



**Climate and Health in New Hampshire:  
New Challenges for a Changing World**

**Paul Friedrichs MD, Board Chair, NH HWCA**

## Goals: Climate Change and Health in New Hampshire

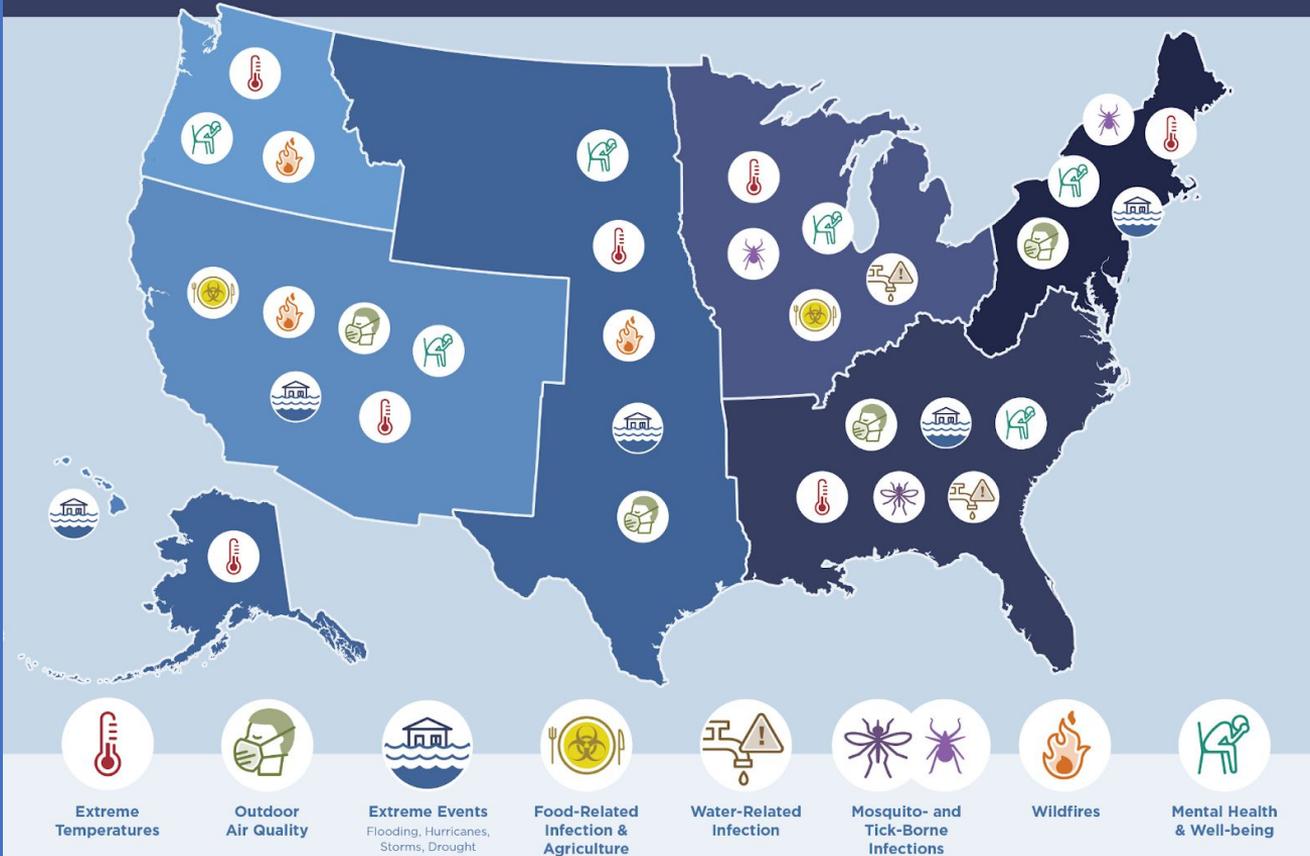
- **What** is Happening?
- **Why** is it Happening?
- **How** should your practice evolve?
- **What can we do** about the root causes?

# WHAT is Happening?

How Does Climate Change Affect our Health?



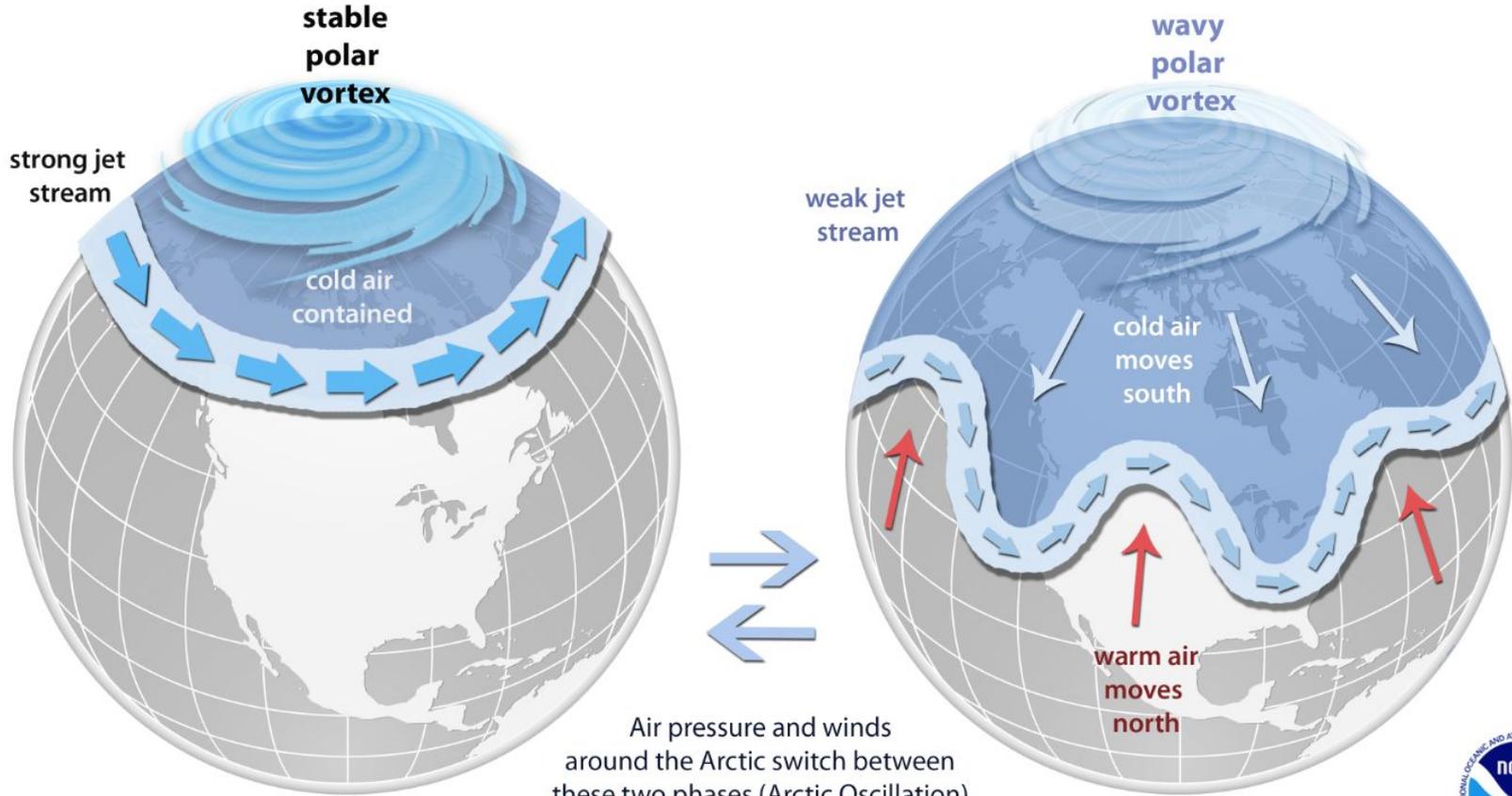
# How Our Health is Harmed by Climate Change: Impacts Differ by Geographic Region



This graphic illustrates key impacts of climate change on health and is based on reports from the U.S. Global Change Research Program. For more information, visit [www.globalchange.gov](http://www.globalchange.gov).

# 8 Major Ways our Health is impacted by Climate Change in **NEW HAMPSHIRE:**

1. Heat related illness
2. Extreme Weather Events
3. Vector-borne Illnesses
4. Increased Allergens
5. Air Quality
6. Water Quality
7. Food Reliability
8. Mental Health impacts



Air pressure and winds around the Arctic switch between these two phases (Arctic Oscillation) and contribute to winter weather patterns.

## DATA FROM **N.H. STATE CLIMATOLOGIST** SHOW:

- NH is WARMING: 3°F since detailed records began in 1901
- NH is warming 2x FASTER than the US average (3.6°F by 2035)  
= 2 decades AHEAD of the rest of the country
- NH warming rate has DOUBLED since 1971
- NH Winters are warming 3x FASTER than Summers  
(meaning less snowpack, more intermittent thaws, earlier ice-out)
- Winter temps in Concord NH are 6°F warmer than historic
- NH is getting WETTER – but precipitation is more EXTREME (meaning more flooding), interspersed with longer periods of DROUGHT
- NH coastal SEA LEVEL has risen 8” since 1901

## NH State Climatologist (3/14/22)

“Climate change **THREATENS THE HEALTH** and well-being of New Hampshire residents through more extreme weather, warmer temperatures, degradation of air and water quality, and sea level rise.”

“Climate change is **HAPPENING NOW**, and it is a real and immediate threat to the unique seasonal character, stored environment, and sense of community here in New England.”

# EXTREME HEAT

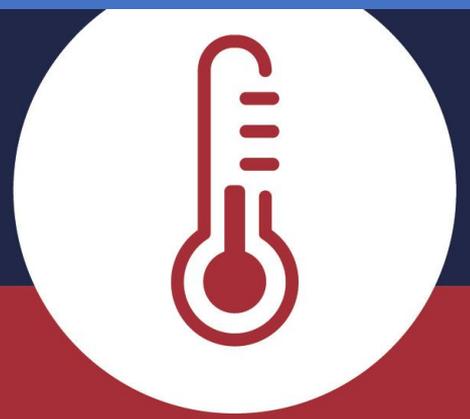
DAYS WITH A HEAT INDEX OF 90°+



Annual days with heat index of 90°F+.

Source: gridMET minimum relative humidity & maximum temperature datasets

# Climate Change and Your Health: Extreme Temperatures



**What is changing  
in our climate?**

We're seeing more frequent days with extreme temperatures.

**What is the impact  
on the environment?**

Extreme temperatures damage crops, make air less healthy to breathe, and are associated with dramatic changes in precipitation leading to droughts, floods and wildfires.

**How does that  
harm our health?**

Extremely hot weather puts people at higher risk of heat stroke and is especially dangerous for older, younger, sicker and poorer Americans.

# Health Effects of Extreme Heat

- 700 Deaths annually in US
  - BUT OVER 1,000 deaths June-July 2021 in NW US+Canada
  - Peak temp 49.6°C (121.3°F) in Lytton, BC
- 67,000 ER visits annually in US
- 10,000 Hospitalizations annually in US Office of Climate, Water, and Weather Services. Weather fatalities, 2012.
- 350,000 Deaths Annually Worldwide. Lancet v 398 2021



ELSEVIER

Contents lists available at ScienceDirect

# Environmental Research

journal homepage: [www.elsevier.com/locate/envres](http://www.elsevier.com/locate/envres)

## Heat-related morbidity and mortality in New England: Evidence for local policy

Gregory A. Wellenius<sup>a,\*</sup>, Melissa N. Eliot<sup>a</sup>, Kathleen F. Bush<sup>b</sup>, Dennis Holt<sup>b</sup>, Rebecca A. Lincoln<sup>c</sup>, Andrew E. Smith<sup>c</sup>, Julia Gold<sup>d</sup>

<sup>a</sup> Brown University School of Public Health, 121 South Main Street, Box G-S121-2, Providence, RI 02912, United States

<sup>b</sup> New Hampshire Department of Health and Human Services, Concord, NH, United States

<sup>c</sup> Maine Department of Health and Human Services, Augusta, ME, United States

<sup>d</sup> Rhode Island Department of Health, Providence, RI, United States

### A B S T R A C T

**Background:** Heat-related morbidity and mortality is a recognized public health concern. However, public health officials need to base policy decisions on local evidence, which is often lacking for smaller communities.

