Climate change and health: a public health concern

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Outline

- Introduction
- Horsemen of the Anthropocene – heat, droughts, wildfires and floods
- Climate change and infectious disease
- Climate change and migration
- Examples of climate change and health research at AHRI

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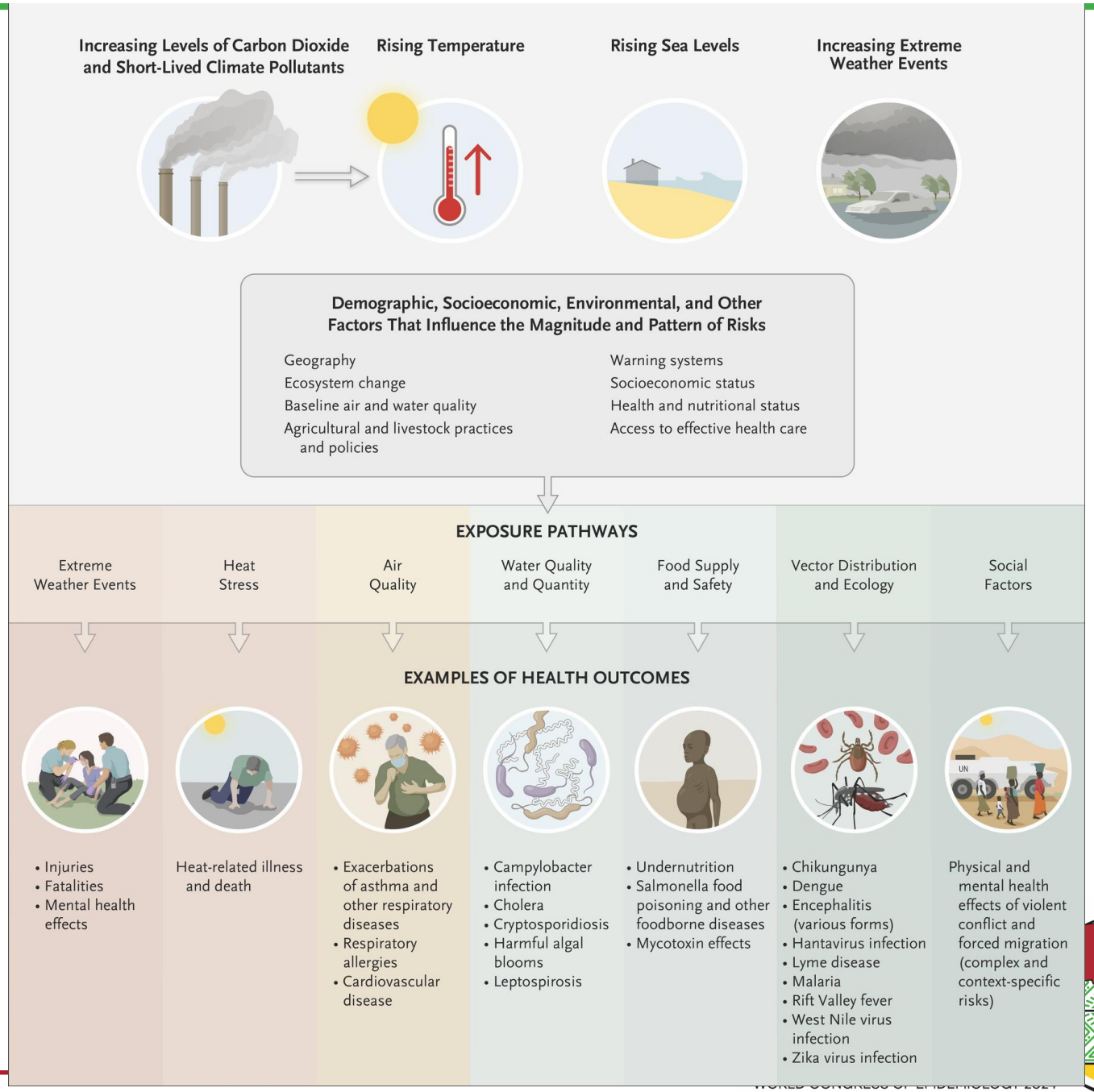
Effects of Climate Change

