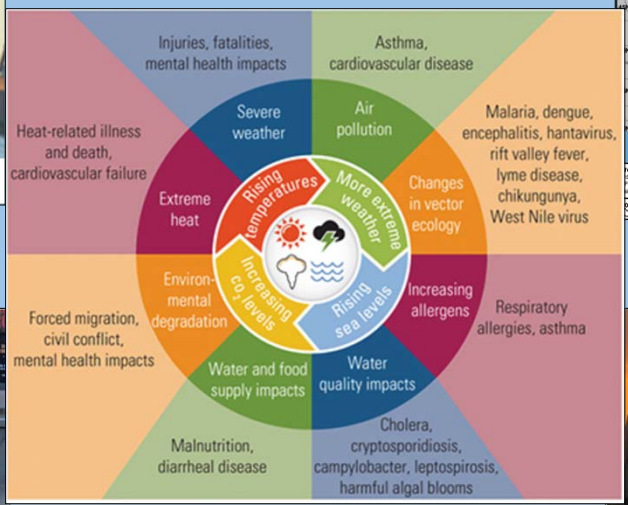
How can Healthcare Providers Reduce the Impacts of Climate Change?

Commissioner's Medical Grand Rounds:
Clinical Intervention and Community Engagement for Climate Change
Anjali Sauthoff
March 24, 2023

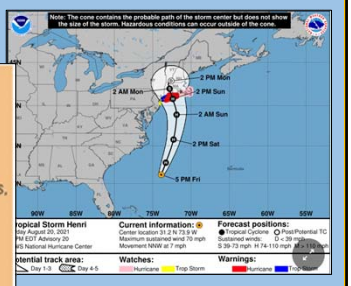
1

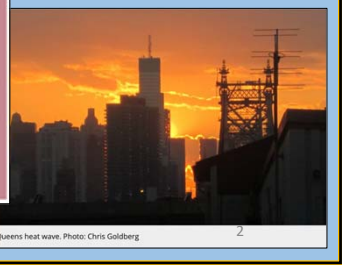
1

Climate Impacts Population Health



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

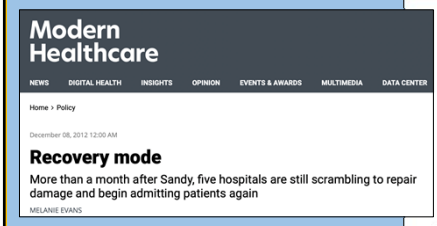




2

2

Climate Impacts Healthcare Systems


Modern Healthcare

NEWS DIGITAL HEALTH INSIGHTS OPINION EVENTS & AWARDS MULTIMEDIA DATA CENTER

Home › Policy

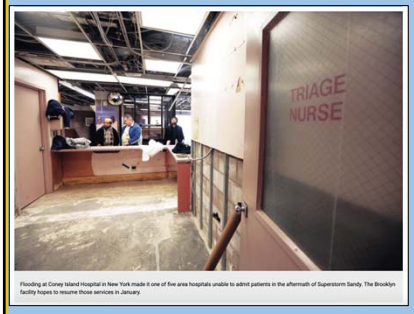
December 08, 2012 12:00 AM

Recovery mode

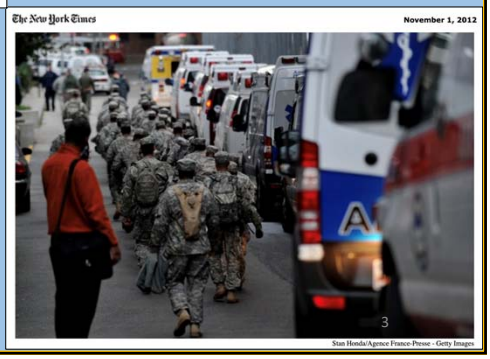
More than a month after Sandy, five hospitals are still scrambling to repair damage and begin admitting patients again

MELANIE EVANS

Flood waters in the Metropolitan Hospital kitchen.



Flooding at Coney Island Hospital in New York made it one of five area hospitals unable to admit patients in the aftermath of Superstorm Sandy. The Brooklyn facility hopes to resume those services in January.


The New York Times November 1, 2012

Stan Honda/Agence France-Presse - Getty Images

3

3

Healthcare Systems Impact Climate

- Global health care climate footprint is equivalent to 4.4% of global net emissions
- If the global health sector were a country, it would be the fifth-largest emitter on the planet
- U.S. healthcare industry contributes nearly 10% to total national emissions
- The U.S. health sector ranks 1st globally in both absolute and per capita emissions

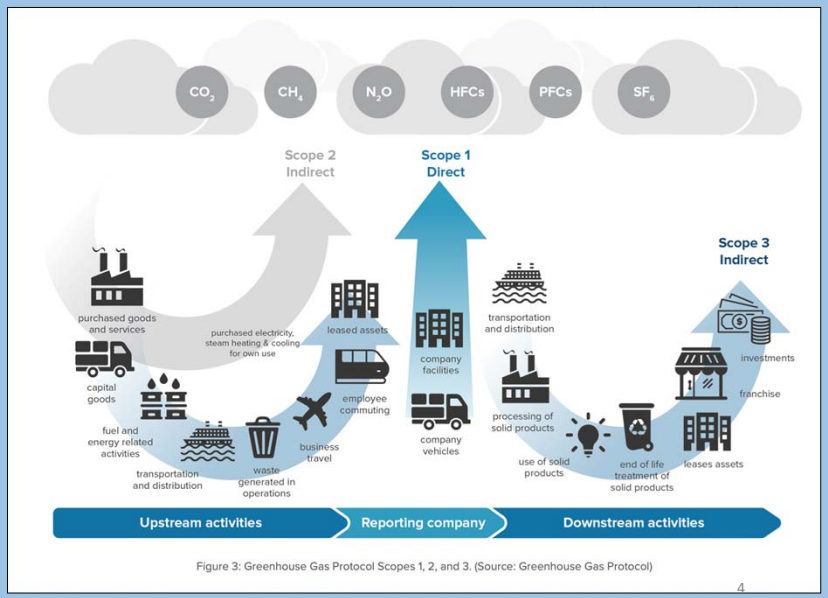


Figure 3: Greenhouse Gas Protocol Scopes 1, 2, and 3. (Source: Greenhouse Gas Protocol)

