

Climate Change, Health and Equity

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Executive Director, Florida Clinician for Climate Action

Co-Chair. Miami Dade Heat, Health Task Force

04/09/2024

Miami Dade County Healthcare Preparedness Coalition

**Conflict of Interest: Former speaker with
Genentech and Medtronic.**

Climate Change, health and equity

1. Describe four ways climate change impacts health.
2. Describe vulnerable populations impacted by climate change.
3. Identify two policies that affected vulnerable populations.
4. Identify three ways clinicians can act for climate change solutions and improve health outcomes.

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.

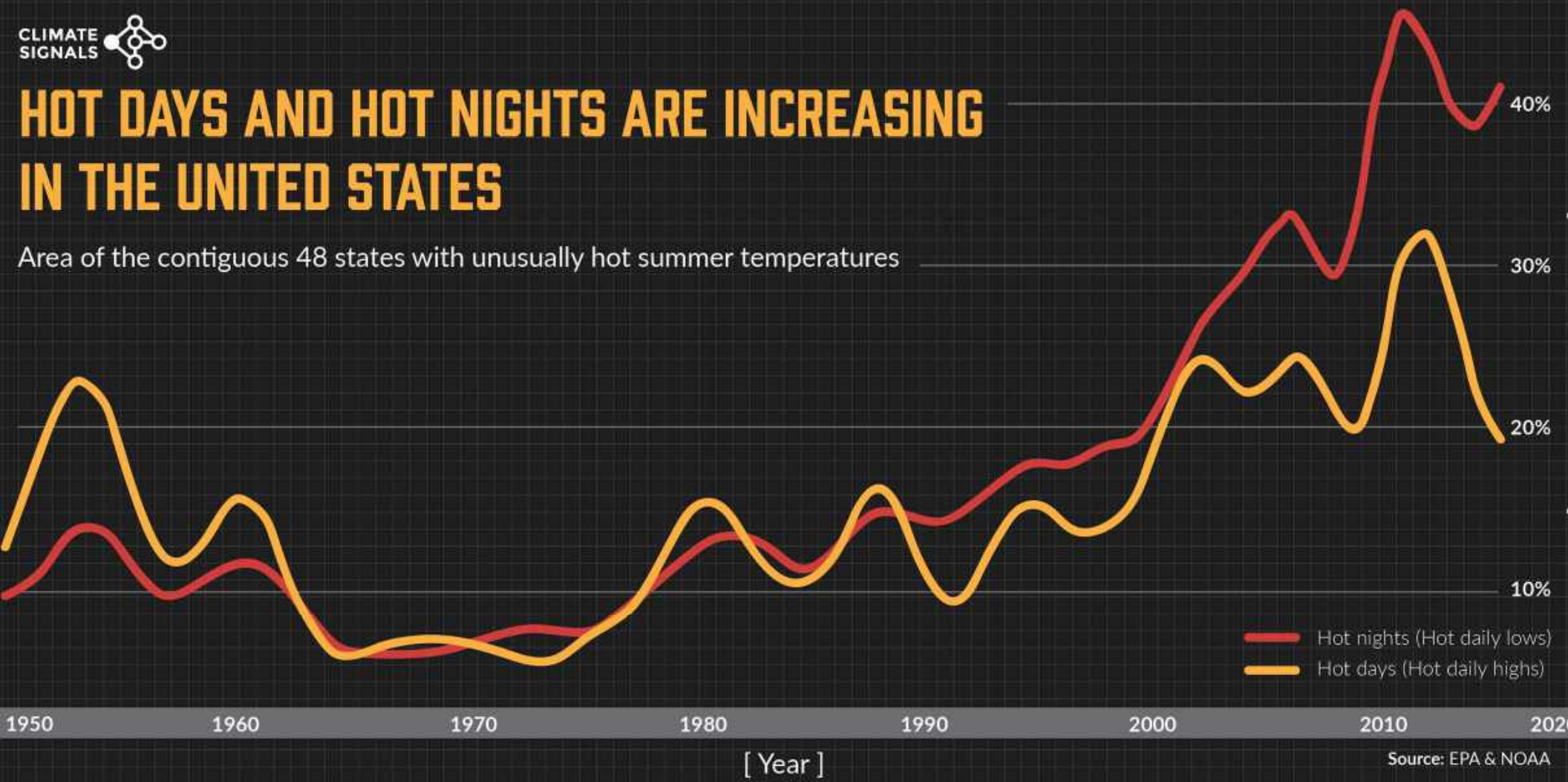
Source: Developed by the DC Department of Health. ©2004.





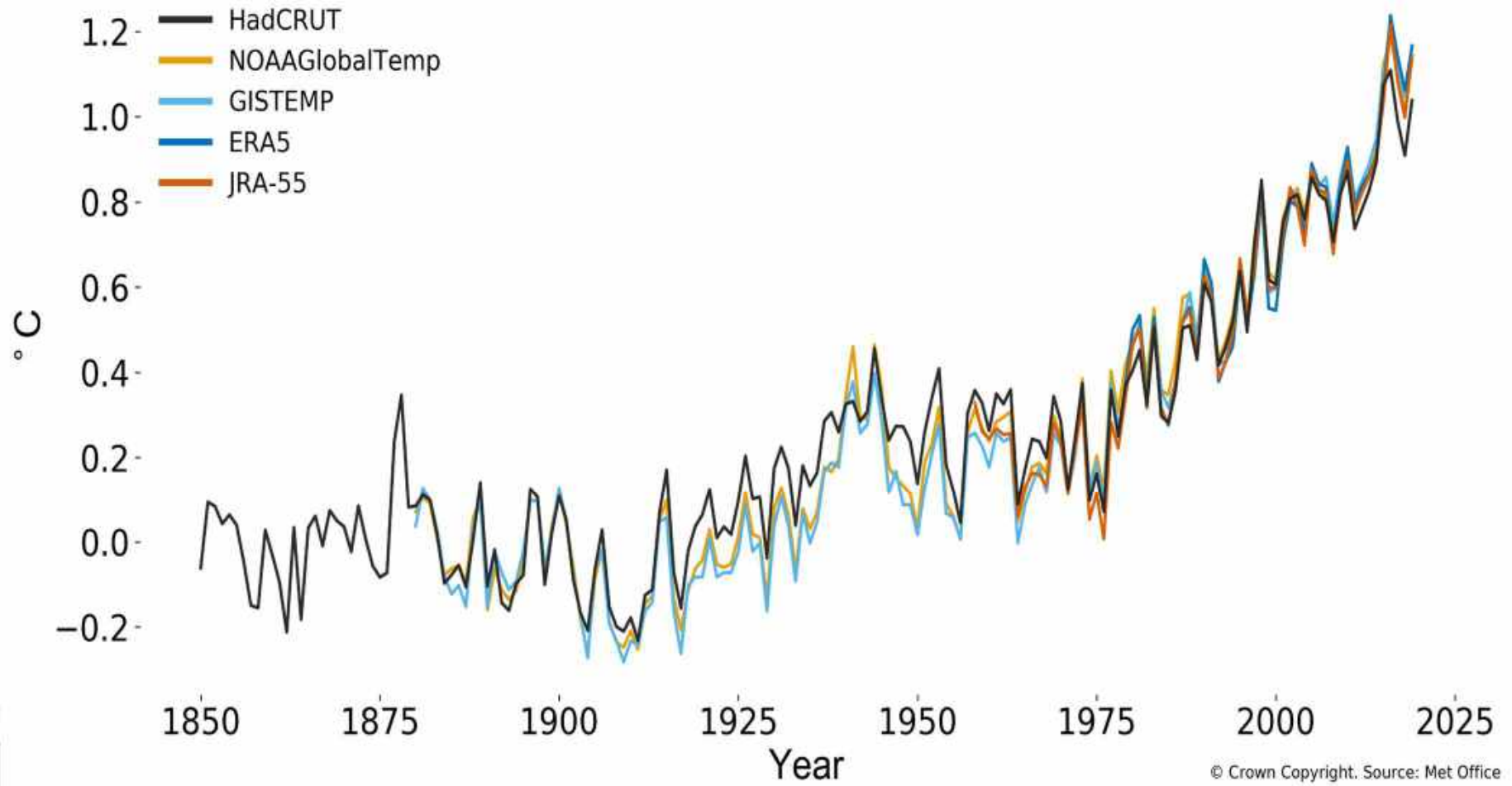
HOT DAYS AND HOT NIGHTS ARE INCREASING IN THE UNITED STATES

Area of the contiguous 48 states with unusually hot summer temperatures



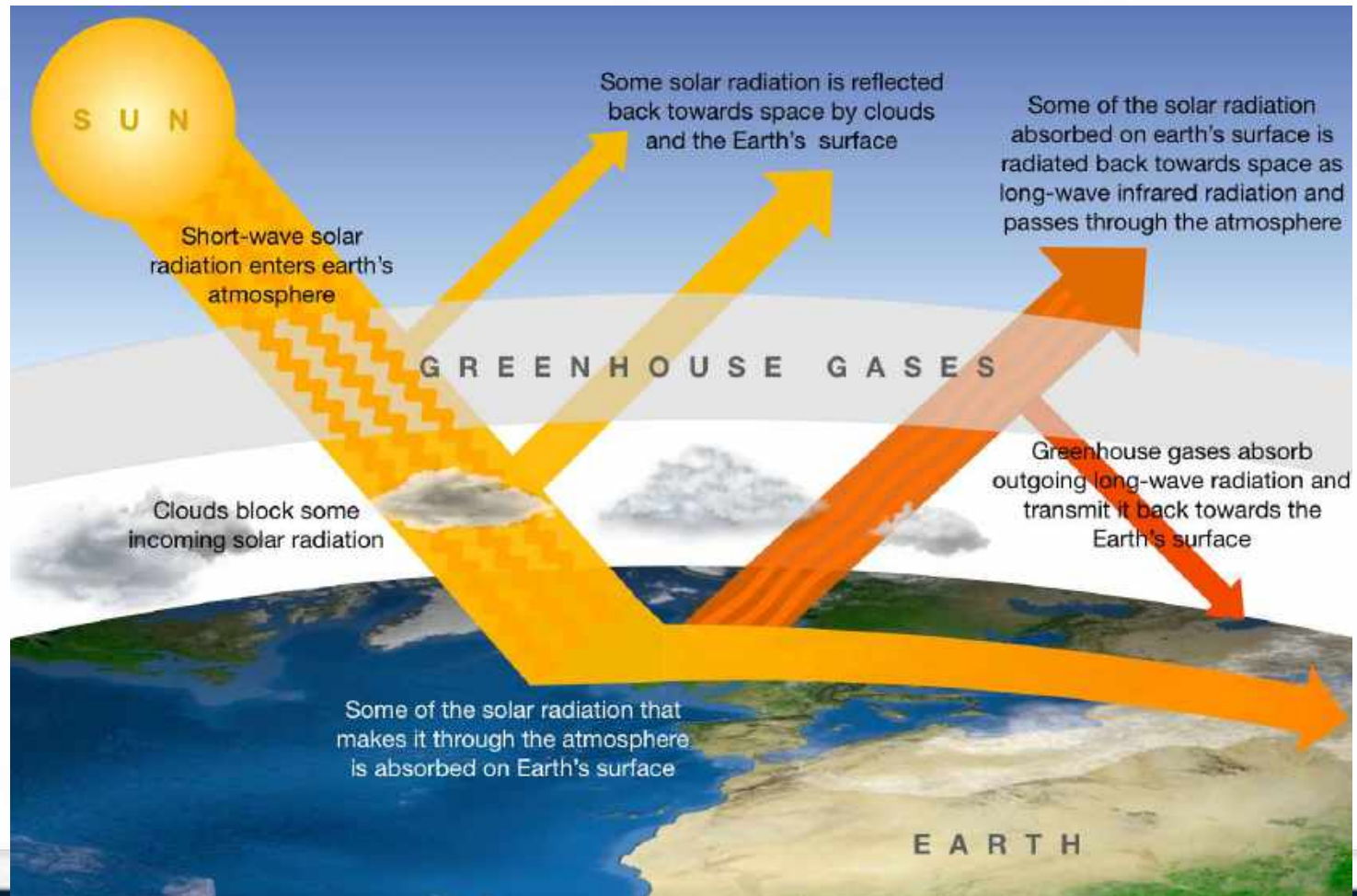
Source: EPA & NOAA

Global mean temperature difference from 1850-1900 (° C)