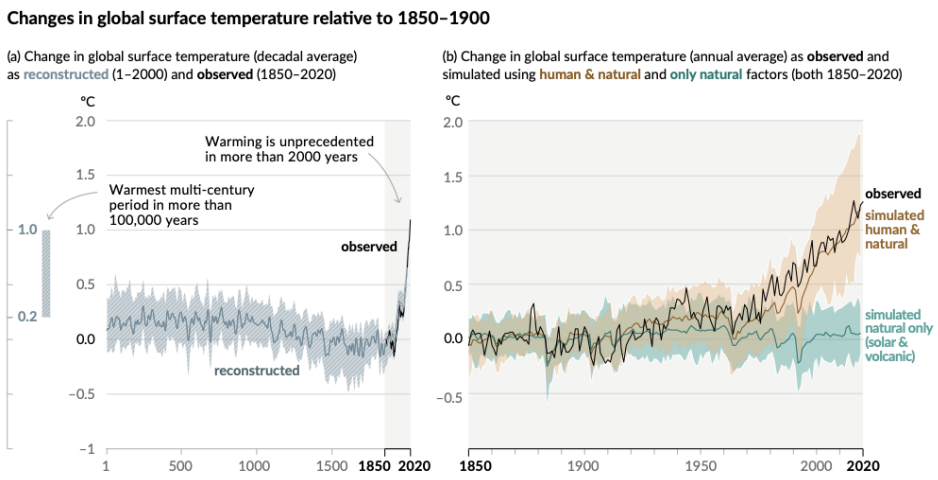
Haines & Ebi 2019

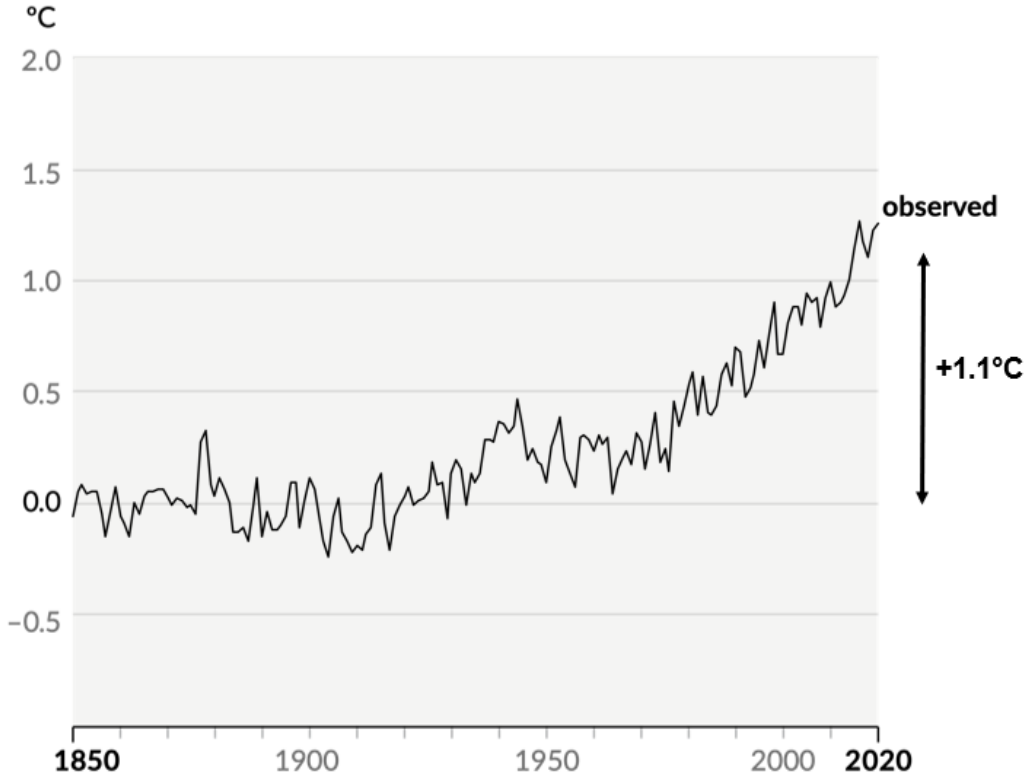


Heat

Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (1850-1900)

- The climate is warming because of human activities
- Current warming of 1.1°C





IPCC 2022 AR6 WG1

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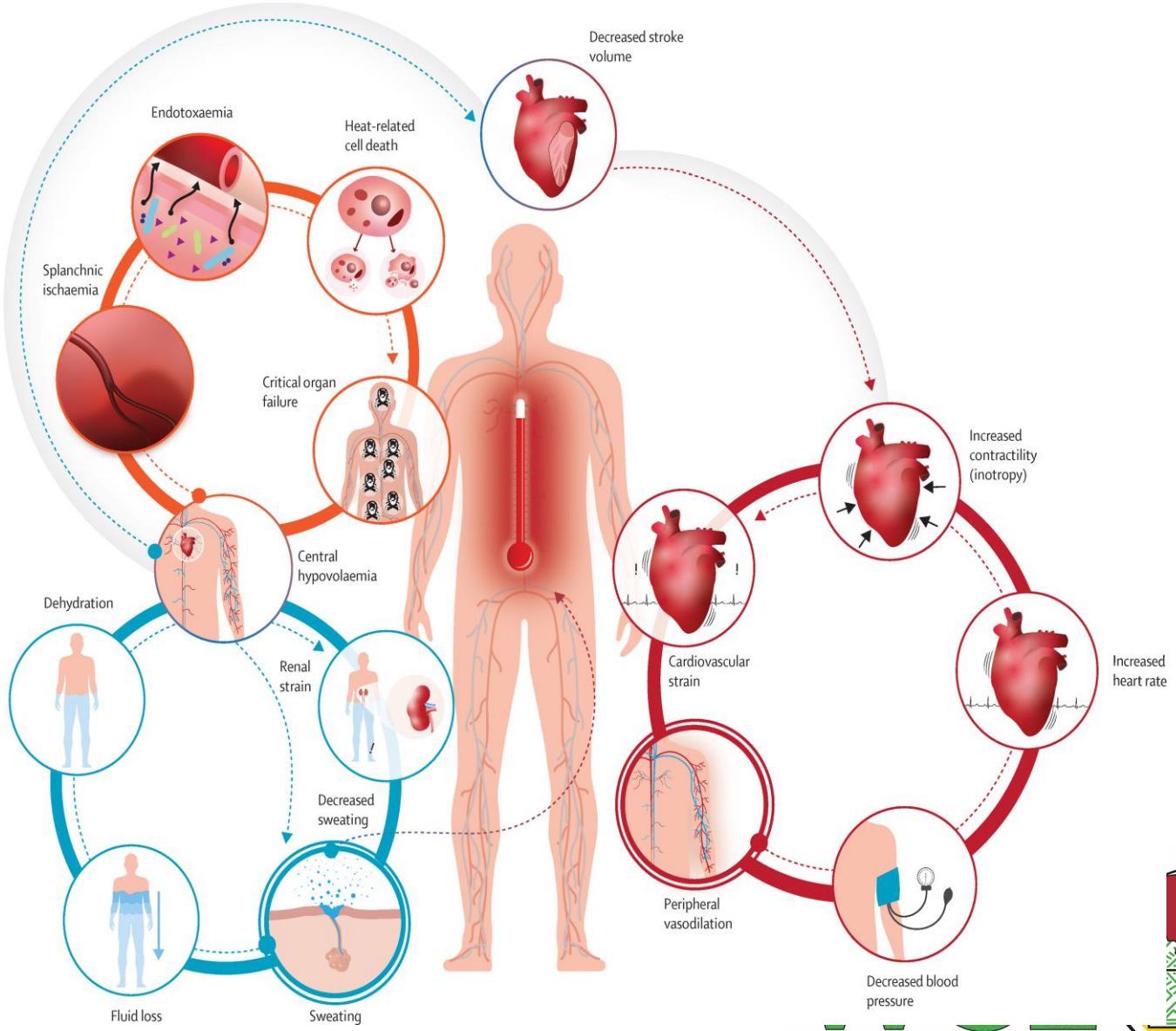
Impact of heat on health

- Heat exhaustion
- Heat stroke
- Death from cardiac ischaemia, infarction and collapse
- ARDS
- Renal failure