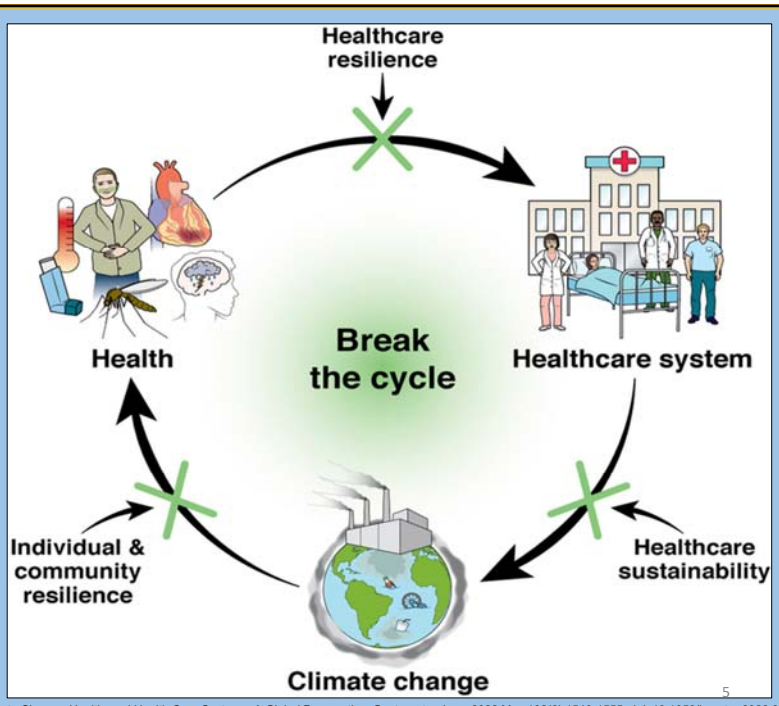
4

Source: Healthcare's Climate Footprint: How the Health Sector Contributes to the Global Climate Crisis and Opportunities for Action

4

Overview

- Adaptation feasibility study
- Mitigation in healthcare
- Health equity
- Opportunities and needs



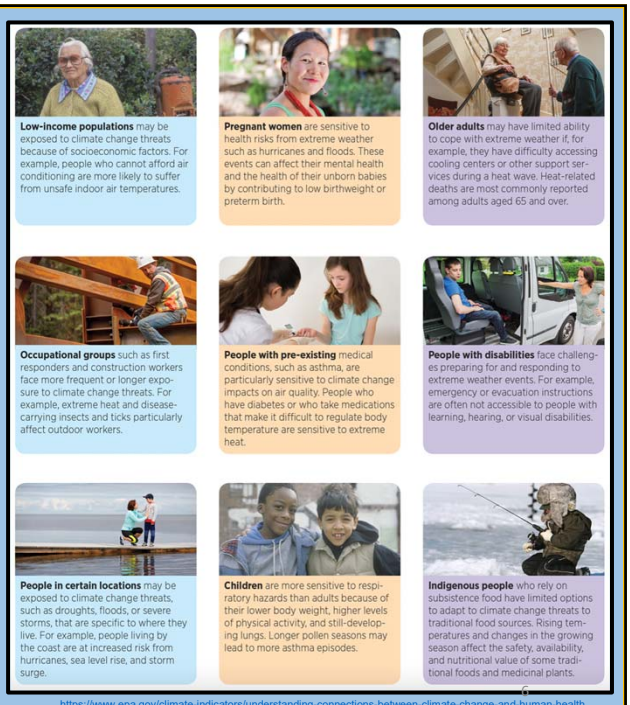
5

Setoguchi et al. Climate Change, Health, and Health Care Systems: A Global Perspective. Gastroenterology. 2022 May;162(6):1549-1555. doi: 10.1053/j.gastro.2022.02.037

5

Vulnerable Populations

- Low-income
- Pregnant women
- Older adults
- Occupational groups
- People with pre-existing medical conditions
- People with disabilities
- Geographic location
- Children
- Indigenous
- Unhoused



https://www.epa.gov/climate-indicators/understanding-connections-between-climate-change-and-human-health