The Earth's Atmosphere

- Carbon Dioxide (CO₂)
- 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 CO₂



THE BIG PICTURE

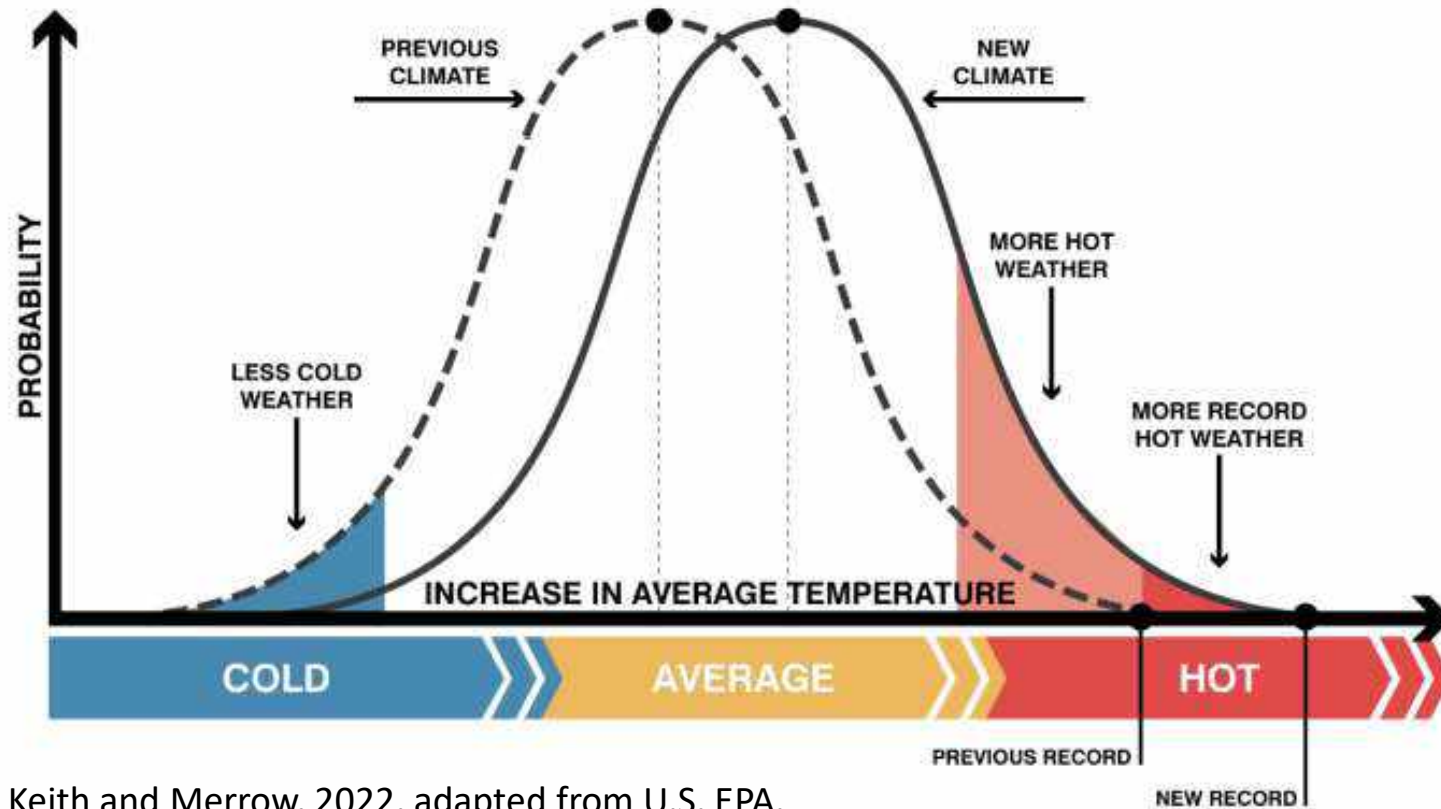
In the atmosphere

TOO MUCH CO₂

now traps

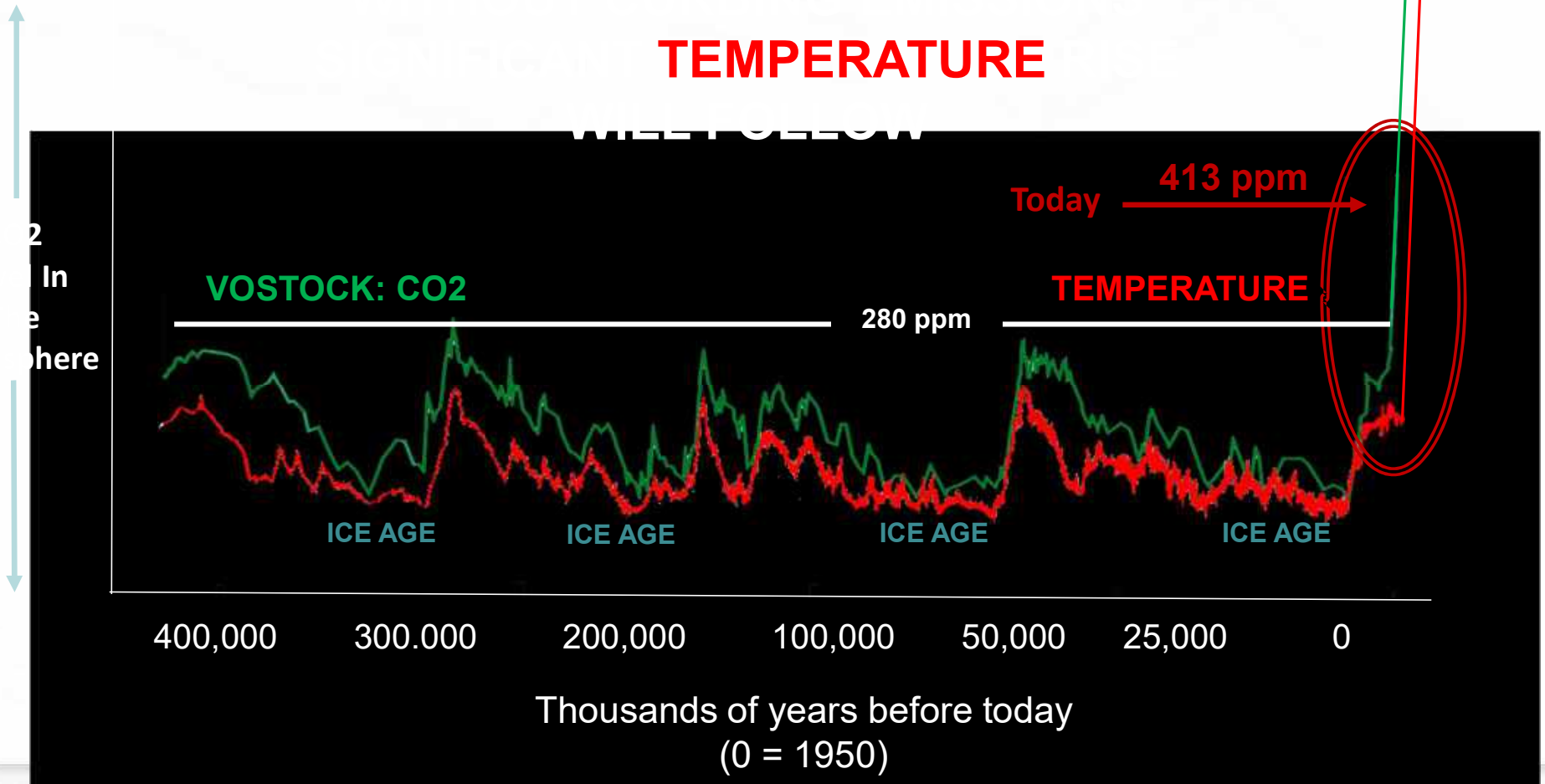
TOO MUCH heat

Increased Extreme Heat is Here and Getting Worse

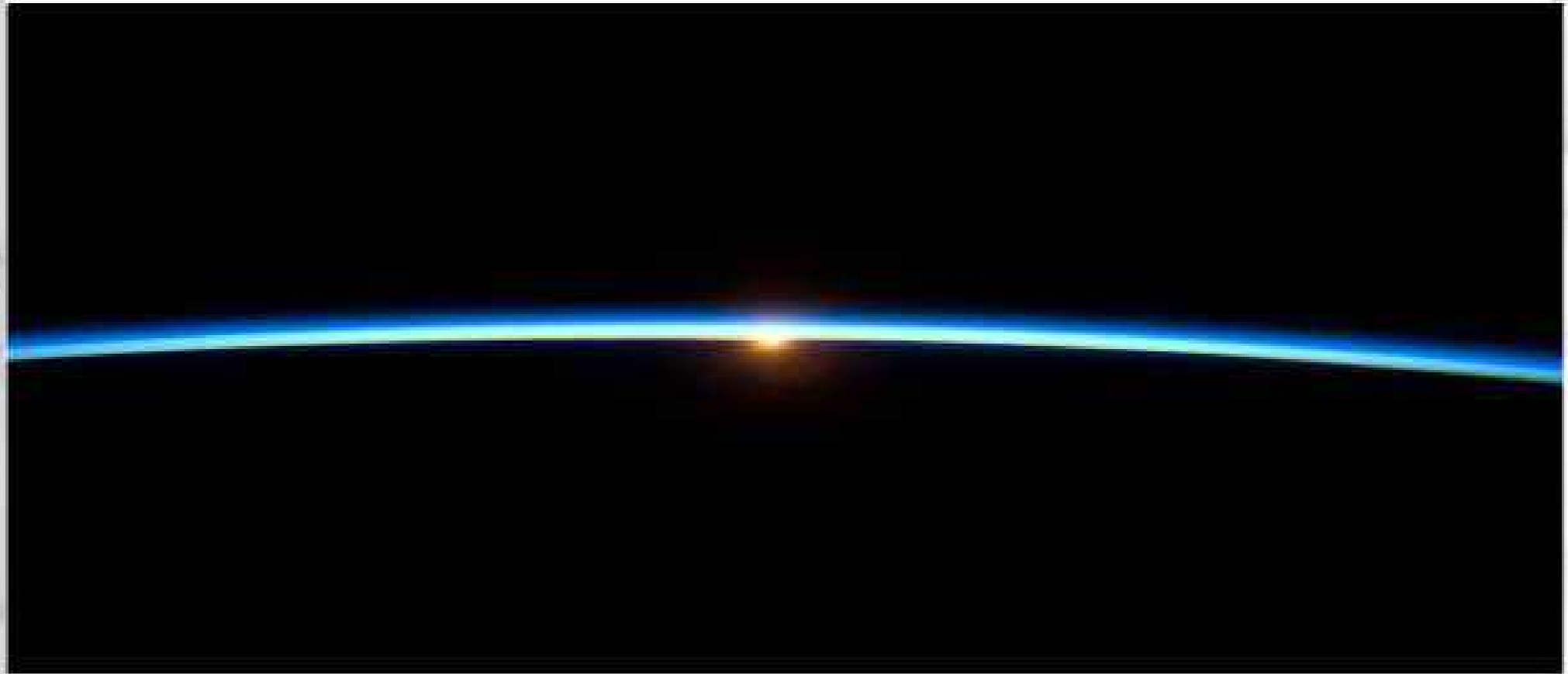


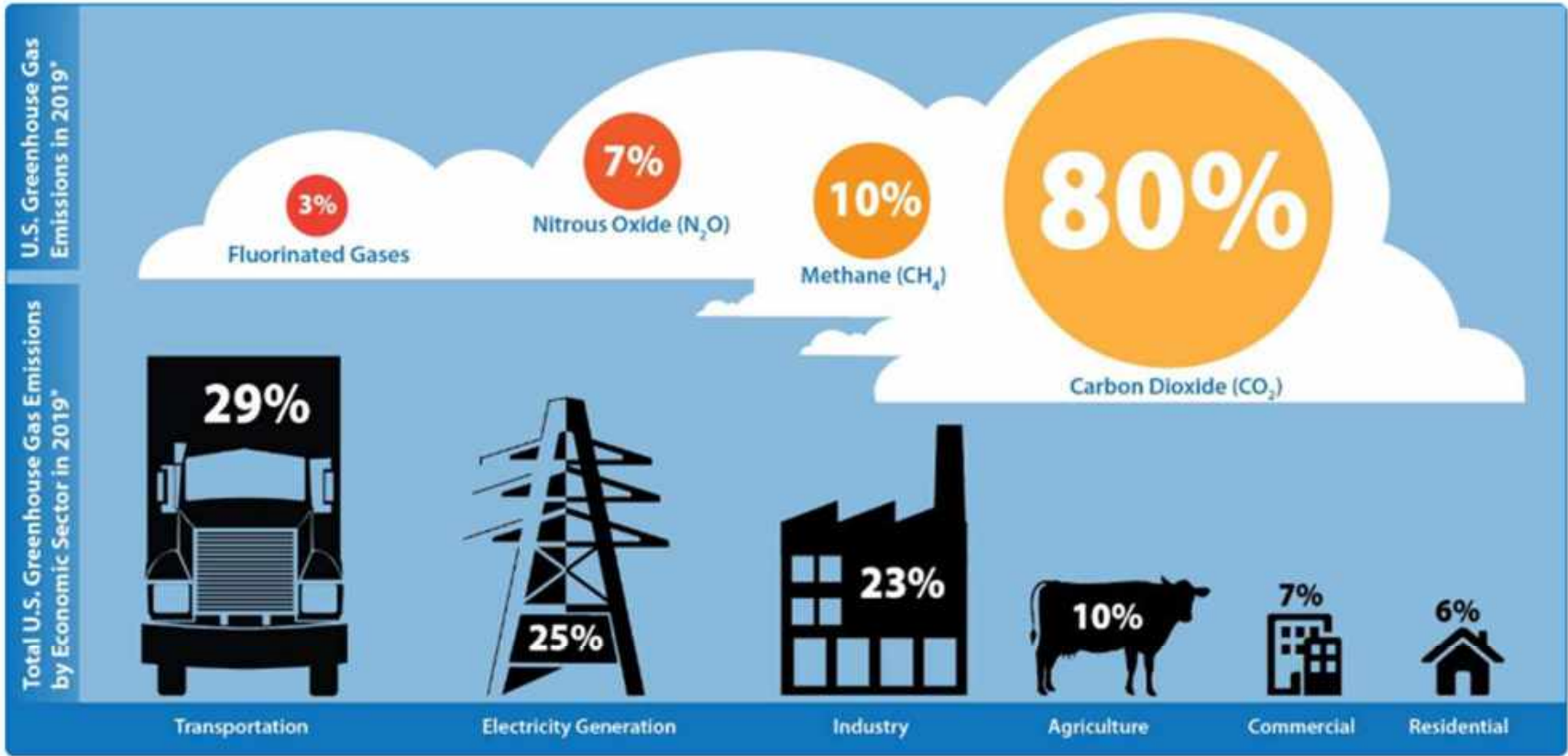
Keith and Merrow, 2022, adapted from U.S. EPA.

TEMPERATURE



Thin Line





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

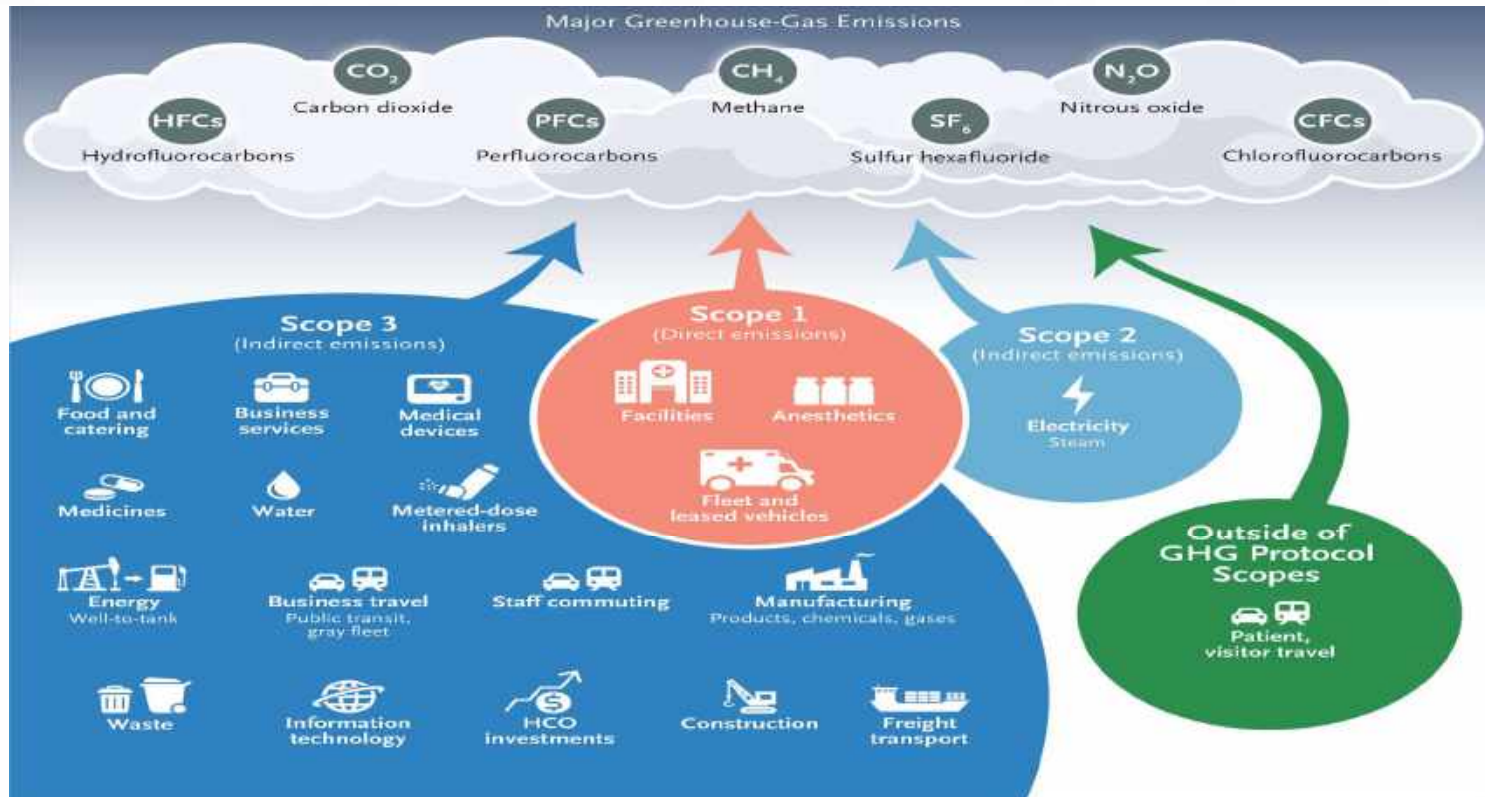
Health Sector is Causing Health Harms

- 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.



Health system contributions



<https://www.nejm.org/doi/full/10.1056/NEJMs2210022>

Climate Impacts Health



**H
E
A
T
W
A
V
E**

Heat illness

Exacerbate heart and lung conditions

Asthma

Traumatic injury

Water and foodborne illnesses

Allergies

Vector-borne disease

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

$$\text{Heat Index} = -42.379 + 2.04901523T + 10.14333127R - 0.22475541TR - 6.83783 \times 10^{-3}T^2 - 5.481717 \times 10^{-2}R^2 + 1.22874 \times 10^{-3}T^2R + 8.5282 \times 10^{-4}TR^2 - 1.99 \times 10^{-6}T^2R^2$$

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

More People Are at Risk as the Heat Index Rises



Heat index conditions as low as 80°F can affect human health. Extreme heat exposure affects people differently depending on their health and environment. Certain groups of people may become more susceptible to heat-related illness as the heat index rises.

© 2019 Union of Concerned Scientists

U.S. EPA

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

.....

