Climate Change and Child Health

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Disclosures

Drs. Ragavan, Lee, and Cisneros are co-chairs of the PA AAP Climate and Environmental Health Committee.
Dr. Cisneros serves as co-chair of PA AAP Advocacy Committee

No other disclosures, financial or otherwise

Pennsylvania Chapter

American Academy of Pediatrics

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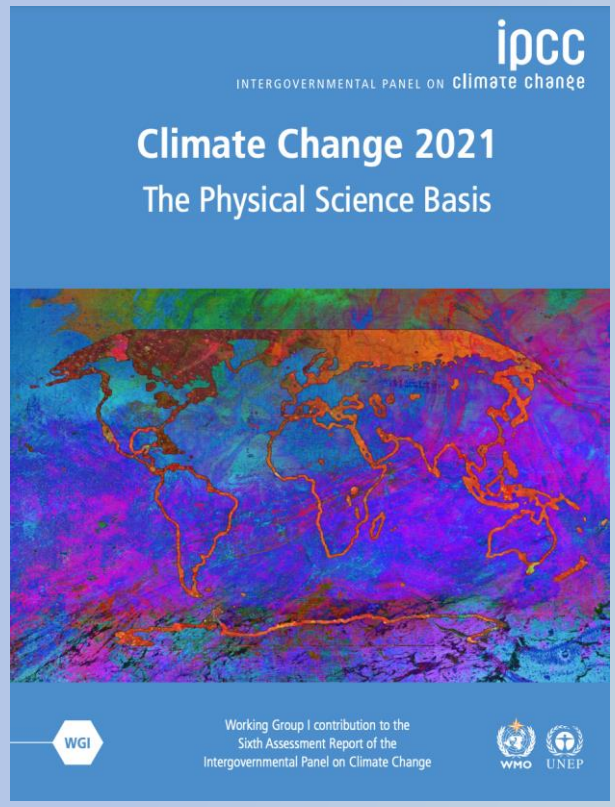
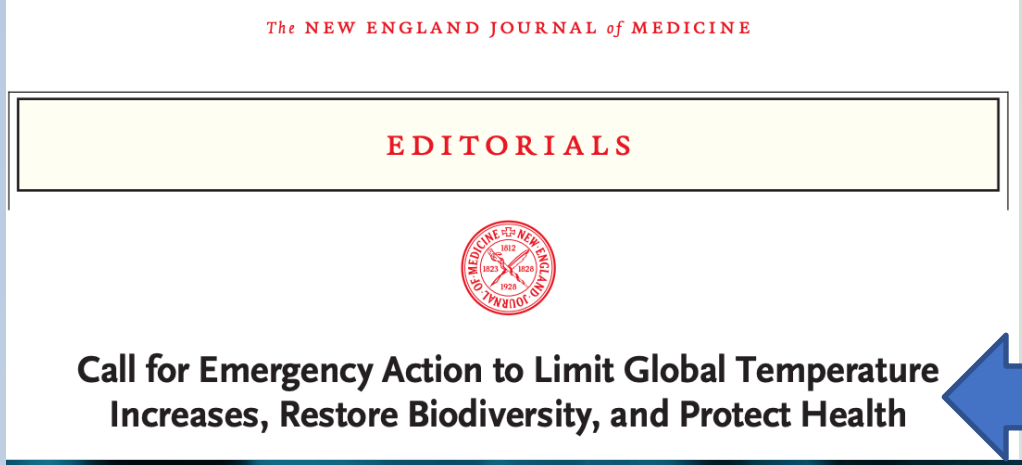
Objectives

1. Understand what climate change is and why it’s happening

2. Recognize how climate change affects child health including how health inequities are interconnected.

3. Review our role in addressing the problem of climate change

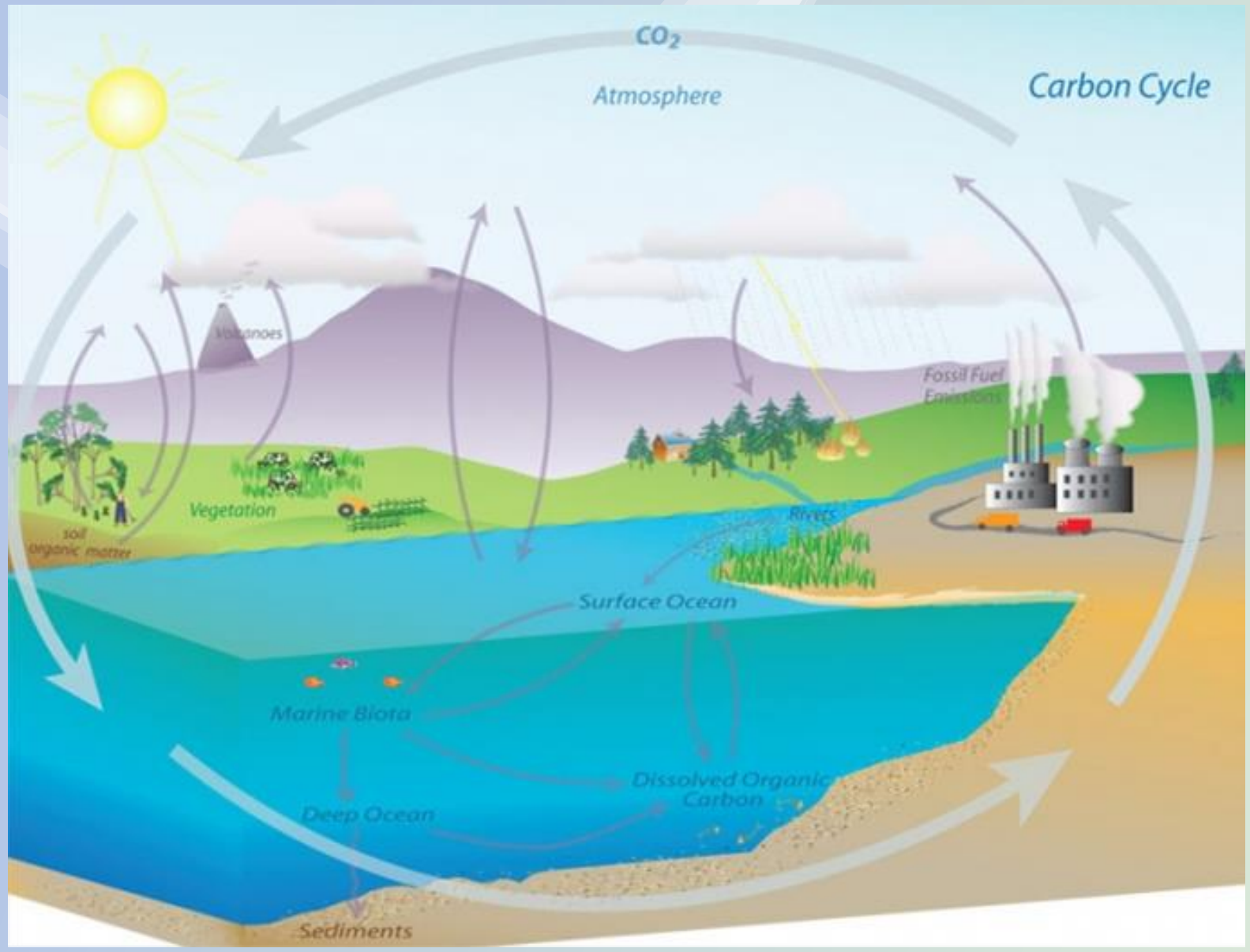




Co-signed by > 200 medical journals!

The 2021 report of the *Lancet* Countdown on health and climate change: code red for a healthy future

Climate change:
What is it and why is it happening?

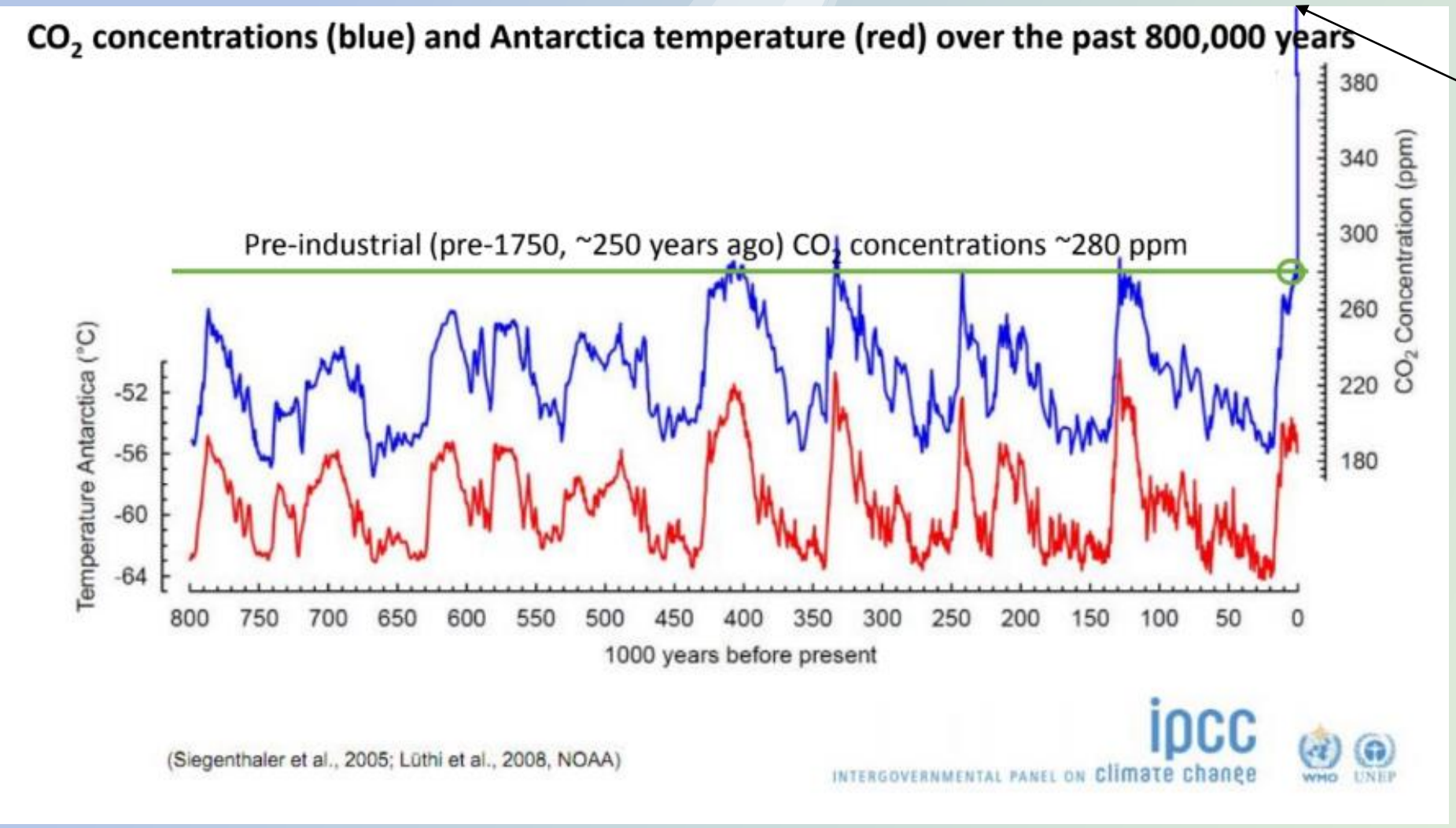


Most of Earth's carbon is stored in rocks and sediments.

