Climate Change, Health and Equity

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09/11/2025
Maryland Psychiatric Society

Conflict of Interest: Former speaker with Genentech and Medtronic.

Learning Objectives

Identify at least two populations which are more vulnerable to heat illness.

Describe four ways children are more vulnerable to heat illness.

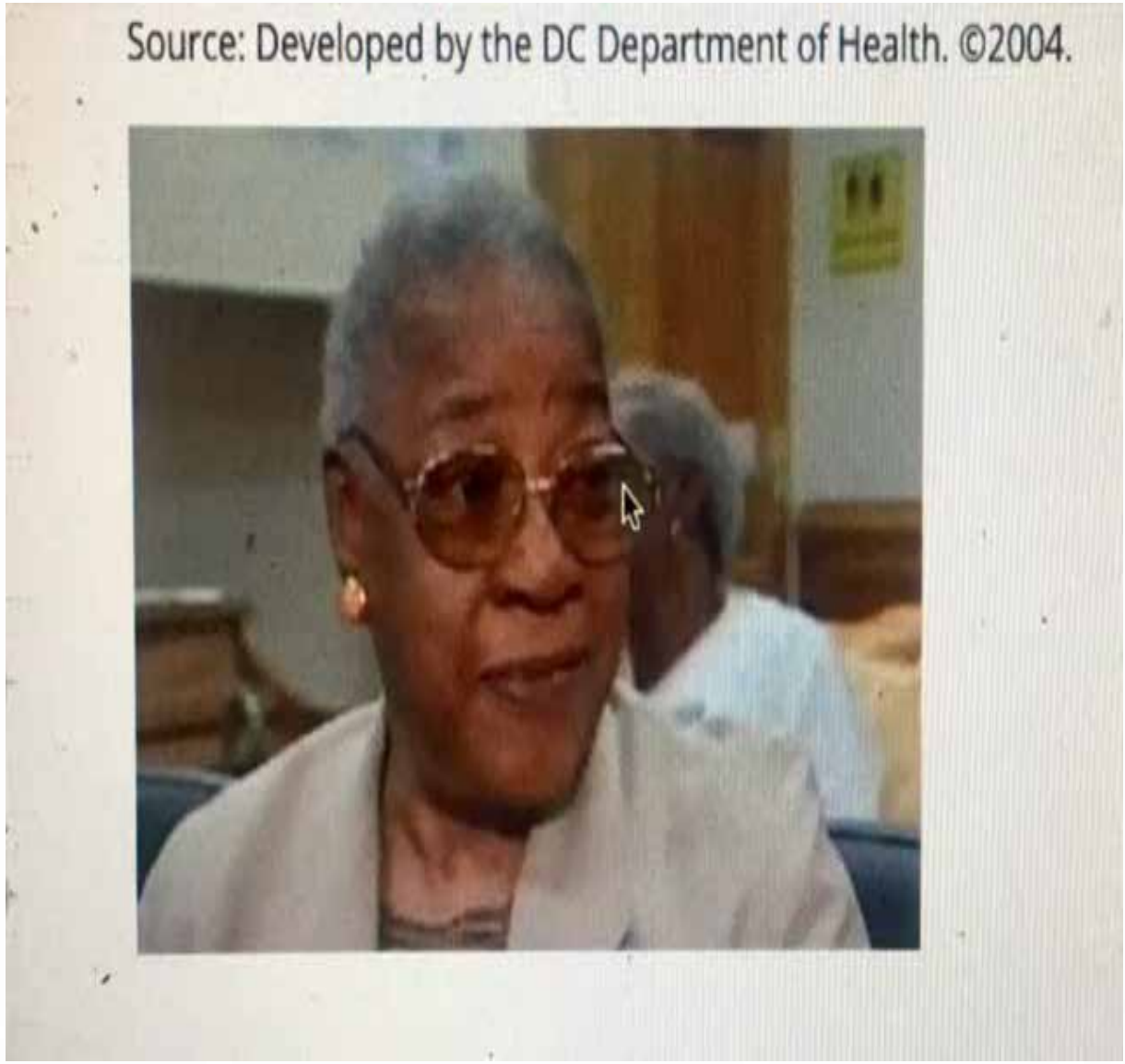
Identify four factors that increases risk for increased heat exposure and heat illnesses.

Describe two ways clinicians can act for climate change solutions and reduce heat health impacts.

Ms. Anna Mae

C.C- “I need a refill on my inhaler”

