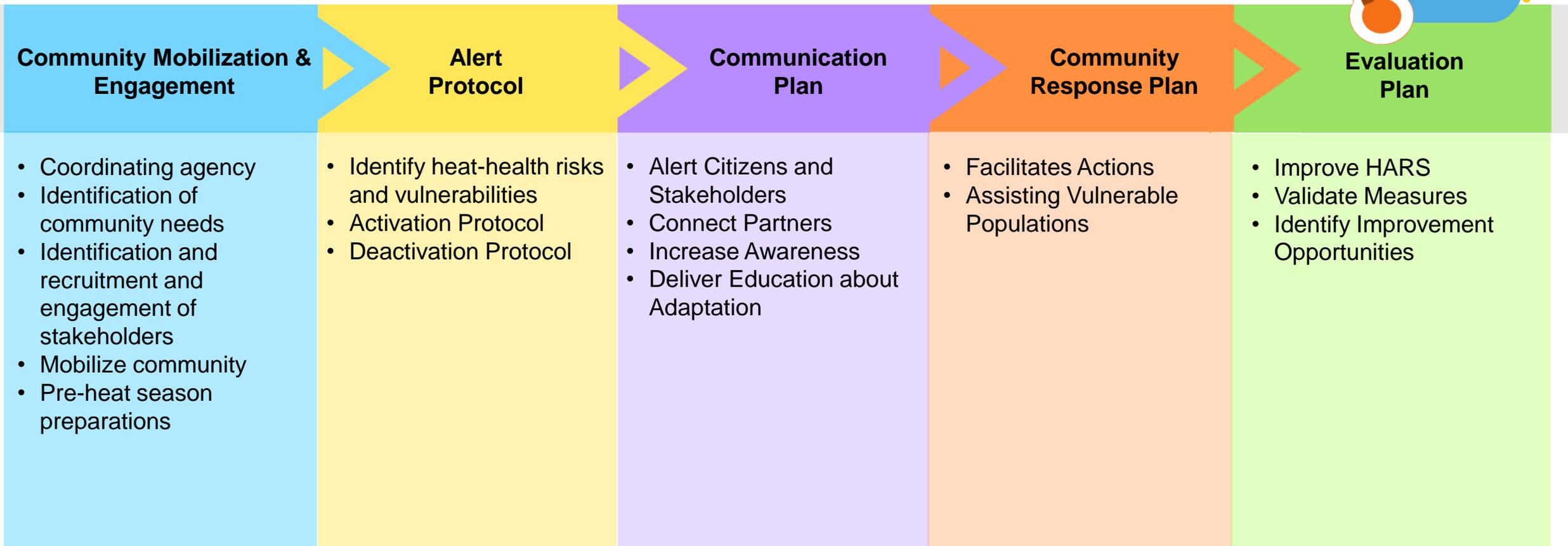
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5.2 Health Canada's Role in adapting to extreme heat



5.3 Health Canada supports a key community adaptation: Heat Alert and Response Systems (HARS)

HEAT ALERT RESPONSE SYSTEMS (HARS)



5.3 Key community adaptation: Heat Alert and Response Systems (HARS) Communication Plans – Social Media



5.3 Key community adaptation: Heat Alert and Response Systems (HARS) *Community Response Plans*

Examples of Actions



- Opening public spaces such as libraries and community centres that are equipped with air conditioning as well as city pools



- Visits to seniors and homecare patients



- Public awareness messages - issuing press releases with locations and hours of cooling facilities open to the public



- Ensure that vulnerable individuals are informed about ways to stay safe in the heat



- Open and promote telephone lines (e.g. 811) to provide advice to the public



- Install and/or enhance shade structures and water stations in public parks as a part of long term planning



- Actions put in place for employees: water distribution, work breaks, cooling necklaces, common areas with AC

5.3 How does Health Canada support HARS development & advancement?

- Guidance and publications
- Supporting pilot projects and exercises
- Facilitating collaboration and knowledge sharing between jurisdictions