The rest is in the ocean, atmosphere and in living and decomposing organisms.

Human activity, primarily the combustion of fossil fuels, has resulted in the transfer of carbon into the atmosphere and oceans.

Source: National Oceanic and Atmospheric Administration (NOAA)

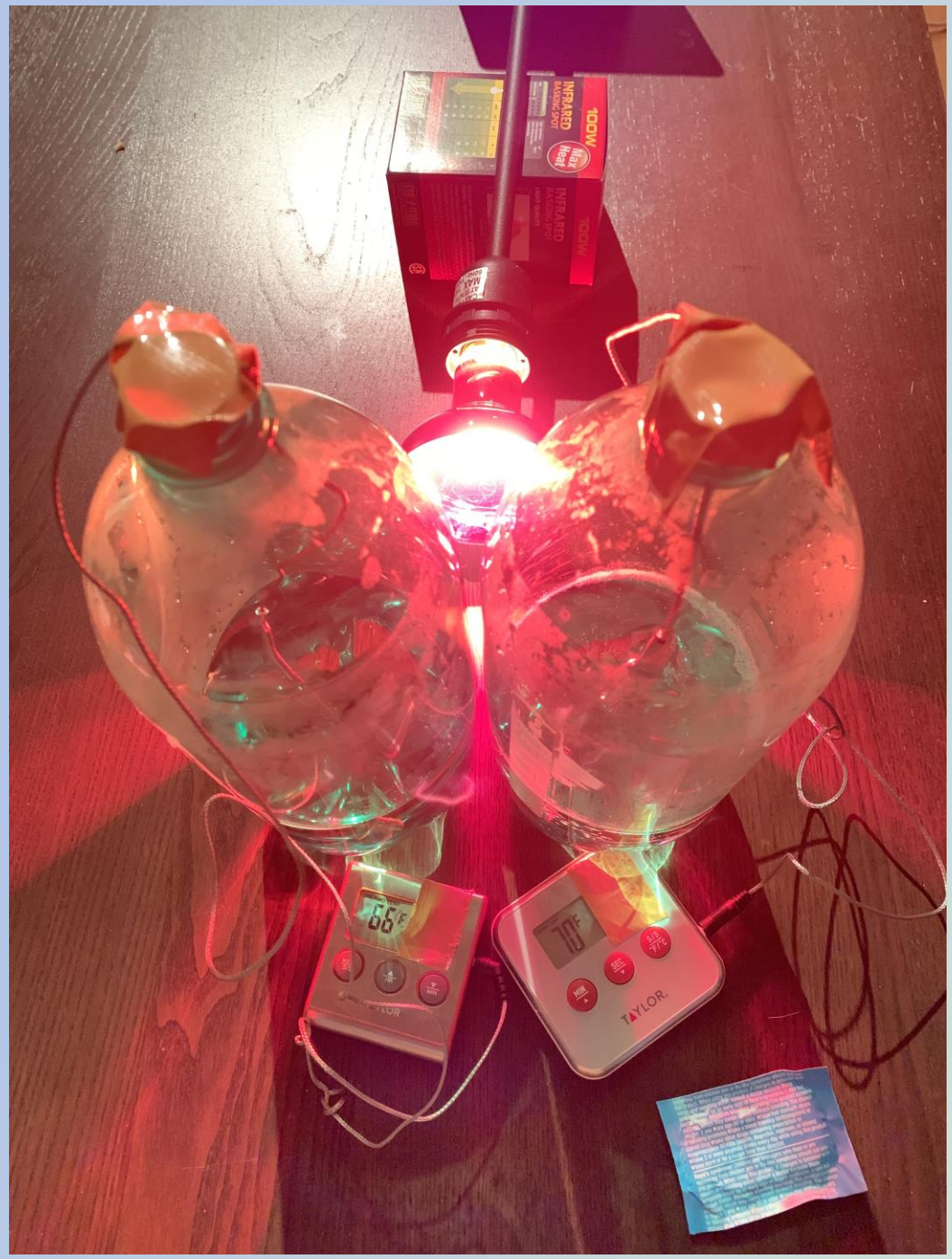


Current levels:
416 ppm

CO_2 traps heat

Temp and atmospheric [CO_2] are correlated

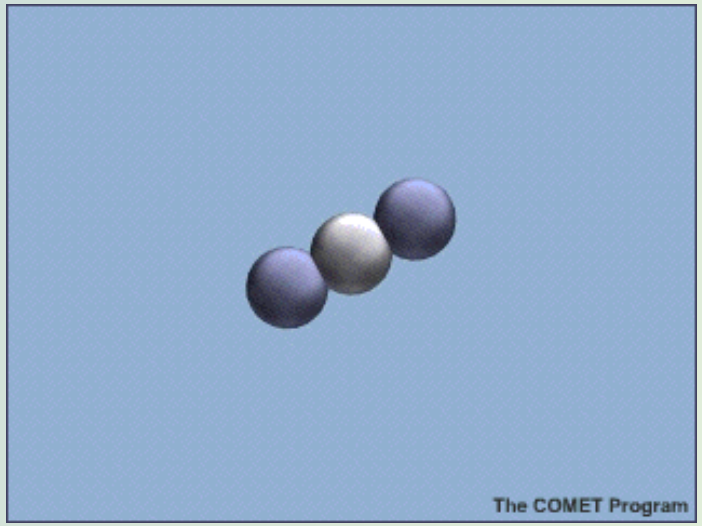
Scientific evidence for warming of the climate system is unequivocal. -IPCC



A simple science experiment you can do with your kids at home showing how CO_2 traps heat

All you need is:
- Two 2 L bottles, half filled with water
- Two thermometers
- An infrared heat lamp (sold at pet shops)
- Alka seltzer tabs (NaHCO3)
- Duct tape to seal the bottles

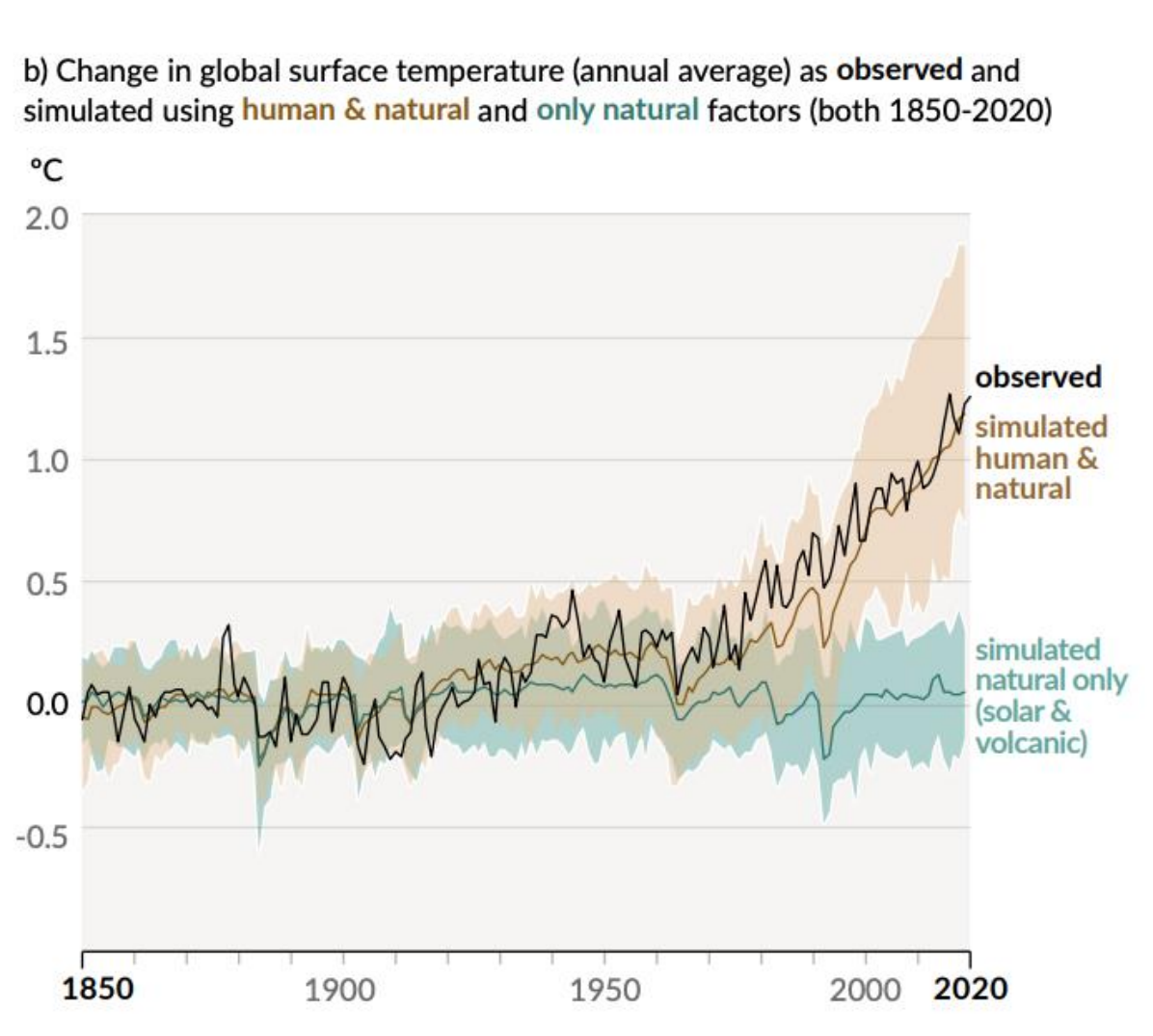
The bottle with water + alka seltzer will have a higher temp than the bottle with water alone as the CO_2 absorbs infrared radiation



Methane (CH4), nitrous oxide (N2O) and ozone (O3) also trap heat.