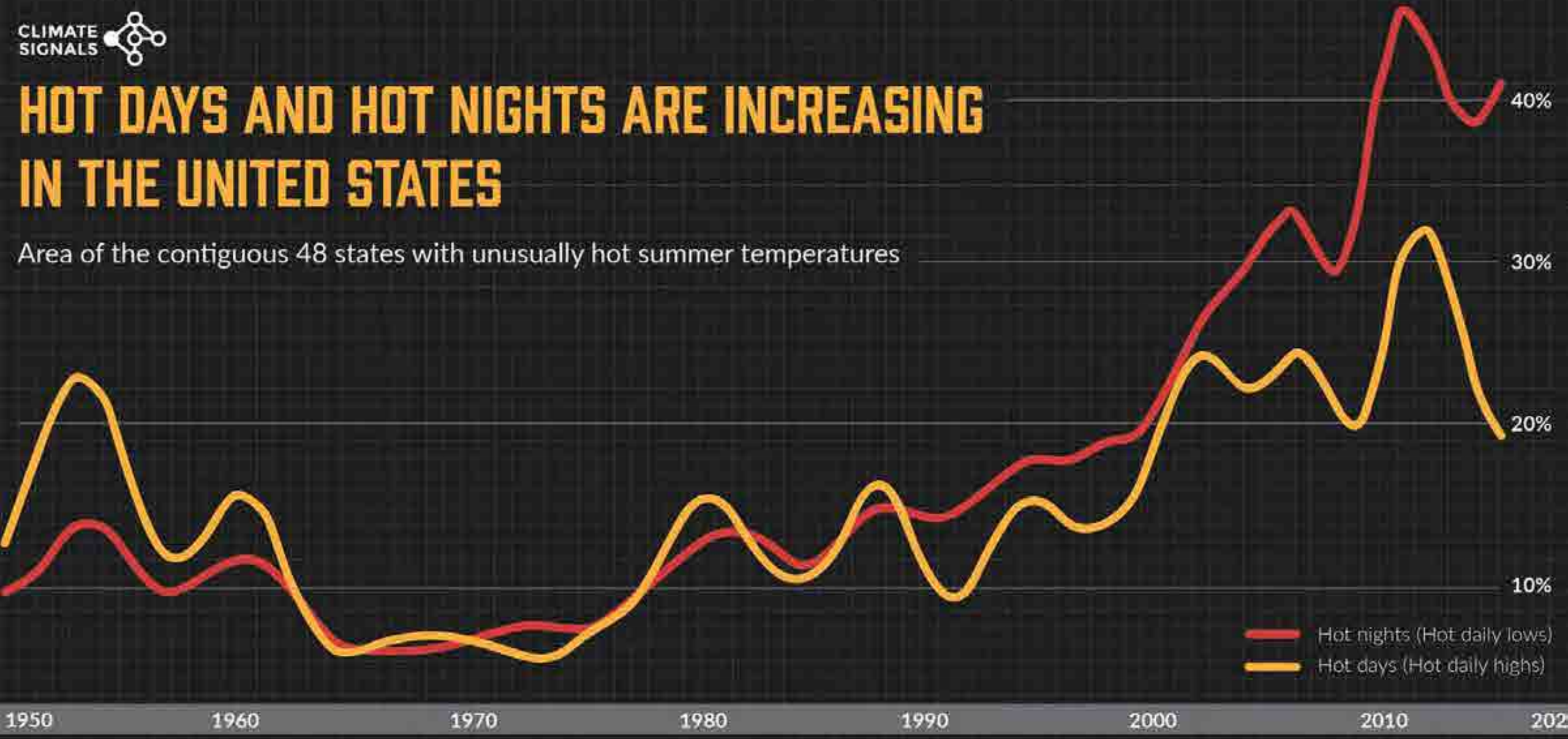
Ms. Anna Mae is a 64 y.o. African American non-smoking, woman living in Opa locka, FL with HTN, T2DM, HLD, Mild Intermittent Asthma, Obesity. Adheres to her meds- Lisinopril 20mg daily, Amlodipine 5mg daily, Metformin 1000mg twice daily, Pravastatin 80mg nightly, Aspirin 81 mg daily, Albuterol prn. She presented for an earlier visit for an albuterol refill. Asked that I complete her Florida Power and Light application form for reduction in her bill.