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



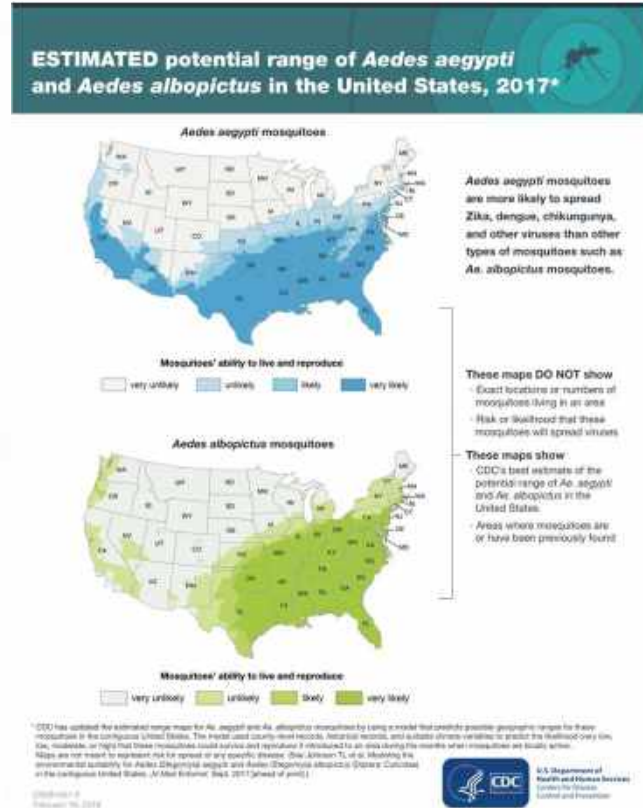
Asthma

- 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.





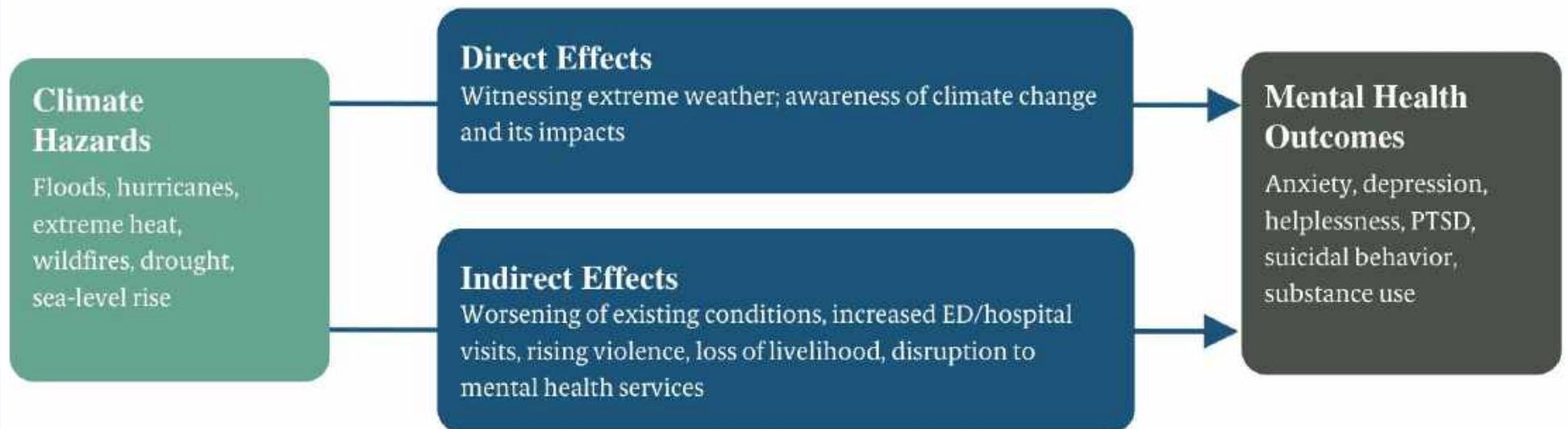
Wtop.
com

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.

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).

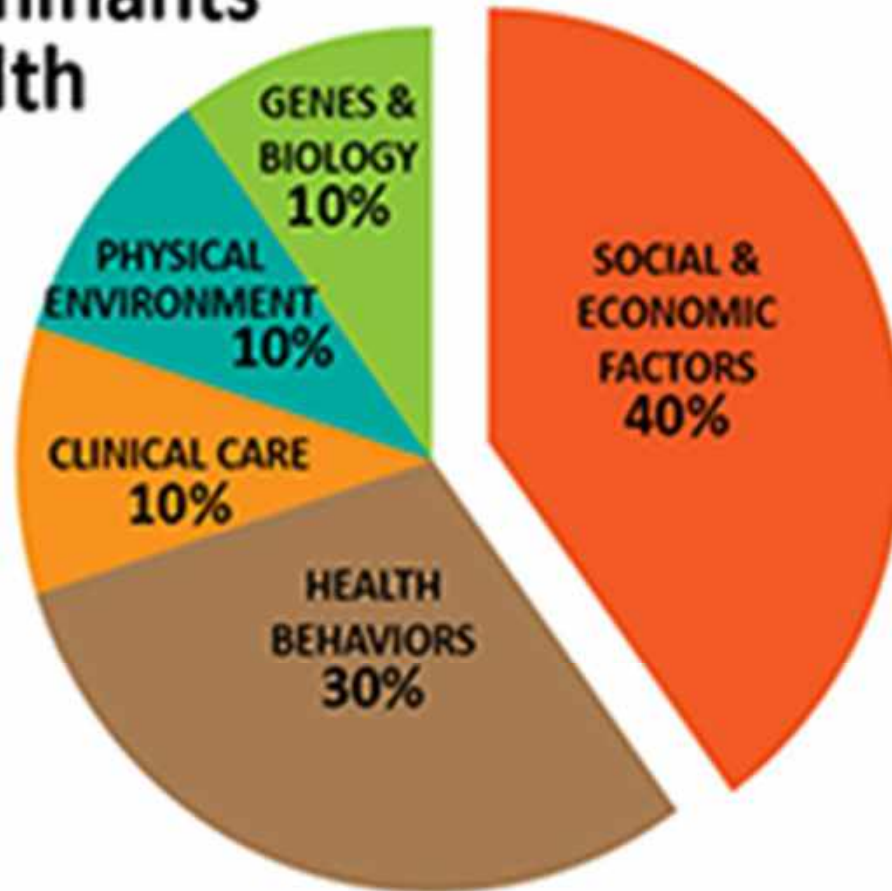
Source: Emily Hough and Nathaniel Counts, "How Climate Change Affects Our Mental Health, and What We Can Do About It" (explainer), Commonwealth Fund, Mar. 29, 2023. <https://doi.org/10.26099/rk6r-ne98>

HOW CLIMATE MIGRATION WILL RESHAPE AMERICA

Millions will be
displaced. Where will
they go?

NY Times 9/15/2020

Determinants of health



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

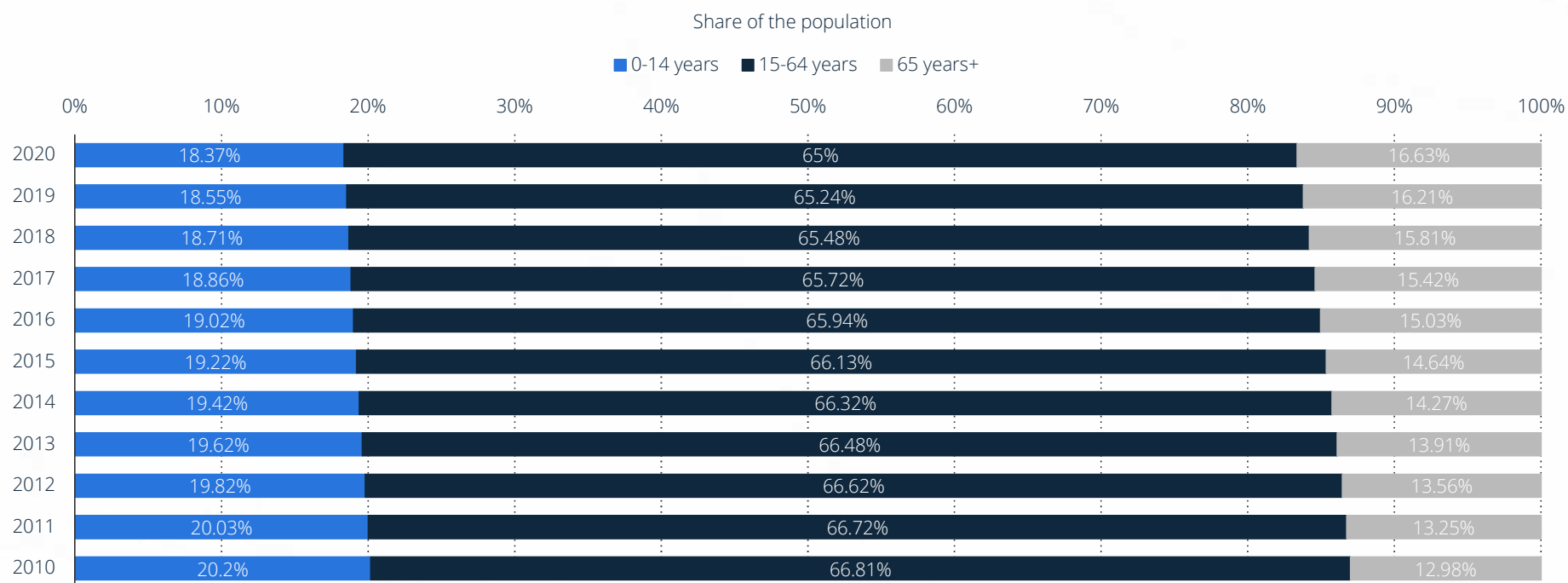
U.S. Latin Population

1. Nearly 50% live in counties that violated ground level ozone standards.
2. Major employment in agriculture, manufacturing, and construction.
3. 55% live in Florida, California and Texas, three states already experiencing serious effects related to climate change:.

<http://www.nhmamd.org/index.php/nhma-media/nhma-in-the-news/233-northjerseycom-news-report-hispanics-disproportionately-impacted-byair-pollution>

Age distribution in the United States from 2010 to 2020

Age distribution in the United States 2020



Note(s): United States

Further information regarding this statistic can be found on [page 8](#).

Source(s): World Bank; ID 270000



Impacts | Vulnerable Populations

Vulnerable Populations

- Demographics, socioeconomic status, and physical location can impact climate vulnerability
- Climate change exacerbates existing inequities

While climate change impacts all of us, low-income communities, communities of color, children, the elderly, and those with limited language proficiency are some of the most vulnerable.