Oxygen and nitrogen don’t

2020 tied 2016 as the warmest year on record



The last seven years have been the warmest since the beginning of modern record keeping.

Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

Effects of a warming planet

1)Extreme heat
2) Cold spell
3) River flood
4) Heavy precipitation
5) Landslide
6) Aridity
7) Drought
8) Fire weather
10) Severe wind storm
11) Cyclone
12) Sand and dust storm
13) Glacier retreat
14) Heavy snowfall and ice storm
15) Snow avalanche
16) Coastal flood
17) Ocean acidity
18) Coastal erosion
19) Air pollution weather
20) Ocean temp rise

How climate change impacts PA

- increasing average temps
- heavy precipitation
- flooding
- heat waves
- landslides
- cyclones
- sea level rise (Delaware estuary)

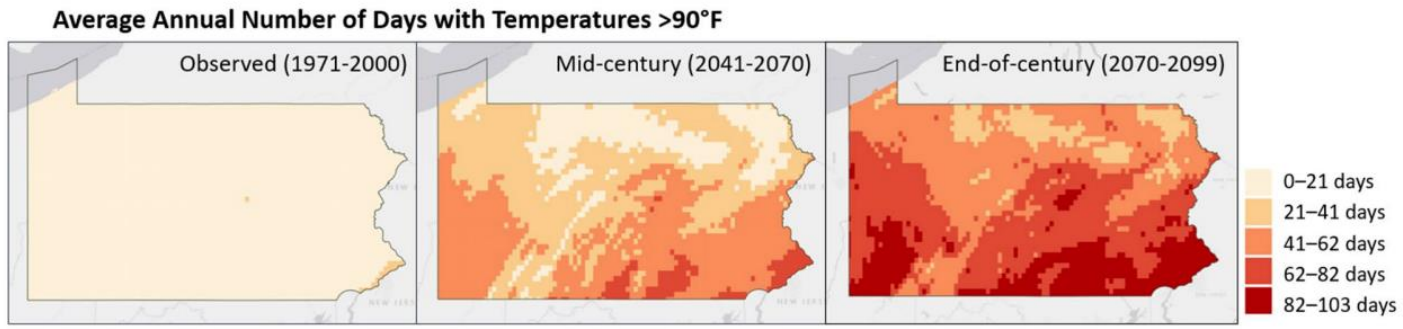


Figure 1. Observed and projected annual days with temperatures above 90°F

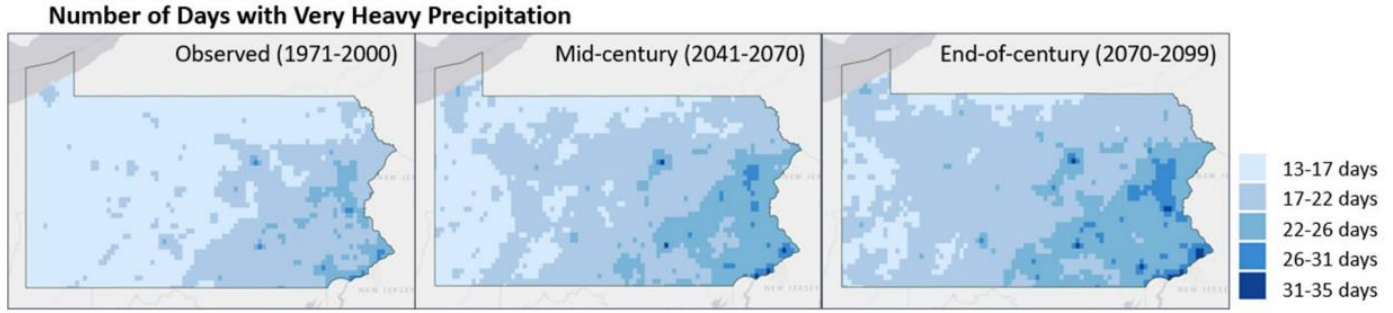


Figure 2. Observed and projected annual days with "very heavy" precipitation

PA Climate Impacts Assessment 2021

How does climate change impact child health?

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POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

Global Climate Change and Children's Health

COUNCIL ON ENVIRONMENTAL HEALTH

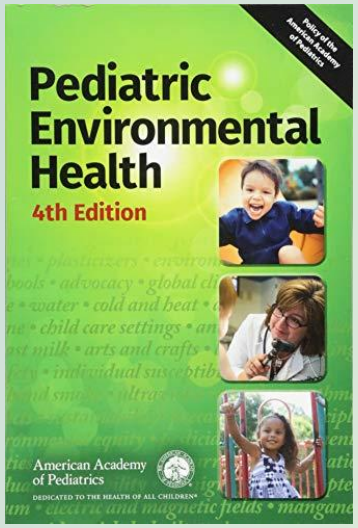
abstract

Rising global temperatures are causing major physical, chemical, and ecological changes in the planet. There is wide consensus among scientific organizations and climatologists that these broad effects, known as "climate change," are the result of contemporary human activity. Climate change poses threats to human health, safety, and security, and children are uniquely vulnerable to these threats. The effects of climate change on child health include: physical and psychological sequelae of weather disasters; increased heat stress; decreased air quality; altered disease patterns of some climate-sensitive infections; and food, water, and nutrient insecurity in vulnerable regions. The social foundations of children's mental and physical health are threatened by the specter of far-reaching effects of unchecked climate change, including community and global instability, mass migrations, and increased conflict. Given this knowledge, failure to take prompt, substantive action would be an act of injustice to all children. A paradigm shift in production and consumption of energy is both a necessity and an opportunity for major innovation, job creation, and significant, immediate associated health benefits. Pediatricians have a uniquely valuable role to play in the societal response to this global challenge.

INTRODUCTION

It is clear from observations across a range of indicators that many fundamental measures of climate are changing. These broad changes, known as "climate change," threaten the biological systems on which the life, health, and prosperity of all children depend. On the basis of well-established evidence from the past 20 years, there is now wide consensus among scientific organizations and approximately 97% of climatologists that human-generated greenhouse gas emissions are the cause of climate change.[1–4] Although the effects of climate change are already being felt across the world, the magnitude of the effects of future changes depends on our ability to substantially reduce greenhouse gas emissions and implement adaptation strategies within the ensuing decades.[5] Thus, it remains possible to protect children, families, and communities from the worst potential effects of climate change.

FROM THE AMERICAN ACADEMY OF PEDIATRICS



Policy of the American Academy of Pediatrics

Pediatric Environmental Health
4th Edition

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Children are uniquely vulnerable to climate change

“More than 88% of the existing burden of disease attributable to climate change occurs in children younger than 5 years.”

- World Health Organization

“1 billion children (half the world’s children) are at ‘extremely high risk’ of the impacts of climate change.”

- UNICEF

Primary effects

- **Natural disasters and extreme weather events**
  - severe storms, flooding and wildfires place children at risk for injury/death, loss/separation from caregivers, exposure to infectious disease and increased risk of mental health consequences

LOCAL // HOUSTON

Analysis reveals nearly 200 died in Texas cold storm and blackouts, almost double the official count

Zach Despart, Alejandro Serrano, Stephanie Lamm, Staff writers

April 1, 2021 | Updated: April 2, 2021 4:40 p.m.

Primary effects

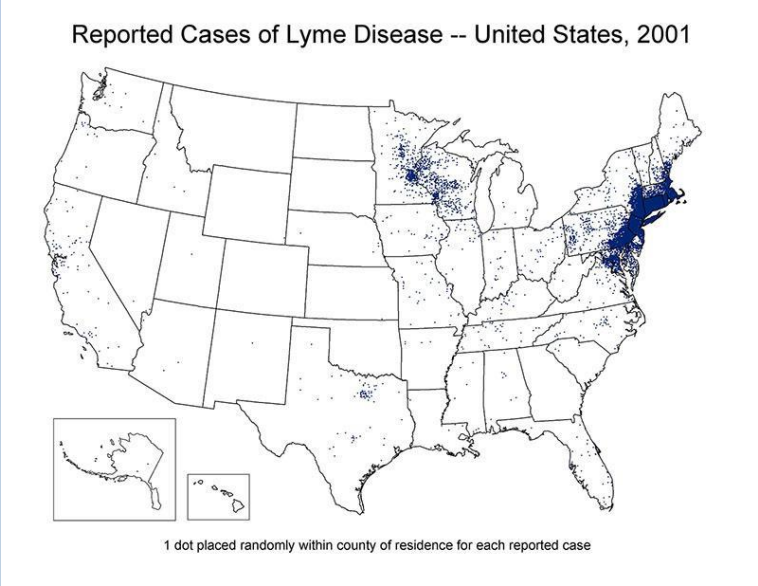
- **Heat waves**
  - Increase in child morbidity and mortality during extreme heat events especially infants and high school athletes

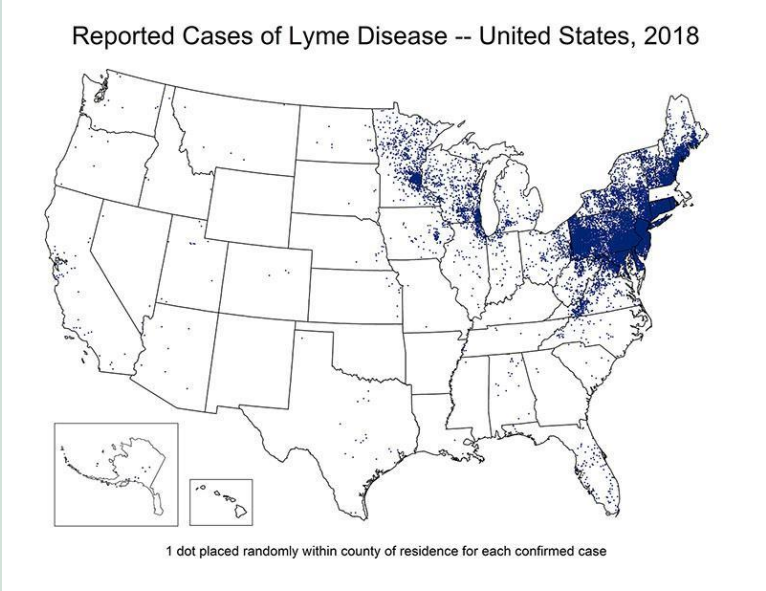
Secondary effects

- **Respiratory disease/asthma**
  - worsening air quality due to temperature-associated elevations in ozone concentration, pollen counts, allergy season duration and wildfire smoke