6

6

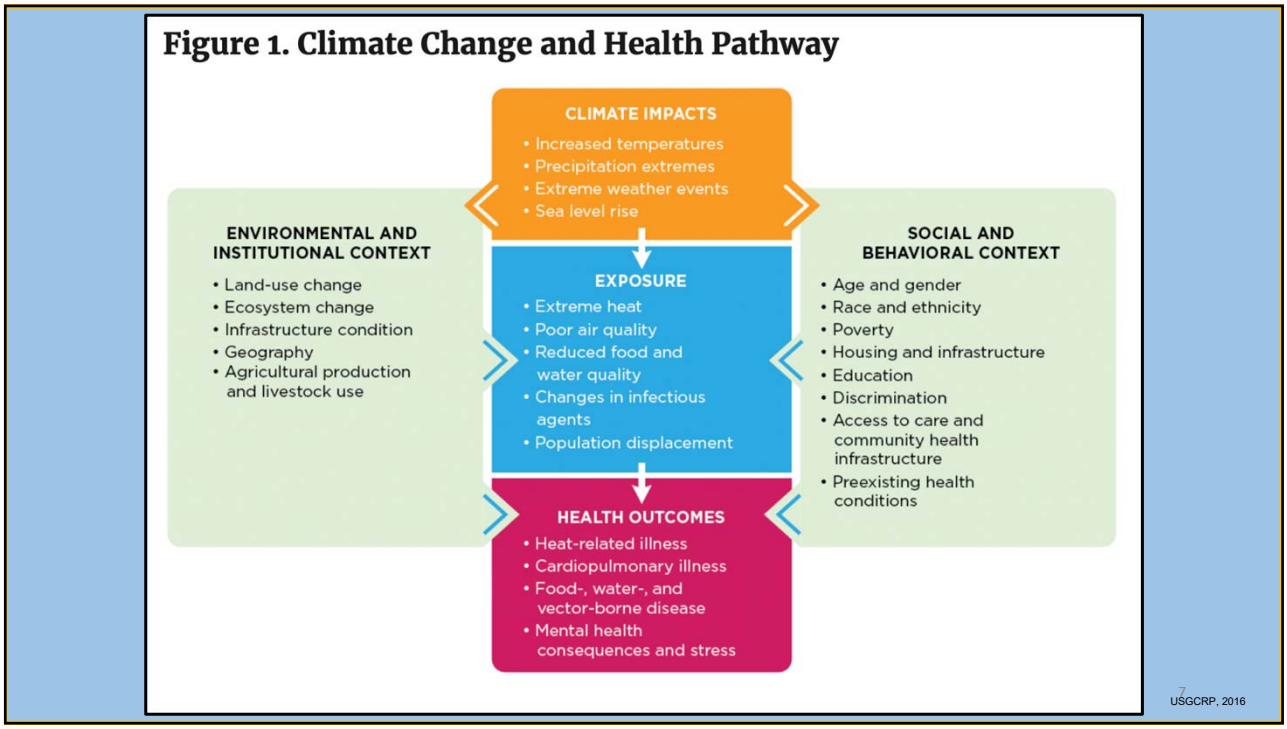
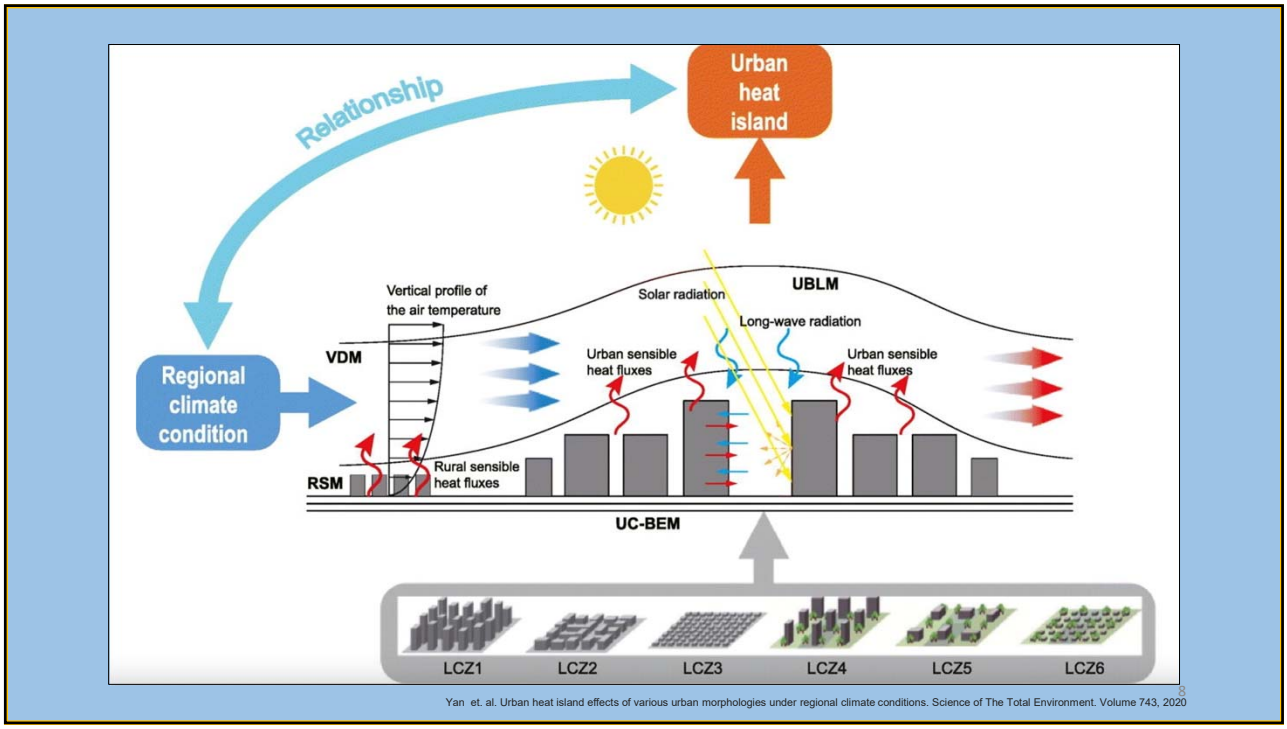