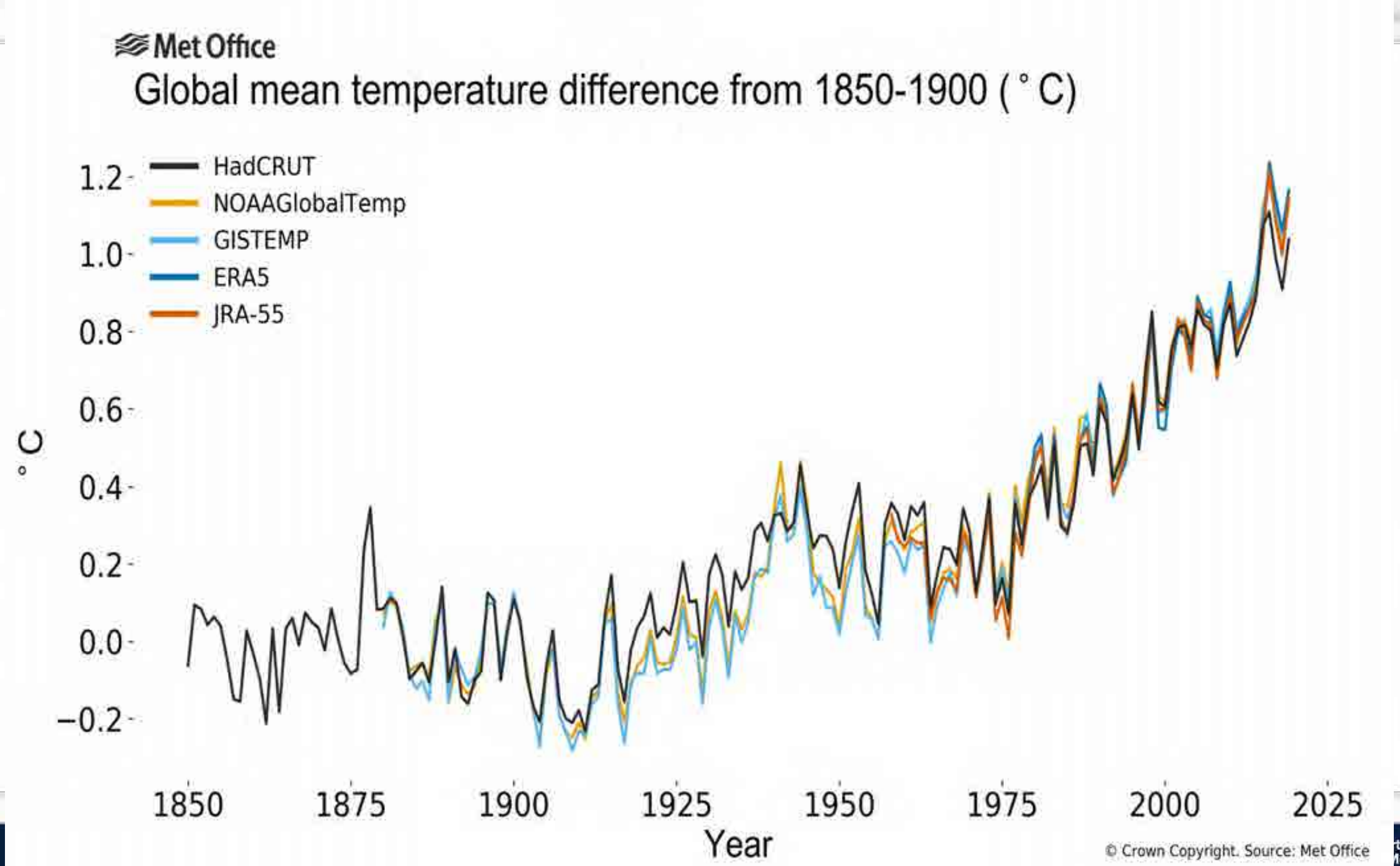
CLIMATE SIGNALS

HOT DAYS AND HOT NIGHTS ARE INCREASING IN THE UNITED STATES

Area of the contiguous 48 states with unusually hot summer temperatures

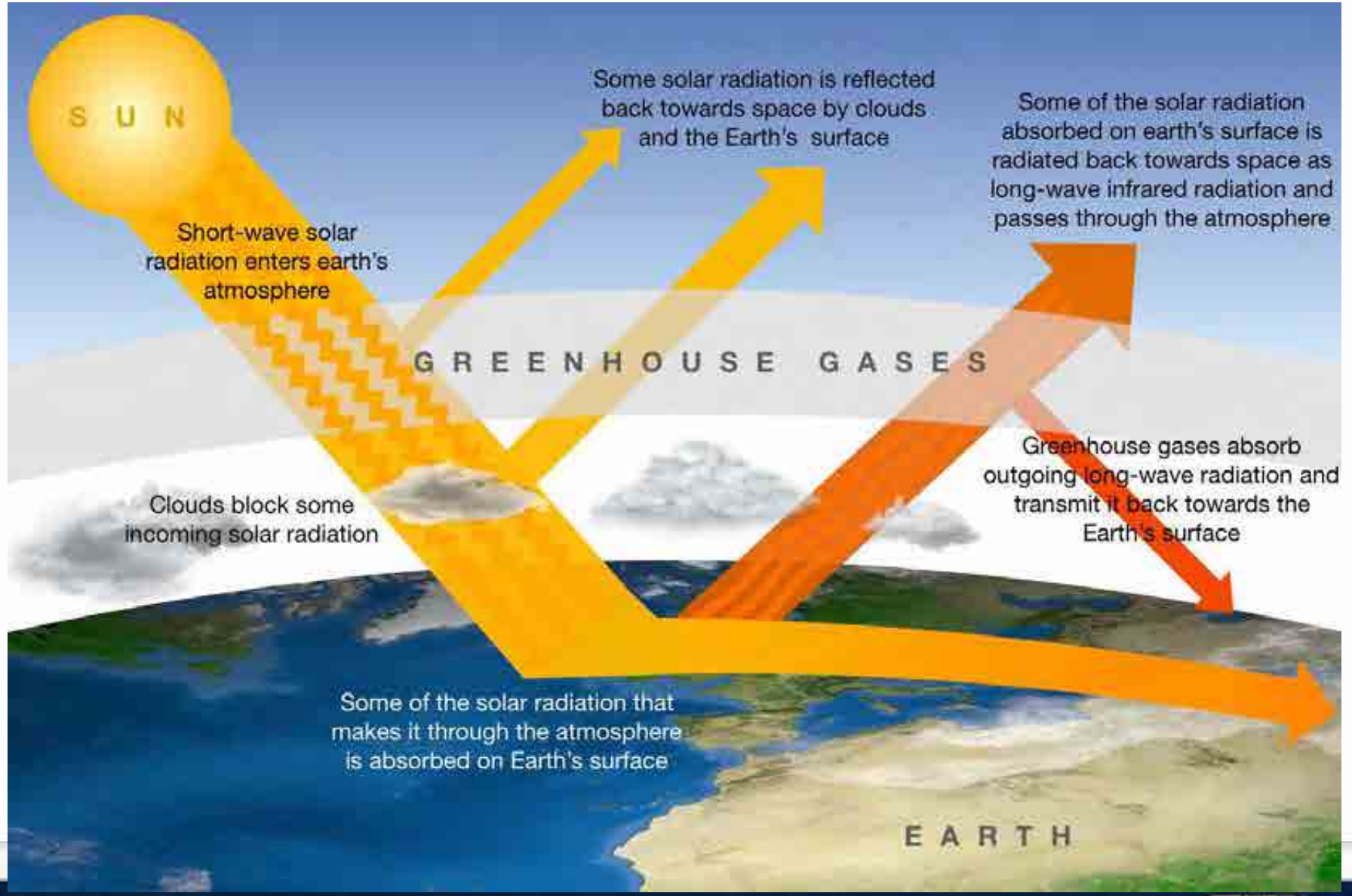


Source: EPA & NOAA


Met Office
Global mean temperature difference from 1850-1900 (°C)
HadCRUT
NOAAGlobalTemp
GISTEMP
ERA5
JRA-55
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
°C
1850
1875
1900
1925
1950
1975
2000
2025
Year
© Crown Copyright. Source: Met Office

The Earth's Atmosphere

- Carbon Dioxide (CO_2)
- Methane, nitrous oxide, and fluorinated gases are the other main GHG that retain heat
- Greenhouse gases (GHG) usually compared in potency of ability to trap heat to CO_2