Secondary effects

- **Infectious diseases**
  - climate warming has contributed to northern expansion of Lyme disease





CDC.gov

- also projected increased burden of child diarrheal illness, coccidioidomycosis, amoebic meningoencephalitis

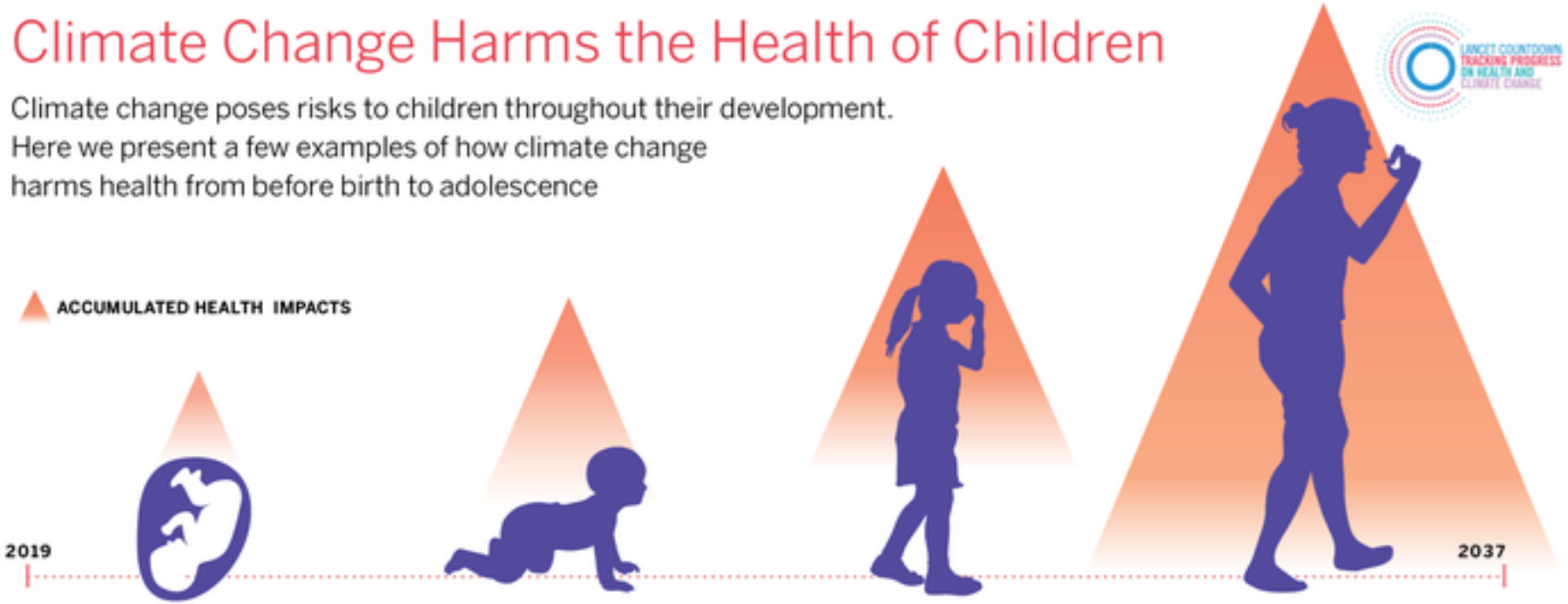
Tertiary effects

- **Disrupted social foundations of child mental and physical health/well-being**
  - sea level rise and loss of biologic diversity impact economies of agriculture, tourism and indigenous communities
  - water scarcity, famine
  - mass migrations
  - increased violent conflicts

Extreme drought in Syria from 2006-2011 exacerbated by climate change resulted in millions of displaced people, followed by social unrest and civil war.

Climate Change Harms the Health of Children

Climate change poses risks to children throughout their development. Here we present a few examples of how climate change harms health from before birth to adolescence



Prenatal

Poor pregnancy outcomes like low birth weight and pre-term delivery

Increased risk of **low birth weight** and **neonatal death**

Infancy

Higher risk for heat-related illness because developing bodies are less able to control temperature

Heightened risk of **water- and food-borne infections** while immune system is developing

Childhood

Long-term **lung problems** and more frequent **asthma attacks**

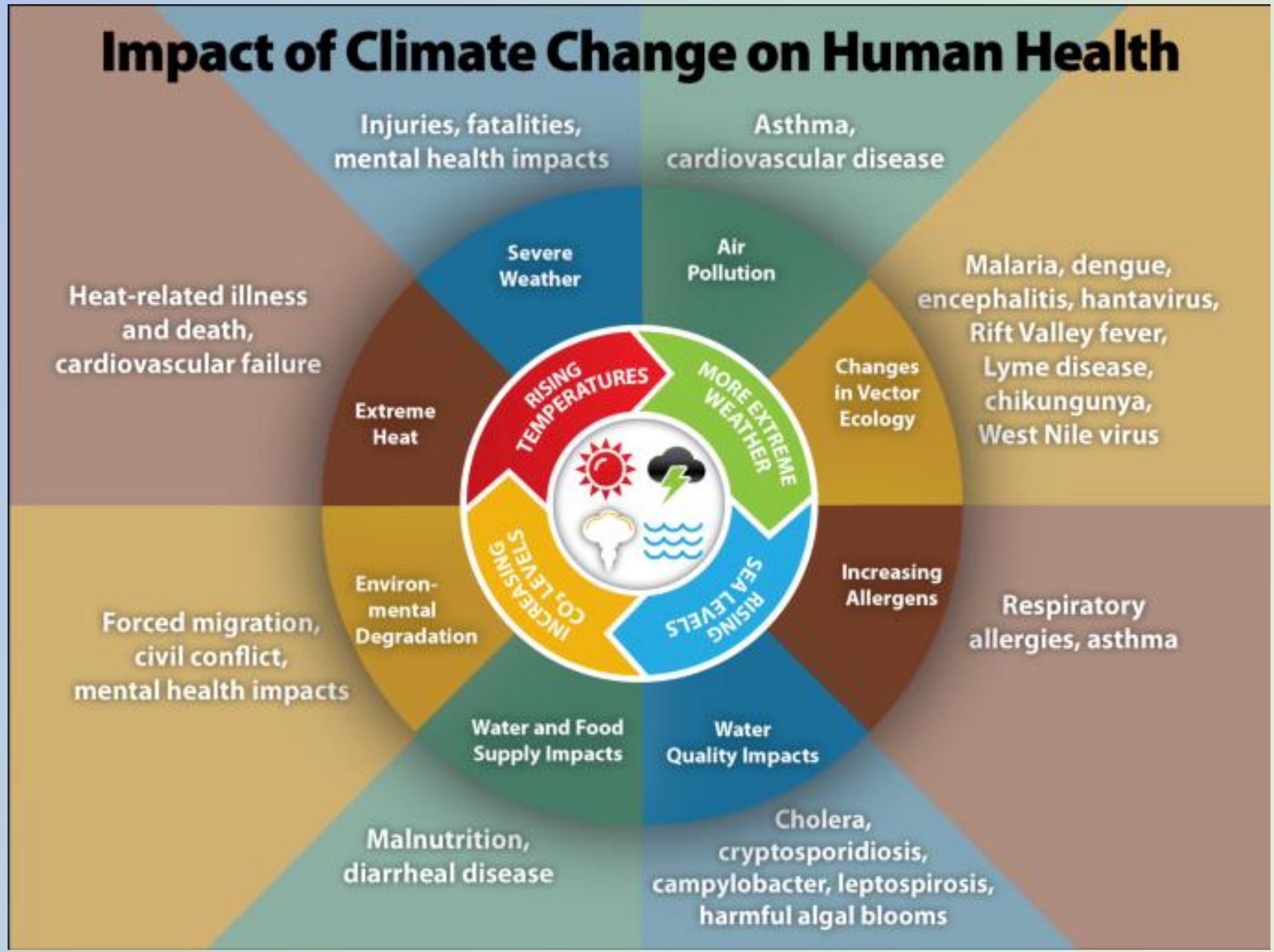
Outdoor exposure increases risk of diseases from insects, like **Lyme disease**