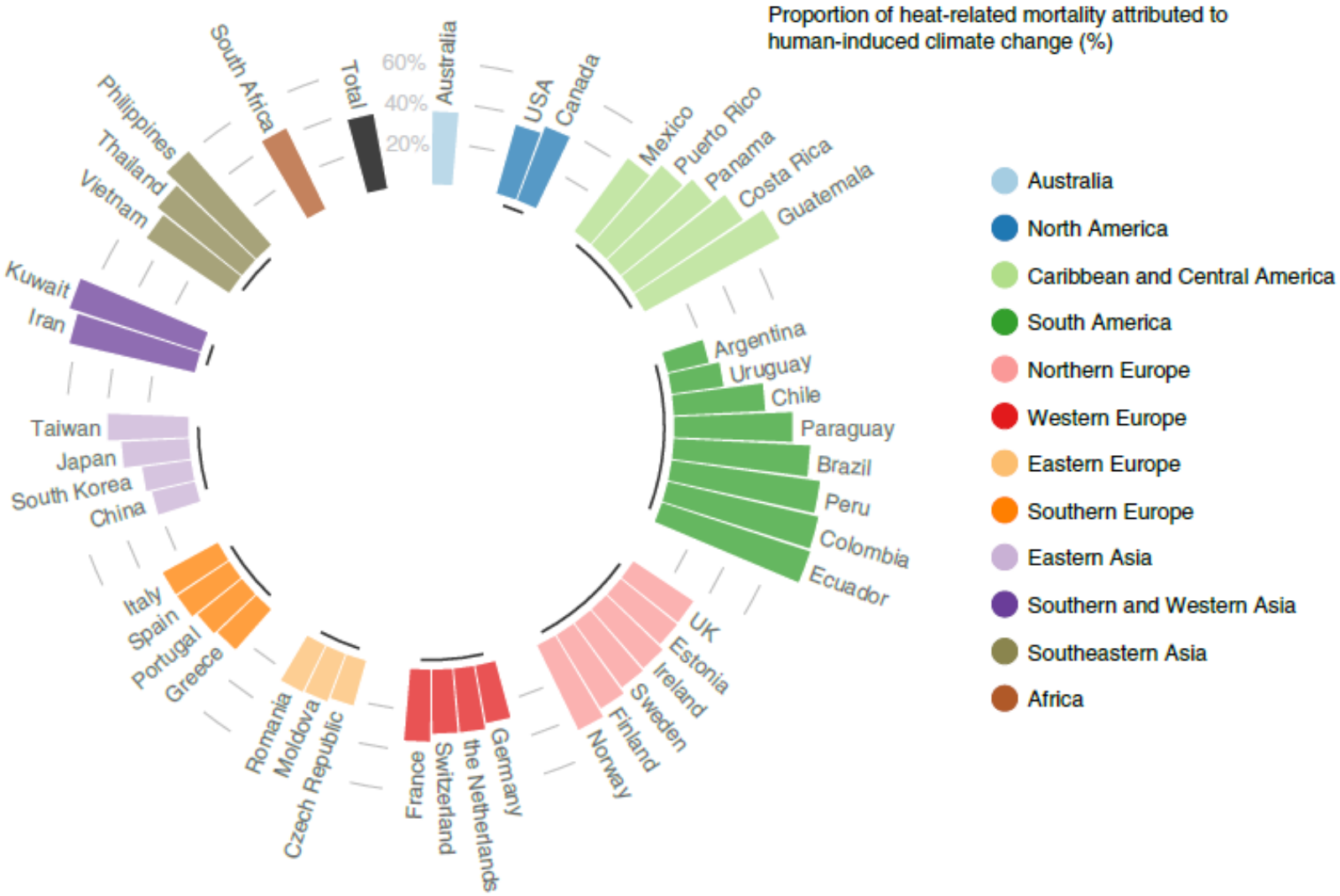


Ebi K et al 2021

Proportion of heat-related mortality attributed to human-induced climate change

- 37% of heat-related deaths are attributable to human-induced climate change

- 43 countries
- 1991-2018



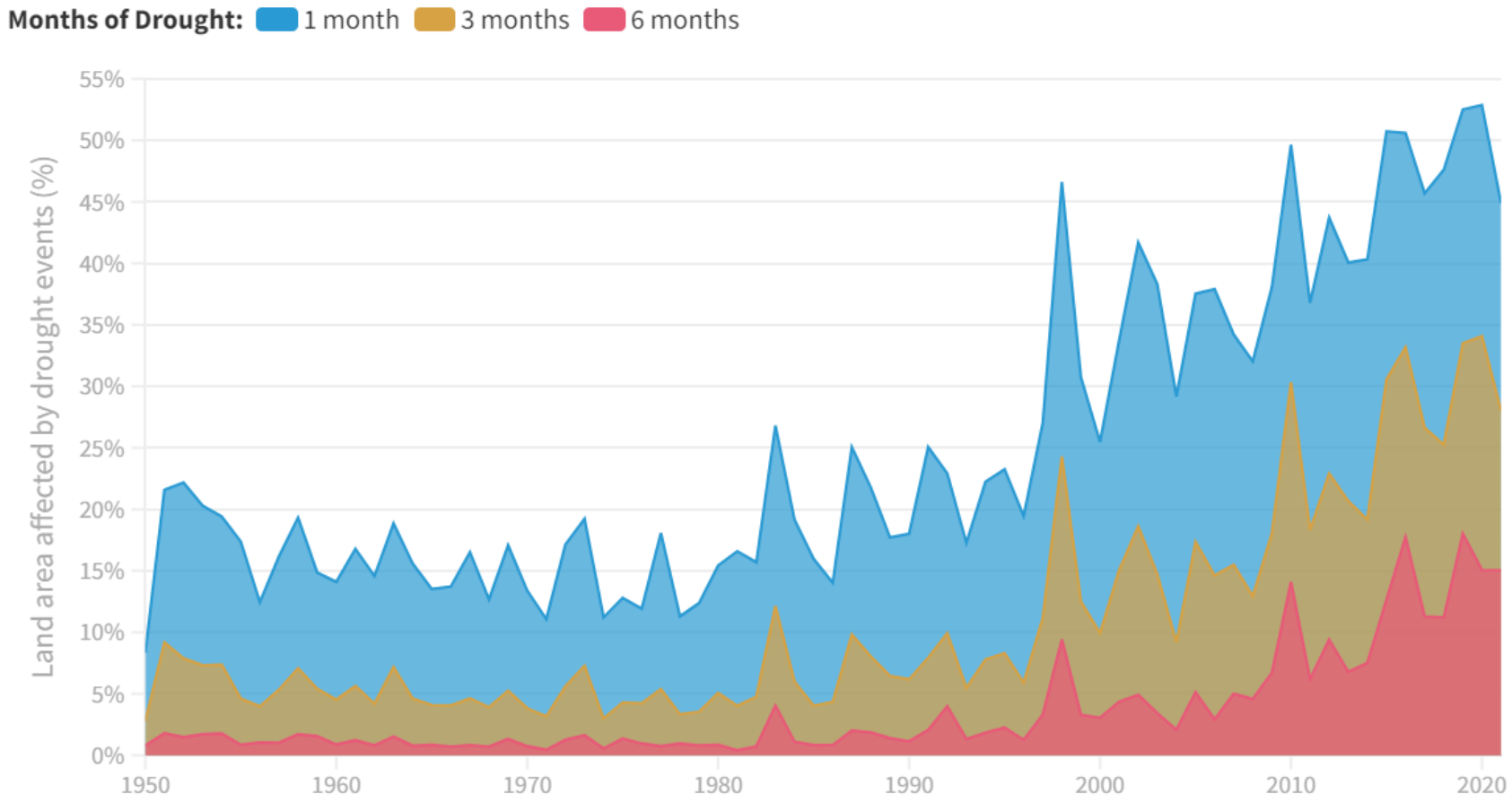
Drought

- Drought is a prolonged dry period in the natural climate cycle
- The drought-induced famine in Uganda caused 2,465 deaths, making it the second deadliest disaster event in 2022
- Impacted 88.9 million people in six African countries (the Democratic Republic of the Congo, Ethiopia, Nigeria, Sudan, Niger, and Burkina Faso) in 2022.
- Drought events also occurred in China (where 6.1 million people were affected, costing damage worth US$ 7.6 B), in the USA (US$ 22 B), and in Brazil (US$ 4 B)

2022 EMDAT Report

Global land area affected by drought events per year

- In 2013-22, almost 47% of global land area was affected by at least 1 month of extreme drought each year