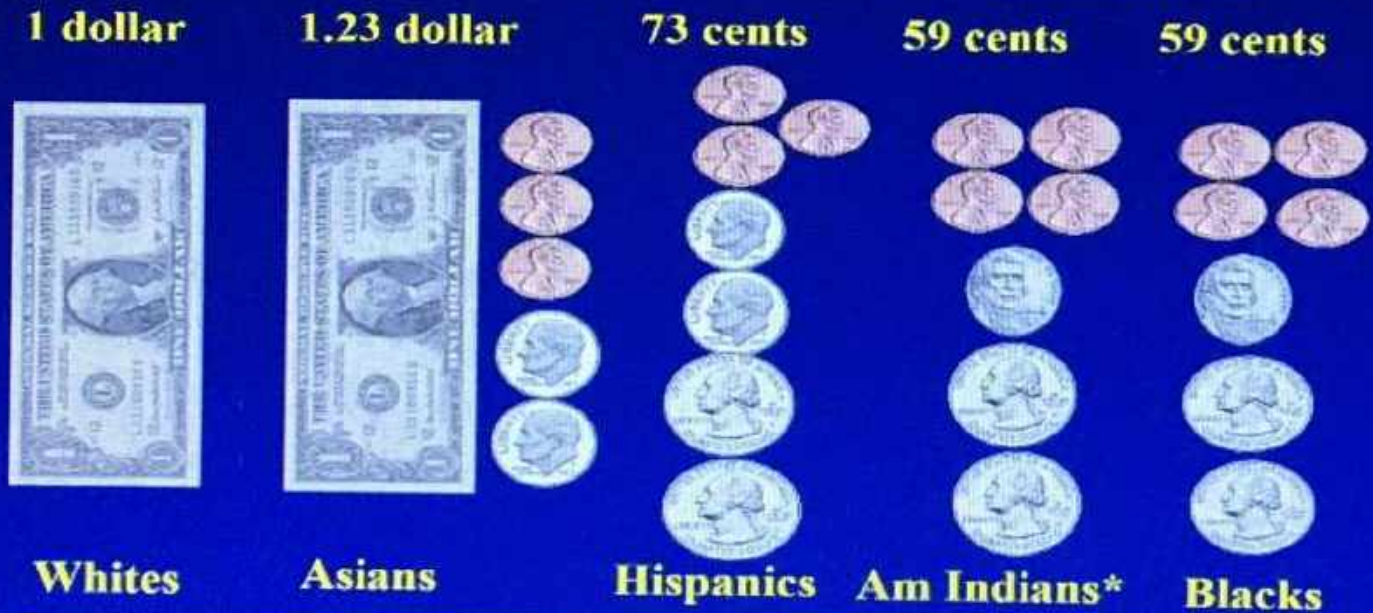
Sources: US Global Research
Program Climate and Health
Assessment "Vulnerable
Populations"

POLICY MATTERS

1619

Median Household Income and Race, 2018

Racial Differences in Income are Substantial:

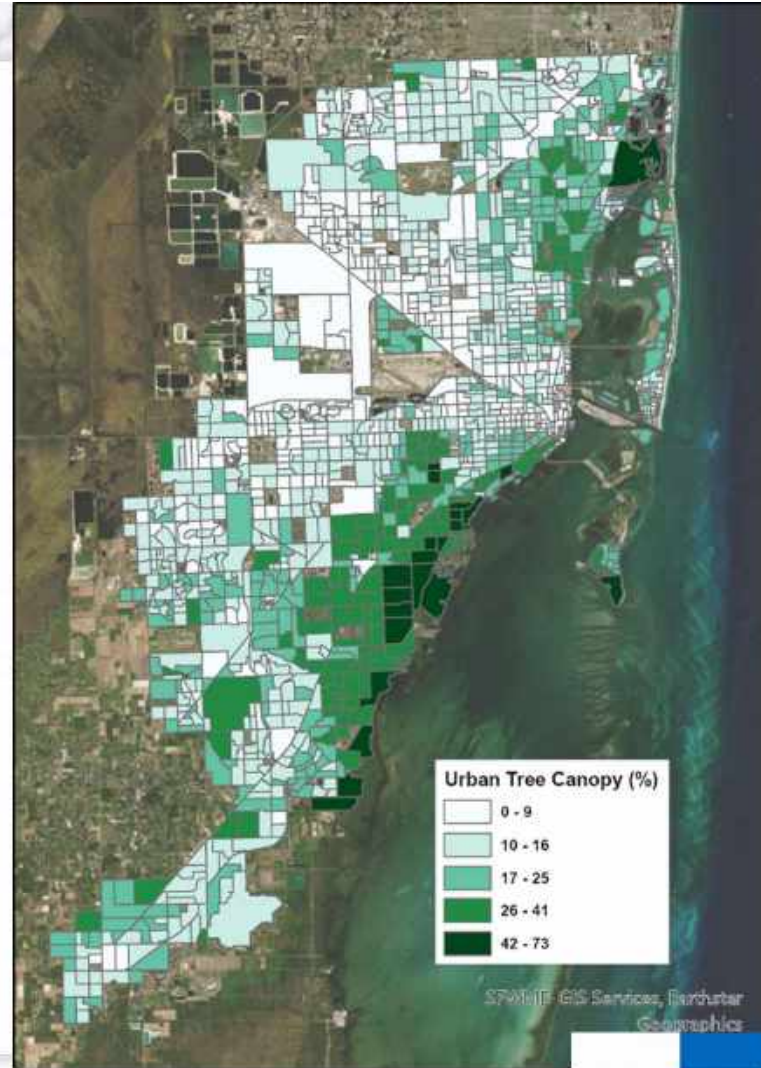
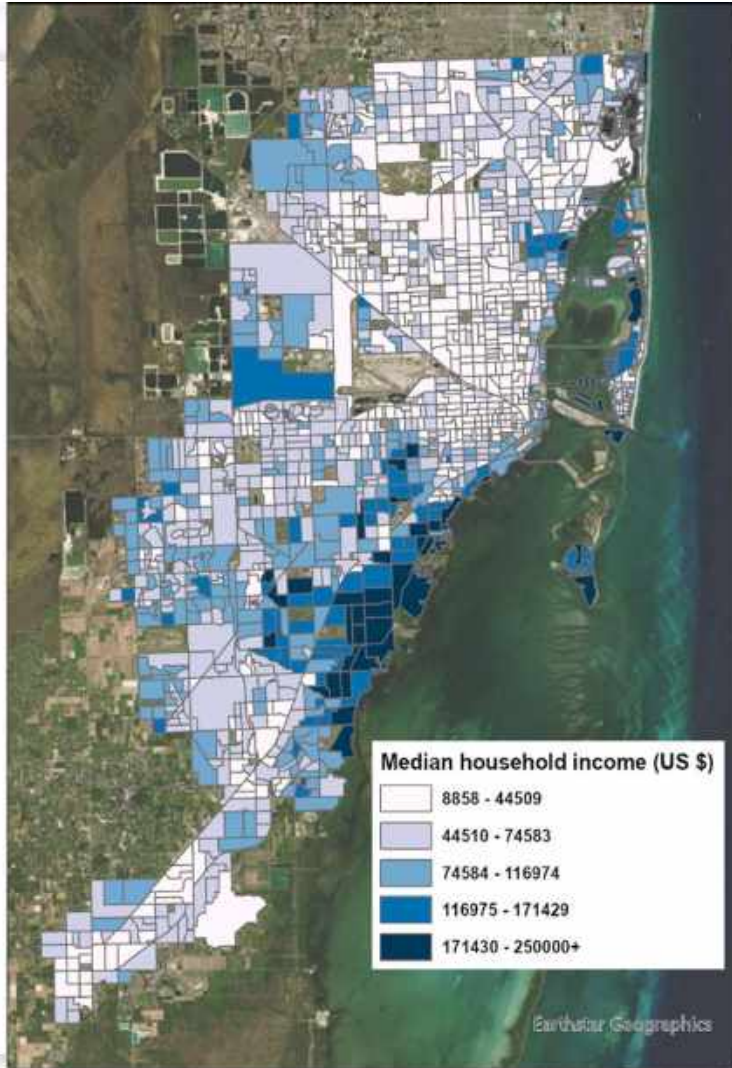


U.S. Census Bureau, Semega et al., 2019; * For 2017; US Census Bureau, ACS, 2017

RICHMOND

Redlined
neighborhoods

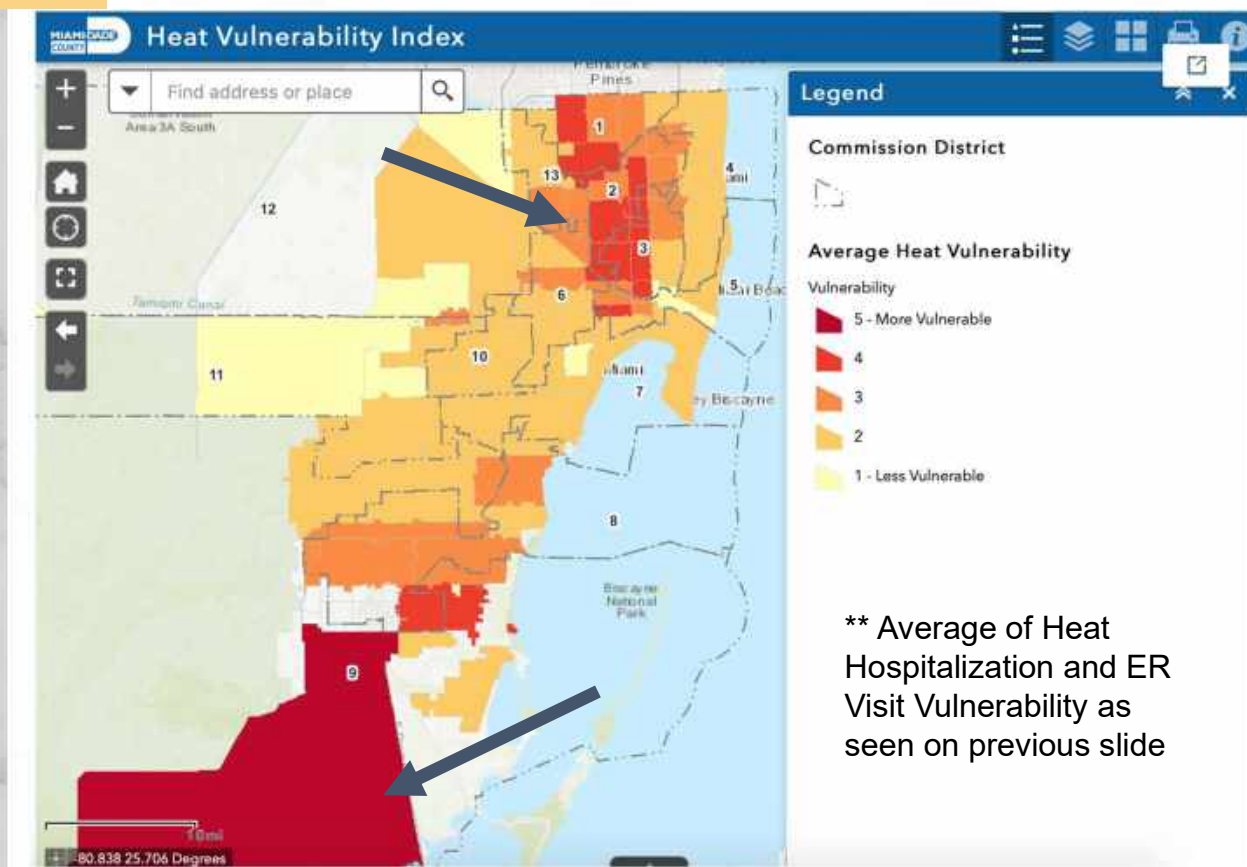
**How Decades of Racist
Housing Policy Left
Neighborhoods Sweltering**
[nytimes.com](https://www.nytimes.com)