Adolescence

Post-traumatic stress and **anxiety** in survivors

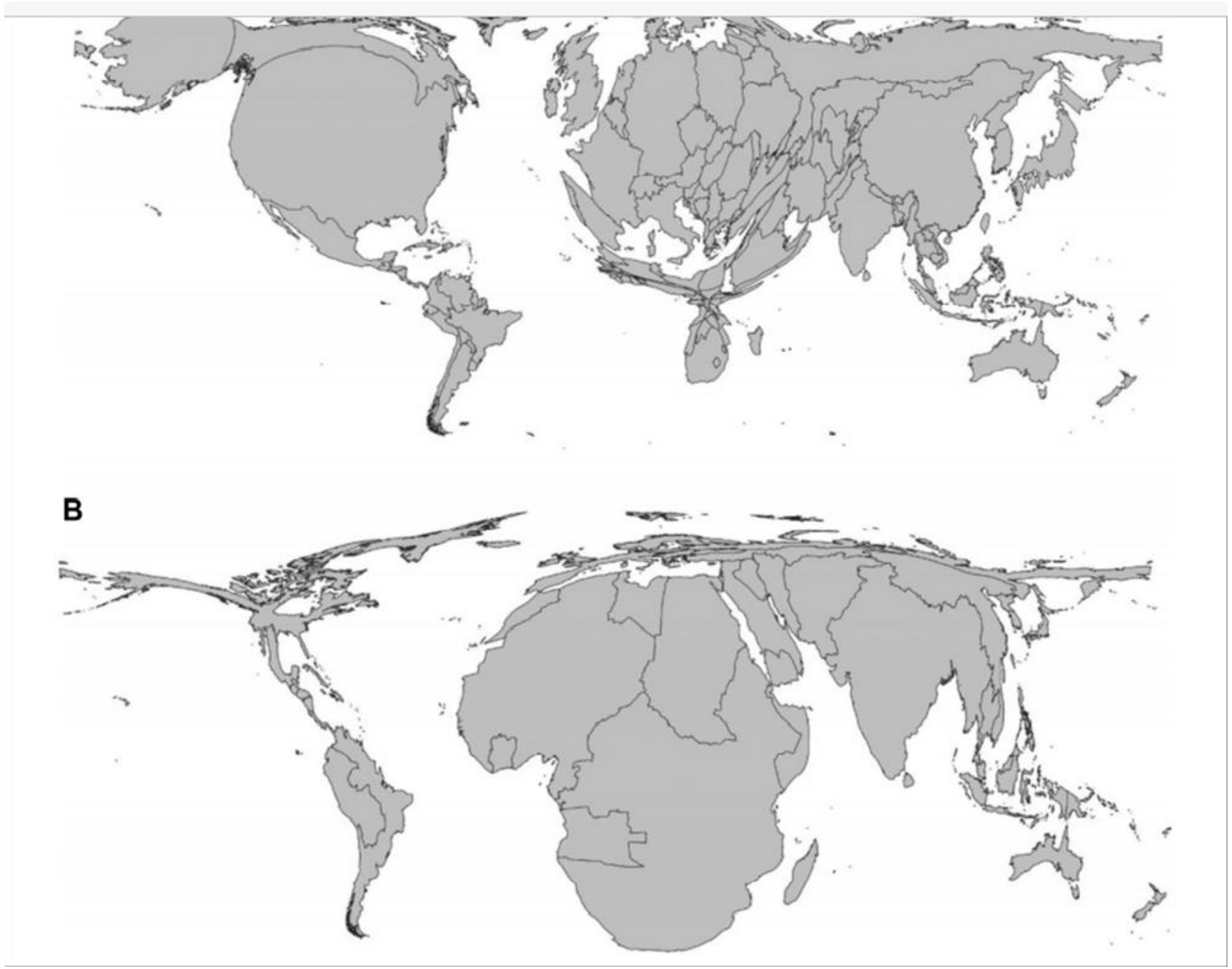
Negative impacts on **ability to think, outdoor recreation** and the **ability to play sports**

Lancet Countdown, 2019: 2019 Lancet Countdown on Health and Climate Change Policy Brief for the US. Salas RN, Knappenberger P, Hess JJ. Lancet Countdown U.S. Policy Brief, London, United Kingdom.


Impact of Climate Change on Human Health
Injuries, fatalities, mental health impacts
Asthma, cardiovascular disease
Heat-related illness and death, cardiovascular failure
Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus
Forced migration, civil conflict, mental health impacts
Respiratory allergies, asthma
Malnutrition, diarrheal disease
Cholera, cryptosporidiosis, campylobacter, leptospirosis, harmful algal blooms
Severe Weather
Air Pollution
Extreme Heat
Changes in Vector Ecology
Environ-mental Degradation
Increasing Allergens
Water and Food Supply Impacts
Water Quality Impacts
RISING TEMPERATURES
MORE EXTREME WEATHER
INCREASING CO2 LEVELS
RISING SEA LEVELS

CDC

Planetary health is interwoven with social justice



Levy et al. 2015. Annals of Global health

Table 4:

Top 20 countries ranked on CO2 emissions (per capita) and corresponding CCRI rank

CO_2 EMISSIONS PER CAPITA RANK (MT)	COUNTRY	CLIMATE AND ENVIRONMENTAL SHOCKS (PILLAR 1)	CHILD VULNERABILITY (PILLAR 2)	CHILDREN'S CLIMATE RISK INDEX (CCRI)	CCRI RANK	CO_2 EMISSIONS PER CAPITA (MT)
1	Qatar	4.1	1.9	3.1	133	32.42
2	Kuwait	4.6	1.8	3.3	128	21.62
3	United Arab Emirates	6.0	2.0	4.3	100	20.80
4	Bahrain	3.9	2.3	3.1	133	19.59
5	Brunei Darussalam	2.9	1.8	2.4	147	16.64
6	Canada	5.4	1.5	3.7	117	15.50
7	Australia	5.4	1.2	3.6	121	15.48
8	Luxembourg	1.1	1.8	1.5	162	15.33
9	Saudi Arabia	6.8	1.7	4.7	88	15.27
10	United States	7.3	1.3	5.0	80	15.24
11	Oman	6.2	1.9	4.4	97	15.19
12	Turkmenistan	6.5	2.0	4.6	90	12.26
13	Republic of Korea	7.3	1.8	5.2	72	12.22
14	Estonia	2.1	1.2	1.7	159	12.10
15	Kazakhstan	5.7	1.9	4.1	102	12.06
16	Russian Federation	6.5	1.8	4.6	90	11.13
17	Czechia	3.2	1.6	2.4	147	9.64
18	Libya	5.5	3.2	4.4	97	8.83
19	Netherlands	4.1	1.0	2.7	140	8.77
20	Japan	6.3	2.1	4.5	94	8.74

Source: See Methodology for CCRI data. CO_2 emissions data downloaded from World Bank WDI data catalogue, original source: Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. Reference Year: 2018. Note: Per cent of global emissions is a calculated indicator using CO_2 emissions (thousand metric tonnes of CO_2) per country.

U.S. ranks 10th in the world in CO2 emissions per capita, but 80th in child risk from climate change.

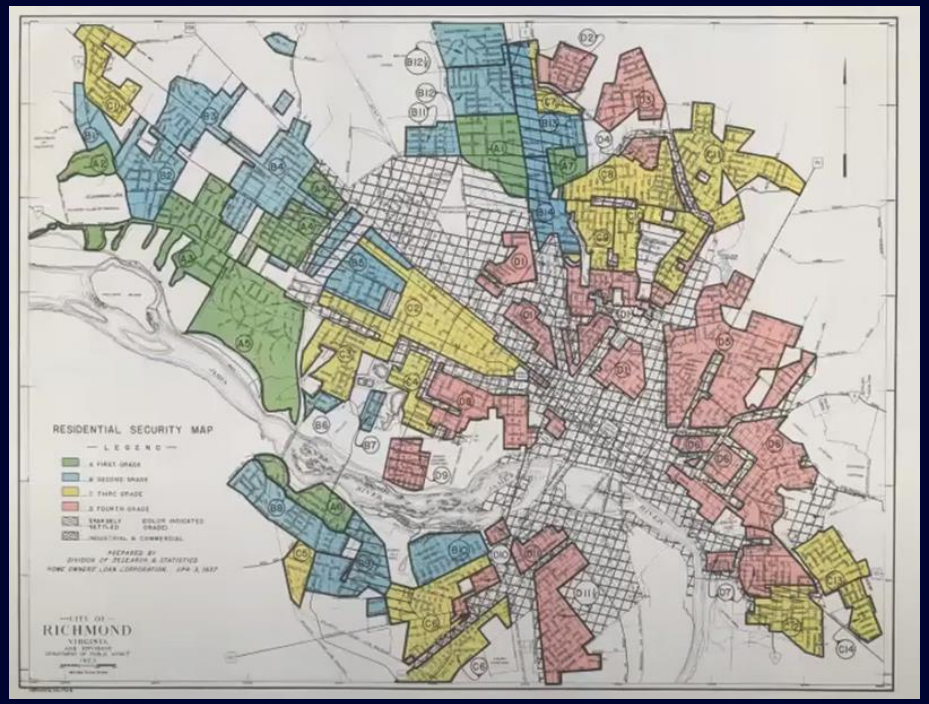
Avila J, Cordoba J. Hurricane Maria Slams into Puerto Rico. WSJ. Sept 20, 2017

Gustin G, Henninger M. Central America's choice: Pray for rain or migrate. NBC News and Inside Climate, July 9, 2019

A Global Perspective:
Since 2008, 24 million people per year have been displaced due to natural disasters.
-Internal displacement monitoring center

A legacy of structural racism

Redlining: Federal housing policy of the 1930s that systematically diverted investment from communities of color while initiating highways, landfill projects in these same areas.



- Mapping temperature, land surface, health indicators & historical redlining in 108 US cities[1]
- 94% of formerly redlined areas were hotter than surrounding neighborhoods
- Temp up to 7°C degrees hotter; Nationally, 2.6°C hotter
- ↑ proportion EMS calls and hospital visits for heat-related illness on extremely hot days

"…historical housing policies may, in fact, be directly responsible for disproportionate exposure to current heat events."

[1]Hoffman, Shandas, and Pendleton. "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas. *Climate.* 2020.

Important for pediatricians to view climate change as a social influence of health, and something that deeply impacts other social influences of health

Critical to our mission of dismantling health inequities and structural racism

Centering the voices of marginalized communities is critical in order to combat climate change and promote health equity

POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

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Global Climate Change and Children's Health