**Objectives:** To evaluate the association between maximum daily heat index (HI) and morbidity and mortality in 15 New England communities (combined population: 2.7 million) in order to provide actionable evidence for local officials.

**Methods:** We applied overdispersed Poisson nonlinear distributed lag models to evaluate the association between HI and daily (May–September) emergency department (ED) admissions and deaths in each of 15 study sites in New Hampshire, Maine, and Rhode Island, controlling for time trends, day of week, and federal holidays. Site-specific estimates were meta-analyzed to provide regional estimates.

**Results:** Associations (sometimes non-linear) were observed between HI and each health outcome. For example, a day with a HI of 95°F vs. 75°F was associated with a cumulative 7.5% (95% confidence interval [CI]: 6.5%, 8.5%) and 5.1% (95% CI: 0.2%, 10.3%) higher rate of all-cause ED visits and deaths, respectively, with some evidence of regional heterogeneity. We estimate that in the study area, days with a HI ≥ 95°F were associated with an annual average of 784 (95% CI: 658, 908) excess ED visits and 22 (95% CI: 3, 39) excess deaths.

**Conclusions:** Our results suggest the presence of adverse health impacts associated with HI below the current local guideline criteria of HI > 100°F used to issue heat advisories. We hypothesize that lowering this threshold

## Findings from this study (2016):

- Quantified excess morbidity and mortality from high heat-index days in Northern New England: **7.5% increase in ER visits; 5.1% increase in deaths (22 more)** with HI of 95°F vs. 75°F
- Found ER visits started to rise with HI >75°F and deaths started to rise with HI >85°F
- Found heat-related deaths had no lag time, but ER visits continued higher for 7 days
- Supports lowering our threshold for heat advisories from HI >100°F to >95°F

# What does extreme heat mean for personal health?



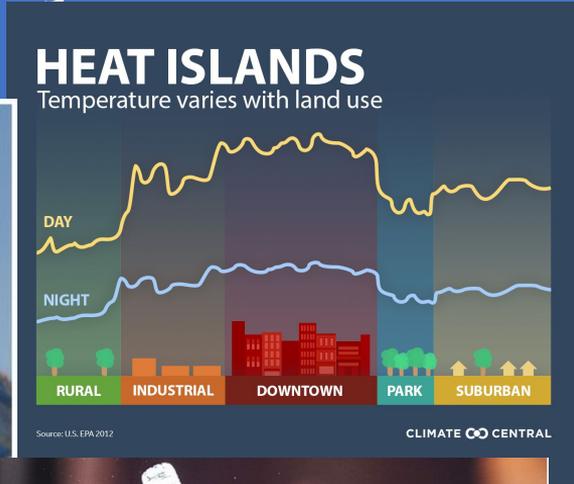
- Mild Symptoms (rash, heat fatigue)
- Heat Exhaustion
  - Thirst, rapid heart beat
  - Weak/Dizzy
  - Cramps/Headache
  - Nausea/Vomiting
  - Profuse Sweating
- Heat Stroke:
  - Confusion, Fainting, Coma
  - Skin dry or moist
  - Core (rectal) temp > 104°
- Risk of Mortality

# Individuals at Risk for Heat Injury

- Inner City Populations
- High School and Colleg Athletes
- Agriculture Workers
- Construction Workers
- Landscapers
- Transportation Workers
- Children and Particularly Infants
- Elderly



Image ©Getty Images



Marathon runner Sviatlana Kudzelich cools down during an event in Doha. Credit: Michael Kappeler/dpa/Alamy

# Climate Change and Your Health: Extreme Weather Events



## What is changing in our climate?

Americans are experiencing more frequent and intense heat waves, floods, droughts and dangerous storms.

## What is the impact on the environment?

These events damage infrastructure and crops, contaminate water supplies and put people in danger.

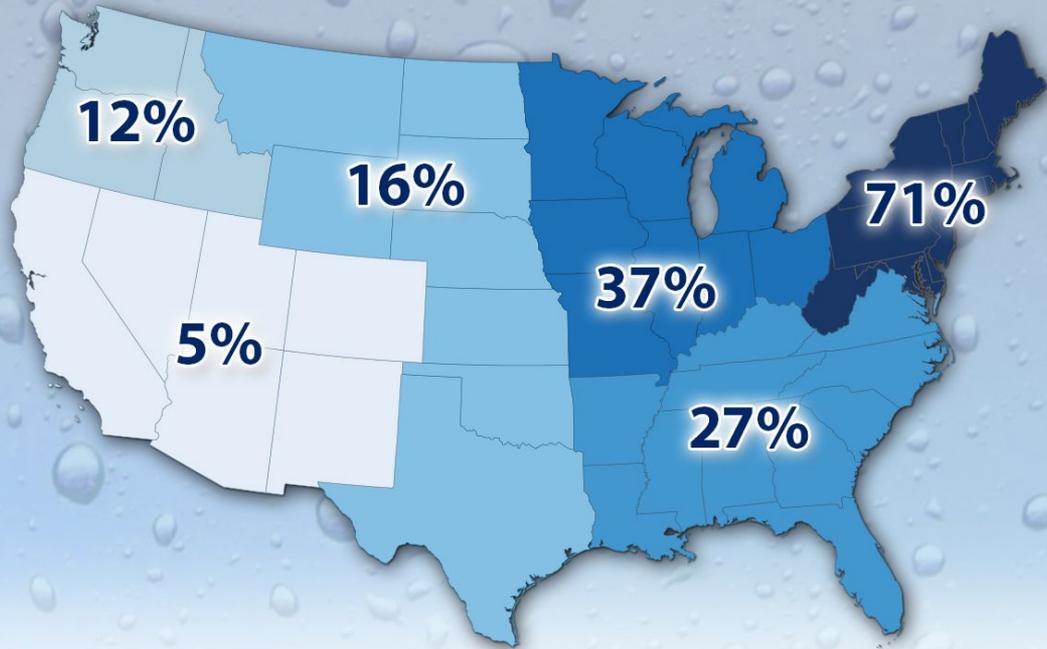
## How does that harm our health?

Extreme weather has immediate impacts – like injuries and drowning – and longer-term effects like illnesses from contaminated water and food, and harm to mental health.

# Extreme Weather Events

- ❑ More frequent and/or more intense extreme events are expected:
  - In NH, we expect increasing heavy rainfall, floods, storms, and storm surge
- ❑ These events can directly cause medical problems:
  - Exacerbate underlying medical conditions.
  - Cause accidents and injuries.
  - Increase stress and lead to adverse mental health effects.
- ❑ Disruptions to critical public health, healthcare, and related systems.

# Heavy Downpours Increasing

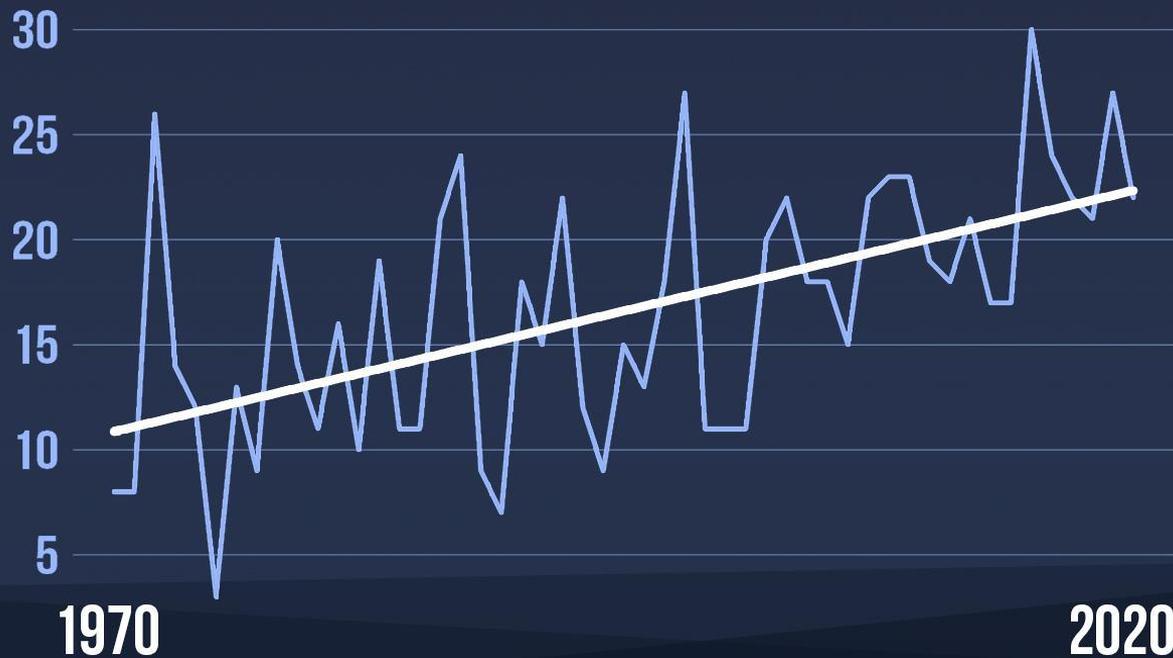


Percent increase from 1958 to 2012 in the amount of precipitation falling in very heavy events.

Very Heavy Precipitation is defined as the heaviest 1% of all daily events from 1958-2012.

# HIGHER TIDES, MORE FLOODING

PEAK # OF CONCURRENT U.S. COASTAL FLOODS YEARLY



Annual maximum number of NOAA tide gauges exceeding a minor flood threshold in a single day, 1970 to September 2020

# Sea Level Rise & Coastal Flooding

- Predicted SLR 10 - 14 inches for the East coast in the next 30 years
- Over 2,544 properties at risk from tidal flooding already  
<https://sealevelrise.org/states/new-hampshire/>
- Tides and storm surge heights to increase and reach further inland
- Damaging coastal flooding will occur more frequently by 2050 (4 events/year)



# Heavy Downpours, Flooding, and Health

- ❑ Accidents and traumatic injury.
- ❑ Viral and bacterial contamination.
- ❑ Spread of contaminants into soils and waterways.
- ❑ Increased mental health problems.



Flood waters cover Perkins Avenue and Auburn Avenue Extension in Hampton, N.H., at high tide Monday morning, Jan. 17, 2022. DAVE MCCOMB

# Climate Change and Your Health: Mosquito- and Tick-Borne Infections



What is changing  
in our climate?

What is the impact  
on the environment?

How does that  
harm our health?

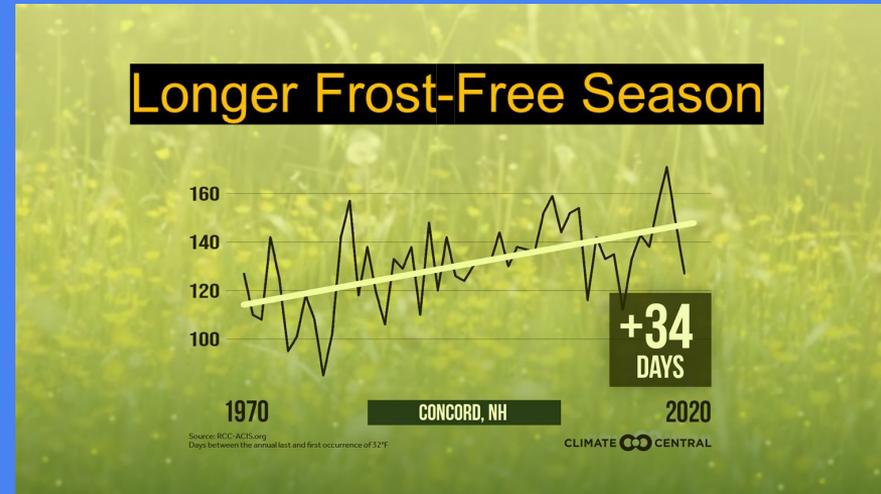
Warmer temperatures and changes in the amount of rainfall have an impact on where mosquitos and ticks can thrive.