British Columbia

- Supporting HARS implementation rural community

New Brunswick

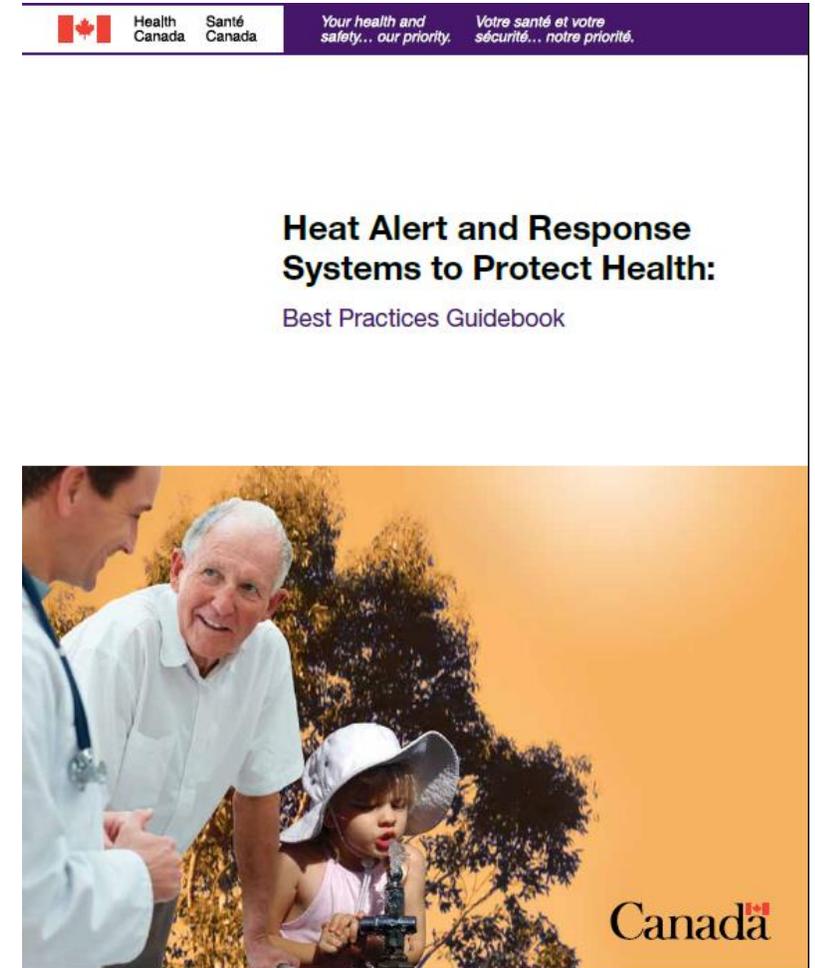
- Supported the implementation of a HARS and continues to provide support for enhancement

Newfoundland and Labrador

- Supporting the development of HARS responses and communications around outdoor summer athletic events

Nova Scotia

- Supporting the development of a Provincial Extreme Heat Action Plan
- Community based HARS Demonstration Project



5.4 Health Promotion and Outreach

- Educate the public and train health care professionals

New Infographic and Fact Sheets

New for 2019 – also being animated

STAYING HEALTHY AS HEAT

HEAT EXHAUSTION

- Headaches
- Skin rash
- Muscle cramps
- Dizziness or fainting
- Nausea or vomiting
- Heavy sweating
- Rapid breathing and heart rate
- Extreme thirst
- Dark urine and decreased urination

If you experience any of these symptoms during a heat wave, immediately move to a cool place and drink liquids; water is best.

What are the SIGNS AND SYMPTOMS of heat illness?

HEAT STROKE

- High body temperature
- Confusion and lack of coordination
- Dizziness or fainting
- No sweating, but very hot, red skin

Heat stroke is a medical emergency! Call 911 or your local emergency number immediately. While waiting for help—cool the person right away by:

- moving them to a cool place, if you can
- applying cold wet cloths to areas of the body, and
- fanning the person as much as possible.

Health Canada Santé Canada

STAYING HEALTHY AS HEAT

Who is MOST AT RISK?

FACT 1 OLDER ADULTS

Older adults may be faced with compounding factors that could put them at increased risk during extreme heat events. These factors may include chronic illnesses, medications that interfere with the body's cooling mechanisms, social isolation, and poverty.

FACT 2 INFANTS AND YOUNG CHILDREN

Given the unique physiological characteristics of children's bodies and their high dependency on caregivers, they are likely to be at risk during extreme heat events.

FACT 3 CHRONIC ILLNESS/SPECIAL MEDICATION

Individuals with breathing difficulties, heart problems, and psychiatric illnesses are at a higher risk of heat-related health effects.

FACT 4 PEOPLE WHO WORK OR ARE ACTIVE OUTDOORS

People who work outdoors (e.g., construction, road repair) and physically active individuals who exercise in the heat could face greater environmental, heat exposure and physical strain.