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abstract

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FREE

www.pediatrics.org/cgi/doi/10.1542/peds.2015-3232

DOI: 10.1542/peds.2015-3232

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

INTRODUCTION

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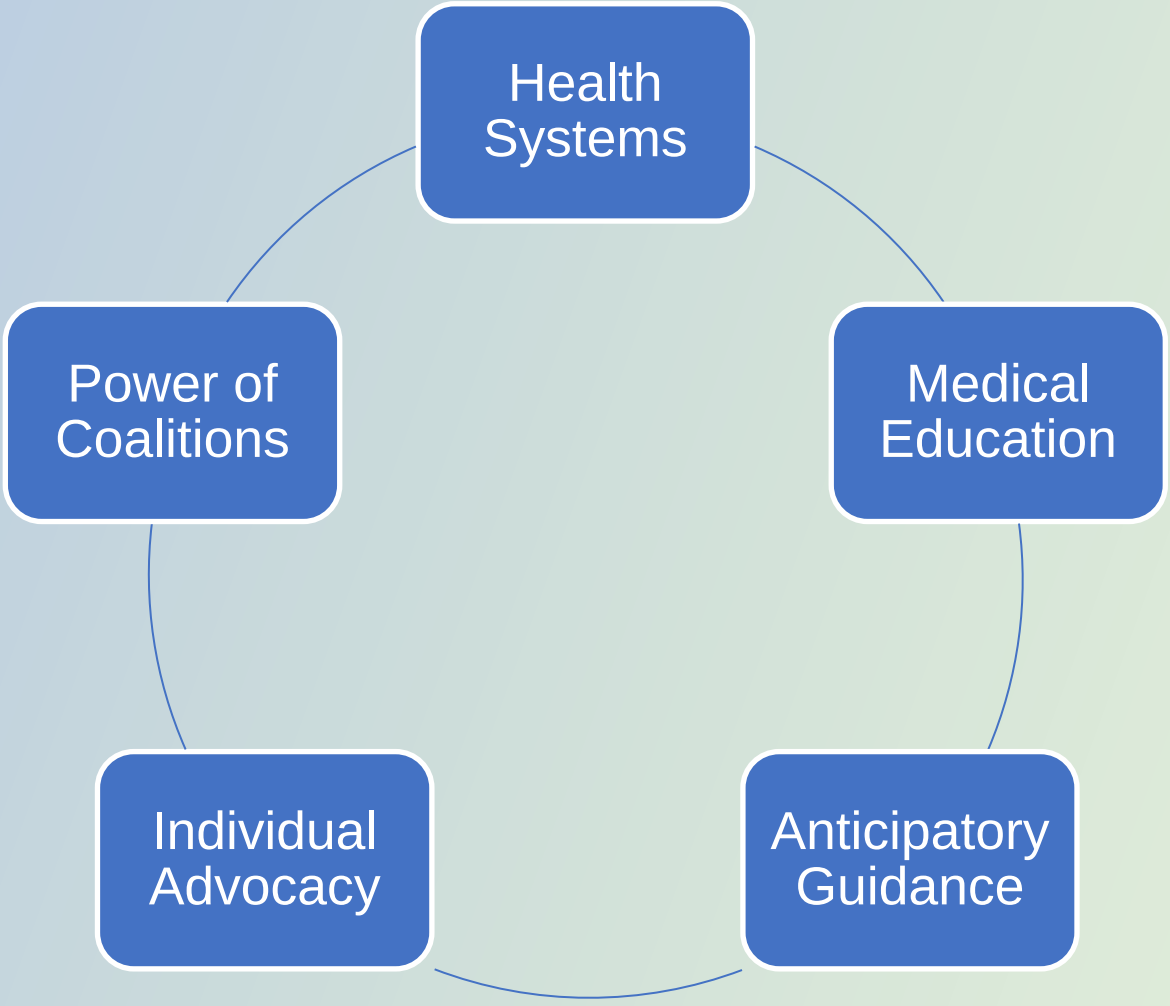
"Given this knowledge, failure to take prompt, substantive action would be an act of injustice to all children."

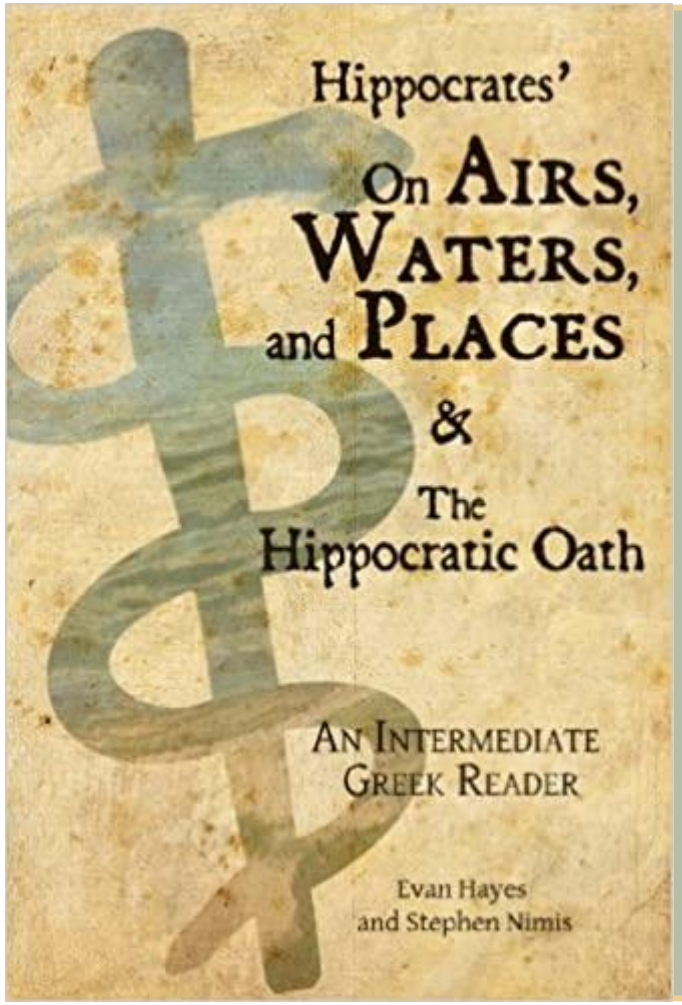
What can we do?



Work with Health Systems

Decrease carbon emissions in healthcare spaces

First, do no harm: Medical ethics and climate change



- US healthcare sector contributes **9-10% *of US*** *greenhouse* gas emissions (GHG)[1]
- If US healthcare were a country, we would rank ***13th in global GHG emissions***
- Harms to health from healthcare pollution:[2]
  - >400,000 disability adjusted life years (DALYs)
  - **44-98,000 deaths**

[1]Eckelman MJ, Sherman JD. Estimated Global Disease Burden From US Health Care Sector Greenhouse Gas Emissions. Am J Public Health. 2018;108(S2):S120-S122.
[2]Eckelman MJ, Sherman JD. Environmental Impacts of the U.S. Health Care System and Effects on Public Health. PLOS ONE. 2016;11(6):e0157014.

#goals

- Boston Medical Center: Carbon neutral since 2020
- Seattle Children's Hospital: Carbon neutral by 2025
- City of Pittsburgh: Cut emissions 50% by 2030
- University of Pittsburgh: Carbon neutral by 2037
- UPMC: ??
- General Motors: phase out gas powered cars by 2035

Green offices

- Earn office certificate from My Green Doctor
- Recognizes your ongoing commitment to a healthier office and community
- Requires completion of five Green Team meetings, five Action Steps, and five Education Steps
- Certificate valid for 3 years

Medical Education

Climate Crisis and Clinical Medicine Virtual Elective for Medical Students

POSTED ON APRIL 30, 2020 / POSTED IN CLIMATE & AIR, HEALTHCARE

Today's medical students will be on the front lines of clinical medicine in the Anthropocene, the geologic era marked by human activity and climate change. Climate-driven exposures harm patients and increasingly intense natural disasters disrupt healthcare delivery. At the same time, many of the actions needed to address climate change – to reduce carbon emissions and transition to a more sustainable future — also benefit health. This virtual elective is designed for M3 and M4 students who are interested in furthering their understanding of the

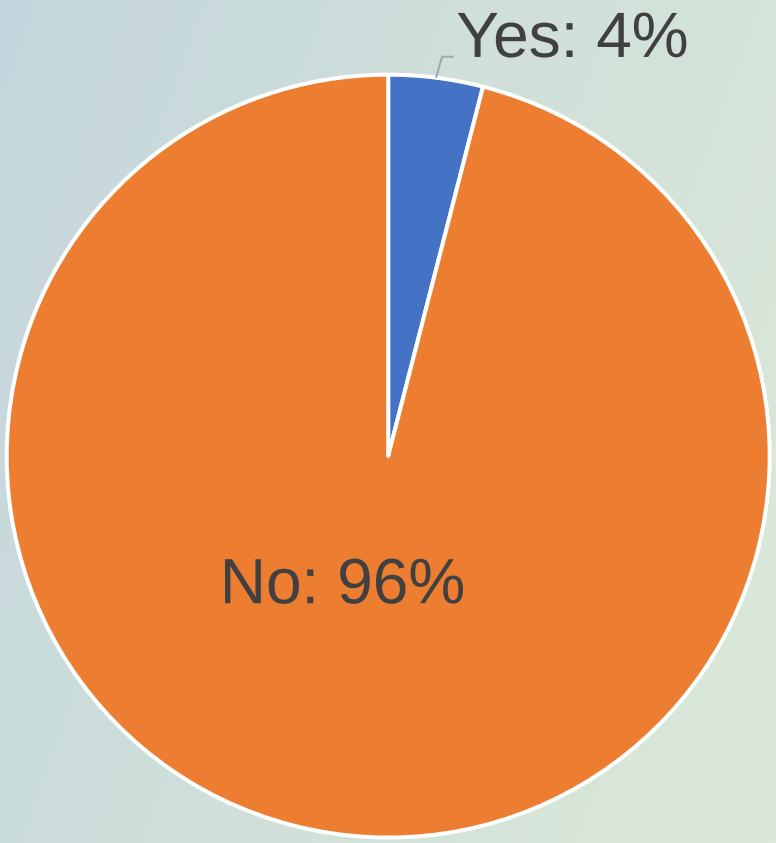
Anticipatory Guidance

Parents perspectives about whether pediatricians should discussed climate change during well-child visits