Mosquitos and tick “seasons” are getting longer, and the pests are spreading to new areas of the country.

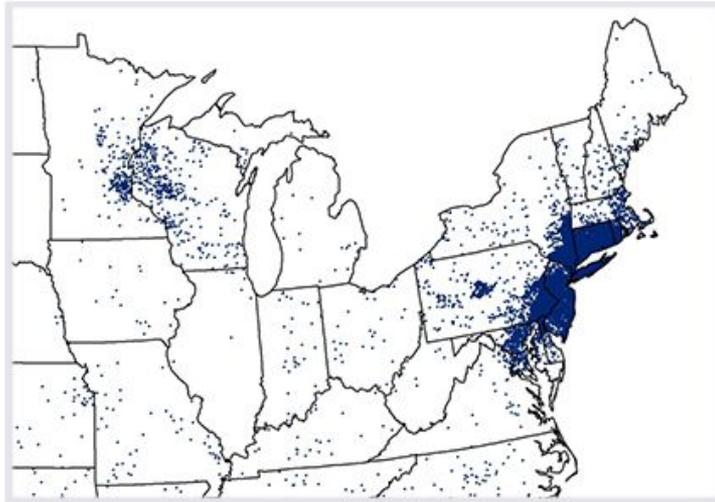
Diseases like West Nile Virus, Dengue Fever and Zika (spread by mosquitos), and Lyme disease (spread by ticks) are infecting more people, and are spreading into new regions where they did not previously exist.

# How Can Climate Change Increase Vector-Borne Diseases?

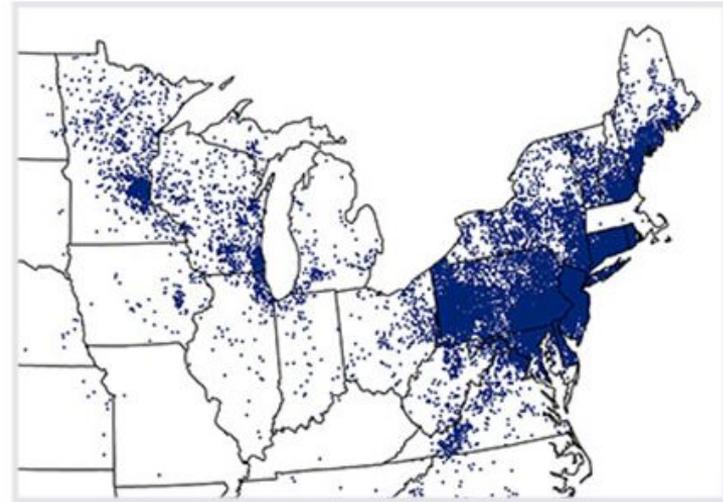
- ❑ Shorter winters extend the period when ticks are active each year.
- ❑ Deer ticks are mostly active on warm humid days.
- ❑ Host prevalence, especially rodent population variability, may be a factor
- ❑ Other factors-proximity of humans to vectors, modified behaviors



## Reported Lyme Disease Cases in 1996 and 2018



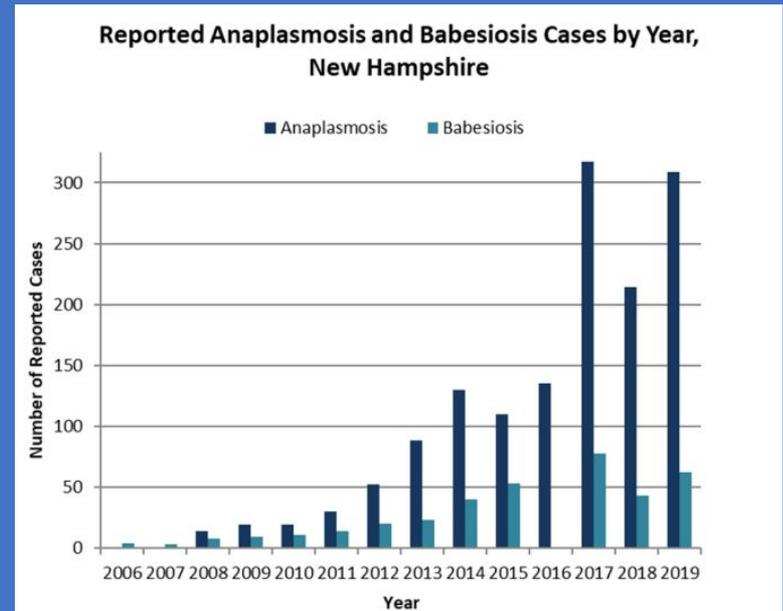
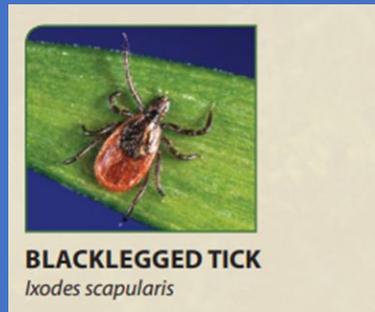
**1996**



**2018**

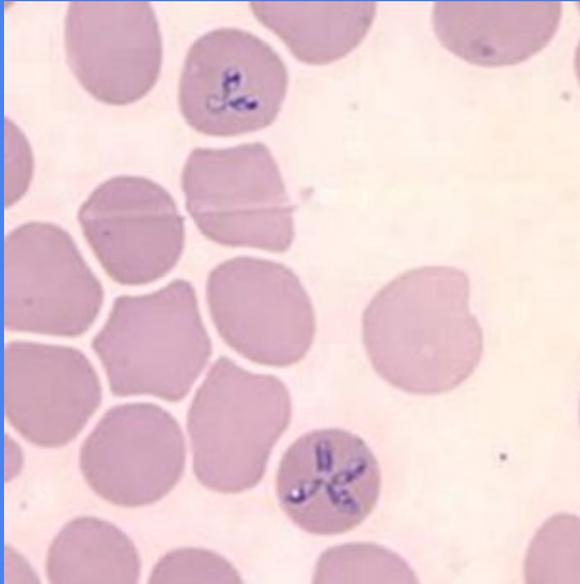
# Tick-borne diseases

- Tick-borne diseases are increasing across the country and in NH.
- People in New Hampshire are at risk for several different tick-borne diseases, including:
  - **Lyme disease**
  - **Anaplasmosis**
  - **Babesiosis**
  - **Powassan virus infection**

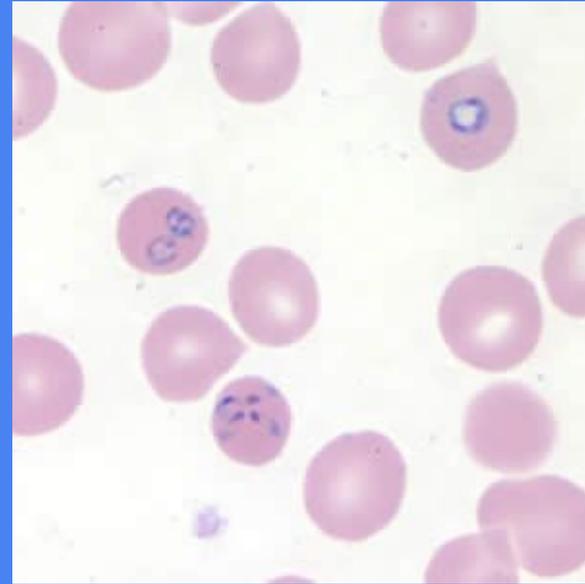


Preliminary data from the NH DHHS/DP

# Peripheral Blood Smear Review



[https://en.wikipedia.org/wiki/Babesia\\_microti](https://en.wikipedia.org/wiki/Babesia_microti)



<https://www.cdc.gov/parasites/babesiosis/diagnosis.html>

. 2023 Mar 17;72(11):273-277. doi: 10.15585/mmwr.mm7211a1.

# Trends in Reported Babesiosis Cases - United States, 2011-2019

Megan Swanson, Amy Pickrel, John Williamson, Susan Montgomery

PMID: 36928071

PMCID: [PMC10027409](#)

DOI: [10.15585/mmwr.mm7211a1](#)

[Free PMC article](#)

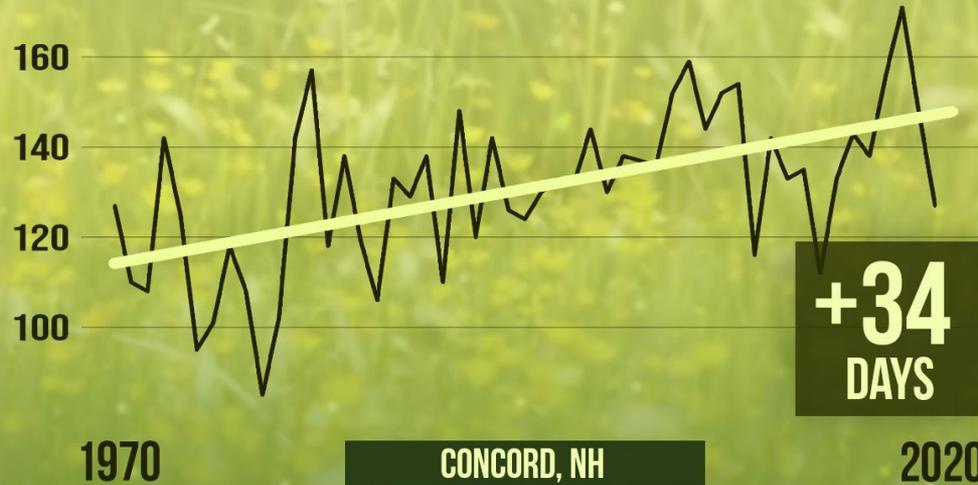
## Abstract

Babesiosis is a tickborne disease caused by intraerythrocytic *Babesia* parasites. In the United States, most babesiosis cases are caused by *Babesia microti*, transmitted from bites of blacklegged ticks, *Ixodes scapularis*, in northeastern and midwestern states. Transmission can also occur through blood transfusions, transplantation of organs from infected donors, or congenital (mother-to-child) transmission (1). *Babesia* infection can be asymptomatic or cause mild to severe illness that can be fatal. Overall, U.S. tickborne disease cases have increased 25%, from 40,795 reported in 2011 to 50,856 in 2019 (2). Babesiosis trends were assessed in 10 states\* where babesiosis was reportable during 2011-2019. Incidence increased significantly in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont ( $p < 0.001$ ), with the largest increases reported in Vermont (1,602%, from two to 34 cases), Maine (1,422%, from nine to 138), New Hampshire (372%, from 13 to 78), and Connecticut (338%, from

| State*,†      | Total no. of cases reported | Average annual case count (range) | BABESIOSIS Incidences§ (no. of cases) |              |               |               |               |               |               |               |               | Average annual incidence (range) | Total 9-yr incidence change, % | p-value¶ |
|---------------|-----------------------------|-----------------------------------|---------------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------------------------|--------------------------------|----------|
|               |                             |                                   | 2011                                  | 2012         | 2013          | 2014          | 2015          | 2016          | 2017          | 2018          | 2019          |                                  |                                |          |
| Maine         | 591                         | 65.7<br>(9–138)                   | 0.7<br>(9)                            | 0.8<br>(10)  | 2.7<br>(36)   | 3.2<br>(42)   | 4.1<br>(55)   | 6.2<br>(82)   | 8.8<br>(118)  | 7.5<br>(101)  | 10.3<br>(138) | 4.9<br>(0.7–10.3)                | 1,421.6                        | <0.001   |
| Massachusetts | 4,136                       | 459.6<br>(208–636)                | 3.1<br>(208)                          | 3.9<br>(261) | 6.2<br>(417)  | 7.9<br>(535)  | 6.5<br>(444)  | 7.6<br>(517)  | 8.6<br>(591)  | 7.6<br>(527)  | 9.2<br>(636)  | 6.7<br>(3.1–9.2)                 | 193.0                          | <0.001   |
| New Hampshire | 340                         | 37.8<br>(13–78)                   | 1.0<br>(13)                           | 1.4<br>(19)  | 1.7<br>(22)   | 3.2<br>(42)   | 4.0<br>(53)   | 1.0<br>(13)   | 5.8<br>(78)   | 2.7<br>(37)   | 4.6<br>(63)   | 2.8<br>(1.0–5.8)                 | 371.5                          | <0.001   |
| New York      | 4,738                       | 526.4<br>(253–696)                | 2.1<br>(418)                          | 1.3<br>(253) | 2.7<br>(534)  | 2.4<br>(471)  | 2.9<br>(581)  | 2.2<br>(430)  | 3.5<br>(696)  | 3.3<br>(641)  | 3.4<br>(663)  | 2.7<br>(1.3–3.5)                 | 58.3                           | <0.001   |
| Rhode Island  | 1,272                       | 141.3<br>(56–190)                 | 6.9<br>(73)                           | 5.3<br>(56)  | 13.5<br>(142) | 16.3<br>(172) | 18.0<br>(190) | 14.7<br>(155) | 15.2<br>(161) | 15.6<br>(165) | 14.9<br>(158) | 13.4<br>(5.3–18.0)               | 115.7                          | <0.001   |
| Vermont       | 114                         | 12.7<br>(2–34)                    | 0.3<br>(2)                            | 0.3<br>(2)   | 1.0<br>(6)    | 0.5<br>(3)    | 1.4<br>(9)    | 2.4<br>(15)   | 3.5<br>(22)   | 3.4<br>(21)   | 5.4<br>(34)   | 2.0<br>(0.3–5.4)                 | 1,601.8                        | <0.001   |

# LONGER GROWING SEASON = LONGER ALLERGY SEASON

CONSECUTIVE DAYS ABOVE FREEZING



Source: RCC-ACIS.org  
Days between the annual last and first occurrence of 32°F

CLIMATE  CENTRAL

# Climate Change and Your Health: Outdoor Air Quality



What is changing  
in our climate?