Figure 1. Climate Change and Health Pathway
CLIMATE IMPACTS
• Increased temperatures
• Precipitation extremes
• Extreme weather events
• Sea level rise
ENVIRONMENTAL AND INSTITUTIONAL CONTEXT
• Land-use change
• Ecosystem change
• Infrastructure condition
• Geography
• Agricultural production and livestock use
EXPOSURE
• Extreme heat
• Poor air quality
• Reduced food and water quality
• Changes in infectious agents
• Population displacement
SOCIAL AND BEHAVIORAL CONTEXT
• Age and gender
• Race and ethnicity
• Poverty
• Housing and infrastructure
• Education
• Discrimination
• Access to care and community health infrastructure
• Preexisting health conditions
HEALTH OUTCOMES
• Heat-related illness
• Cardiopulmonary illness
• Food-, water-, and vector-borne disease
• Mental health consequences and stress
USGCRP, 2016

7

7


Relationship
Urban heat island
Regional climate condition
VDM
Vertical profile of the air temperature
Solar radiation
UBLM
Long-wave radiation
Urban sensible heat fluxes
Urban sensible heat fluxes
RSM
Rural sensible heat fluxes
UC-BEM
LCZ1
LCZ2
LCZ3
LCZ4
LCZ5
LCZ6
Yan et. al. Urban heat island effects of various urban morphologies under regional climate conditions. Science of The Total Environment. Volume 743, 2020

8

8

"There is no such thing as a single-issue struggle because we don't live single issue lives."

Audre Lorde

Source: https://www.cjrfund.org

9

NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION

STATE CLIMATE SUMMARIES 2022
NEW YORK

KEY MESSAGE 1

Temperatures in New York have risen almost 2.5°F since the beginning of the 20th century. Under a higher emissions pathway, historically unprecedented warming is projected during this century. Extreme heat is a particular concern for densely populated urban areas such as New York City, where high temperatures and high humidity can cause dangerous conditions.

KEY MESSAGE 2

Since 1880, sea level has risen by about 13 inches along the coast of New York, more than the global average rise of 7–8 inches. Global average sea level is projected to rise another 1–4 feet by 2100, but levels along the coast of New York will likely be higher due to local and regional factors. Sea level rise will increase the frequency, extent, and severity of coastal flooding, which is a grave risk to dense, high-value development along New York's coastline.

KEY MESSAGE 3

New York has experienced a large increase in the frequency and intensity of extreme precipitation events, and further increases are projected. Increases in winter and spring precipitation are projected, raising the risk of springtime flooding, which could cause delayed planting and reduced yields.

10

10

NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION

STATE CLIMATE SUMMARIES 2022
NEW YORK

KEY MESSAGE 1

Temperatures in New Yo… of the 20th century. Under a higher emissions pathw… jected during this century. Extreme heat is a particular concern for densely populated urban areas such as New York City, where high temperatures and high humidity can cause dangerous conditions.

EXTREME HEAT

KEY MESSAGE 2

Since 1880, sea level has risen by about 13 inches along the coast of New York, more than the global average rise of 7–8 inches. Global average sea level is projected to rise another 1–4 feet by 2100, but levels along the coast of New York will likely be higher due to local and regional factors. Sea level rise will increase the frequency, extent, and severity of coastal flooding, which is a grave risk to dense, high-value development along New York's coastline.

KEY MESSAGE 3

New York has experienced a large increase in the frequency and intensity of extreme precipitation events, and further increases are projected. Increases in winter and spring precipitation are projected, raising the risk of springtime flooding, which could cause delayed planting and reduced yields.

11

11

NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION

STATE CLIMATE SUMMARIES 2022
NEW YORK

KEY MESSAGE 1

Temperatures in New Yo… of the 20th century. Under a higher emissions pathw… jected during this century. Extreme heat is a particular concern for densely populated urban areas such as New York City, where high temperatures and high humidity can cause dangerous conditions.

EXTREME HEAT

KEY MESSAGE 2

Since 1880, sea level has risen by about 13 inches along the coast of New York, more than the global average ri… se another 1–4 feet by 2100, but levels … l and regional factors. Sea level rise will increase the frequency, extent, and severity of coastal flooding, which is a grave risk to dense, high-value development along New York's coastline.