FLORIDA INTERNATIONAL UNIVERSITY



ArcGIS StoryMap: Vulnerability



** Average of Heat Hospitalization and ER Visit Vulnerability as seen on previous slide

- Interact with the [Heat Vulnerability Index](#) web mapping application to identify vulnerable zip codes in Miami-Dade
- Homestead, Florida City, Hialeah, Miami, Opa-Locka, and Miami Gardens

US Census 2020

- Pop. Increased by 7.35%- slowest increase ever recorded- 331.4 Million
- Decline in non Hispanic white population – Hispanic grew 34%, Blacks-declined, Mixed Race- increased; STILL white majority- 235.4 million (71%)
- Population shifted to cities.
- POC undercounted

Inequity in consumption of goods and services adds to racial–ethnic disparities in air pollution exposure

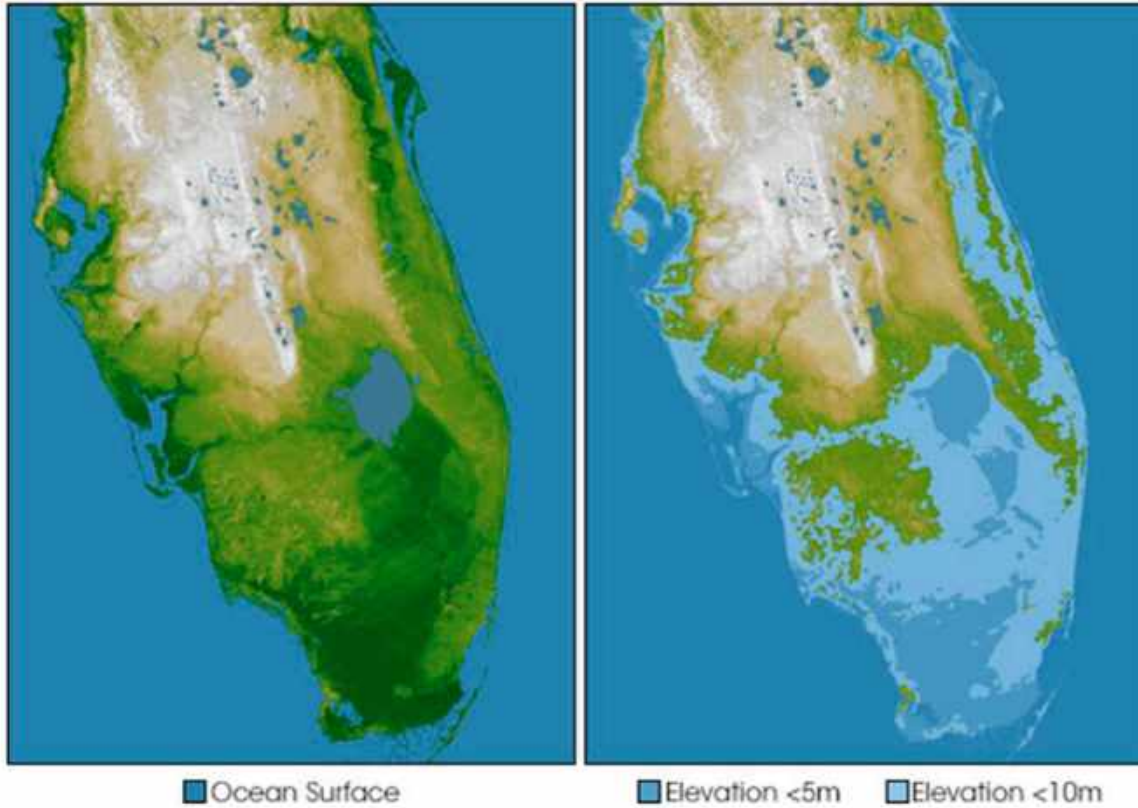
Christopher W. Tessum, Joshua S. Apte, Andrew L. Goodkind, Nicholas Z. Muller, Kimberley A. Mullins, David A. Paoella, Stephen Polasky, Nathaniel P. Springer, Sumil K. Thakrar, Julian D. Marshall, and Jason D. Hill

Abstract

Fine particulate matter (PM_{2.5}) air pollution exposure is the largest environmental health risk factor in the United States. Here, we link PM_{2.5} exposure to the human activities responsible for PM_{2.5} pollution. We use these results to explore “pollution inequity”: the difference between the environmental health damage caused by a racial–ethnic group and the damage that group experiences. We show that, in the United States, PM_{2.5} exposure is disproportionately caused by consumption of goods and services mainly by the non-Hispanic white majority, but disproportionately inhaled by black and Hispanic minorities. On average, non-Hispanic whites experience a “pollution advantage”: They experience ~17% less air pollution exposure than is caused by their consumption. Blacks and Hispanics on average bear a “pollution burden” of 56% and 63% excess exposure, respectively, relative to the exposure caused by their consumption. The total disparity is caused as much by how much people consume as by how much pollution they breathe. Differences in the types of goods and services consumed by each group are less important. PM_{2.5} exposures declined ~50% during 2002–2015 for all three racial–ethnic groups, but pollution inequity has remained high.

Proceedings of the National Academy of Science of the U.S. <https://doi.org/10.1073/pnas.1818859116>

Sea Level Rise www.miamiherald.com/news/nation-world/national/article172347252.html

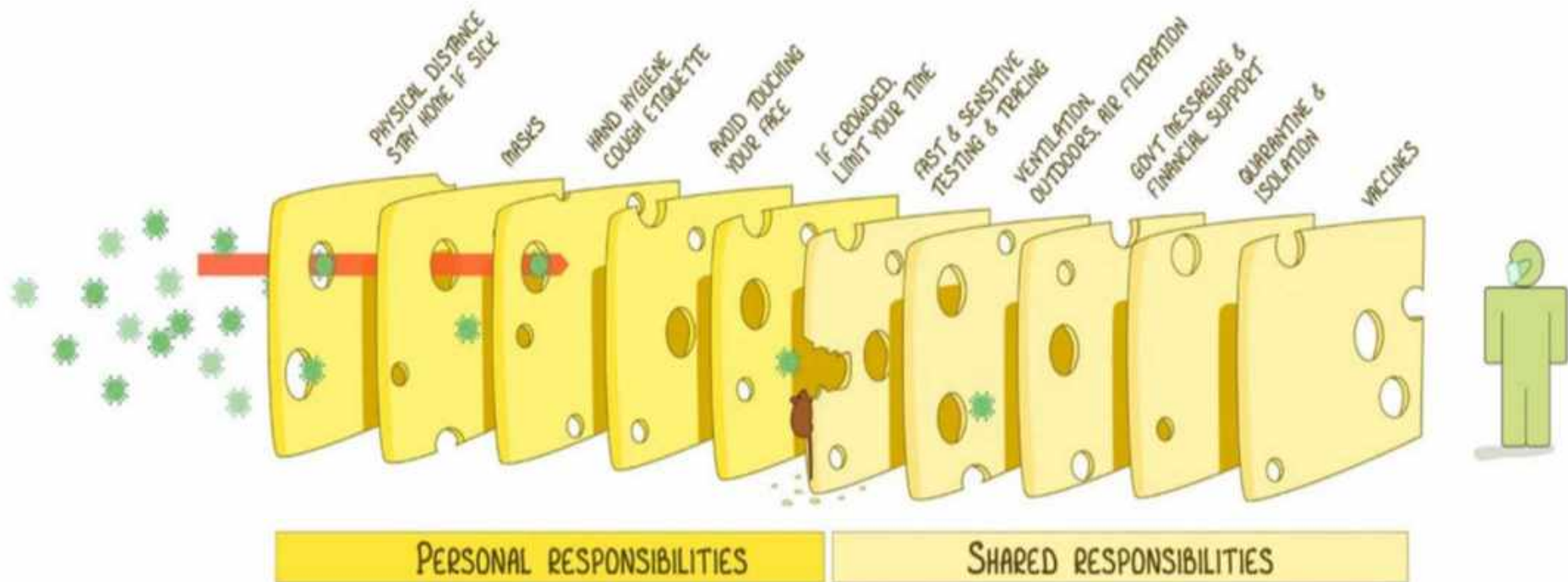




United Nations” Intergovernmental Panel on Climate Change

Efforts that improve liveability while also reducing greenhouse gas emissions are "more urgent than previously thought". Actions that prioritize equity and justice, including tackling gender or income inequalities, have better overall outcomes".

The Swiss Cheese Respiratory Virus Pandemic Defense: Recognizing that No Single Intervention is Perfect at Preventing Spread



EACH INTERVENTION (LAYER) HAS IMPERFECTIONS (HOLES).
MULTIPLE LAYERS IMPROVE SUCCESS.

Health Professionals are the best messengers!!

America's Most & Least Trusted Professions

Rating of selected U.S. professions in terms of honesty and ethical standards in 2018



© ⓘ ⓘ n=1,025 U.S. adults
@StatistaCharts Source: Gallup

statista

Health Sector

22 million health sector workers

- 3.8 million nurses
- 1 million doctors
- Over 300K pharmacists



Actions You Can Take To Advocate for Climate Solutions

1. **Engage-** Learn more about climate change. Participate in programs like Michael Hawken's **Project Drawdown**
2. **Educate** - about climate change with your family, friends, colleagues, community, legislature- EVERYONE
3. **Advocate-** **Join** an organization advocating for solutions to climate change, **VOTE**
 - Florida Clinicians for Climate Action (FCCA) www.FloridaClinicians.org
 - Alliance of Nurses for Healthy Environments (ANHE) <https://envirn.org/>
 - <https://medsocietiesforclimatehealth.org/>

Climate & Heat Health Task Force



Goals reached:

- World's First Chief Heat Officer
- Created community workshops.
- Urban Heat Research Working Group.
- Clinician education programs

The Task Force included

- County appointed policy makers,
- Volunteer scientific experts
- Volunteer healthcare professionals
- Two community members (ensure community voices are heard and lifted up)

<https://miamifoundation.org/extremeheat/>

Medical-Legal Partnership

Letter Templates & Instructions

Protecting Climate-Vulnerable Patients

A patient does not have to be a recipient of social security disability benefits or meet Social Security's definition of disabled to request a reasonable accommodation.