Health Canada Santé Canada

STAYING HEALTHY AS HEAT

SAFETY TIPS

TIP 1 PREPARE FOR THE HEAT

- Have a regularly scheduled weather forecast and alert so you know when to take extra care.
- If you have an air conditioner, make sure it works properly.
- If you don't have an air conditioner, find an air-conditioned space close by where you can cool off for a few hours on very hot days.

TIP 2 KNOW THE SIGNS OF HEAT

TIP 3 PAY ATTENTION TO HOW YOU—AND THOSE AROUND YOU—FEEL

Frequently visit neighbors, friends and older family members, especially those who are chronically ill, to make sure that they are cool and hydrated.

TIP 4 DRINK LIQUIDS; WATER IS BEST.

TIP 5 STAY COOL

How to stay cool?

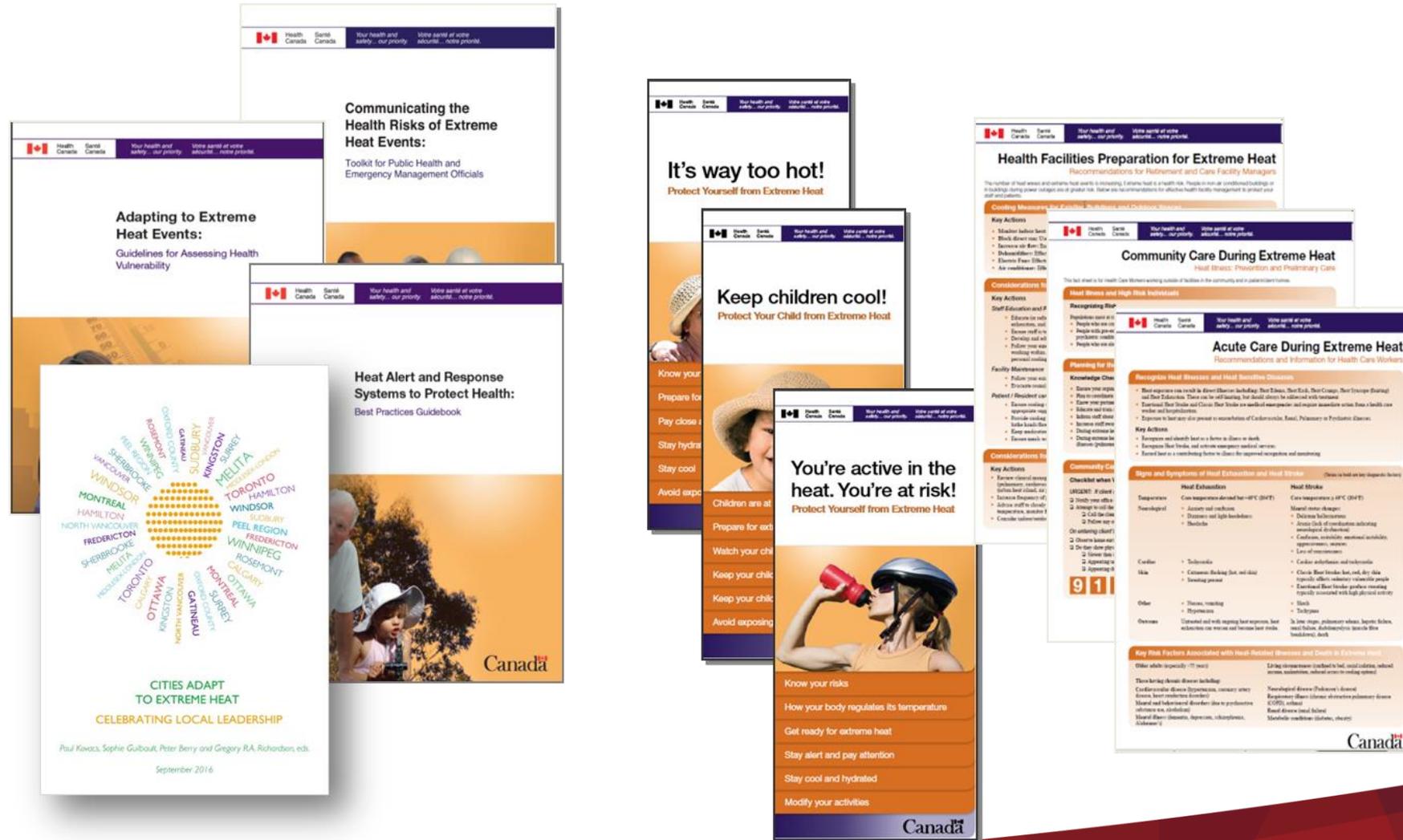
- Wear loose-fitting, light-colored clothing made of breathable fabric.
- Take cool showers or baths and use fans, exhaust.
- Plan strenuous outdoor activities for cooler times, or choose a cooler location. Use shade with air conditioning when the temperature is high.
- Avoid hot beverages and alcohol. If you must have a hot drink, it should be a four-ounce cup, so you can finish it quickly.