Lancet Countdown 2023

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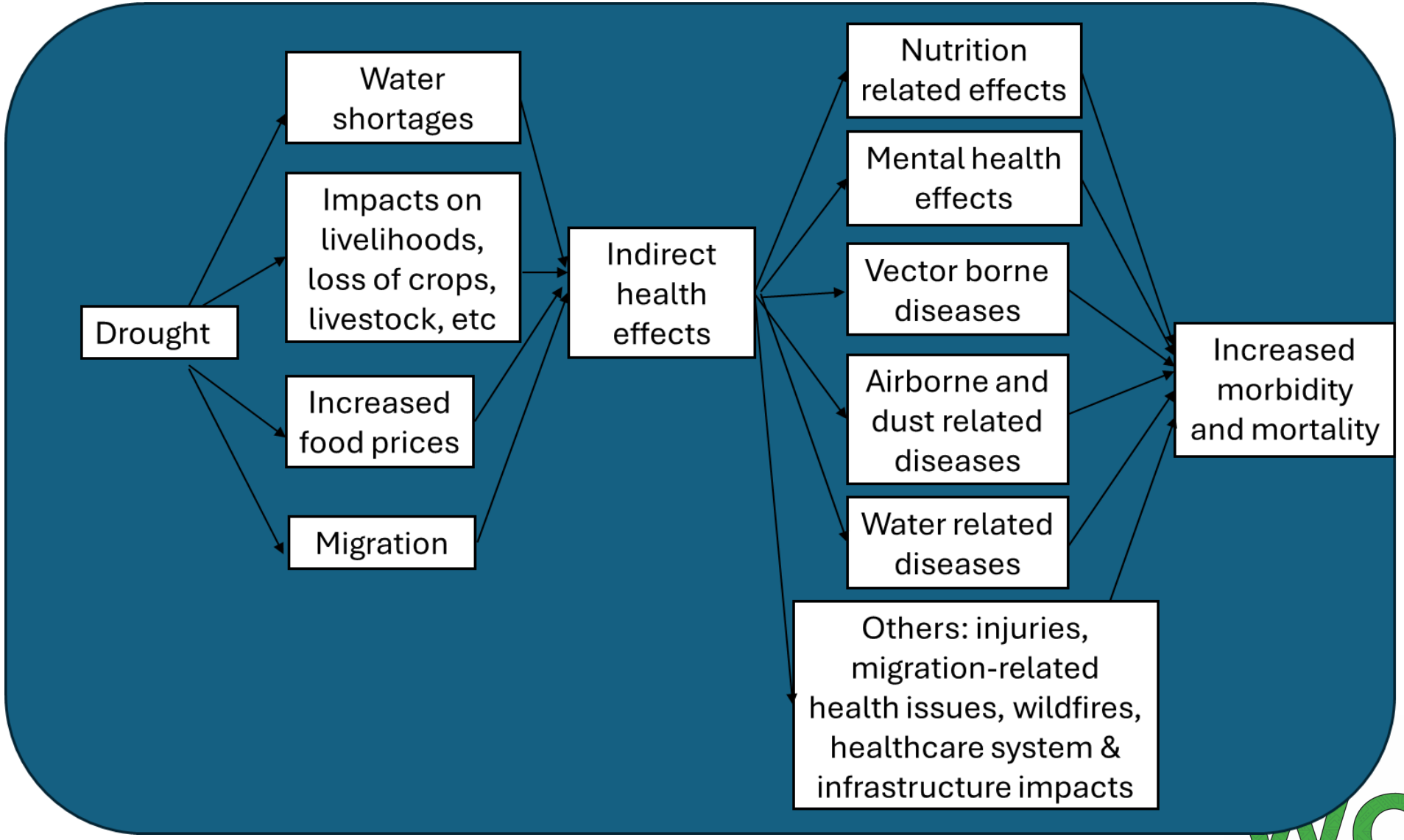
Health impacts of drought



Stanke C et al., 2013

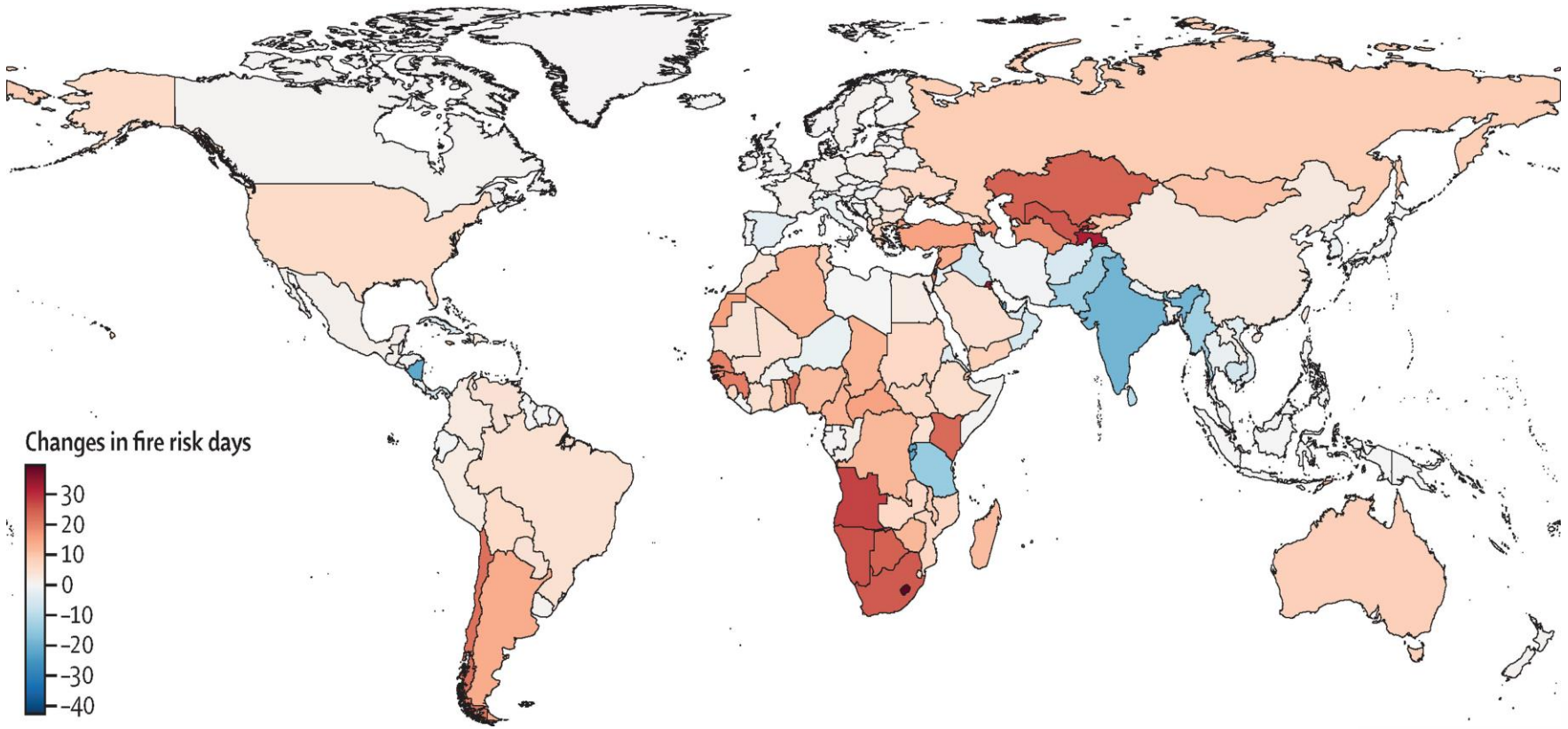
Wildfires

- Fires are increasing around the world
  - Unhealthy, dangerous, expensive
  - Air pollution

- Nearly 61% of countries had an increase in the number of days people were exposed to very high or extremely high fire danger in 2018–21 compared with 2001–04