THE BIG PICTURE

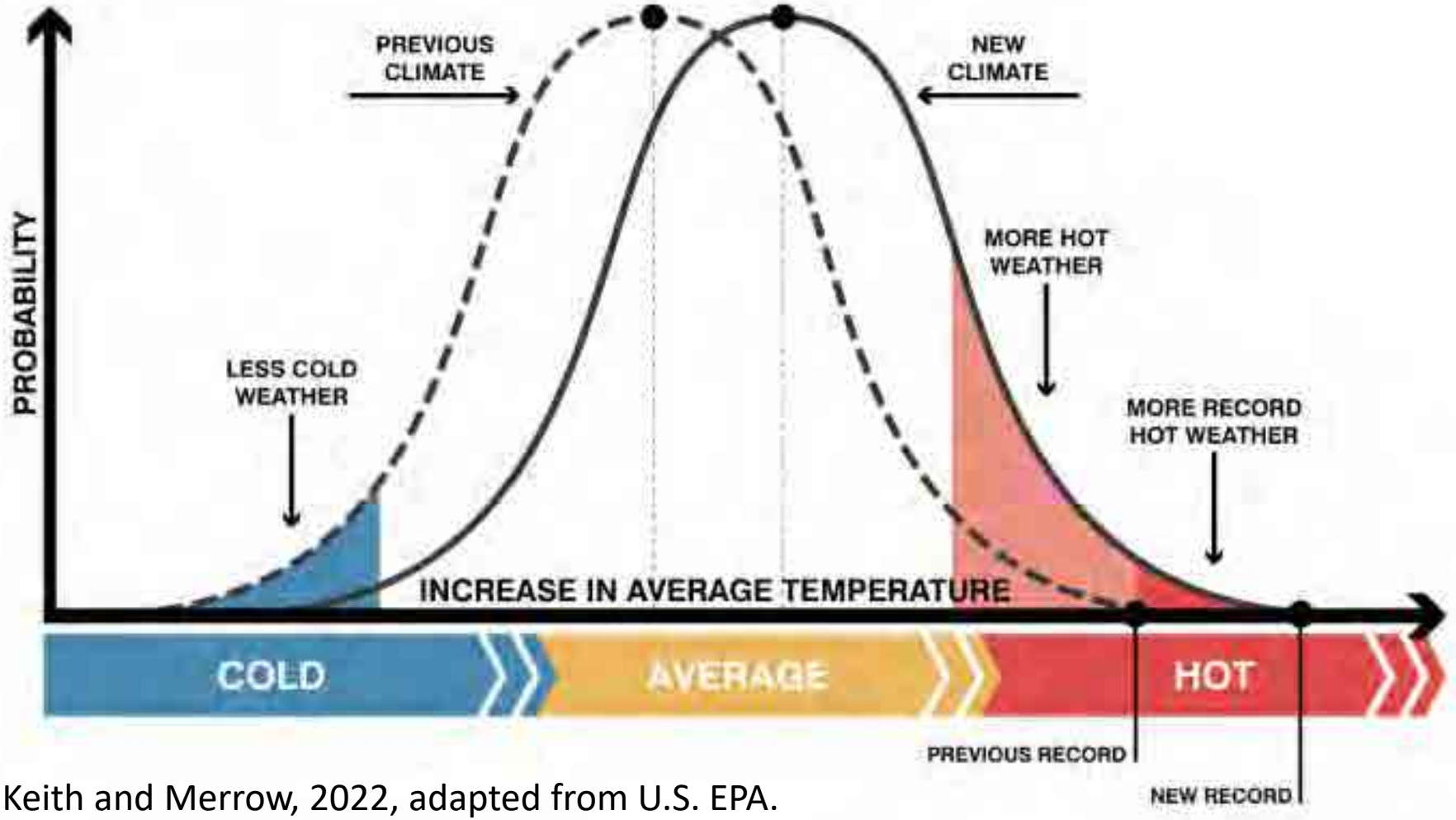
In the atmosphere

TOO MUCH CO_2

now traps

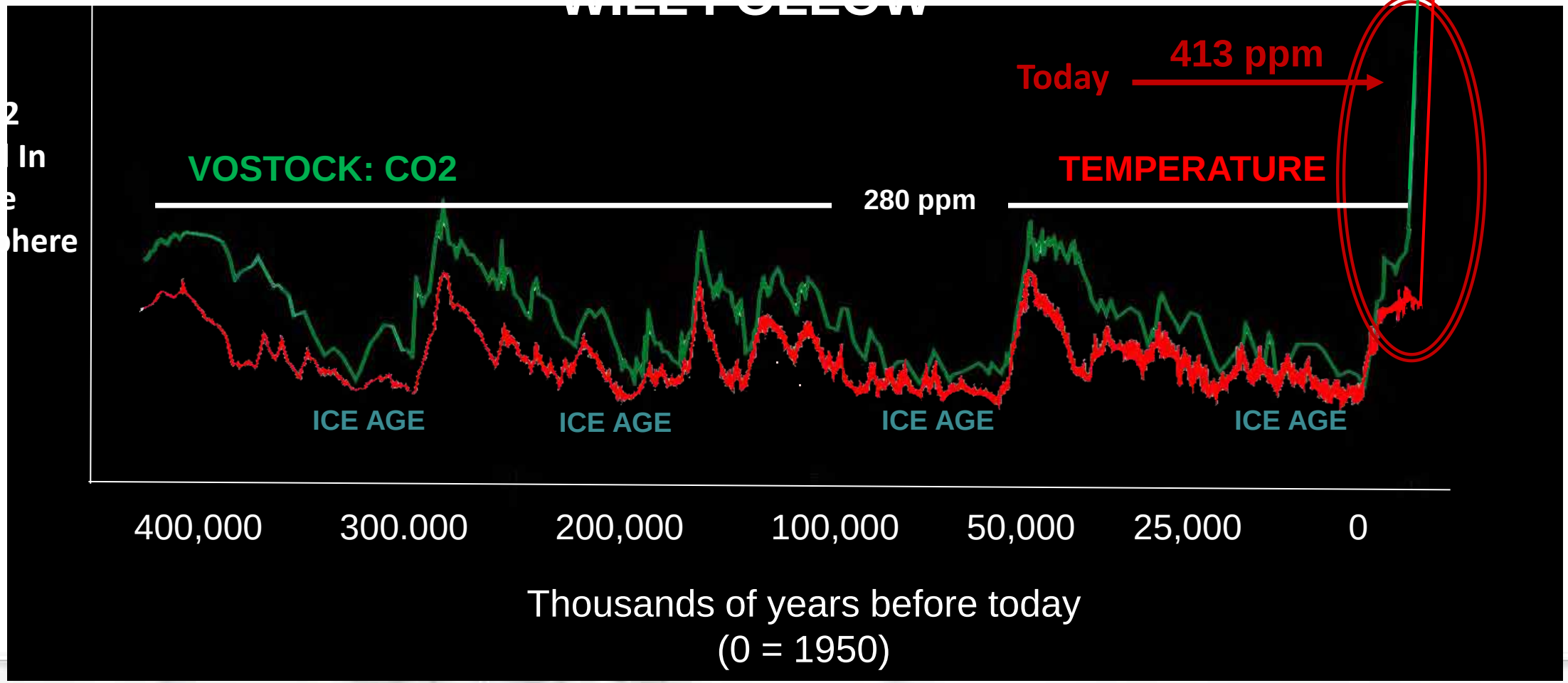
TOO MUCH heat