Health Canada Santé Canada

5.3 Health Promotion and Outreach

Health Canada Heat Health Publications

- Wide variety of audiences
- Action oriented



5.4 Health Promotion and Outreach

Heat Community of Practice

(<https://gccollab.ca/groups/profile/87076/ennational-heat-health-community-of-practicefrcommunautu00e9-9-de-pratique-nationale-sur-la-chaleur-et-la-santu00e9>)

aims to support and further efforts at the local and regional levels across Canada to protect health from extreme heat, by linking partners through the sharing of:

Information

Experiences

Best adaptation practices

Training Health Care Professionals

designed to increase awareness and train health professionals to deliver messages regarding extreme heat to the public including vulnerable populations and also with other health care professionals



National Heat Health Community of Practice (HCOP)

To join contact rami.yassine@canada.ca
or maria.malik@canada.ca

7. Conclusion

- **Extreme Heat Events:** The number of extremely hot days in a year is expected to more than double in some parts of Canada and also increase the number of warm/ hot nights.
- **Mortality:** As climate change progresses, Canada is projected to experience an increase in heat-wave associated excess mortality
- **Solutions:** Heat related illness and death is preventable
- Evidence that HARS / Heat Health Action Plans reduce the risk of heat related illness and death
- Need to build the Canadian evidence base to improve the understanding of interventions and their effectiveness
- More heat science is needed and to support and advance adaptation

Thank you

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HEAT EXHAUSTION

- Skin rash
- Muscle cramps
- Dizziness or fainting
- Nausea or vomiting
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HEAT STROKE

What are the SIGNS AND SYMPTOMS of heat illness?

- High body temperature
- Confusion and lack of coordination
- Slurred or fainting
- No sweating, but very hot, red skin

Heat stroke is a medical emergency! Call 911 or your local emergency number to send help. While waiting for help—cool the person right away by:

- moving them to a cool place if you can,
- applying cool water to large areas of the skin and
- fanning the person as much as possible.

For more information, visit the [Prevention of heat-related illness](#) page.

Canada

Who is MOST AT RISK?

FACT 1 OLDER ADULTS

Older adults may be faced with compounding factors that could put them at increased risk during extreme heat events. These factors may include chronic illnesses, medications that interfere with the body's cooling mechanisms, social isolation, and poverty.

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FACT 4 PEOPLE WHO WORK OR ARE ACTIVE OUTDOORS

People who work outdoors (e.g., construction, road repair) and physically active individuals who exercise in the heat could face greater environmental heat exposure and physical strain.

Canada

SAFETY TIPS

TIP 1 PREPARE FOR THE HEAT

Take long-term steps to reduce your heat stress and always be prepared to take extra care. If you have an air conditioner, make sure it works properly. If you don't have an air conditioner, find air-conditioned spaces like libraries you can cool off for a few hours on very hot days.

TIP 2 KNOW THE SIGNS OF HEAT

TIP 3 PAY ATTENTION TO HOW YOU—AND THOSE AROUND YOU—FEEL

Frequently visit neighbors, friends and older family members, especially those who are chronically ill, to make sure they are cool and hydrated.

TIP 4 DRINK LIQUIDS; WATER IS BEST.

TIP 5 STAY COOL

How to stay cool?

- Wear loose-fitting, light-colored, clothing made of breathable fabric.
- Take cool showers or baths and use fans.
- Plan to exercise or outdoor activities in the cooler parts of the day, or indoors in air-conditioned spaces.
- Use air conditioning or fans to cool your home.
- Check if you have a hot water heater. It should be turned down or set to 120°F to save energy and prevent scalding.