Lancet Countdown 2022

Annual population-weighted mean change in the number of days with very high and extremely high risk of wildfire from 2001–04 to 2018–21 for each country or territory



Lancet Countdown 2022

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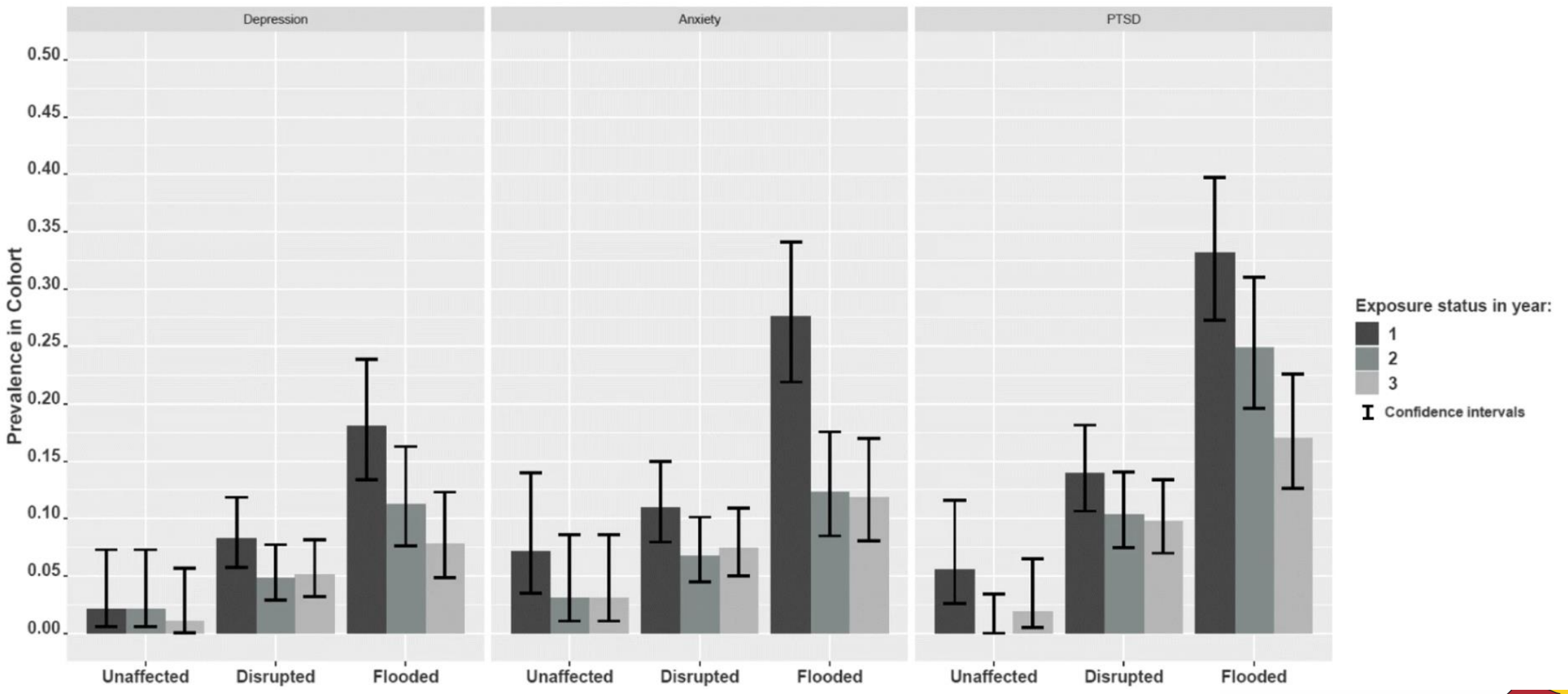
Australia's 2019-2020 Black Summer bushfires

- 2019 was the hottest and driest year on record in Australia
- Anthropogenic climate change increased the probability of bushfires by more than 30%
- The fires directly caused:
  - 450 deaths
  - 1300 emergency asthma presentations, and
  - 1120 cardiovascular and 2030 respiratory admissions
  - Worsening mental health outcomes and
  - Displaced 47 000 people
  - Nearly 3 billion wild animals wiped out
- These bushfires contributed to 715 megatonnes of CO_2 emissions, equivalent to around 0·2% of global greenhouse gas emissions that year

Floods

- Physical injuries and death
- Drowning/electrocution
- Infrastructure damage
  - Power outages
  - Building damage – moulds
- Water-borne diseases
- Access to healthcare facilities
- Mental health impacts
- Migration

Floods and mental health



Mulchandani R et al., 2020

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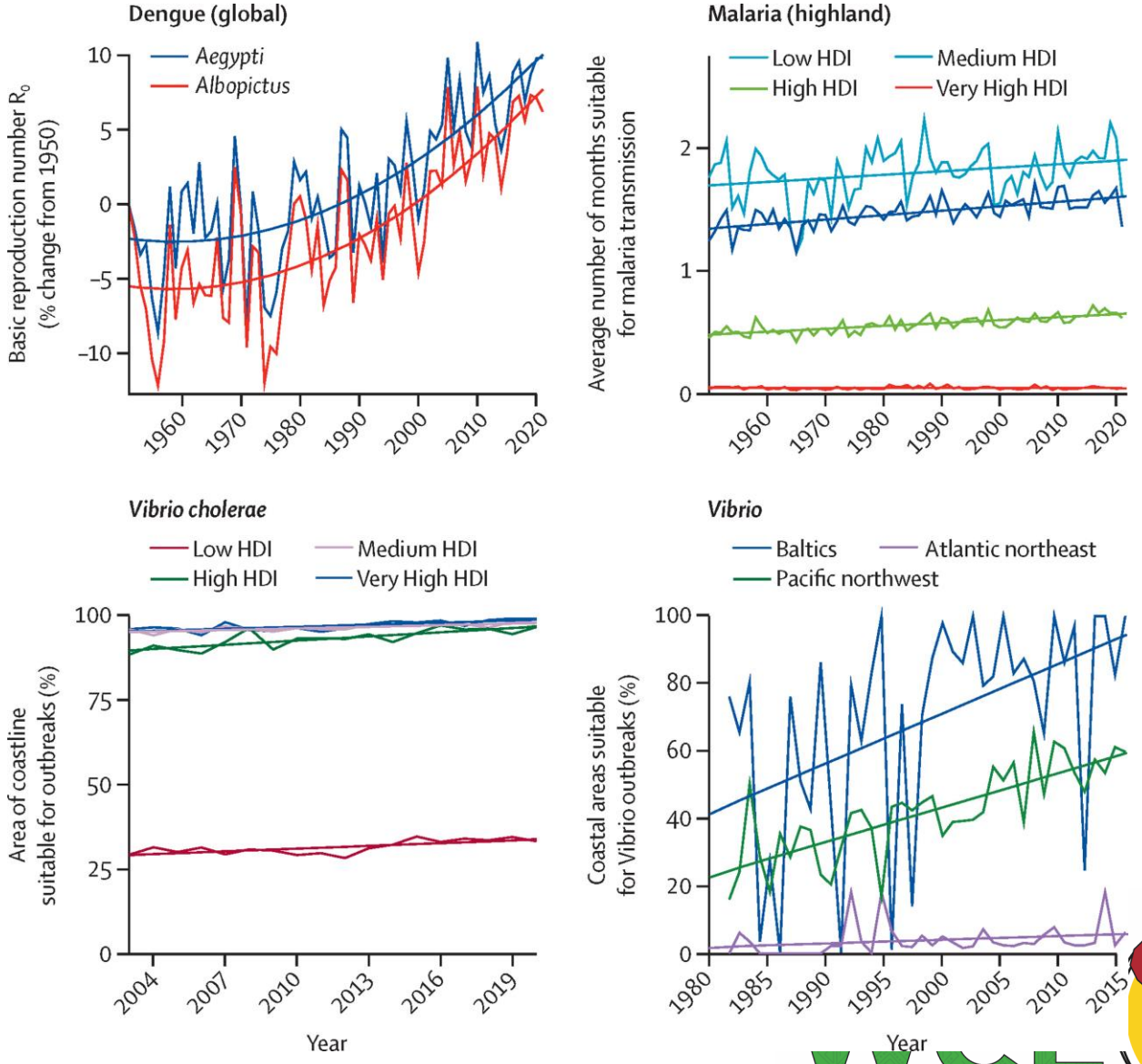
Climate change and infectious disease transmission