Increased Extreme Heat is Here and Getting Worse

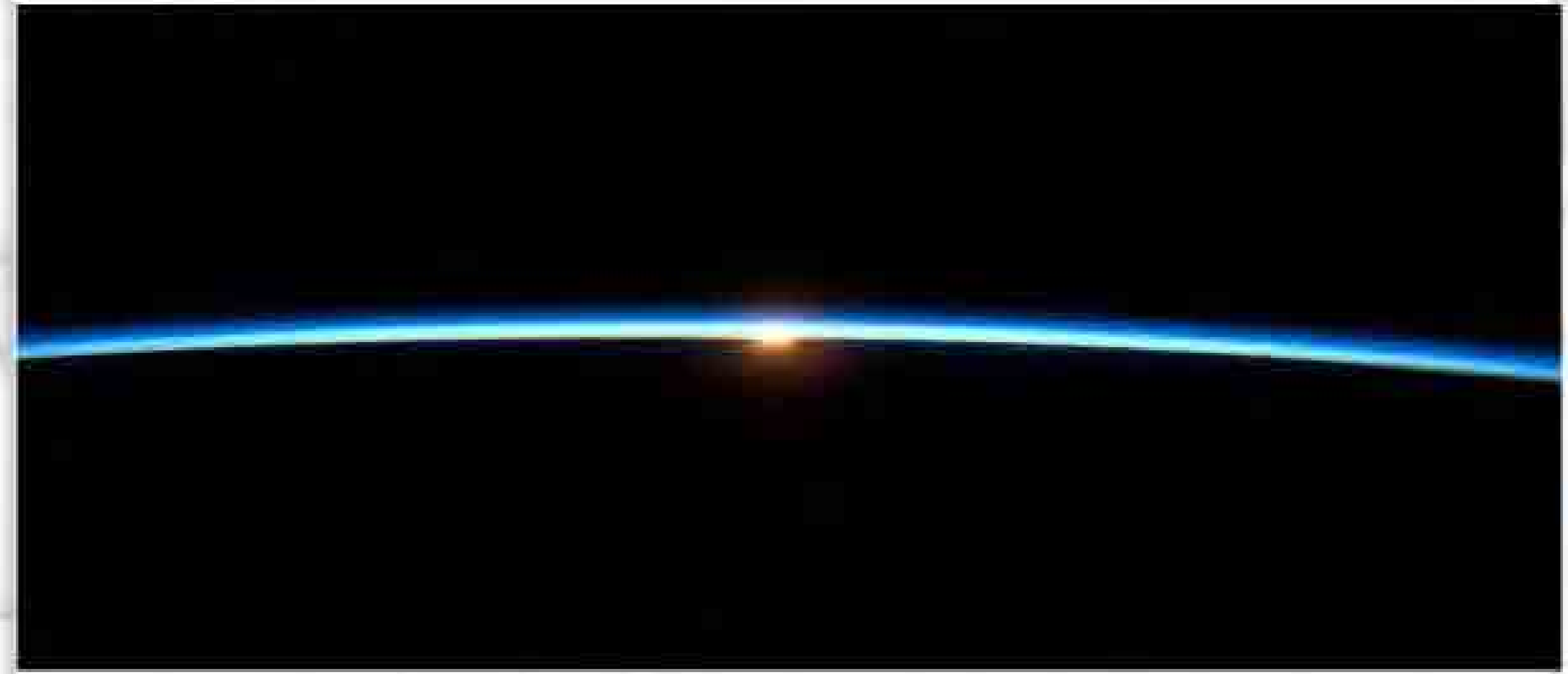


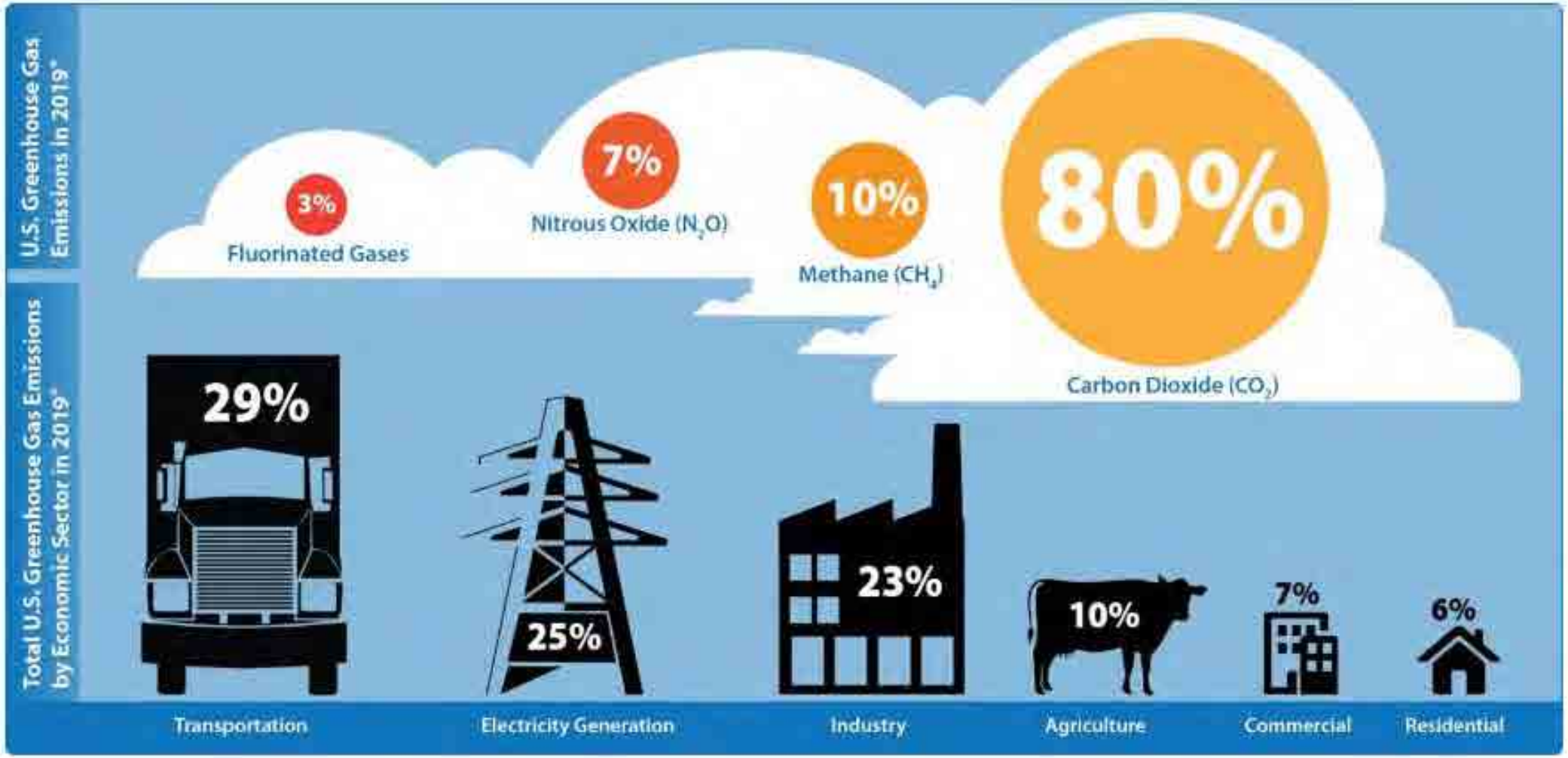
Keith and Merrow, 2022, adapted from U.S. EPA.