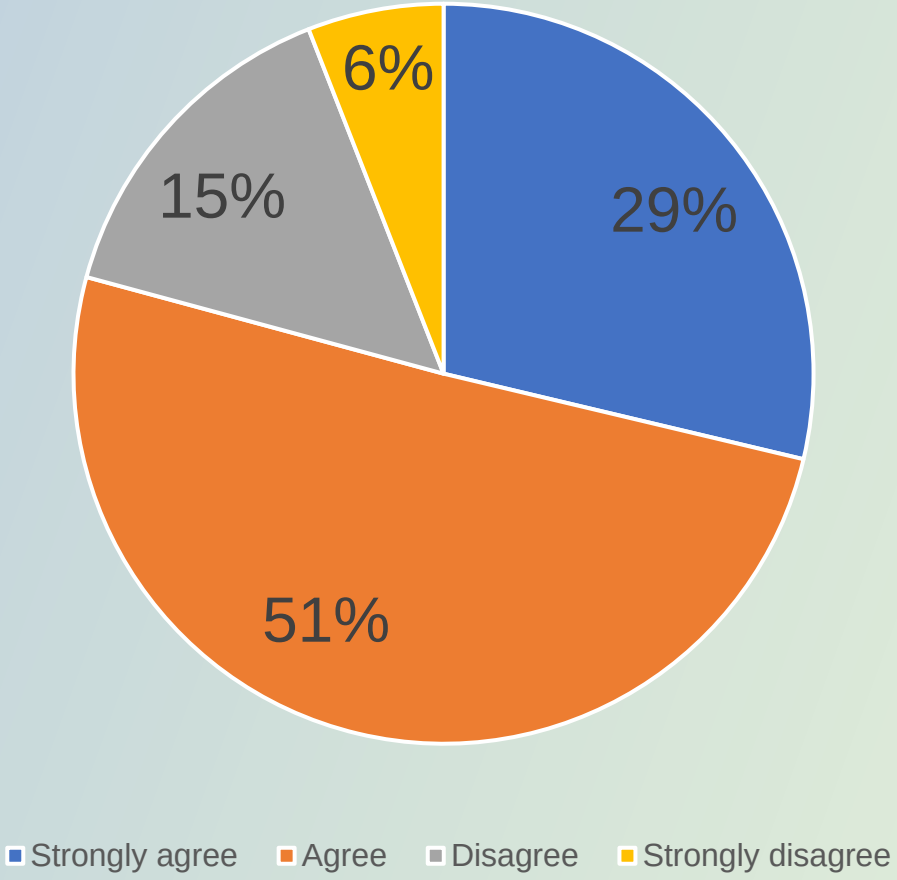
Parents recruited from CCP Cranberry, PCC in Oakland, and Pitt + Me

372 participants total, 82% female; 83% White

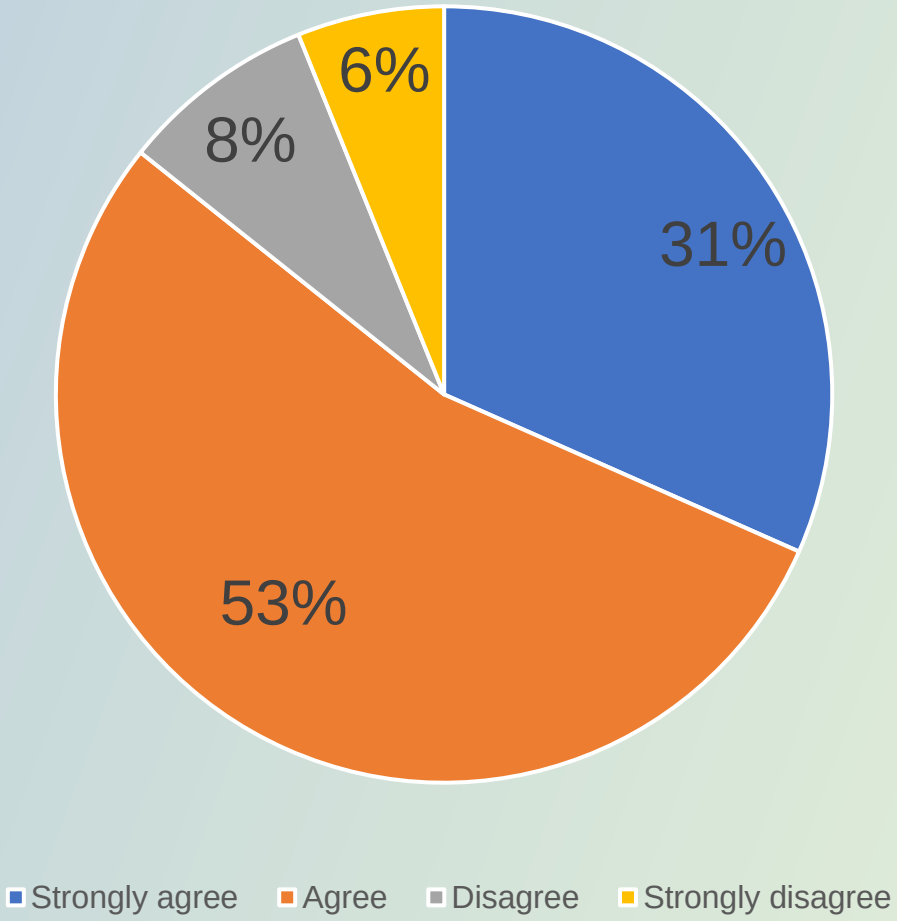
In the past 12 months has your child's doctor talked with you about climate change during a well-child visit



My child’s doctor should talk with me about how global warming could affect my child’s health



My child’s doctor should talk with me about what to do if my child is feeling stressed about global warming



Suggestions for incorporating climate change in pediatric visits

- Discussing air quality during asthma visits
- Including prevention of heat illnesses during sports visits
- Discussing changing pollen counts during visits for worsening allergies
- Review civic engagement during adolescent visits
- Planetary health education in clinics
- Education and resources on eco-anxiety and talking to your children about climate change
- Considering climate change as a social influence of health
- Others?

The Medical Society Consortium
ON CLIMATE & HEALTH

MENU

For your Patients

CATEGORIES

HEALTH BENEFITS OF CLIMATE ACTION POSTERS

ASTHMA & HEAT RESOURCES

MY GREEN DOCTOR BROCHURES

HEALTH IMPACTS OF CLIMATE CHANGE POSTERS

CLIMATE CHANGE & YOUR HEALTH: ACP FACT SHEET

CLIMATE CHANGE & CHILDREN'S HEALTH

How Climate Change Affects Children: AAP Policy Explained

By: Claire McCarthy, MD, FAAP

When pediatricians take care of children, we aren't just thinking about their health and safety now—we are thinking about their health and safety in the future, too.

Back to Top

When we talk with parents about healthy diet and exercise, we aren't j

Talking with Children about Climate Change

By: Steph Lee, MD, MPH, FAAP

Your children may have questions about the changing climate. Many are hearing about or experiencing climate-change-fueled disasters such as wildfires and severe storms.

Climate change affects everyone, but it impacts kids the most. Children are especially vulnerable to environmental health harms since they are still growing and have higher exposure to air, food, and water based on weight.

While the climate crisis can feel like an overwhelming topic, there are healthy ways to talk with kids about it. We can communicate in a way that is honest, hopeful, developmentally appropriate, and action oriented. By helping kids understand the issue of climate change and how it affects their health and futures, we empower them to make a difference.

Toddlers and Young Children (age 1-5)

Toddlers are just beginning to learn about their relationship with the world. It's a perfect time to introduce them to the joys of nature. Here are some ideas:

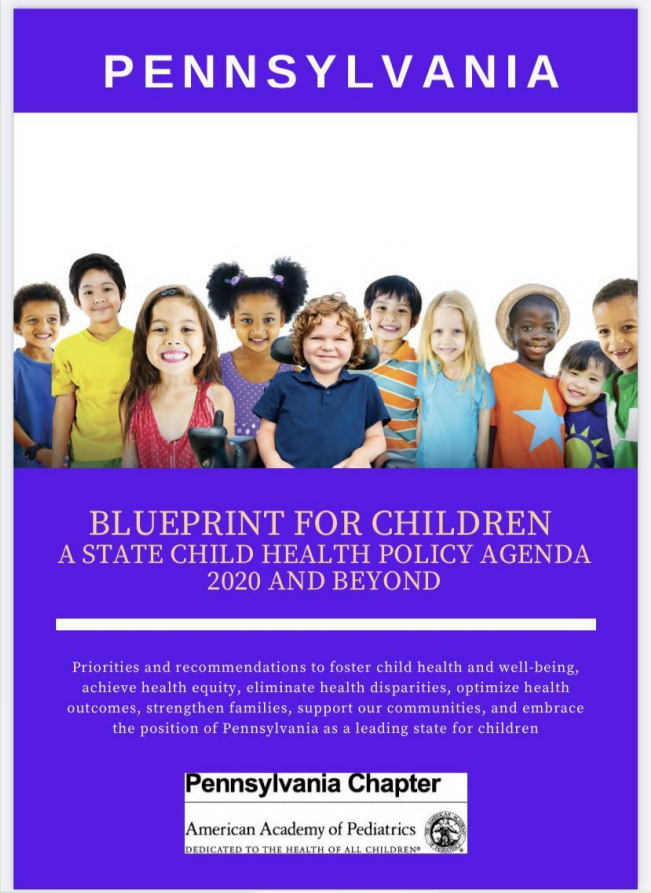
- **Nature walks.** Take walks to show how weather affects nature. Talk about how weather makes the seasons. You can point out bird nests, for example, and talk about how weather influences when and where birds make their nests. Talk about other wild animals and discuss how they all have homes that need protecting.