Heat-trapping pollution is causing warmer weather, more intense heat waves, and more droughts and wildfires.

What is the impact  
on the environment?

Warmer weather leads to longer and worse allergy seasons; hotter temperatures create more smog (ground-level ozone); and wildfire causes dangerous air pollution.

How does that  
harm our health?

Increases in airborne allergens, smog and smoke make asthma and allergies worse, and put those with lung and heart diseases at higher risk.

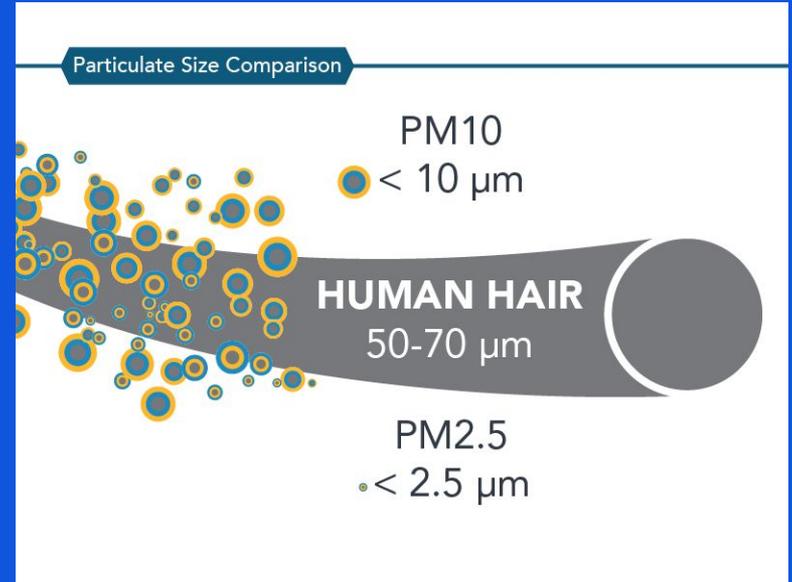
# Carbon-based Power



Carbon based power comes from burning of fossil fuels, which produces air pollutants, especially ground level ozone and small particles. These pollutants are harmful to the lungs and heart. Nearly everyone in the U.S. knows someone with a heart or lung condition.

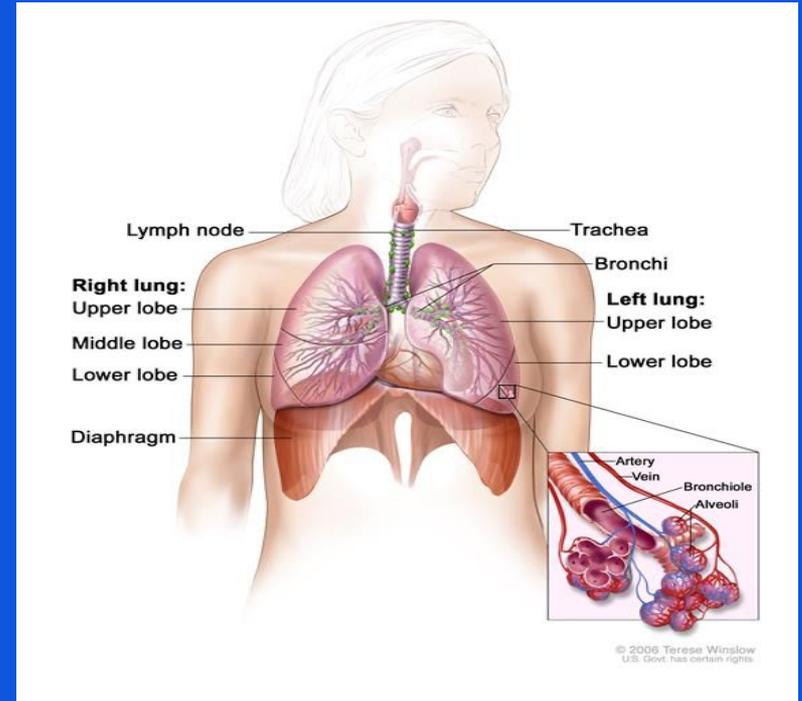
# Fossil Fuel Related Air Pollution

- ❑ Nitrogen Dioxide
- ❑ Sulfur Dioxide
- ❑ Ozone
- ❑ Particulate Matter
  - ❑ < 10 micron PM 10
  - ❑ < 2.5 micron PM 2.5
  - ❑ < 0.1 micron. Ultrafine PM
- ❑ Human Hair is 60 microns
- ❑ Red Blood Cell is 8 microns



# Particulate Matter

- PM 10 from road dust, wildfires, and demolition
- PM 2.5 from burning of fossil fuels
- Ultrafine PM < 0.1 microns from Tail Pipe exhaust
- Worsening COPD in adults and Asthma in Children
- Causes Lung Cancer
- Causes Vascular events: Stroke and Heart Attack



# Health Benefits of The Clean Air Act

Since 1970 major pollutants reduced by 73%

230,000 fewer deaths per year

2.4 million fewer Asthma attacks per year

200,000 fewer Heart Attacks per year

66,000 fewer hospitalizations for COPD per year

Cost of implementation of the Clean Air Act paid back 30 fold!



# Reducing air pollutants reduces demand for healthcare:

## The 1996 Summer Olympics were in Atlanta, GA:

Traffic restrictions led to a 23% decrease in peak a.m. traffic

- Ozone levels decreased 28%.
- Emergency room visits for children with asthma decreased 42%.
- Children's emergency room visits for causes other than asthma did not change.





## Report: Health Costs from Climate Change and Fossil Fuel Pollution Tops \$820 Billion a Year

Cutting U.S. climate pollution soon can avoid a wave of misery, deliver enormous health benefits and cost savings, protect vulnerable communities, and safeguard our future

May 20, 2021

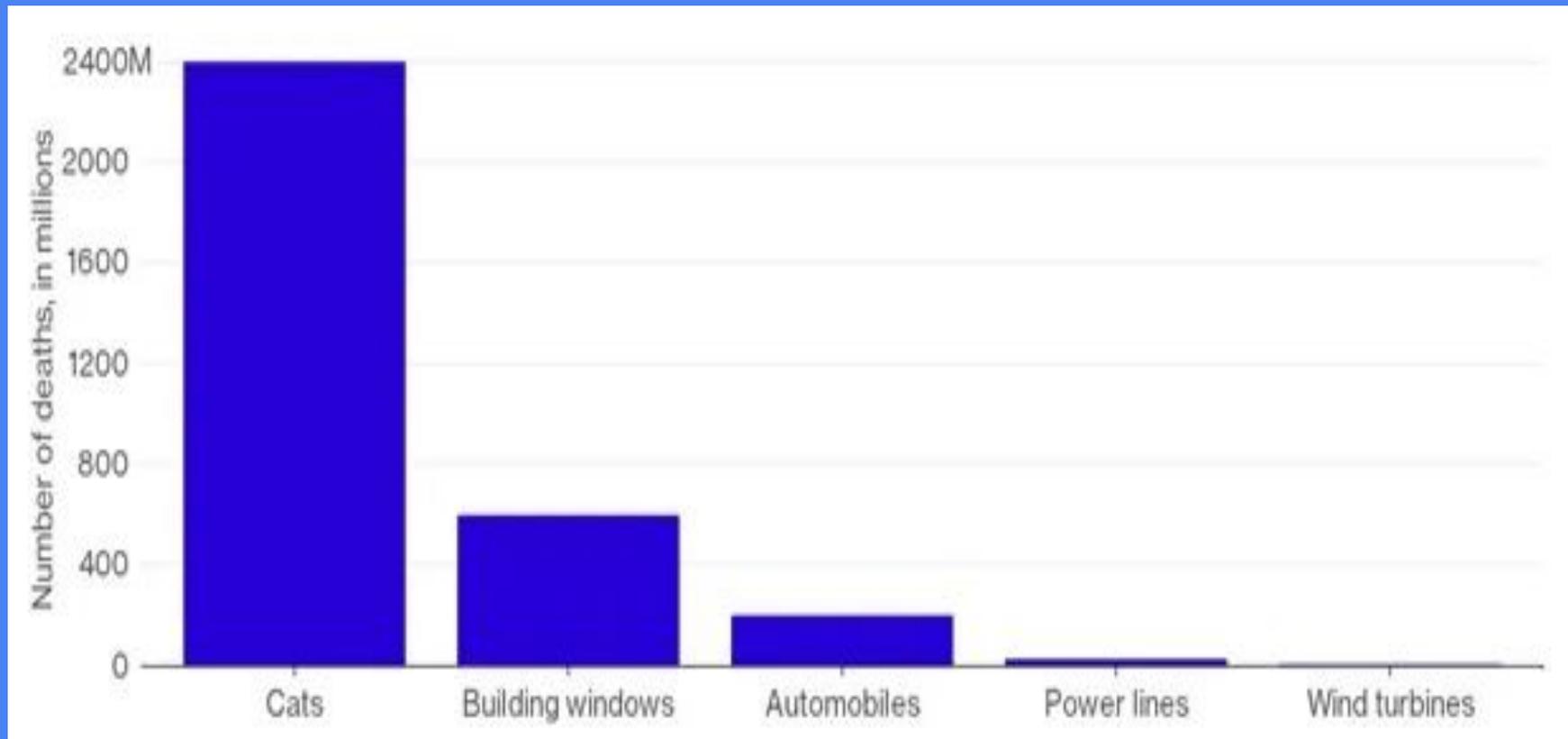
WASHINGTON – The staggering, often-overlooked financial costs to our health from fossil-fuel generated air pollution and climate change surpass \$820 billion in health costs *each year*—a burden falling heaviest on vulnerable communities but also shared in part by everyone in the United States, a new report shows.