TEMPERATURE



Thin Line





https://www.erg.com/project/improving-us-greenhouse-gas-emissions-inventory

Health Sector is Causing Health Harms

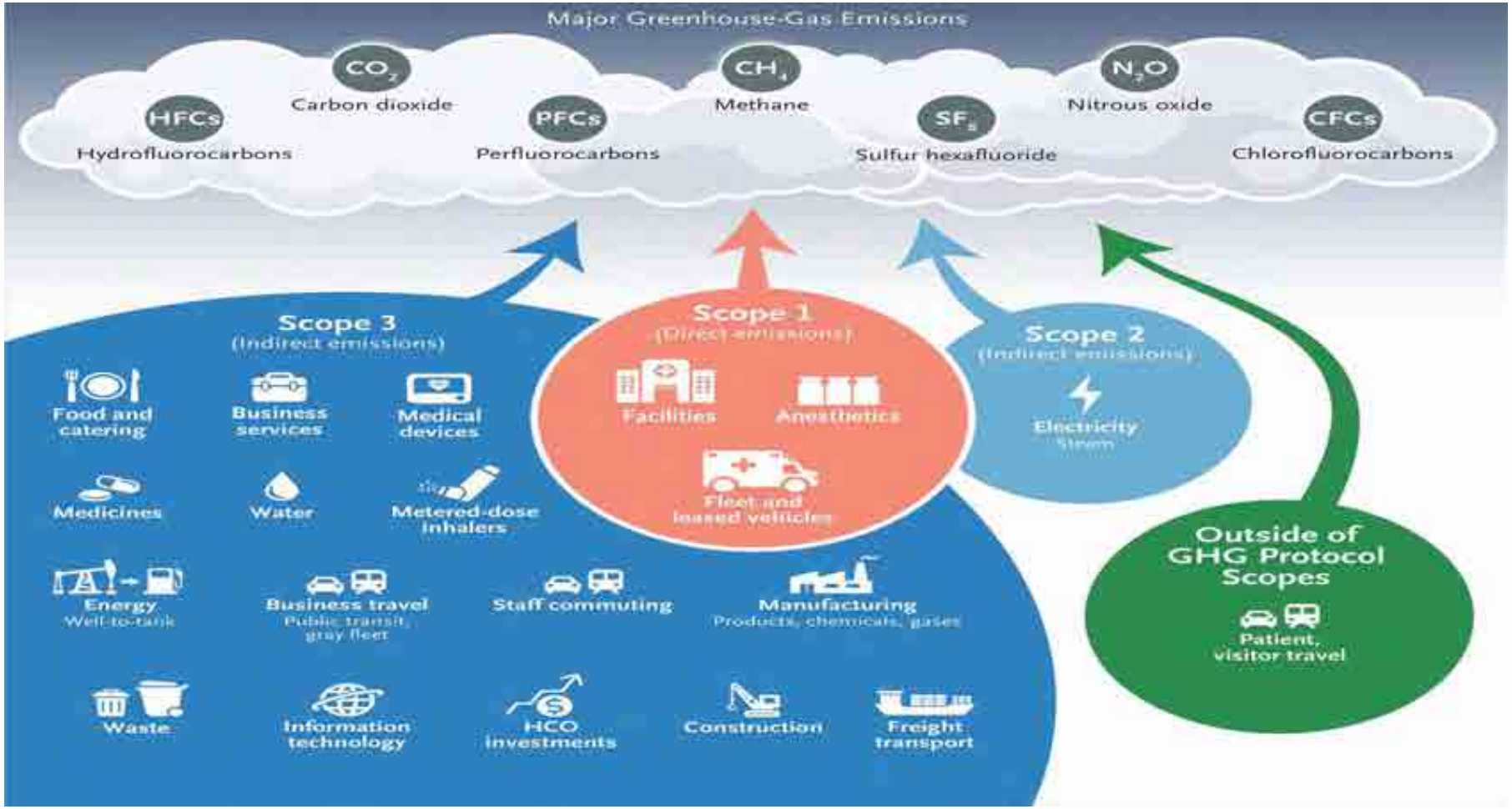
- Healthcare accounts globally for ~5% of GHG emissions
- Higher - 8.5% - in the U.S.
  - Emissions in the U.S. increased 6% from 2010 to 2018
  - Responsible for 25% of global health sector emissions
- "We found this amount of disease burden, unreported and largely unrecognized in health care, is similar in magnitude to annual deaths stemming from preventable medical errors "

Eckelman M, Huang K, Lagasse R et al. *Health Affairs* 2020.
Eckelman M and Sherman J. *PLoS ONE* 2016.

MIAMI-DADE COUNTY

FCCA
Florida Clinicians for Climate

Health system contributions



https://www.nejm.org/doi/full/10.1056/NEJMsb2210022

Climate Impacts Health

H Heat illness

E Exacerbate heart and lung conditions

A Asthma

T Traumatic injury

W Water and foodborne illnesses

A Allergies

V Vector-borne disease

E Emotional stress

Eight Impacts Four Categories:

- ***Direct Impact***
  - Extreme Heat
  - Air Pollution
  - Extreme Weather
- ***Spread Disease***
  - Insects & Vectors
  - Contaminated Water
  - Contaminated Food
- ***Disrupt Food Supply***
  - Hunger & Malnutrition
- ***Disrupt Well Being***
  - Emotional stress

Heat Index

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Heat Index = -42.379 + 2.04901523T + 10.14333127R - 0.22475541TR - 6.83783 x 10-3T2 - 5.481717 x 10-2R2 + 1.22874 x 10-3T2R + 8.5282 x 10-4TR2 - 1.99 x 10-6T2R2

T - air temperature (F)
R - relative humidity (percentage)

https://www.weather.gov/ama/heatindex

Heat #1 Weather related killer!