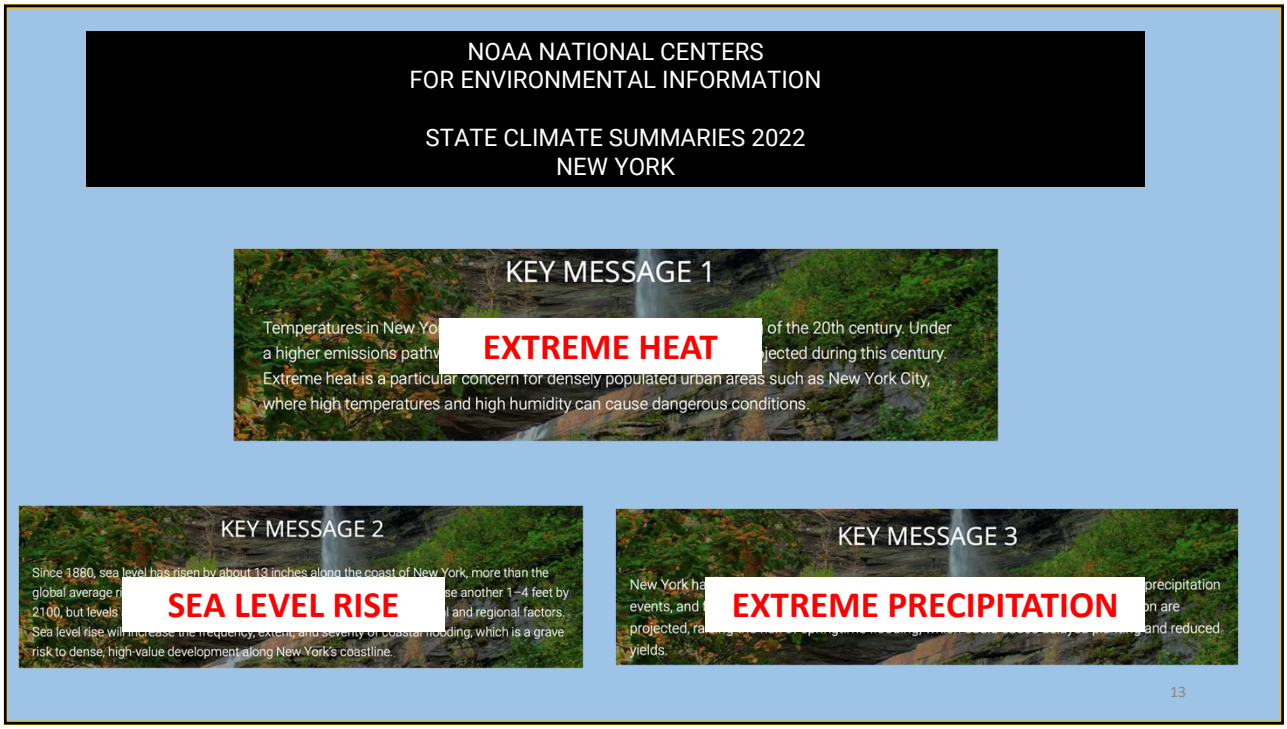
SEA LEVEL RISE

KEY MESSAGE 3

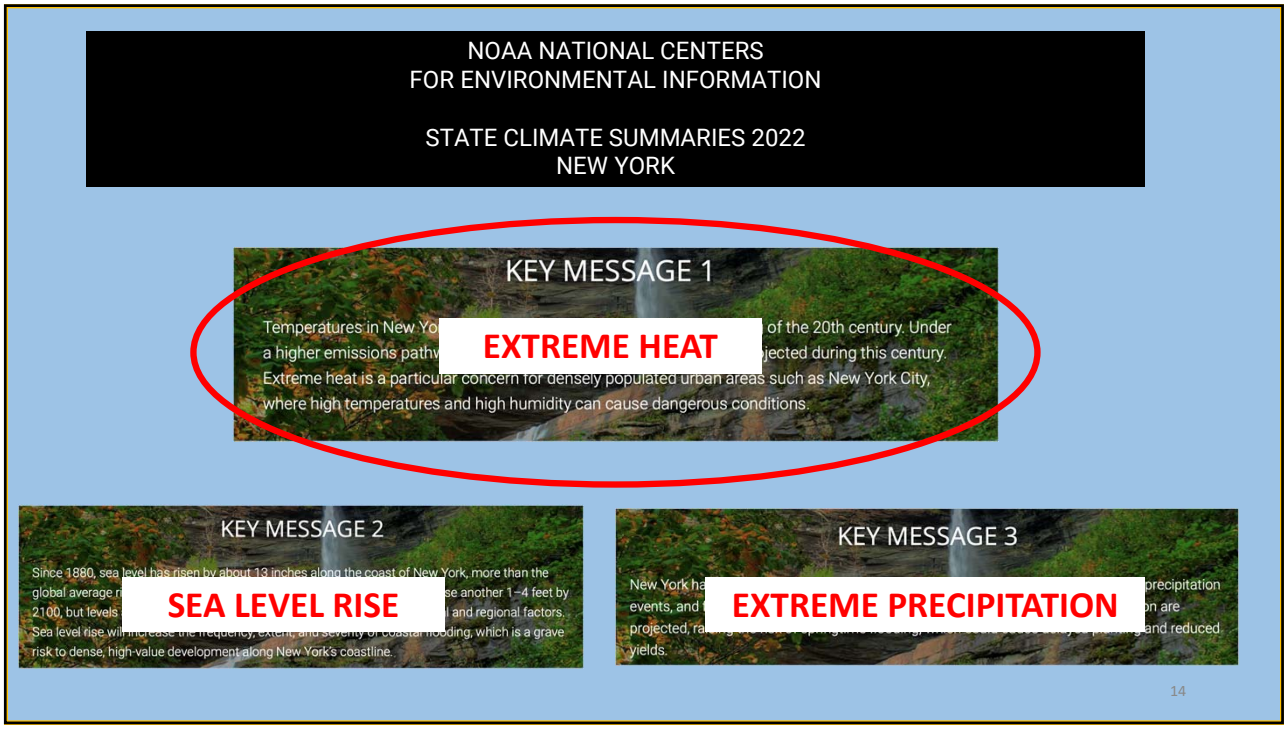
New York has experienced a large increase in the frequency and intensity of extreme precipitation events, and further increases are projected. Increases in winter and spring precipitation are projected, raising the risk of springtime flooding, which could cause delayed planting and reduced yields.