“The science is clear: the dangerous effects of climate change—and their profound costs to our health and our pocketbooks— will worsen each year we fail to curb the pollution that is destabilizing our planet,” said Dr. Vijay

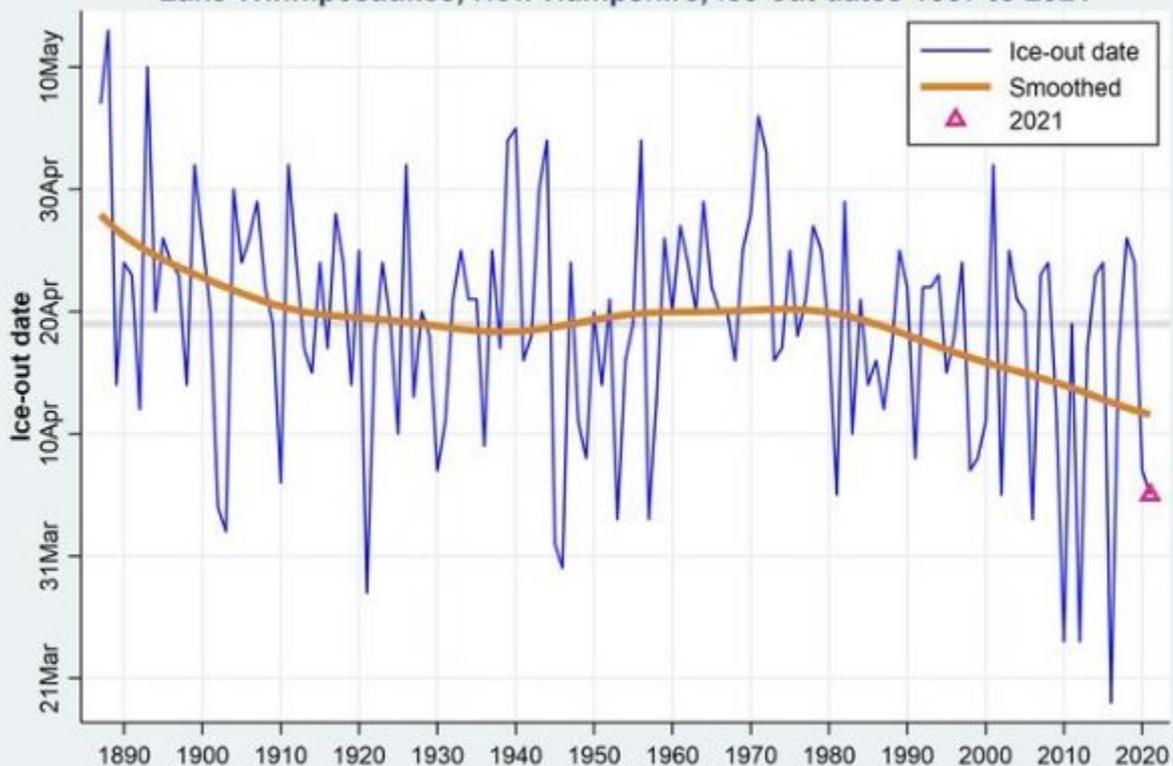


**Clean Energy Means Cleaner Air**

# Comparative Bird Deaths



### Lake Winnepesaukee, New Hampshire, ice-out dates 1887 to 2021

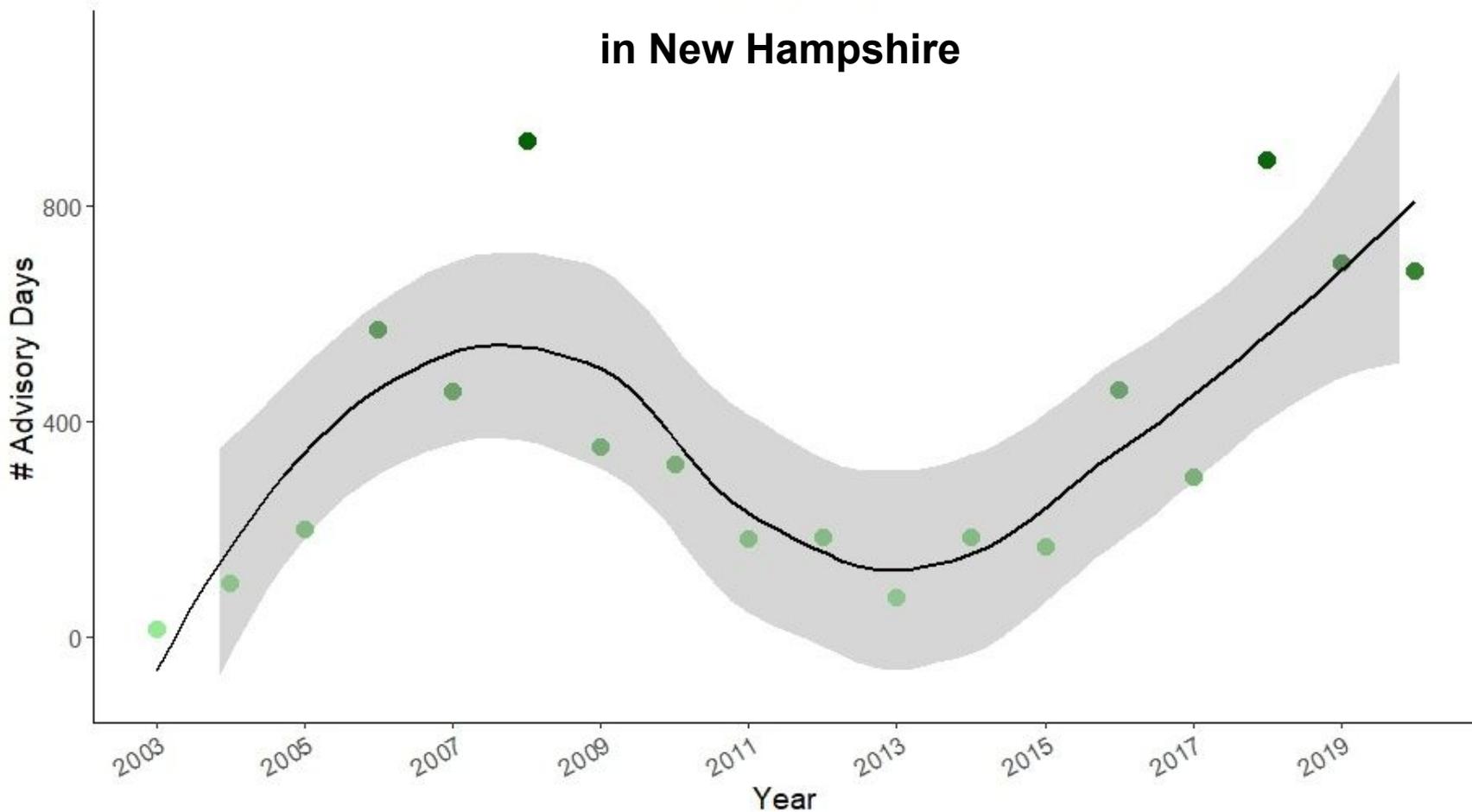


data: [winnepesaukee.com](http://winnepesaukee.com) graph: L Hamilton

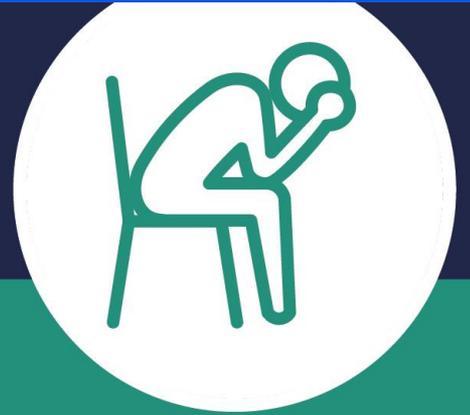
# Number of Cyanobacteria Advisory Days Over Time

2003 - 2020

## in New Hampshire



# Climate Change and Your Health: Mental Health and Well-Being



What is changing  
in our climate?

Many effects of climate change, such as extreme heat and violent weather, can harm people's mental health and well-being.

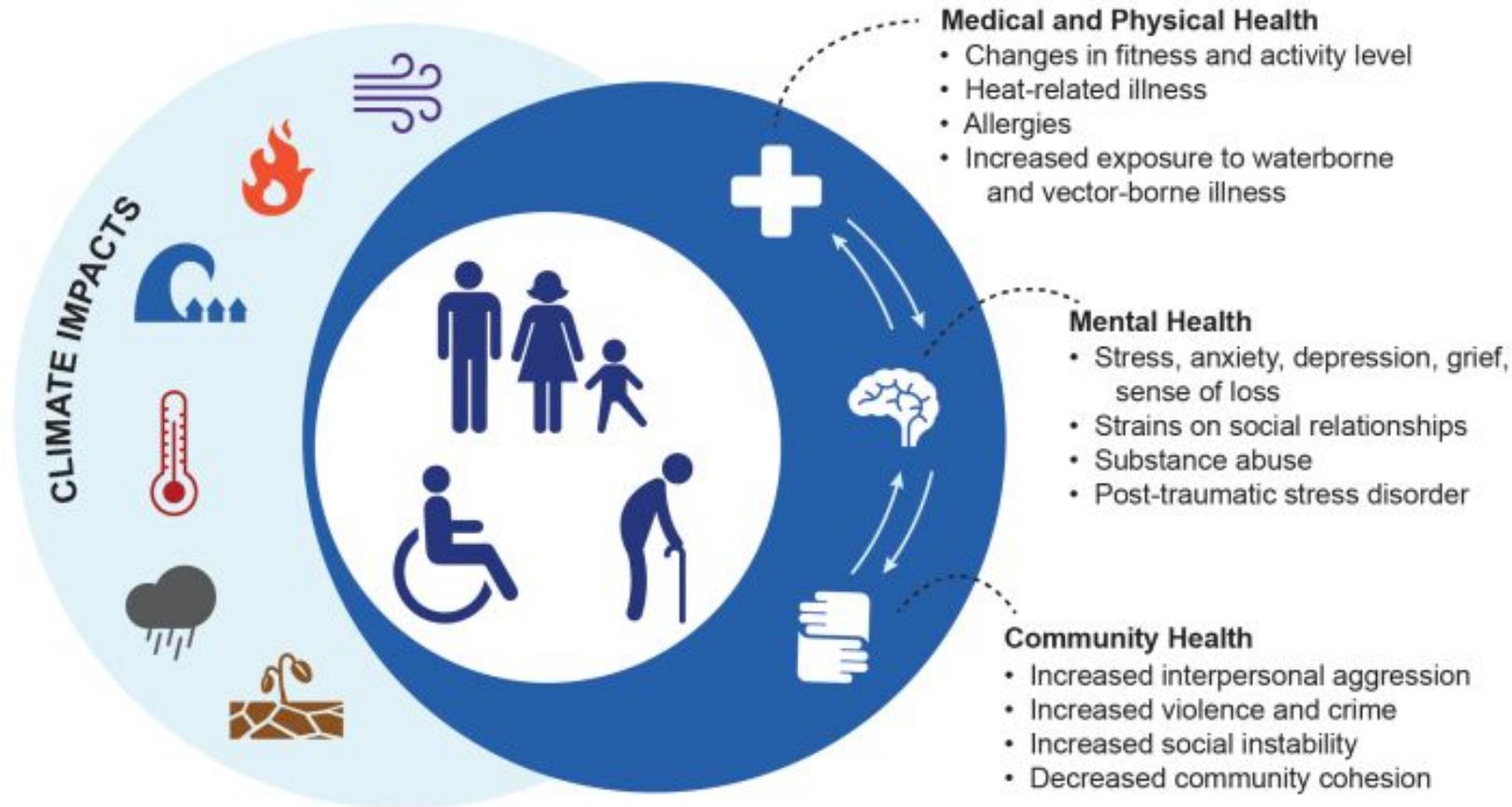
What is the impact  
on the environment?

Extreme weather, floods and fires can threaten, damage or destroy people and their homes, communities, loved ones and social networks.