Canada

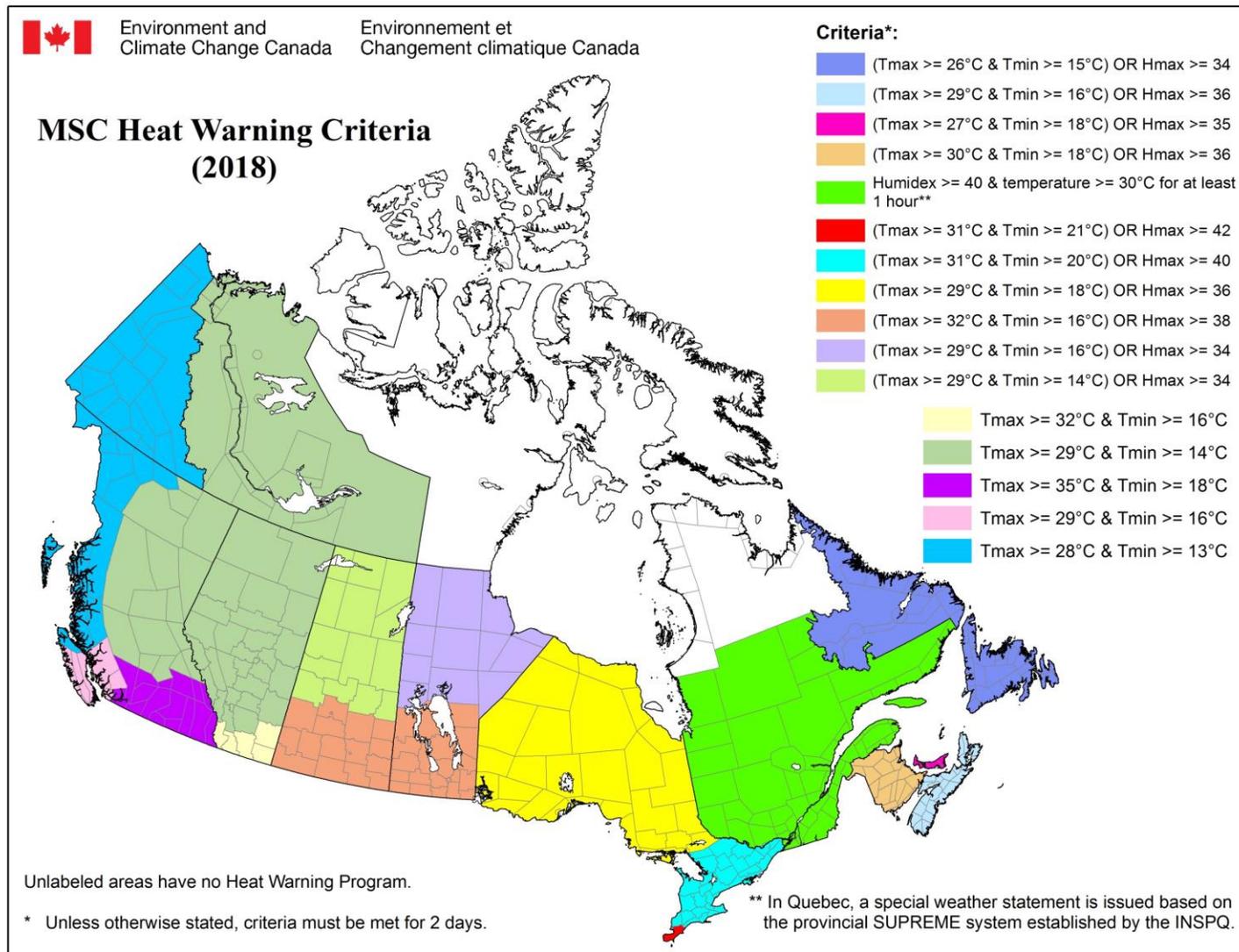
Heat, Health and Climate Change

APPENDIX

Spectrum of Health Related Illness



1.2 Thresholds for heat warnings in Canada - 2018



1. What is extreme heat and why does it matter to Canadians?

1.3 Thresholds for heat warnings in Canada

Source: <https://www.canada.ca/en/environment-climate-change/services/types-weather-forecasts-use/public/criteria-alerts.html#heat>