12

12


NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION
STATE CLIMATE SUMMARIES 2022
NEW YORK
KEY MESSAGE 1
EXTREME HEAT
of the 20th century. Under
jected during this century.
Extreme heat is a particular concern for densely populated urban areas such as New York City,
where high temperatures and high humidity can cause dangerous conditions.
KEY MESSAGE 2
SEA LEVEL RISE
and regional factors.
risk to dense, high-value development along New York's coastline.
KEY MESSAGE 3
EXTREME PRECIPITATION
precipitation
and reduced
yields.
13

13


NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION
STATE CLIMATE SUMMARIES 2022
NEW YORK
KEY MESSAGE 1
EXTREME HEAT
of the 20th century. Under
jected during this century.
Extreme heat is a particular concern for densely populated urban areas such as New York City,
where high temperatures and high humidity can cause dangerous conditions.
KEY MESSAGE 2
SEA LEVEL RISE
and regional factors.
risk to dense, high-value development along New York's coastline.
KEY MESSAGE 3
EXTREME PRECIPITATION
precipitation
and reduced
yields.
14

14

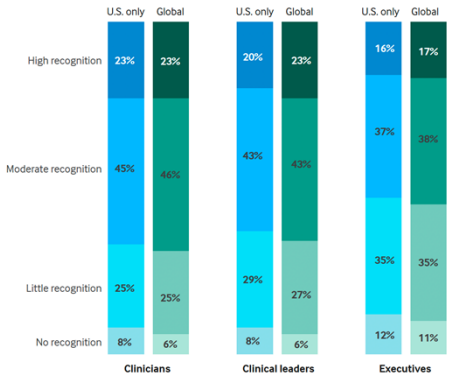
Typical Extreme Heat Warnings

15

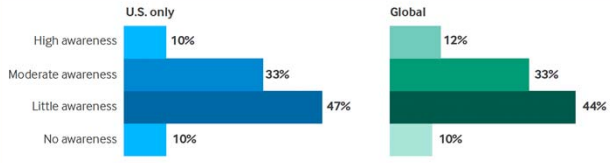
15

NEJM INSIGHTS REPORT: The Growing Link Between Climate Change and Health

Health Care Professionals Have Moderate Recognition of Health Impacts from Climate Change



Patients Have Limited Awareness of Health Impacts from Climate Change



Base: U.S. only – 473; Global – 792
NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

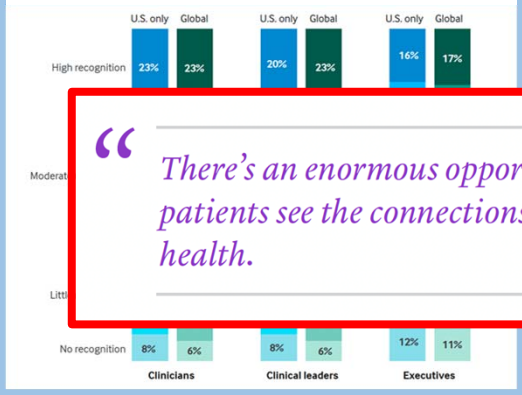
Vol. 3 No. 3 | March 2022 NEJM Catalyst Innovations in Care Delivery 2022; 03. 10.1056/CAT.22.0052

16

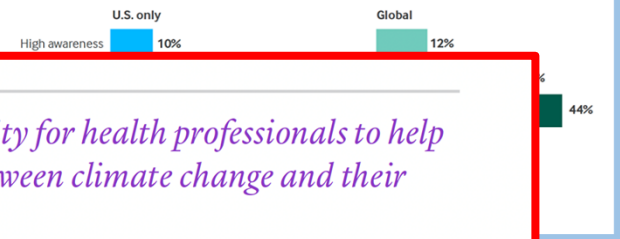
16

NEJM INSIGHTS REPORT: The Growing Link Between Climate Change and Health

Health Care Professionals Have Moderate Recognition of Health Impacts from Climate Change



Patients Have Limited Awareness of Health Impacts from Climate Change



> *There's an enormous opportunity for health professionals to help patients see the connections between climate change and their health.*

Vol. 3 No. 3 | March 2022 NEJM Catalyst Innovations in Care Delivery 2022; 03. 10.1056/CAT.22.0052

17

17

Addressing Extreme Heat in Westchester County:

An Institutional-level Early Warning Plan

Goal

Develop a method to more precisely target specific vulnerable populations at an institutional level with relevant extreme heat warnings