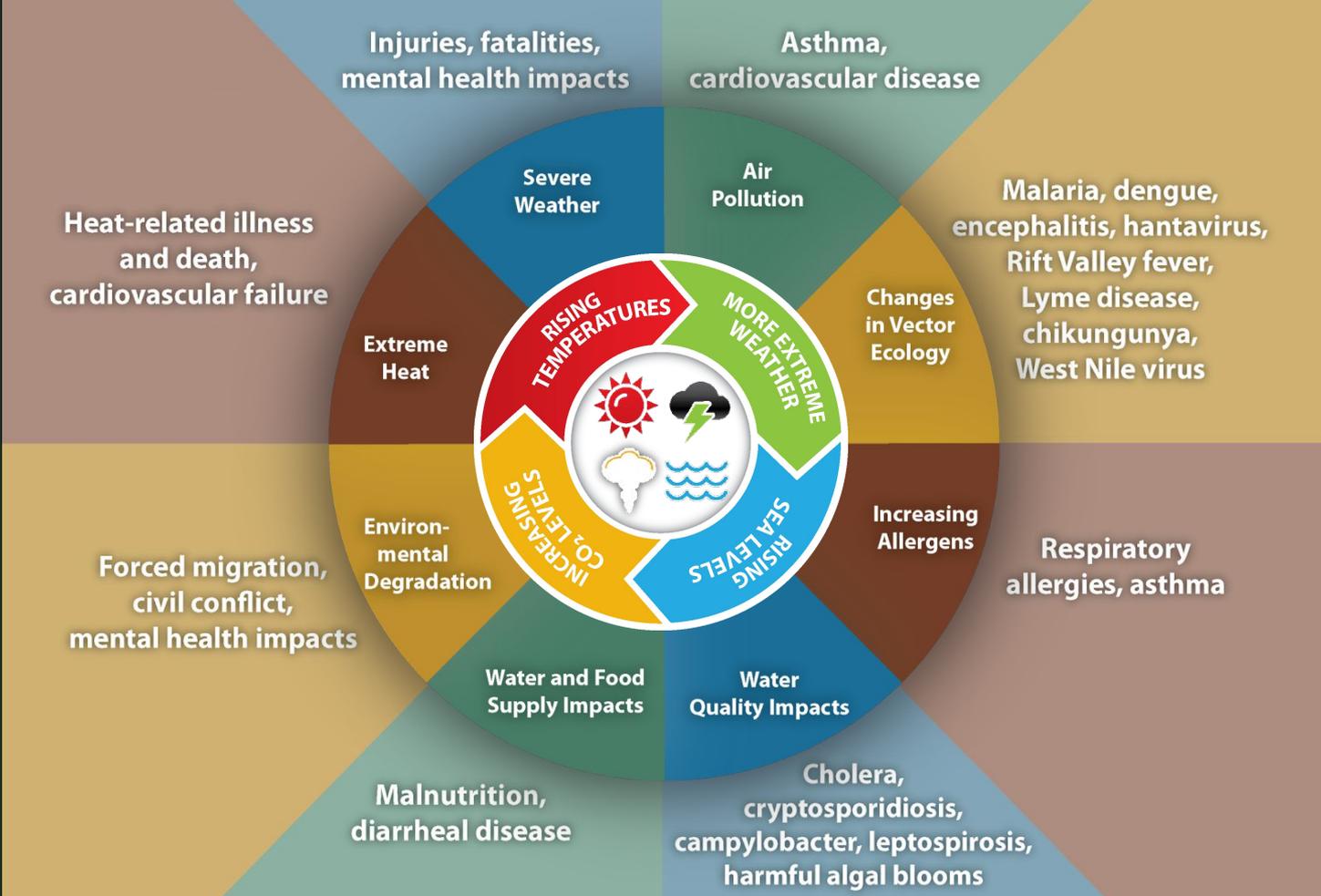
How does that  
harm our health?

The threat, damage and destruction caused by climate change can cause increased anxiety and depression in many people, especially children, older adults and low-income Americans.

## Impact of Climate Change on Physical, Mental, and Community Health



# Impact of Climate Change on Human Health



<https://www.cdc.gov/climateandhealth/effects/default.htm>

But.... The ill effects of the  
Climate Crisis are NOT  
evenly distributed....

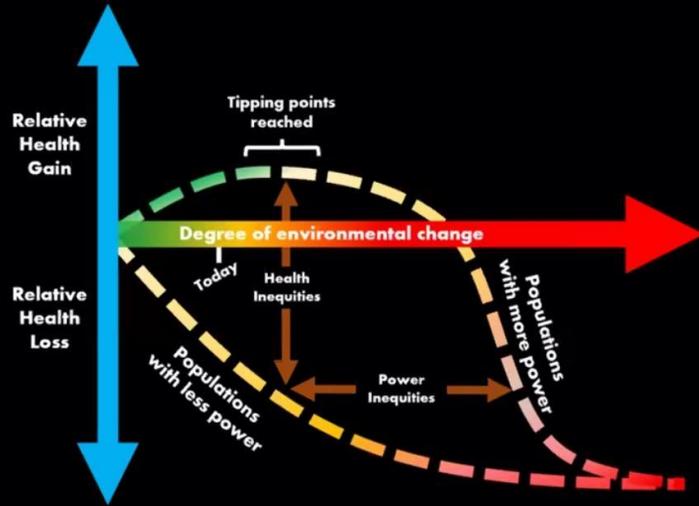


The World's  
Carbon Polluters

vs.

Those Dying from  
Carbon Pollution

From Patz JA, Gibbs HK,  
Foley JA, et al. Climate  
change and global health:  
quantifying a growing  
ethical crisis. *EcoHealth*.  
2007;  
doi:10.1007/s10393-007-  
0141-1



**Populations with less power tend to be more affected by environmental change.**

Faerron Guzmán and Zotova, In Press - 2022

At present, the Wealthy benefit at the expense of the Poor (but the Climate Crisis will catch up with everyone...)

**WHY ?**

# What Causes Climate Change

## The Greenhouse Effect



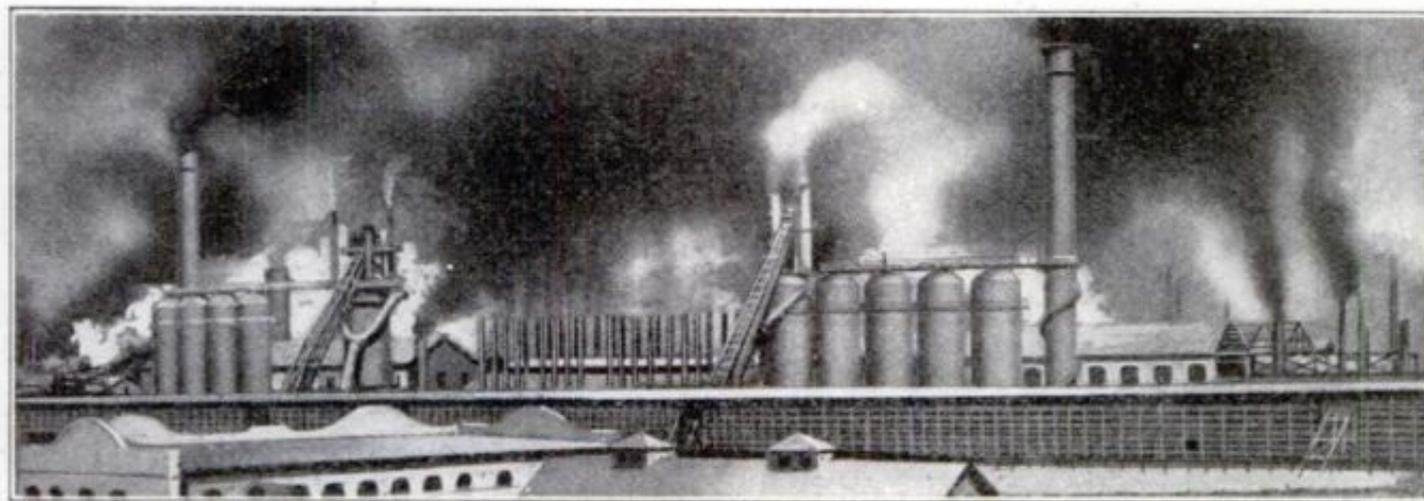
## What are our “Greenhouse Gases” here on Earth?

- Water Vapor (H<sub>2</sub>O)
- **CARBON DIOXIDE (CO<sub>2</sub>)**
- Methane (CH<sub>4</sub>)
- Nitrous Oxide
- Halogenated gases (esp. ANESTHETIC GASES) – Chlorofluorocarbons, Hydrofluorocarbons, Perfluorocarbons (including MDI PROPELLANTS)
- Ground-level Ozone (O<sub>3</sub>)

**Table 1. Tropospheric Lifetime and 20-Year Global Warming Potential of Inhaled Anesthetics**

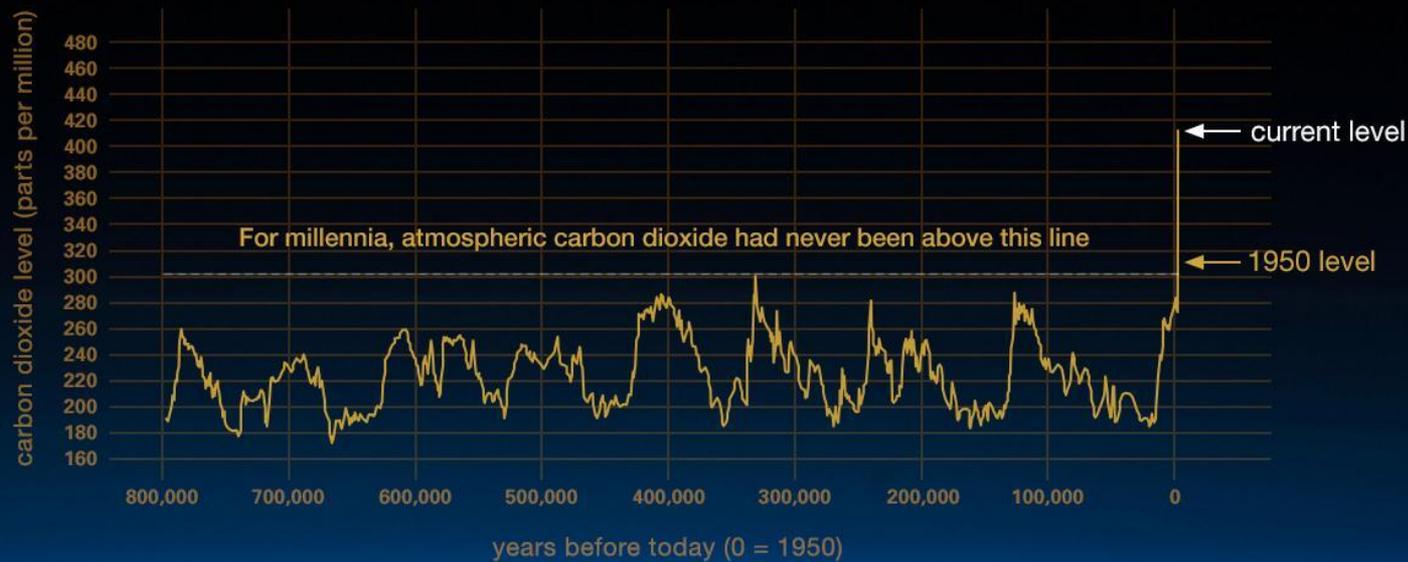
| <b>Compound</b>              | <b>Lifetime (y)</b> | <b>GWP<sub>20</sub></b> |
|------------------------------|---------------------|-------------------------|
| Carbon dioxide <sup>15</sup> |                     | 1                       |
| Sevoflurane                  | 1.2                 | 349                     |
| Isoflurane                   | 3.6                 | 1401                    |
| Desflurane                   | 10                  | 3714                    |
| Nitrous oxide <sup>15</sup>  | 114                 | 289                     |

GWP<sub>20</sub> = 20-year global warming potential.