Location	Threshold criteria
Alberta - Extreme south (including Pincher Creek, Cardston, Lethbridge, and Medicine Hat)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 32° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer.
Alberta - Remainder of Alberta (including the Cities of Edmonton, Red Deer and Calgary)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 14° C or warmer.
British Columbia – Northeast – Northern Interior, Central Interior, including Chilcotin, Cariboo, Prince George, North Thompson, and North Columbia, BC Peace, Bulkley Valley and the Lakes and Fort Nelson	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 14° C or warmer.
British Columbia – Northwest – Central and Northern Coast (inland and coastal regions), Northern Vancouver Island, and northwestern BC	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 28° C or warmer and nighttime minimum temperatures are expected to fall to 13° C or warmer.
British Columbia – Southeast – Fraser Valley, Southern interior (including South Thompson and Okanagan), Kootenays, and Columbias (south)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 35° C or warmer and nighttime minimum temperatures are expected to fall to 18° C or warmer.
British Columbia – Southwest – Metro Vancouver, Howe Sound, Whistler, Sunshine Coast, Vancouver Island (except northern sections)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer.
Manitoba - North	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 34 or higher.
Manitoba - South	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 32° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 38 or higher.
New Brunswick	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 30° C or warmer and nighttime minimum temperatures are expected to fall to 18° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 36 or higher.
Newfoundland and Labrador	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 26° C or warmer and nighttime minimum temperatures are expected to fall to 15° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 34 or higher.
Northwest Territories	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 14° C or warmer.
Nova Scotia	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 36 or higher.
Nunavut	No Heat Warning Program at this time.
Ontario - extreme southwest (Essex and Chatham-Kent Counties)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 31° C or warmer and nighttime minimum temperatures are expected to fall to 21° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 42 or higher.
Ontario - North	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 18° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 36 or higher.
Ontario - remainder of southern Ontario (including the District of Parry Sound)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 31° C or warmer and nighttime minimum temperatures are expected to fall to 20° C or warmer OR Issued when 2 or more consecutive days of humidex values are expected to reach 40 or higher.
Prince Edward Island	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 27° C or warmer and nighttime minimum temperatures are expected to fall to 18° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 35 or higher.
Quebec, except Nunavik*	Issued when the humidex value is 40 or higher and when the temperature is 30° C or warmer, and both conditions persist for at least one hour. Or Issued when temperature is 40° C or warmer.
Saskatchewan - North and Central (including Meadow Lake, The Battlefords, Prince Albert, and Hudson Bay)	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 29° C or warmer and nighttime minimum temperatures are expected to fall to 14° C or warmer. Or Issued when 2 or more consecutive days of humidex values are expected to reach 34 or higher.
	Issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 32° C or warmer and nighttime minimum temperatures are expected to fall to 16° C or warmer.

4.1 Future heat health impacts in Canada – Appendix?

REGION ^b	SCENARIO; PERIOD; MEDIAN (25%, 75% PERCENTILE)			
	RCP2.6		RCP8.5	
	2031–2050	2081–2100	2031–2050	2081–2100
Annual highest daily maximum temperature, °C				
British Columbia	1.7 (0.9, 2.4)	1.7 (1.2, 2.4)	2.3 (1.6, 3.2)	6.7 (4.9, 7.9)
Prairies	1.6 (0.9, 2.3)	1.6 (1.1, 2.4)	2.5 (1.8, 3.1)	6.9 (5.2, 8.2)
Ontario	1.6 (1.0, 2.4)	1.5 (0.8, 2.2)	2.5 (1.9, 3.0)	6.6 (5.2, 7.7)
Quebec	1.4 (0.8, 2.2)	1.3 (0.7, 2.0)	2.1 (1.5, 2.7)	5.9 (4.7, 7.1)
Atlantic	1.4 (0.9, 1.9)	1.2 (0.6, 1.9)	1.9 (1.4, 2.4)	5.5 (4.6, 6.5)
North	1.3 (0.6, 2.2)	1.5 (0.7, 2.2)	1.8 (0.9, 2.7)	5.7 (3.6, 7.3)
Canada	1.4 (0.7, 2.3)	1.5 (0.8, 2.2)	2.0 (1.2, 2.8)	6.1 (4.2, 7.5)
Annual highest daily minimum temperature, °C				
British Columbia	2.1 (1.1, 3.7)	2.7 (1.4, 4.2)	3.7 (2.4, 5.3)	10.1 (8.5, 11.7)
Prairies	2.1 (1.3, 3.3)	2.5 (1.6, 3.8)	3.5 (2.5, 4.9)	10.5 (9.3, 12.8)

Source: Table 4.3: Multi-model changes in indicators of temperature (CCCR 2019. <https://changingclimate.ca/CCCR2019/graphics/>)

^aBased on statistically downscaled temperature from simulations by 24 Earth system models (adopted from Li et al., 2018).

^bRegions are defined by political boundaries; “North” includes the three territories (see Figure 1.1).