NEW YORK MEDICAL COLLEGE
A MEMBER OF THE TOURO COLLEGE AND UNIVERSITY SYSTEM

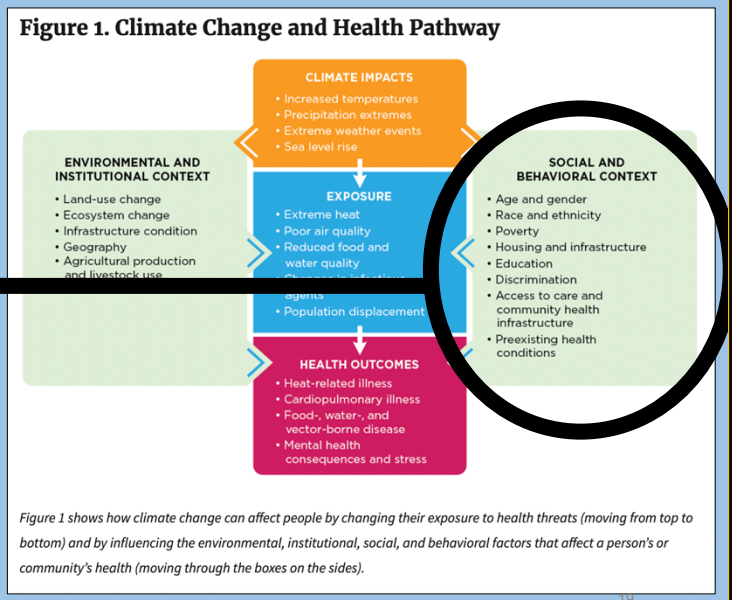
OPEN DOOR
FAMILY MEDICAL CENTER AND FOUNDATION

Westchester gov.com George Latimer Westchester County Executive

18

18

Institutional level—more targeted messaging for vulnerable populations



19

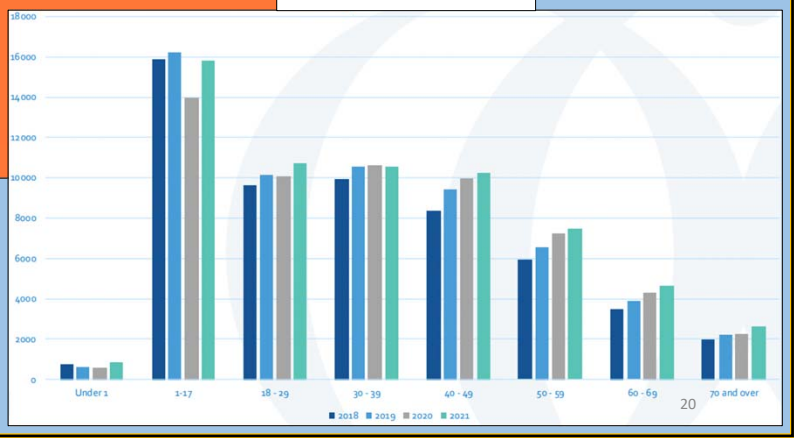
19

Patients of Open Door Family Medical Center

62,903 patients in 2021:

- Patients best served in a language other than English: 71%
- Hispanic or Latino/a: 79%
- Black/African American: 6%
- Uninsured: 36%
- Medicaid/CHIP/Public: 47%
- Medicare: 4.5%
- Private: 12%

Patients by Age



20

20

Open Door: Focus on Social Determinants of Health

Documentation of
self-identified
needs and circumstances
in areas such as housing,
education,
employment,
insurance,
basic material needs,
transportation, and social integration

https://prapare.org

21

21

What can we leverage?

1. Information on underlying medical conditions
2. Social determinants of health data
3. 96% of all Open Door patients have cell phones
4. COVID communication platform—text messaging

22

22

Methods

- Background research
- Considerations:
  - Text fatigue, platform, language
  - What defines success--Awareness? Health outcome data?
  - Capstone constraints
- Developed messaging—text messaging, flyers, video monitors
- Healthcare provider discussion with vulnerable patients

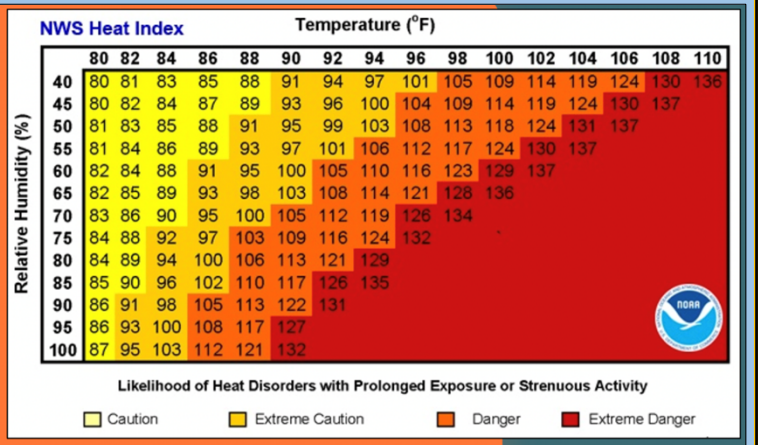
23

23

Timing of Text Messaging

Beginning the Alert

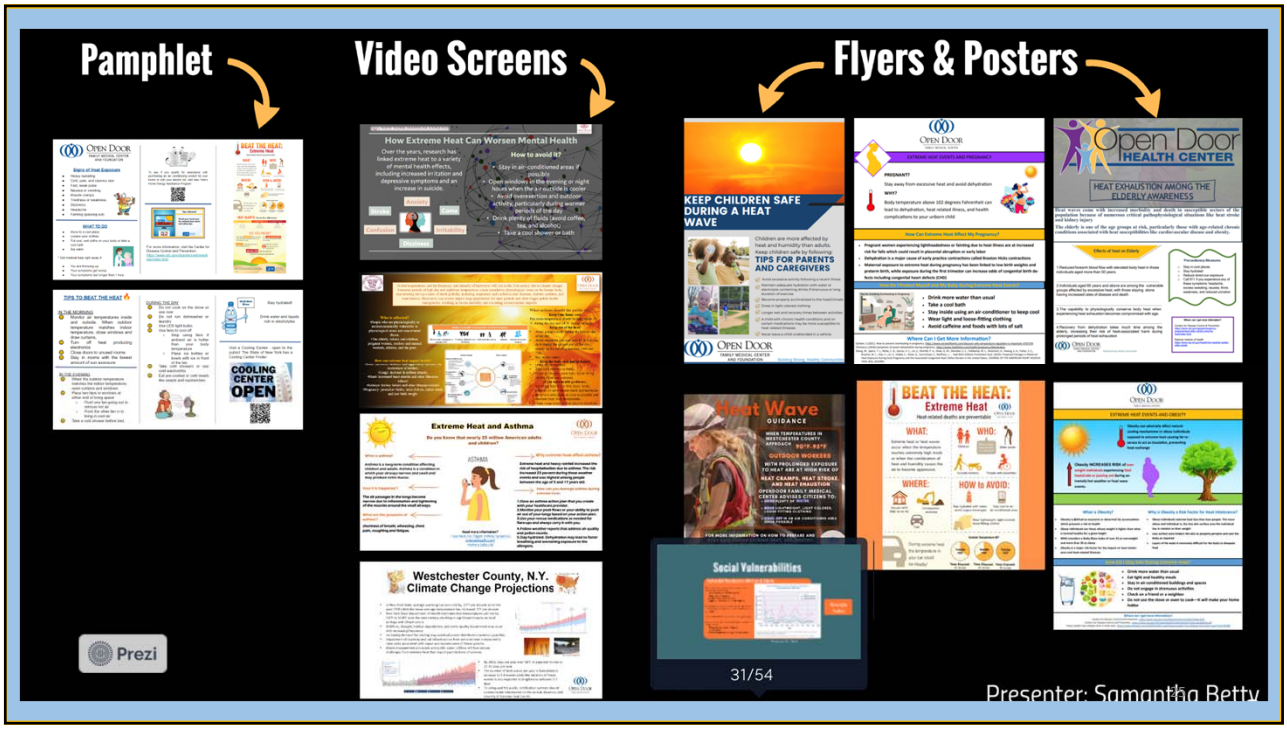
- Heat information from the National Weather Service
- Extreme Caution – Notification to vulnerable groups
- Danger – Notification to all groups