- In Florida, there is an historical average of 25 days per year with a heat index “Feels like” temperature above **100 degrees** Fahrenheit.
- This would increase to 105 days per year on average by midcentury (2036 – 2065) and 141 by the century’s end.
- In crease heat illness – heat stroke –body temperature >105 deg: death

Climate Change and The Kidney

1. Heatstroke (both clinical and subclinical whole-body hyperthermia) - acute kidney disease rhabdomyolysis, or heat-induced
2. Recurrent heat and dehydration - Chronic kidney disease (CKD).
3. Heat stress and dehydration – increased kidney stone formation, electrolyte abnormalities
4. Poor hydration habits may increase the risk for recurrent urinary tract infections.

Ann Nutr Metab. 2019:74 Suppl 3:38-44.doi:10.1159/000500344. Epub 2019 Jun 14.

Environmental factors have adverse impacts on pregnancies, and there are clear racial disparities

By Avery Ellfeldt, E&E News on June 22, 2020

Asthma

- High CO2 Causes:
  - Increase ground level ozone.
  - 60% more pollen from ragweed.
  - Trees flower 3-5 weeks earlier.
  - Incidence of asthma

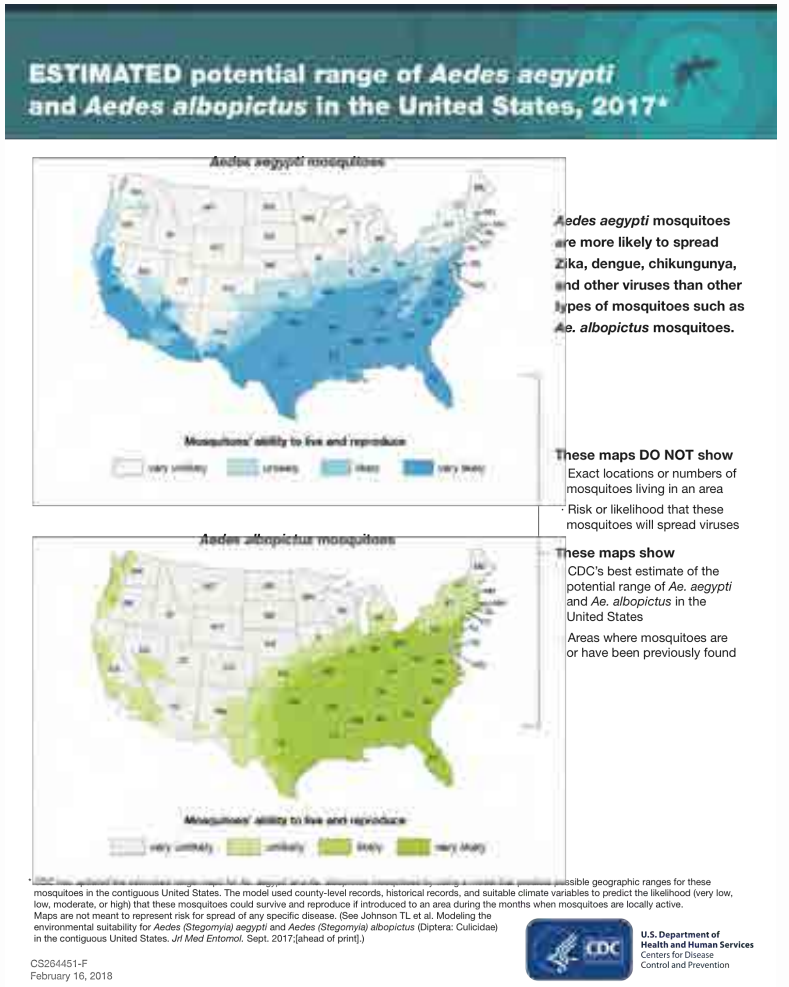
  - 1:9 African Americans and 1:7 in Hispanics

  - AA Women have the highest rate of asthma, and more have died from asthma than any other group

  - www.stateoftheair.org

Vector Borne Diseases

- https://www.cdc.gov/dotw/zika/index.html



Maria

- 32 yo G2P2 post-partum by nine months, undocumented worker from South Dade presented for entry into primary care. She was encouraged to see a doctor by support group leader. She was s/p Zika infection with post partum depression and obesity.

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Vector

A Debilitating Virus Surges Globally as Mosquitoes Move With Warming Climate

Chikungunya, which can disable victims for years, is spreading rapidly, including in China, France and other places that have not seen major outbreaks before.

▶ **Listen to this article · 8:15 min** Learn more

A worker sprayed insecticide following reports of chikungunya cases in Hong Kong earlier this month. Tyrone Siu/Reuters

By Stephanie Nolen

Stephanie Nolen, who covers global health,

In New Places, A Virus Emerges

Mosquitoes carrying a disabling illness are expanding into areas that've never been seen before.

SPREADING DISEASE

CONTAMINATED WATER

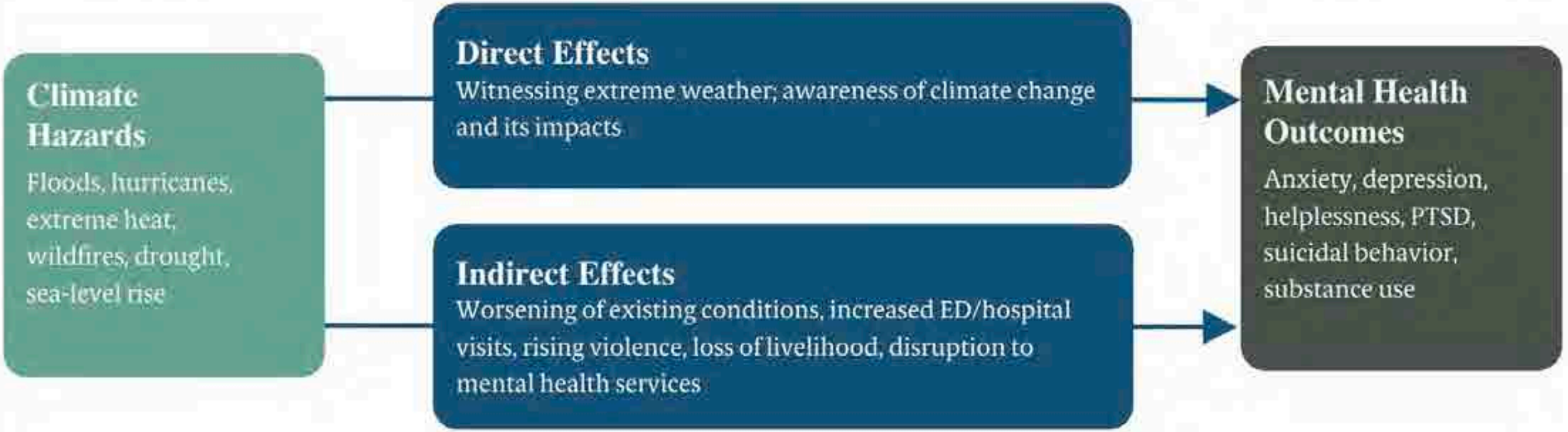
Higher water temperatures, heavier downpours, rising sea levels, and more flooding help spread:

gastrointestinal illness, diseases from toxins in swimming areas and drinking water