Individual Advocacy

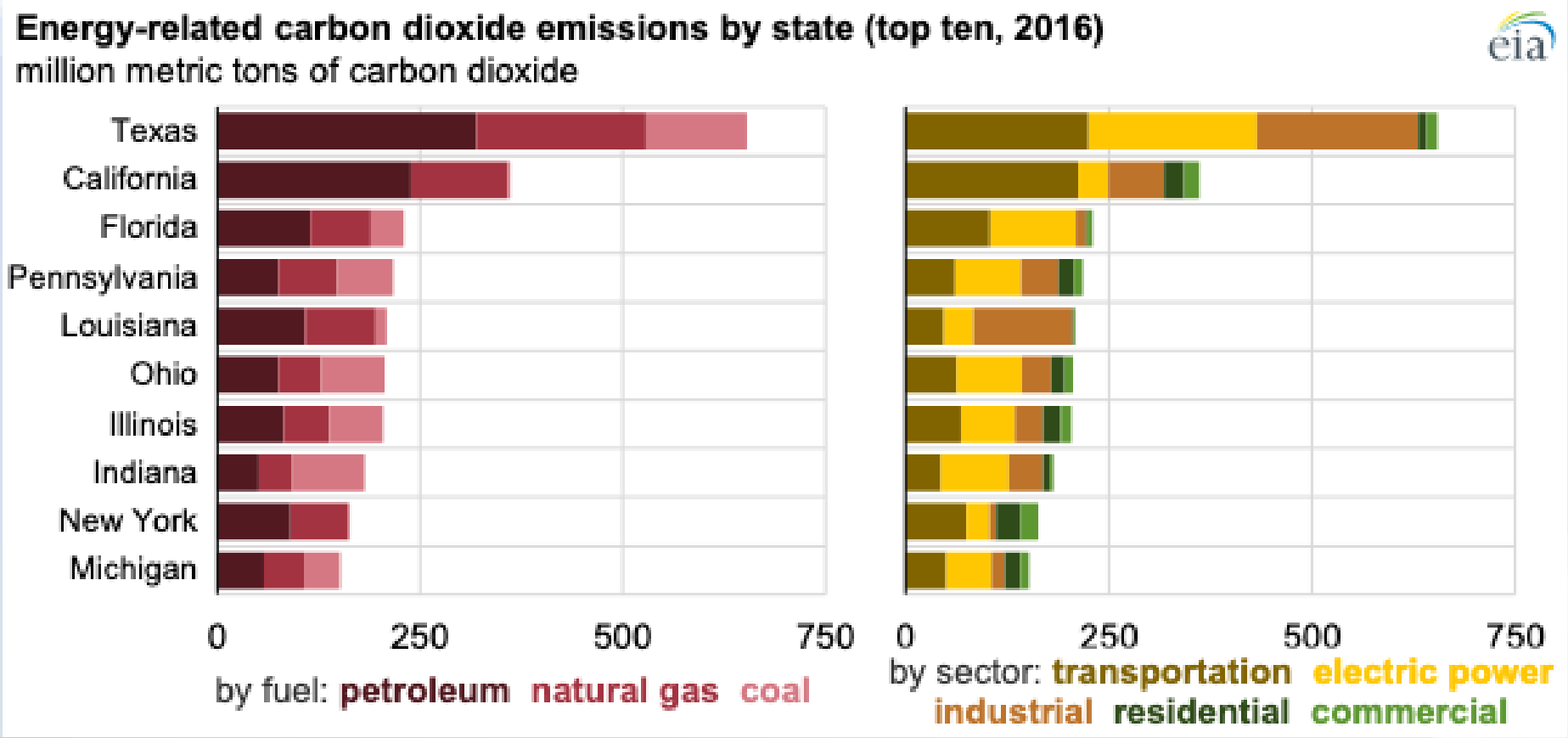
Pennsylvania Blueprint for Children 2021-2022

Includes policy recommendations on:

- COVID-19
- **<u>Climate change and environmental health</u>**
- Mental health
- Access to care and child poverty
- Practice-related issues
- Immunizations
- Gun violence prevention
- Anti-racism and immigrant health



PA ranks 4th in U.S. for carbon emissions



Source: U.S. Energy Information Administration

Regional Greenhouse Gas Initiative (RGGI)

Partnership between northeastern and mid-Atlantic states to cap & reduce carbon emissions from fossil fuel power plants

- Electricity use is 2nd leading source of carbon emissions
- Since 2005, RGGI states have reduced carbon emissions by 45%
- In June 2020 Gov Wolf signed Executive Order to begin process of joining RGGI
- PA legislature passed HB 2025 requiring legislature's approval to join RGGI, Wolf vetoed

Climate-related Legislation

Zero emissions vehicles regulatory proposal

- PA Clean Vehicles Program does not incorporate California fuels requirements or Zero Emission Vehicle (ZEV) requirements

State	Authority	Year Adopted	Model Year Effective
California	AB 1493	2002	2005
New Jersey	P.L. 2003, Chapter 266	2004	2009
Connecticut	Public Act 04-84	2004	2008
Washington	House Bill 1397	2005	2009
Vermont	Amendments to Subchapter XI	2005	2009
New York	Chapter III, Subpart 218-8	2005	2009
Maine	Amendments to Chapter 127	2005	2009
Rhode Island	Air Pollution Control Regulation No. 37	2005	2009
Massachusetts	Amendments to the state's LEV regulations	2005	2009
Oregon	Regulations (Division 257; OAR 340-256-0220)	2006	2009
Pennsylvania	Amendments to Title 25, Chapters 121 and 126	2006	2008
Maryland	Senate Bill 103	2007	2011
Washington D.C	Act 17-323	2008	2012
Delaware	Regulation 1140	2010	2014
Colorado	Colorado CAL LEV EO B2018-006 .pdf	2018	2022

Climate-related Legislation

Senate Bill 275

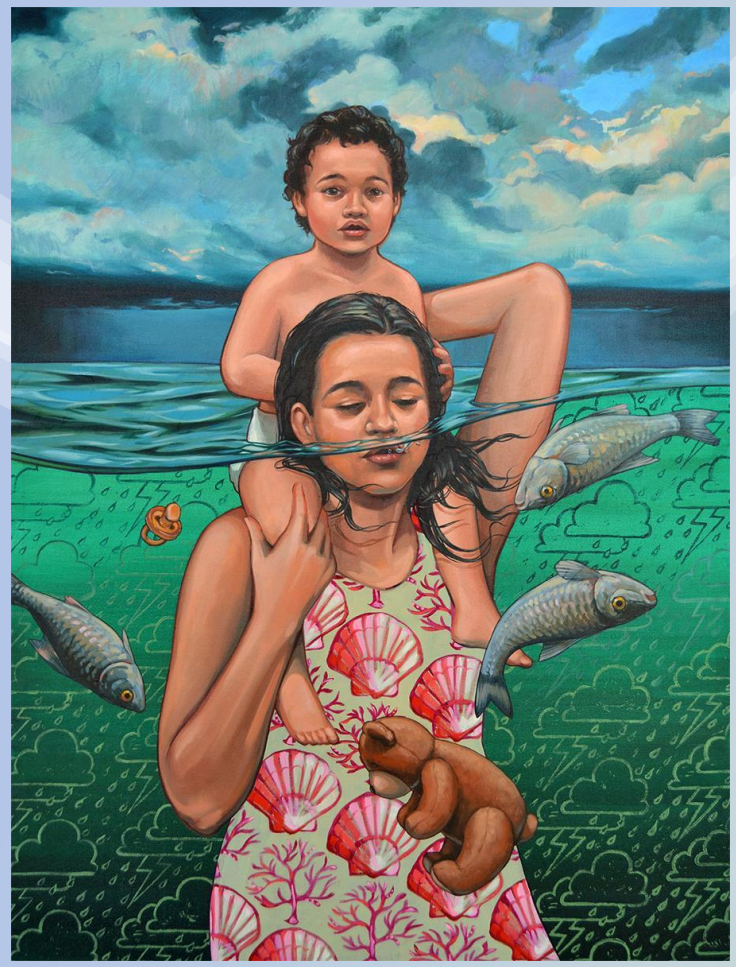
- will stop local ordinances from adopting stricter carbon reduction strategies like switching to electric options for energy usage

8 § ~~306~~ 307. Restrictions on utility services prohibited. <--
9 (a) Prohibitions.--
10 (1) A municipality may not:
11 (i) Adopt a policy that restricts or prohibits, or
12 has the effect of restricting or prohibiting, the
13 connection or reconnection of a utility service based
14 upon the type of source of energy to be delivered to an
15 individual consumer within the municipality.
16 (ii) Discriminate against a utility service provider
17 based in whole or in part on the nature or source of the
18 utility service provided for an individual consumer

1 within the municipality.
2 (2) A policy, or part of a policy, that is adopted by a
3 municipality may not restrict or prohibit, or have the effect
4 of restricting or prohibiting, the ability of an individual
5 or entity within the municipality to use the services of a
6 utility service provider that is capable and authorized to
7 provide utility service for the property of the individual or
8 entity.

Individual Actions

- Trade in gas car for EV
- Plant-based diet
- Invest in renewable energy sources
- Improve home energy efficiency
  - smart thermostat, insulating window shades
- Travel smart



Ashley Cecil, local artist, *Violence in Eden* exhibition at Zynka Gallery in Milvale captures the suffering of women and children from climate change

Power of Coalitions

ONE PA

PSR Pennsylvania — *Health Professionals Addressing the Greatest Threats to Public Health*

PennEnvironment — Clean air. Clean water. Open spaces.

PennFuture

Medical Students for a Sustainable Future

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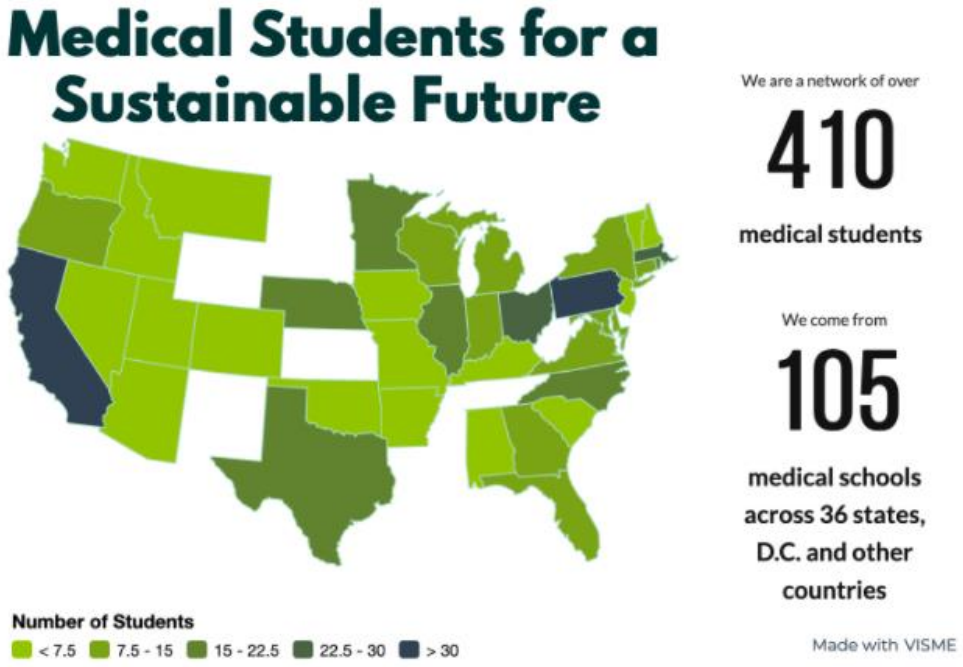
Founded in 2019, MS4SF is dedicated to uniting medical students invested in the health of our planet and patients and providing them with tools to make a difference at their institutions and in their communities through advocacy, curriculum reform, research, and climate-smart health care. Learn more about our different work areas here.



Conclusion

Climate change is harming child health in many ways and will worsen if we don't cut carbon emissions

Join our newly formed climate committee!!

Casey O'Neill
Advocacy Coordinator
coneill@paaap.org

Acknowledgments: Dr. Rebecca Philipsborn