- Distribution and transmission of many infectious diseases
- Half the world's population now lives in countries where dengue is present
- R0 for transmission of dengue, Zika and Chikungunya
- Longer duration of transmission season for malaria
- Increased survival of *vibrio cholerae* in natural waters



Lancet Countdown 2022

Climate change and mass migration

- Myriad health effects:
- nutrition, mental health, crowded shelter conditions leading to infectious and vector- and water- borne illness, violence

Chi Xi et al., 2020

THE LANCET
Planetary Health

REVIEW | VOLUME 6, ISSUE 4, E359-E370, APRIL 2022 Download Full Issue

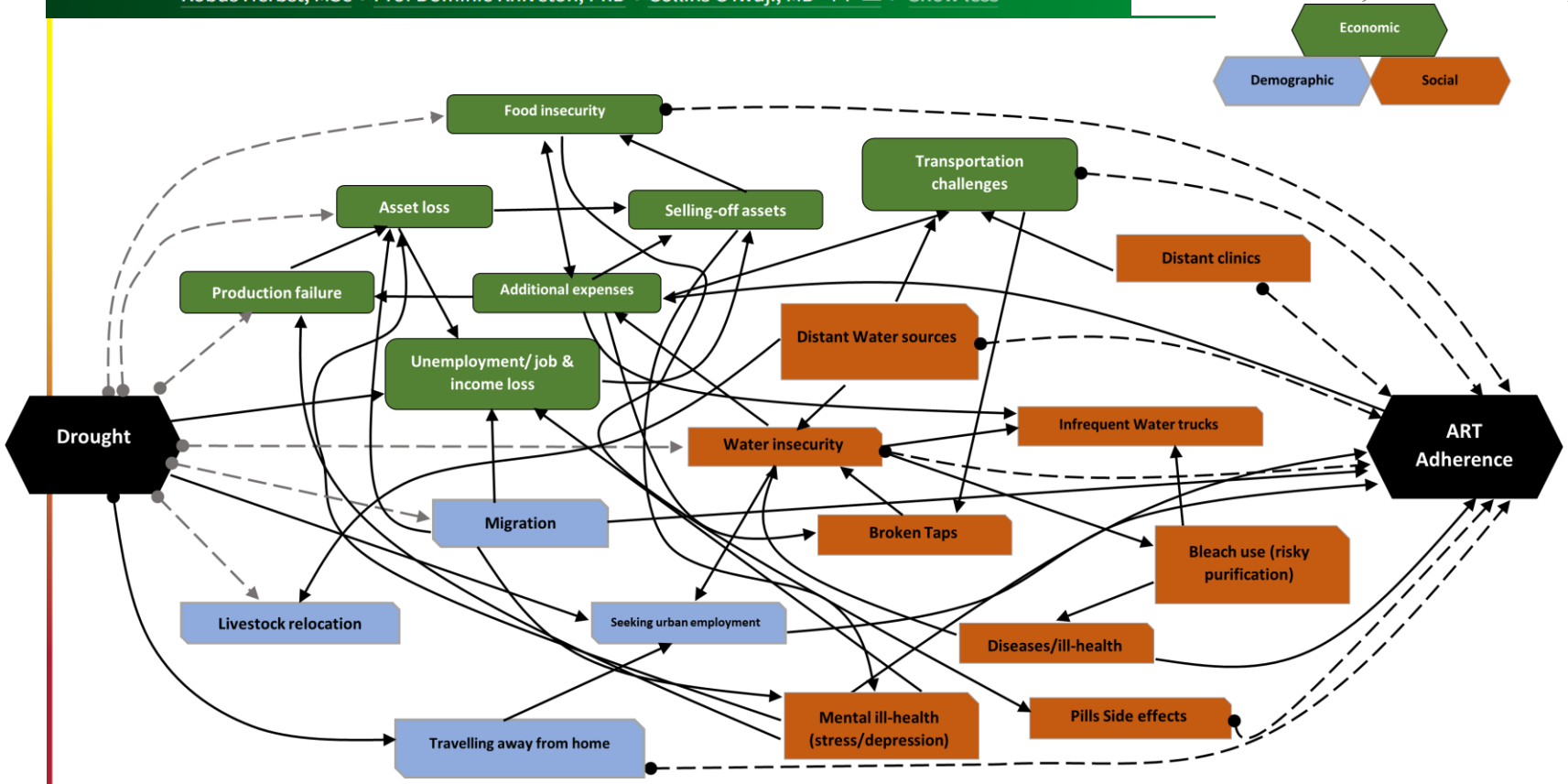
Exploring linkages between drought and HIV treatme adherence in Africa: a systematic review

Kingsley Stephen Orievulu, PhD • Sonja Ayeb-Karlsson, PhD • Sthembile Ngema, PGDip • Kathy Baisley, Prof Frank Tanser, PhD • Nothando Ngwenya, PhD • Prof Janet Seeley, PhD • Prof Willem Hanekom, MBC Kobus Herbst, MSc • Prof Dominic Kniveton, PhD • Collins C Iwuji, MD • Show less

Contents lists available at ScienceDirect
Climate Risk Management
journal homepage: www.elsevier.com/locate/crm

Economic, social and demographic impacts of drought on treatment adherence among people living with HIV in rural South Africa: A qualitative analysis

Kingsley Orievulu [a,b,c,d], Sonja Ayeb-Karlsson [b,e,k], Nothando Ngwenya [a], Sthembile Ngema [a], Hayley McGregor [f], Oluwafemi Adeagbo [a,g,l], Mark J. Siedner [a,h], Willem Hanekom [a,d], Dominic Kniveton [i], Janet Seeley [a,j], Collins Iwuji [a,b,*]



Systems diagram linking drought with ART adherence

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The Impact of Drought on HIV Care in Rural South Africa: An Interrupted Time Series Analysis

Original Contribution | Open Access | Published: 31 July 2023 | (2023)