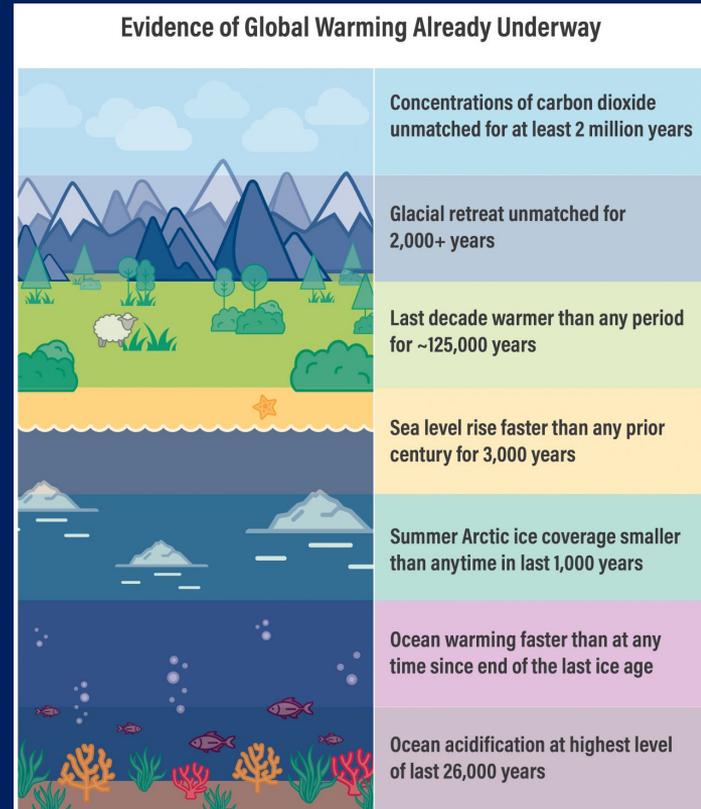
The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

## CO2 Levels Over the Millennia



# United Nations IPCC 2021

- ❑ **Unequivocally** due to human activity
- ❑ 1.1°C (2° F) warming since mid 1800s
- ❑ Will reach 1.5°C (2.7° F) within two decades



# “Code Red for Climate and Health”

— September 5, 2021

The NEW ENGLAND JOURNAL of MEDICINE

EDITORIAL



## Call for Emergency Action to Limit Global Temperature Increases, Restore Biodiversity, and Protect Health

The United Nations General Assembly in September 2021 will bring countries together at a critical time for marshalling collective action to tackle the global environmental crisis. They will meet again at the biodiversity summit in Kunming, China, and at the climate conference (COP26) in Glasgow, United Kingdom. Ahead of these pivotal meetings, we — the editors of health journals worldwide — call for urgent action to keep average global temperature increases below 1.5° C, halt the destruction of nature, and protect health.

Health is already being harmed by global temperature increases and the destruction of the

lutions, ethnic minorities, poorer communities and those with underlying health problems.<sup>2,4</sup>

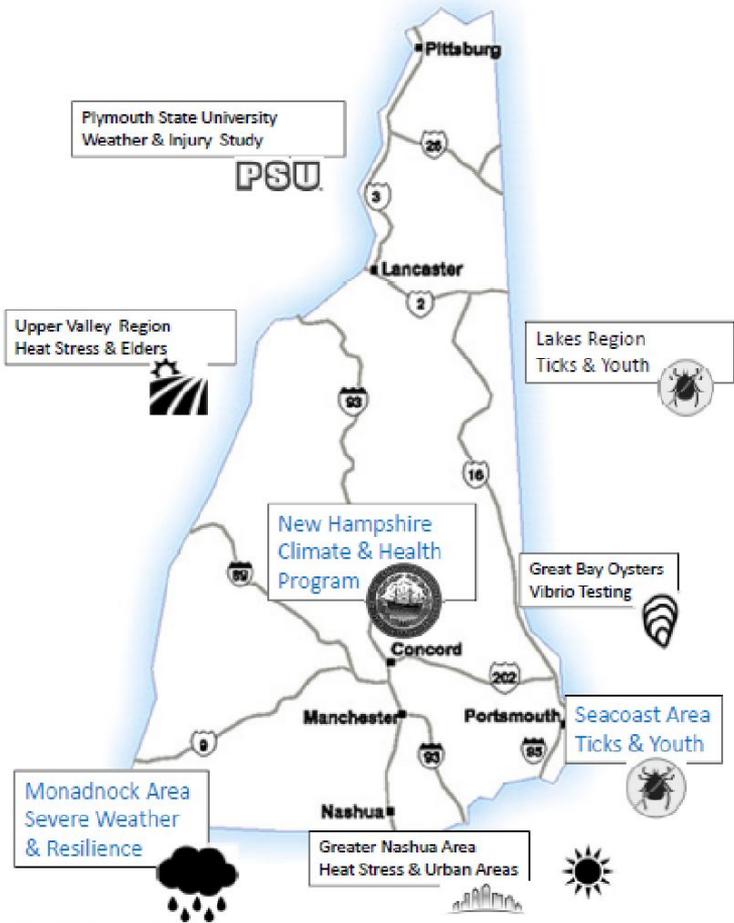
Global heating is also contributing to the decline in global yield potential for major crops which has fallen by 1.8 to 5.6% since 1981; this decline, together with the effects of extreme weather and soil depletion, is hampering efforts to reduce undernutrition.<sup>4</sup> Thriving ecosystems are essential to human health, and the widespread destruction of nature, including habitats and species, is eroding water and food security and increasing the chance of pandemics.<sup>3,7,8</sup>

The consequences of the environmental crisis fall disproportionately on those countries and



**HOW should this  
affect your practice?**

## NH DPHS Climate & Health Projects



Updated 10/15/2019

# 2021 Climate Health Adaptation Projects in NH

Source: NH DHHS, Division of Public Health Services

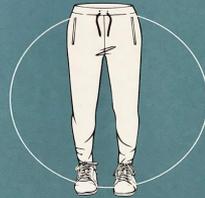
Source: [www.dhhs.nh.gov/dphs/climate/index.htm](http://www.dhhs.nh.gov/dphs/climate/index.htm)

# TICK FREE

NEW HAMPSHIRE

PREVENT • INSPECT • REMOVE

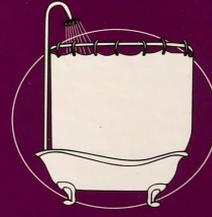
## PREVENT LYME DISEASE



Wear protective clothing, including long pants and long sleeves with pants tucked into socks and shirt tucked into pants. Stay on the center of the path when hiking.



Treat your clothing and shoes with Permethrin. Spray exposed skin with an insect repellent containing 20-30% DEET. Never use more than 30% DEET on children.



Always check yourself and your pets for ticks after spending time in tall grassy, wooded or brushy areas. Take a shower after returning indoors to wash off any unattached ticks.

### TICK IDENTIFICATION



#### BLACKLEGGED TICKS Carry Lyme Disease



### REMOVE TICKS IMMEDIATELY

- Using tweezers, grasp the tick close to the skin
- Pull upward with steady, even pressure (Do not twist or yank the tick as this can cause tick parts to remain in your skin)
- After removing the tick, thoroughly clean bite area
- Dispose of a live tick by putting it in alcohol, placing it in a sealed bag/container, wrapping it tightly in tape, or flushing it down the toilet
- Call your doctor if you have been bitten by a tick

Questions?  
Call 603-271-4496



tickfreenh.org



# Using Trusted Messenger Status



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

## The Journal of Climate Change and Health

journal homepage: [www.elsevier.com/foclim](https://www.elsevier.com/foclim)



Short survey

### Patients value climate change counseling provided by their pediatrician: The experience in one Wisconsin pediatric clinic



Andrew A Lewandowski<sup>a,\*</sup>, Perry E Sheffield<sup>b</sup>, Samantha Ahdoot<sup>c</sup>, Edward W Maibach<sup>d</sup>

<sup>a</sup> Group Health Cooperative of South Central Wisconsin, Madison, United States

<sup>b</sup> Departments of Environmental Medicine and Public Health and Pediatrics, Icahn School of Medicine at Mount Sinai, New York City, United States

<sup>c</sup> University of Virginia School of Medicine, Charlottesville, United States

<sup>d</sup> Center for Climate Change Communication, George Mason University, Fairfax, United States

#### ARTICLE INFO

##### Article History:

Received 16 August 2021

Accepted 10 September 2021

Available online 20 September 2021

#### ABSTRACT

In 2015, the American Academy of Pediatrics (AAP) recommended that the health effects of climate change be incorporated into the existing anticipatory guidance framework. Despite this recommendation, there are only anecdotal accounts of pediatricians offering climate change counseling, and no literature evaluates such counseling effectiveness in any outpatient setting. This investigation describes patient and family responses to climate change counseling administered by one pediatrician in a Wisconsin clinic. A standardized message about the effects of climate change on children's health was delivered during 262 well-child encounters (234 unique families) over a 3 month period. Electronic surveys were administered (response rate of 59% (138/234)) to evaluate knowledge gained as a result of the counseling, intentions of respondents to change their energy use behaviors, and degree of support for clean energy initiatives. Self-described political ideology and general responses to the counseling were also collected. Large majorities of liberal, moderate and conservative families responded positively to the guidance. Although limited to the patients of one pediatrician in a single pediatric practice, our findings bolster the AAP recommendation that counseling about climate change as a child health issue in the outpatient setting is an important and potentially effective educational strategy.

© 2021 The Authors. Published by Elsevier Masson SAS. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

## **Case #1:**

**83yo female with HTN, diastolic heart failure, serum creatinine 1.3, chronic A.fib, MCI, and urinary frequency on diltiazem, HCTZ, apixaban and oxybutynin;  
lives alone in historic family homestead;  
receives MOW's; daughter brings her shopping every Saturday. She comes in for her q6mo recheck in June and says she's feeling just fine.**

**What should you ask her?**

## Case #2:

37yo mother of 3 on multivitamins, turmeric, lion's tail and CBD oil asks to be screened for Lyme disease because her family spends a lot of time outdoors and she won't use "any of those dangerous chemicals" against ticks.

How do you counsel her?

## Case #2:

- It's good that you're concerned about tick exposure!
- Remember: Lyme not the only disease spread by ticks in NH (Anaplasmosis, Babesiosis, Powassan virus)
- Remember: Mosquitos also carry disease (West Nile, EEE in NH; dengue, chikungunya, Zika also in US)
- **Oil of Lemon Eucalyptus** is an effective EPA-registered insect repellent
- The effectiveness of non-EPA registered repellents is unknown
- Wear long pants tucked into socks and long sleeves if possible. Stay on center of trail
- **Permethrin** (also use for scabies and lice) can be sprayed on clothing, or long-lasting permethrin-treated clothing can be worn.
- Take a shower and check for ticks at the end of the day!

### Case #3:

18yo male with seasonal allergic rhinitis and intermittent asthma on Symbicort and loratadine comes in for a refill of his MDI in February.

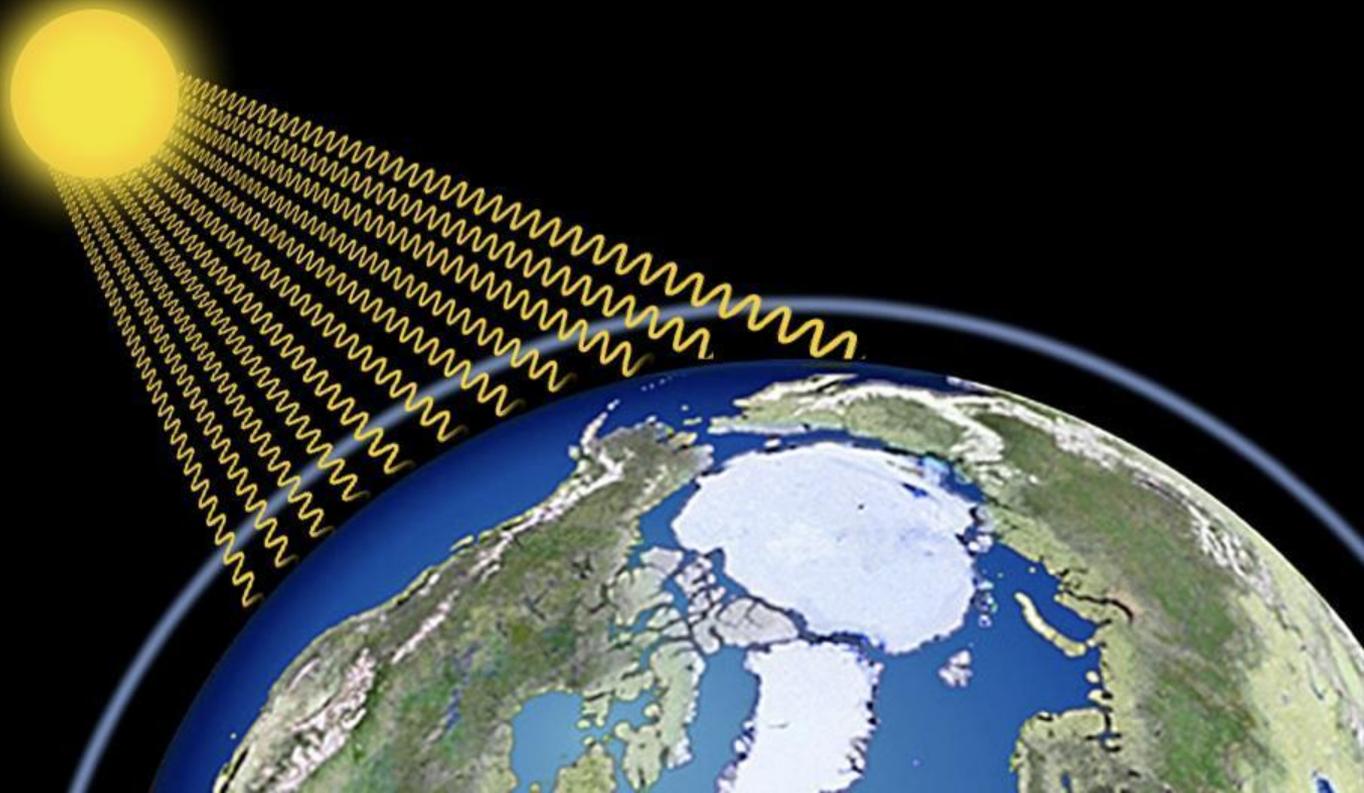
What do you advise?