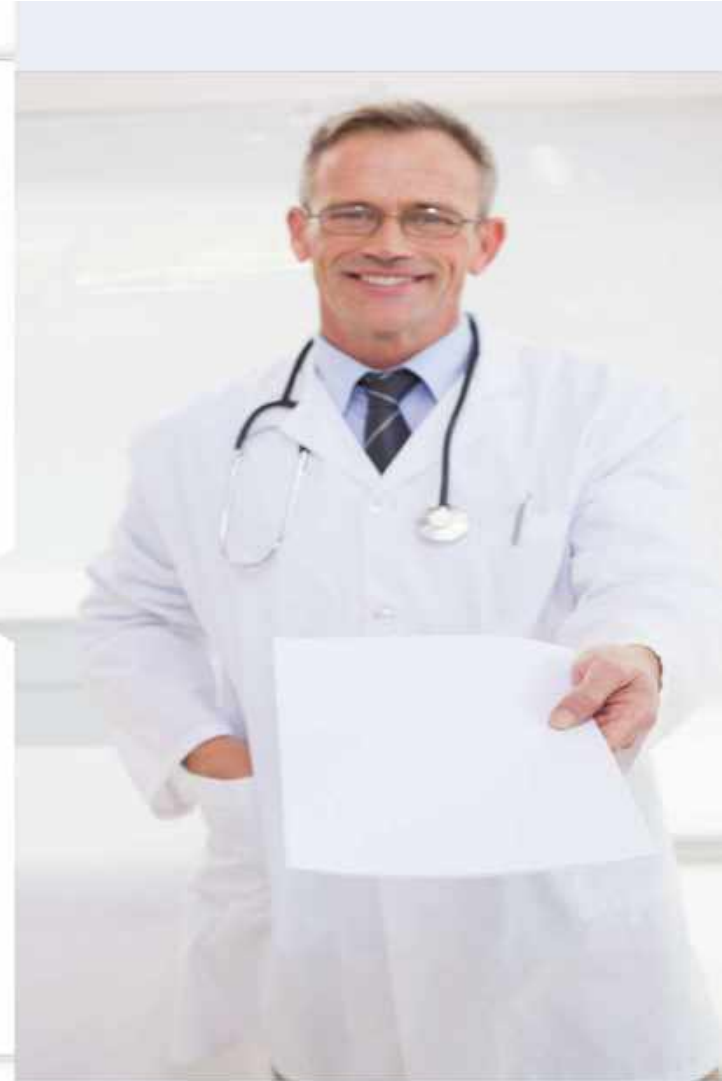
**REASONABLE ACCOMMODATIONS IN
EDUCATION**



**REASONABLE ACCOMMODATIONS IN
EMPLOYMENT**

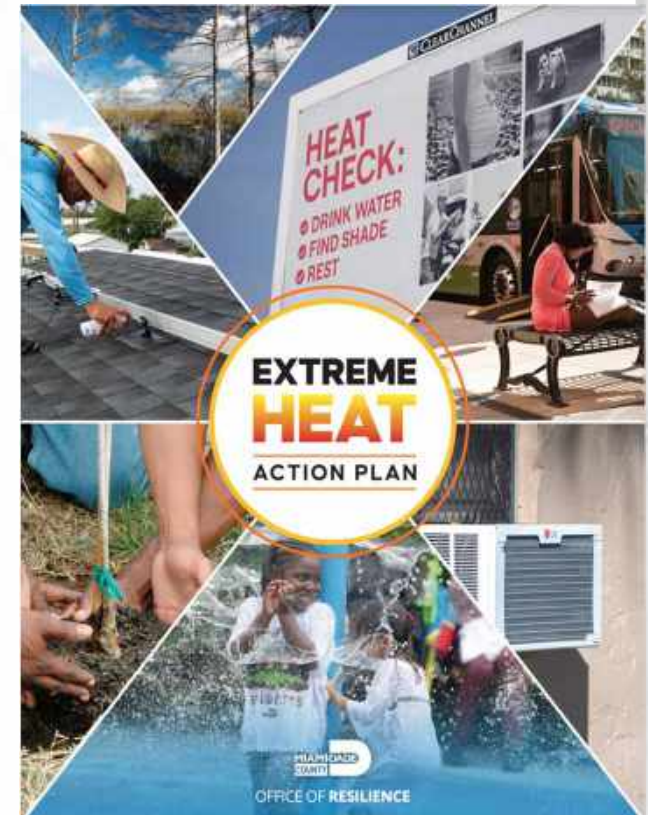


**REASONABLE ACCOMMODATIONS IN
HOUSING**



Extreme Heat Action Plan

- **Goal 1: Inform, Prepare and Protect People**
- **Goal 2: Cool our Homes and Emergency Facilities**
- **Goal 3: Cool our Neighborhoods**



Florida Clinicians for Climate Action's Education Strategy

Free CME Climate Change and Health Webinars with Baptist Health System

On-site Clinician and Patient Education in high (heat) vulnerability communities' health centers and hospitals.

Quarterly "Lunch and Learn" webinars for all Florida Clinicians (non-CMEs)

Community Practicums for Medical Students

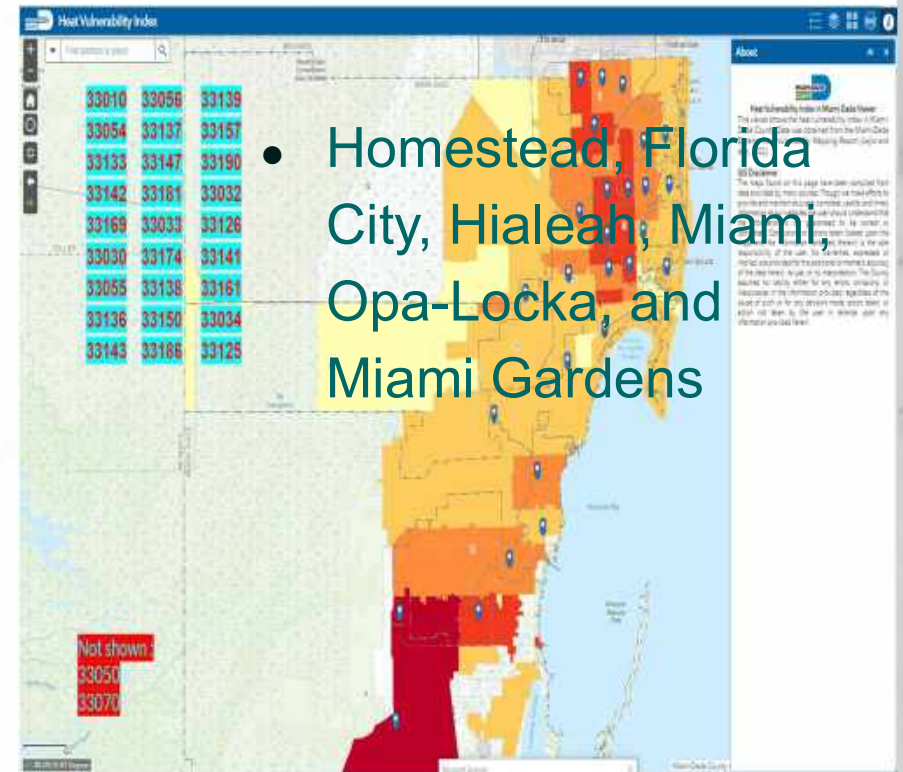
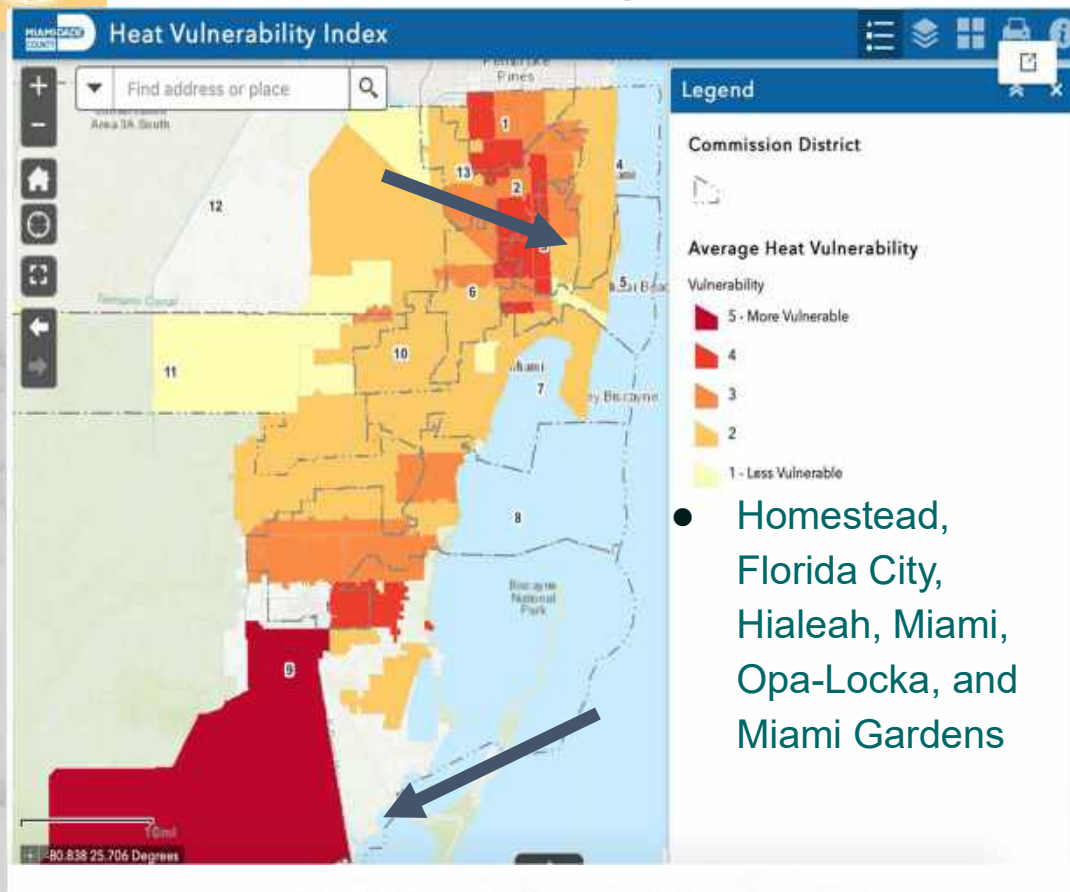
Climate and Health Training Program to develop community educators (16+ y/o volunteers)