More Vulnerable: Children, the elderly, people with weakened immune systems, people in remote or low-income communities with inadequate water systems, and people in communities that are dependent on fish and shellfish

Wtop.
com

The Connection Between Climate Change and Mental Health



Data: Adapted in part from World Health Organization, *Mental Health and Climate Change: Policy Brief* (WHO, June 3, 2022).

Source: Emily Hough and Nathaniel Counts, "How Climate Change Affects Our Mental Health, and What We Can Do About It" (explainer), Commonwealth Fund, Mar. 29, 2023. https://doi.org/10.26099/rk6r-ne98

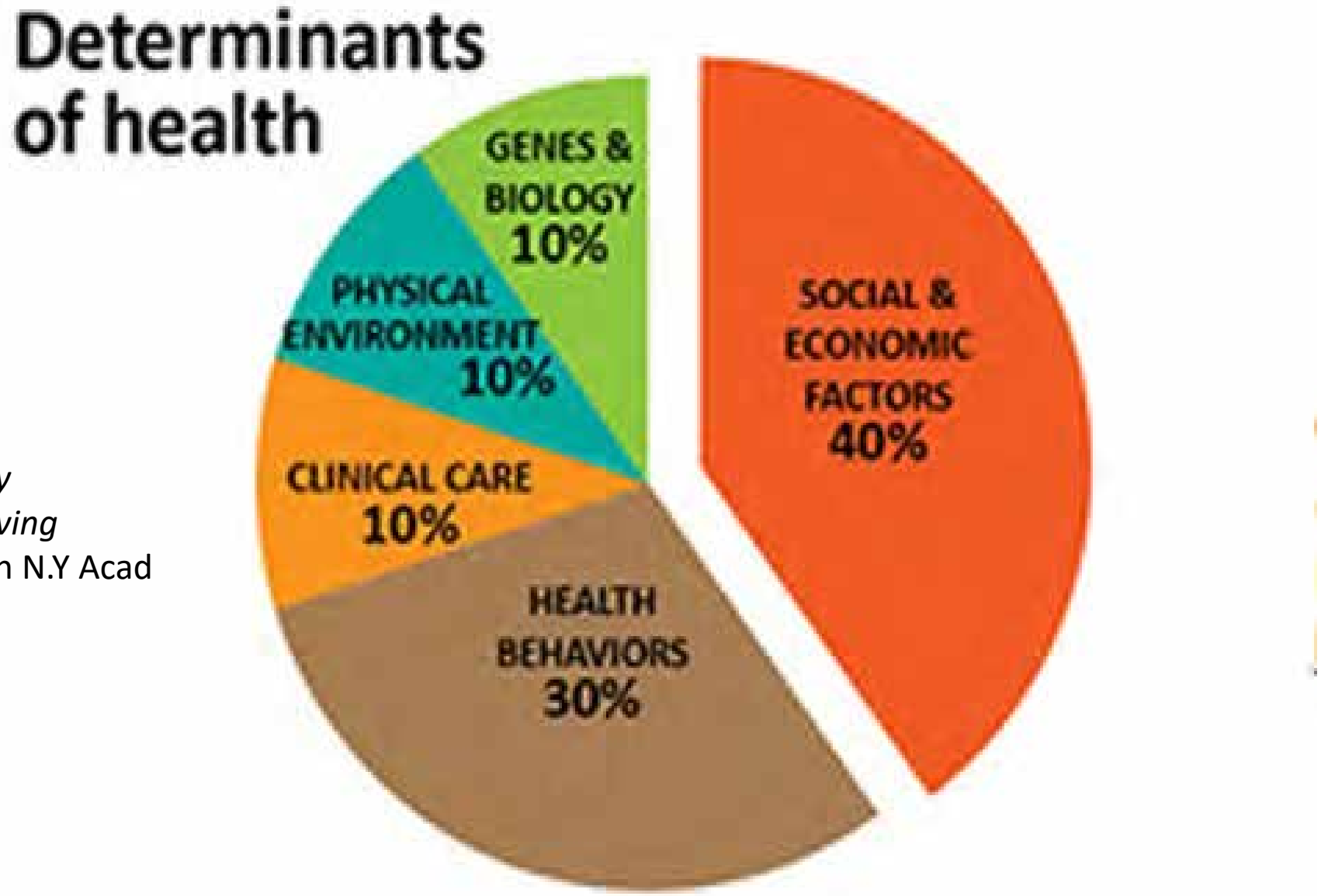
High-Risk Medication Categories in Heat

Drug Class	Risk in Heat Exposure
Diuretics	Dehydration, electrolyte imbalance
Anticholinergics	Impaired sweating, heat stroke risk
Beta-blockers	Reduced cardiac adaptation to heat
Psychotropics	Impaired thermoregulation
Insulin	Heat alters blood glucose control
NSAIDs	Kidney strain when dehydrated

HOW CLIMATE MIGRATION WILL RESHAPE AMERICA

Millions will be displaced. Where will they go?

NY Times 9/15/2020



Tarlov AR. *Public policy frameworks for improving population health.* Ann N.Y Acad Sci 1999; 896: 281-93.

Facts- Low Income & Minority Communities

- Exposed to particulate pollution at levels that are 35% (B)and 28% (H) higher, than white communities.
- live in homes with inadequate conditions at disproportionately high rates.
- Experienced higher energy burdens than the average household in the same city

Protecting the Health of Vulnerable Populations with In-Home Energy Efficiency:

A Survey of Methods for Demonstrating Health Outcomes

Sara Hayes and Ronald Denson Jr. 10/19