## Case #3:

- Because of climate change, consider starting his daily loratadine in mid-March instead of April.
- Because of your concern about the adverse-effect of greenhouse gases such as in his MDI, ask him to consider switching his inhaler to a DPI (dry powder inhaler), such as Advair diskus, Airduo, Pro-Air RespiClick, Pro-Air Digihaler, Flovent Diskus, Tudorza Pressair, Breo Ellipta, Asmanex Twisthaler, Pulmicort Flexhaler, Spiriva HandiHaler, etc.  
or go back to using his NEBULIZER

What can **WE DO**  
about the root causes  
of Climate Change?

Enough solar energy reaches Earth **every hour**  
to fill all the world's energy needs **for a full year**

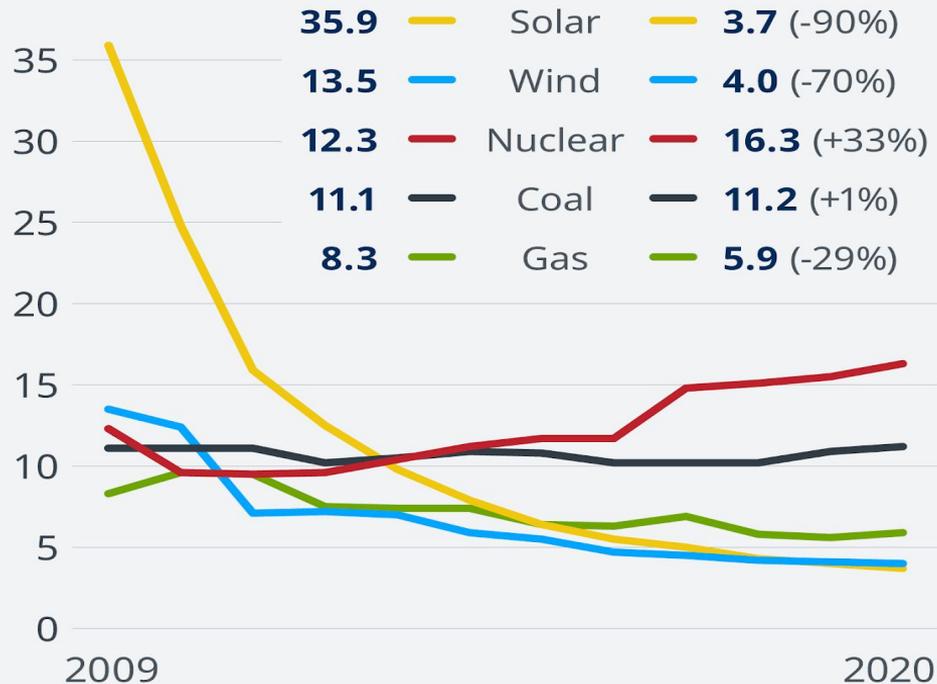




**Globally, wind could  
supply worldwide  
electricity consumption  
40 times over**

# Worldwide energy prices over the last decade

Generation costs in dollar/cents per kWh



## We Can Save With Renewable Energy

- **Clean and healthy**
- **Creates jobs**
- **Addresses environmental injustice**
- **Can cost less**

# Nuclear Energy

NO Carbon emission

Controversial

Expensive

Emotional

High Profile but Rare Accidents

4th generation Safer and Innovative

Small Module Reactors

Can use Depleted Uranium

In all probability, needed to get to ZERO

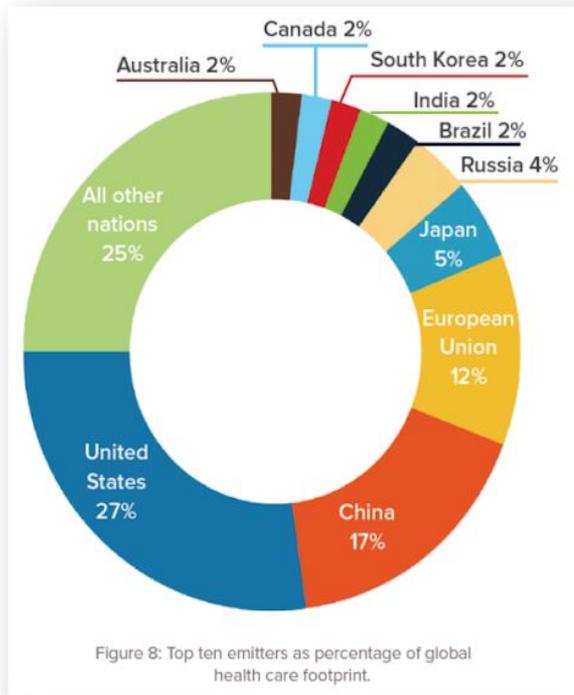


# US health care leaves a big carbon footprint

The U.S. is the 1<sup>st</sup> in terms of health care sector GHG emissions accounting for 27% of the global health care footprint—with <5% population

**IF U.S. HEALTHCARE WAS A COUNTRY,  
WE WOULD RANK #13 IN GLOBAL  
CARBON EMISSIONS, MORE THAN THE  
ENTIRE U.K.**

<https://noharm-uscanada.org/ClimateFootprintReport>



Scope 1



Scope 2



Scope 3



# What Makes Up Your Footprint

Scopes of Emissions

## **9 Reasons Why Health Systems Need to Work on Climate Change Now:**

- 1. Healthy Communities are our Business** – it's what we do
- 2. Other businesses look to Healthcare as Leaders**
- 3. Sustainability can Lower Costs** (by reducing waste & improving efficiency)
- 4. To Maintain and Improve Access to Capital** (S&P, Moody's are adding environmental performance metrics)
- 5. Enhance Employee Recruitment and Retention** – where would you rather work?
- 6. Green team building sustains positive behavioral change** in an organization
- 7. P.R.:** to protect brand and Grow Market Share
- 8. To improve Social Equity and Tackle Social Determinants of Health**
- 9. To Leave a Healthy Climate for Our Children and Grandchildren** (Climate Change is NOT our grandchildren's problem to solve!)

- ❑ The Arctic is warming faster than the rest of us.
- ❑ If melted, the Greenland ice sheet alone would add 7 meters (23 feet) of sea level rise.
- ❑ Antarctica is even scarier.
- ❑ Permafrost has so much carbon stored that its thaw and decomposition could trigger an unstoppable CO2 release.
- ❑ The USA is already 20 years behind the EU in clean energy (wind and solar) development.

— Daniel Schrag PhD, Harvard Professor of Geology  
October 19, 2022

**“ Today, Climate must be at the heart of everything we do.”**

**“ We need to pull the world back from the precipice of climate catastrophe.”**

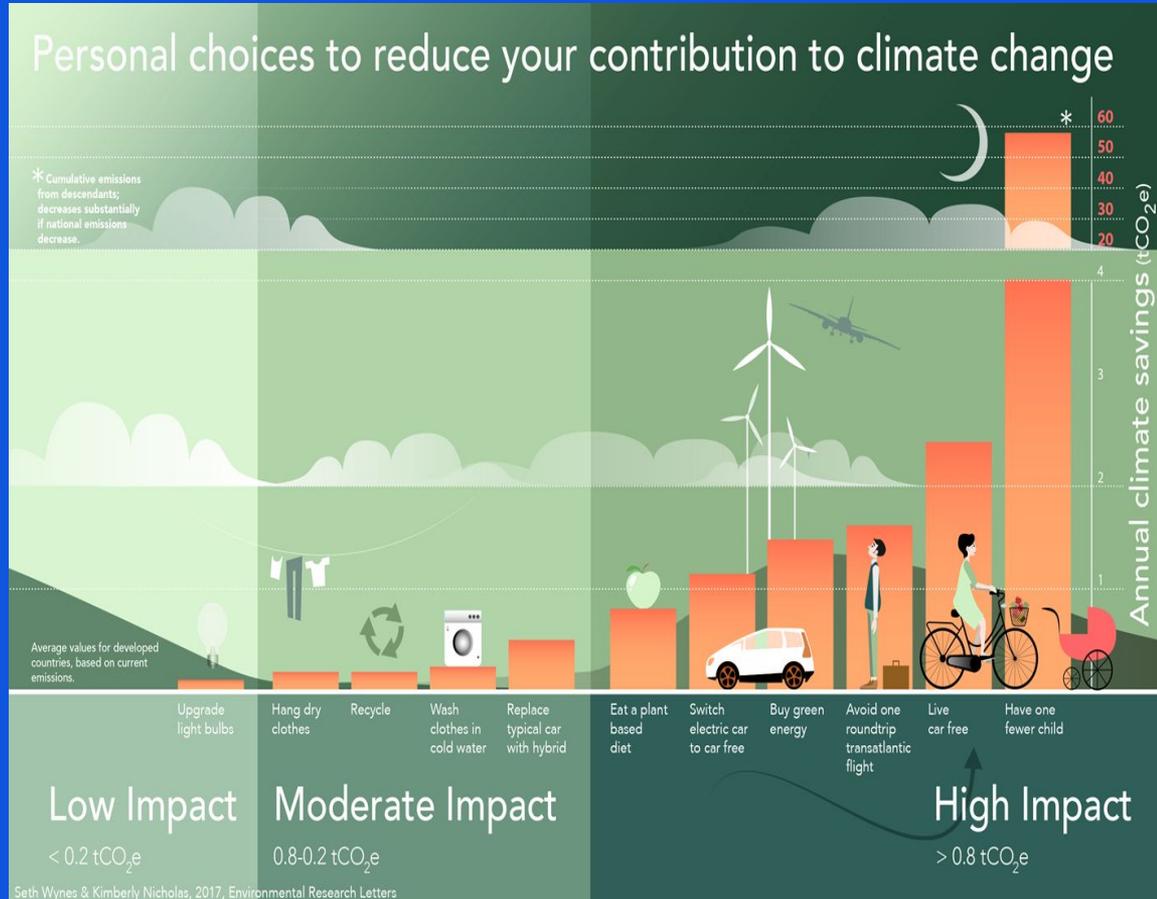
**— COP26 President Alok Sharma (UK), 10/14/22**

Climate is Changing.  
Humans are Responsible.  
The Impacts are Serious.  
The Time to Act is Now.

—Katharine Hayhoe, evangelical Christian and  
climate scientist, “Saving Us”.

# Individual Actions are Important: If not you, Who?

- ❑ Talk about climate– to your patients, your family, your community
- ❑ Call, write, or email your elected officials – Make your voice heard!
- ❑ Vote
- ❑ Join a climate group– Like **NH HWCA!**
- ❑ De-carbonize your practice
- ❑ Make consumer choices
- ❑ Make lifestyle choices
- ❑ Fossil Fuel Divestment– e.g. Third Act





[nhclimatehealth.org](https://nhclimatehealth.org)