Social Media Presence





ArcGIS Story Map: Vulnerability



Contacting Hospitals & Clinics

66	Steward Family Hospital	Coral Gables Hospital	Main	2	33134	305-445-8461	3100 Douglas Rd Coral Gat Primary Care
67	Jackson Health System	Jackson Memorial Hospital	Main	4	33136	305-585-1111	1611 NW 12th Ave, Miami, I Emergency, Br
68	Jackson Health System	Jackson Health Behavioral Hospital	Satellite	4	33136	305-355-7000	1695 NW 9th Ave, Miami, FI Behavioral and
69*	University of Miami. Team Meetir	University of Miami Hospital And Clinic	Satellite	4	33136	305-325-5511	1400 NW 12th Ave, Miami, Medical, Surgic
70*	University of Miami Team Meetir	University of Miami Hospital	Main	3	33125	305-243-4000	1295 NW 14th St, Miami, FL Medical, Surgic
71	Wellpath .. 11/22/22 Carol spoke	South Florida Evaluation and Treatme	Main	5	33034	786-349-6000	18680 SW 376th St, Homes Behavioral and
72	La Colonia Medical Center	La colonia Medical Center Homestear	Satellite	3	33032	305-889-3121	27435 S Dixie Hwy, Naranja, F Primary Care, Ca
73	La Colonia Medical Center	La colonia Medical Center Little Hava	Satellite	3	33125	00) 305-889-3121 prefe	2001 NW 7th St, Miami, FL : Primary Care, C



Heat Stress and Heat Illness Prevention Series: Malaria in Florida

September 27, 2023 | 6:00 p.m. - 7:00 p.m. EST

An estimated 34 heat-related deaths occurred annually in Miami-Dade County from 2015 to 2019 and 6,804 emergency room visits in the state of Florida were attributed to heat-related illness in 2019. The risk of heat related illness persists due to a warming climate. Scientific evidence indicates that patient health is already impacted by increased days of extreme heat. Join presenters from the Miami-Dade Heat Task Force and Florida Clinicians for Climate Action as they address how to identify signs and symptoms of heat stress and heat illness and explore cost-effective strategies to treat and prevent heat illness in our patients.

[Enroll today at BaptistHealth.net/CME](https://www.baptisthealth.net/CME)

Faculty

Disclosure



Miami-Dade County
Florida Clinicians for Climate Action



HEAT HEALTH EDUCATION!
FOR CLINICIANS AND COMMUNITY

**STAYING SAFE IN
HOT WEATHER**



BAPTIST HEALTH HOMESTEAD HOSPITAL
Outside the Carambola Cafe
October 18th & 20th
11 am - 1 pm

Become a C-HOT Youth Representative

Part-time summer opportunity via Florida Clinicians for Climate Action



What Is C-HOT?

The **Climate-Health Outreach Team** empowers Miami youth to engage clinicians with climate and health advocacy. We inform and equip healthcare providers to start the conversation on climate and health and act on climate solutions.



Responsibilities

C-HOT Youth Representatives will visit Miami clinics and start conversations on climate and health with providers, aiming to increase their involvement in the movement to fight climate change.

Youth Reps will play a critical role in equipping clinicians to advocate for their patients via climate reform.



C-HOT

Climate Health Outreach Team

C-HOT aims to build a small-but-mighty army of engaged, informed health professionals who can advocate for action to combat climate change. We empower youth to start conversations with providers on climate and health.

Our Youth Representatives visit clinics to inform and equip providers to promote future dialogue around climate and health.

Staying Safe in Hot Weather

Watch for these signs of hyperthermia:

Dizziness Muscle cramps
Sweating in your armpits and feet Nausea and weakness Rapid pulse

Tips to prevent hot-weather illness:

Drink liquids Limit caffeine and alcohol
Wear light-colored, loose fitting clothes If it's too hot, try exercising indoors

Learn more about staying safe in hot weather at www.nia.nih.gov/hot-weather-safety

WEATHER ALERT

HEAT WAVE

Drink Water - Find Shade - Get Rest
Check On Seniors, Babies and Pets

FCCA

Heat Waves are Dangerous	Cooling Strategies - Preventing Heat-Related Illness	Pay Extra Attention to Vulnerable Communities								
<p>Heat waves are dangerous because they can cause heat stroke, dehydration, and other health problems. Heat waves can also cause power outages, which can be dangerous for people who rely on electricity for medical equipment, air conditioning, and other essential services.</p> <p>Be prepared for heat waves by staying hydrated, wearing light-colored clothing, and staying in shade. If you are at home, use fans and air conditioning if available. If you are outdoors, wear a hat and sunglasses, and seek shade frequently.</p> <p>Check on vulnerable people, such as seniors, children, and people with chronic health conditions. Make sure they have access to water, shade, and cooling services.</p>	<p>Stay hydrated by drinking plenty of water. Avoid alcohol and caffeine, which can dehydrate you. Drink water frequently, even if you don't feel thirsty.</p> <p>Wear light-colored, loose-fitting clothing to help keep you cool. Avoid heavy fabrics like wool and synthetic materials.</p> <p>Use fans and air conditioning if available. If you don't have these services, look for public cooling centers in your community.</p> <p>Seek shade frequently, especially during the hottest part of the day. Avoid strenuous outdoor activities during heat waves.</p> <p>Check on vulnerable people, such as seniors, children, and people with chronic health conditions. Make sure they have access to water, shade, and cooling services.</p>	<p>Recognize the Signs of Heat Illness - What to Look For</p> <table border="1"> <tr> <th>HEAT EXHAUSTION</th> <th>HEAT STROKE</th> </tr> <tr> <td> <ul style="list-style-type: none"> Fatigue or drowsiness Headache or dizziness Nausea or vomiting Muscle cramps </td> <td> <ul style="list-style-type: none"> Throbbing headache Hot, dry skin Confusion or loss of consciousness Rapid, strong pulse High body temperature </td> </tr> </table> <p>Treatment - What To Do</p> <table border="1"> <tr> <th>HEAT EXHAUSTION</th> <th>HEAT STROKE</th> </tr> <tr> <td> <ul style="list-style-type: none"> Move to a cooler place Rest in shade Use salt tablets or sports drinks Call 911 if symptoms worsen </td> <td> <ul style="list-style-type: none"> Call 911 immediately Do not give anything to drink Move to a cooler place </td> </tr> </table>	HEAT EXHAUSTION	HEAT STROKE	<ul style="list-style-type: none"> Fatigue or drowsiness Headache or dizziness Nausea or vomiting Muscle cramps 	<ul style="list-style-type: none"> Throbbing headache Hot, dry skin Confusion or loss of consciousness Rapid, strong pulse High body temperature 	HEAT EXHAUSTION	HEAT STROKE	<ul style="list-style-type: none"> Move to a cooler place Rest in shade Use salt tablets or sports drinks Call 911 if symptoms worsen 	<ul style="list-style-type: none"> Call 911 immediately Do not give anything to drink Move to a cooler place
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HEAT Toolkit: Educational Brochures in English, Spanish & Creole

PROTECTING YOUR COMMUNITY

SURVIVING EXTREME HEAT

Staying healthy, hydrated, and safe

BEING SAFE DURING EXTREME HEAT EMERGENCIES

- Stay hydrated by drinking plenty of water.
- Wear light-colored, loose-fitting clothing.
- Use fans and air conditioning if available.
- Seek shade frequently, especially during the hottest part of the day.
- Check on vulnerable people, such as seniors, children, and people with chronic health conditions.

MY FLORIDA

www.floridastate.gov

HEAT STRESS Overview

Understanding heat stress can help you to stay safe while working in hot environments.

Types of Heat Illness

Heat cramps

- Caused by dehydration and electrolyte loss.
- Common in people who work in hot environments.

Heat exhaustion

- Caused by dehydration and electrolyte loss.
- Common in people who work in hot environments.

Heat stroke

- Caused by dehydration and electrolyte loss.
- Common in people who work in hot environments.

Medical Student Heat Education Practicum

1. Started in August 2023
2. 77 students oriented from 3 orientations sessions
3. 12 students completed the C-HOT training and attended our 7 events .



RESULTS

- ● 12 webinars on Baptist Health System Continuing education platform; four, on- demand and five virtual.
- ● 407 CME attendees
- ●. Four Federally Qualified Health Centers – Providers Meetings and onsite patient education sessions
- Free Clinic providers and staff education sessions.
- Largest safety net hospital – Grand Rounds and onsite patient education.
- IRB approved research ongoing Goal-250 responses. Current -60.

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.

Source: Developed by the DC Department of Health. ©2004.



Group Activity



What are some host factors increasing Ms A's susceptibility to heat?

What are some environmental factors increasing Ms. A's risk of heat illness?

What other information would be helpful to know?

Affects of Hurricane Ian in Port Charlotte Florida



PATIENTS' MESSAGES

CANCELLED APPT BENDETOWICZ, DANIEL

Perform Eligibility Check

Message Rx Labs/DI Notes Addendum Log History Virtual Visit

Message [Complaints](#) [Browse](#) [Check Spelling](#)

PT CANCELLED APPT FOR 11/07/2022 AT 9:30AM AS SHE HAS MOVED BACK UP NORTH DUE TO LOSING HER HOME HERE.

Action Taken [Messenger](#) [Time Stamp](#) [Action Taken](#) [Check Spelling](#)

BENDETOWICZ,DANIEL 10/7/2022 9:16:59 AM > NOTIFIED.

Jorge -Thank You



Physicians, Nurses, and other Health Professionals,

“**Mitigating climate change presents unrivaled opportunities
for improving public health**” – Ian Roberts, Clinical Medicine 2009.

Health Professionals are key to the solution.
Please join us!

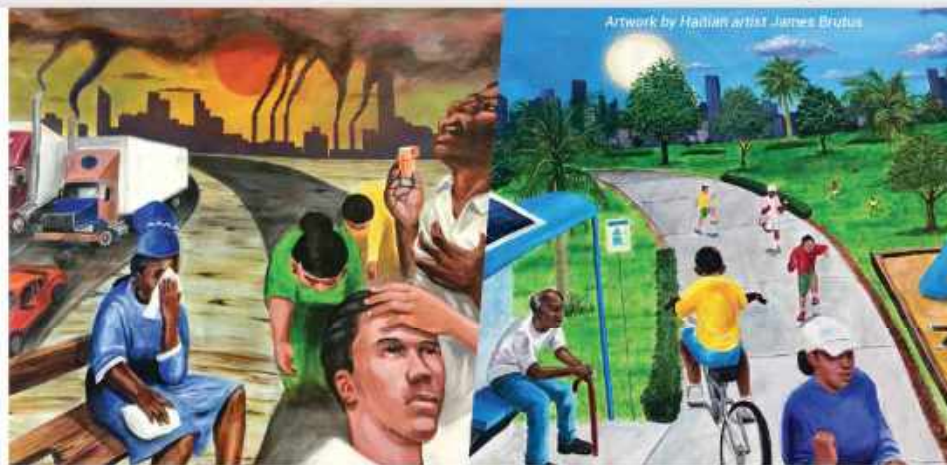


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Thank You

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