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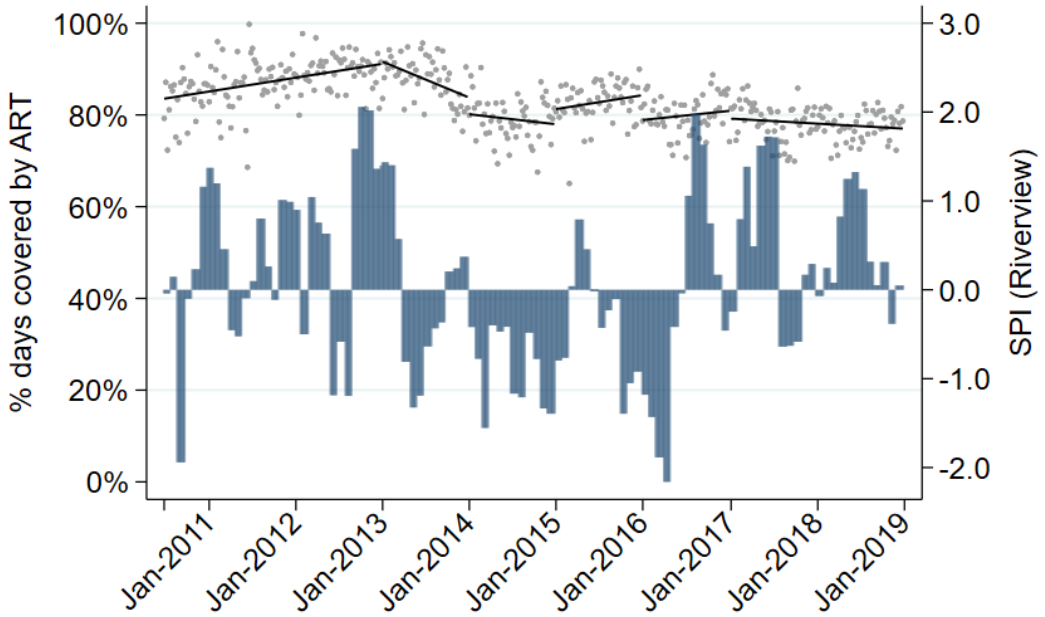
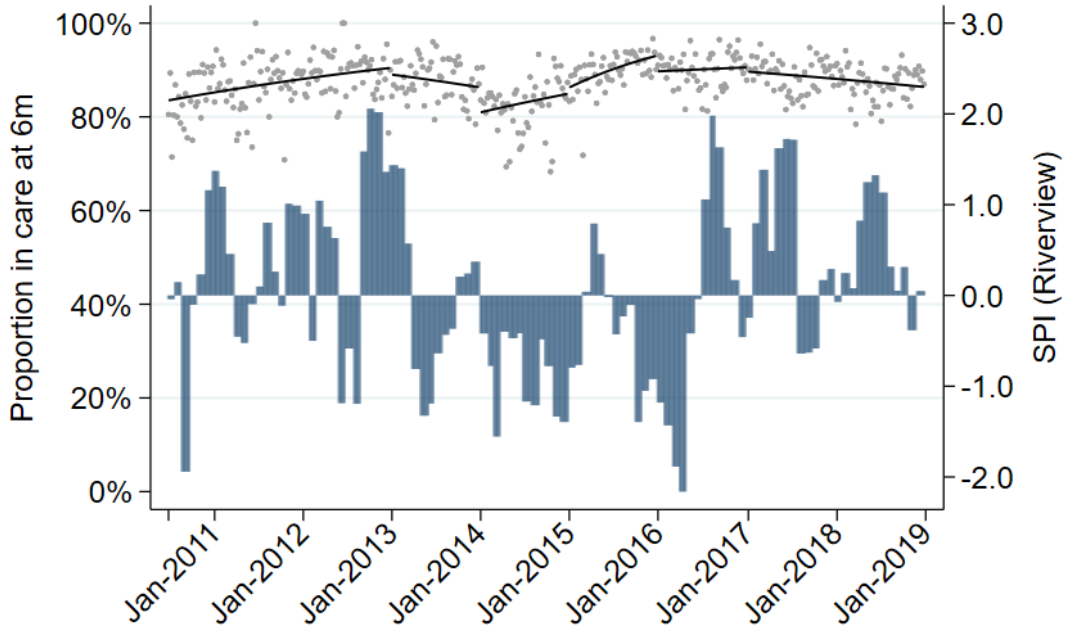
Collins C. Iwuji, Kathy Baisley, Molulaqhooa Linda Maoyi, Kingsley Orievulu, Lusanda Mazibuko, Sonja Ayeb-Karlsson, H. Manisha Yapa, Willem Hanekom, Kobus Herbst & Dominic Kniveton

Relationship between SPI and a) MPR b) Retention





Adaptations to strengthen healthcare delivery and resilience to extreme weather events in Southern Africa (ASTRA)

Jan 2024 to Mar 2028 (NIHR)

South Africa, Zambia, Mozambique

- Hypothesis
  - Strengthening the resilience of health care facilities and the community to extreme weather events will lead to uninterrupted care for people with HIV and or tuberculosis
- Objectives
  - Health system and community vulnerability and adaptive capacity assessments
  - Co-design and evaluate interventions
    - Health workforce capacity strengthening
    - Community Resilience Map

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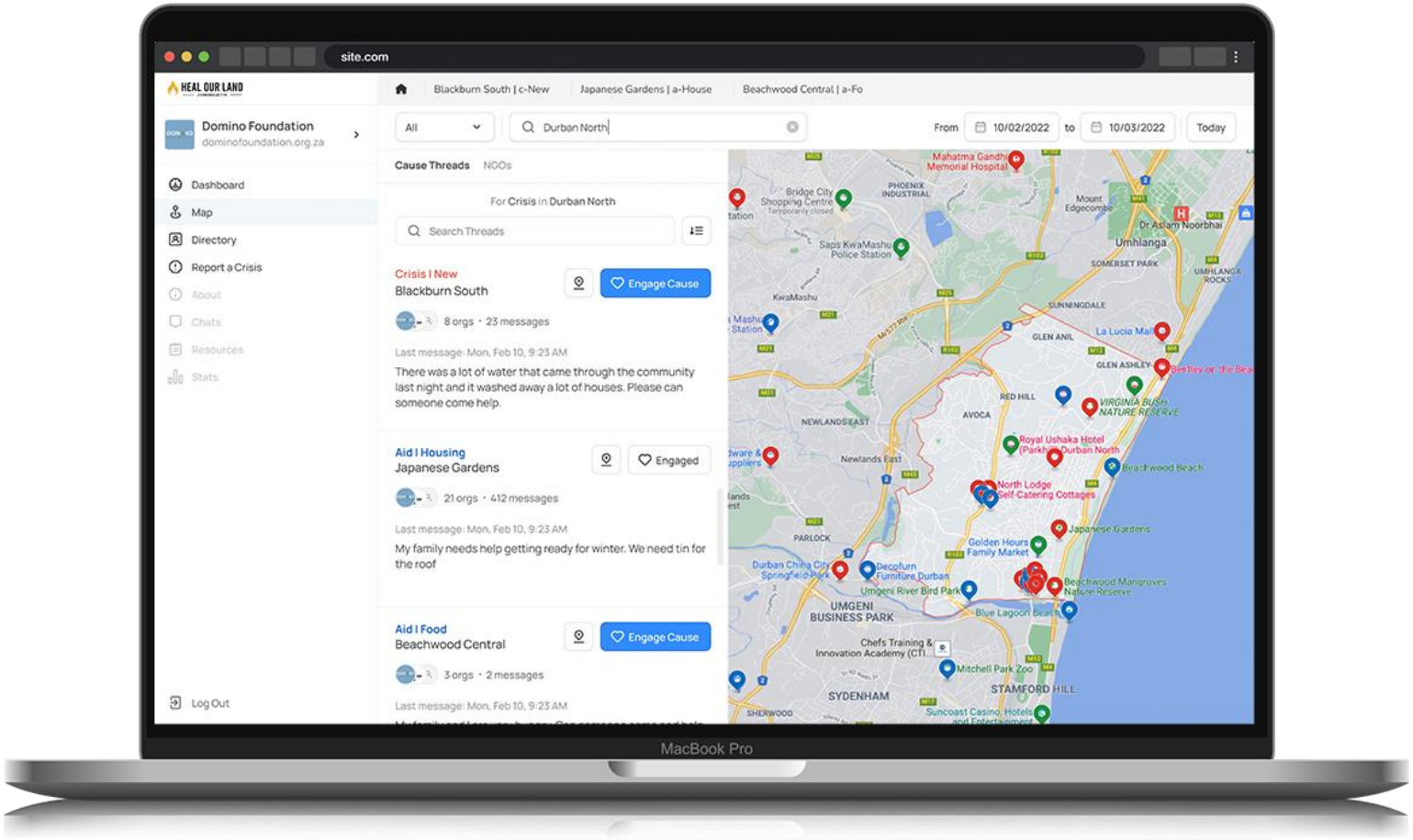
Community Resilience Map



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The impact of extreme weather events on the mental health of vulnerable populations in Africa (WEMA project)

- South Africa, Mozambique, Kenya and Burkina Faso
- 1 Apr 2024 to 31 Mar 2027

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WEMA aims

- Make the impact of climate change on mental health visible
- Catalyse change in policy and practice
  - Community mental healthcare
  - Secure housing

Innovations in development Environmental sustainability

iShack - upgrading housing in South Africa

Stellenbosch University researchers are using solar power to improve life in a large informal settlement near Cape Town

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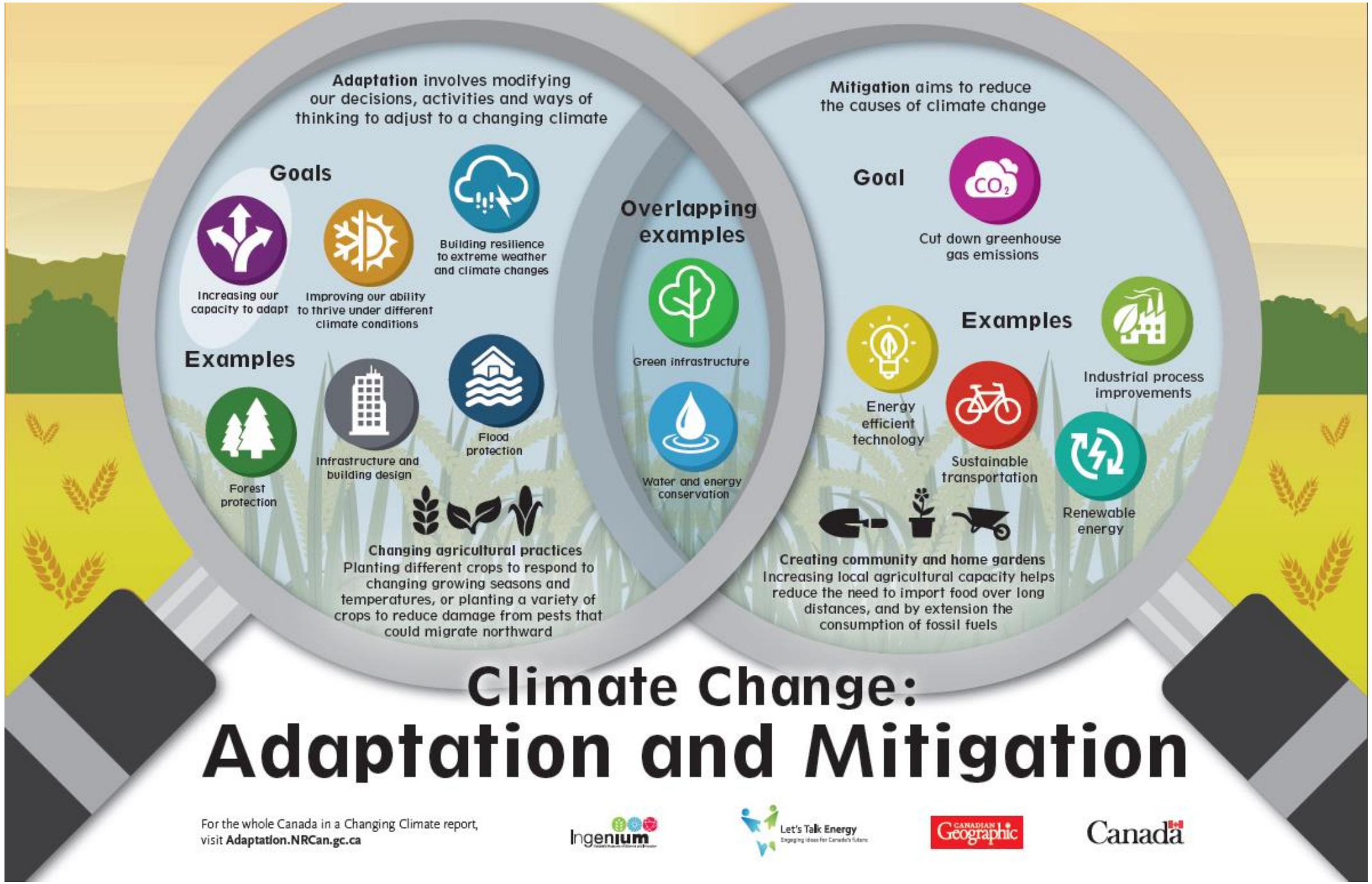
Adaptation involves modifying our decisions, activities and ways of thinking to adjust to a changing climate
Goals
Increasing our capacity to adapt
Improving our ability to thrive under different climate conditions
Building resilience to extreme weather and climate changes
Examples
Forest protection
Infrastructure and building design
Flood protection
Changing agricultural practices
Planting different crops to respond to changing growing seasons and temperatures, or planting a variety of crops to reduce damage from pests that could migrate northward
Overlapping examples
Green infrastructure
Water and energy conservation
Mitigation aims to reduce the causes of climate change
Goal
CO_2
Cut down greenhouse gas emissions
Examples
Energy efficient technology
Sustainable transportation
Industrial process improvements
Renewable energy
Creating community and home gardens
Increasing local agricultural capacity helps reduce the need to import food over long distances, and by extension the consumption of fossil fuels
Climate Change:
Adaptation and Mitigation
For the whole Canada in a Changing Climate report, visit Adaptation.NRCan.gc.ca
Ingenium
Let's Talk Energy
Canadian Geographic
Canada

Acknowledgements

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