(NOAA's National Weather Service, 2019)

24

24



25

Preliminary Evaluation

SWOT Analysis

Strengths

- Quick notification time
- Cost effective
- Direct communication with patients
- Encourages risk mitigating behaviors
- Bilingual

Weaknesses

- Limited to those who can receive messages
- Character limits (320)
- Authenticity of message origin
- Character-based messaging

Opportunities

- Scalability
- Diverse target population
- Educates patients
- Prevents heat-related illnesses
- Model to emulate

Threats

- Reliant on cell service grid
- Misinformation
- Miscommunication
- Human error

26

26

Evaluation, Cont'd

- Staff capacity
- Patient feedback
- Healthcare provider feedback
- Resources, support, training

27

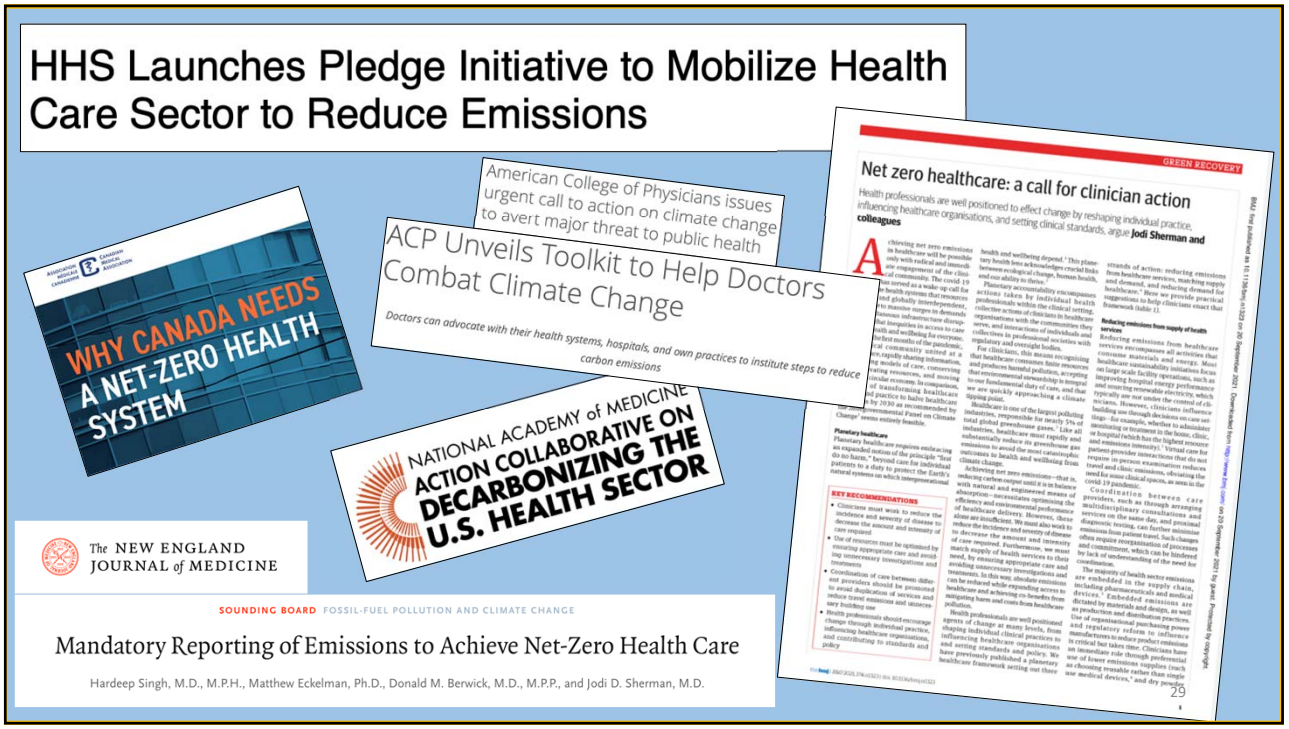
27

Next Steps

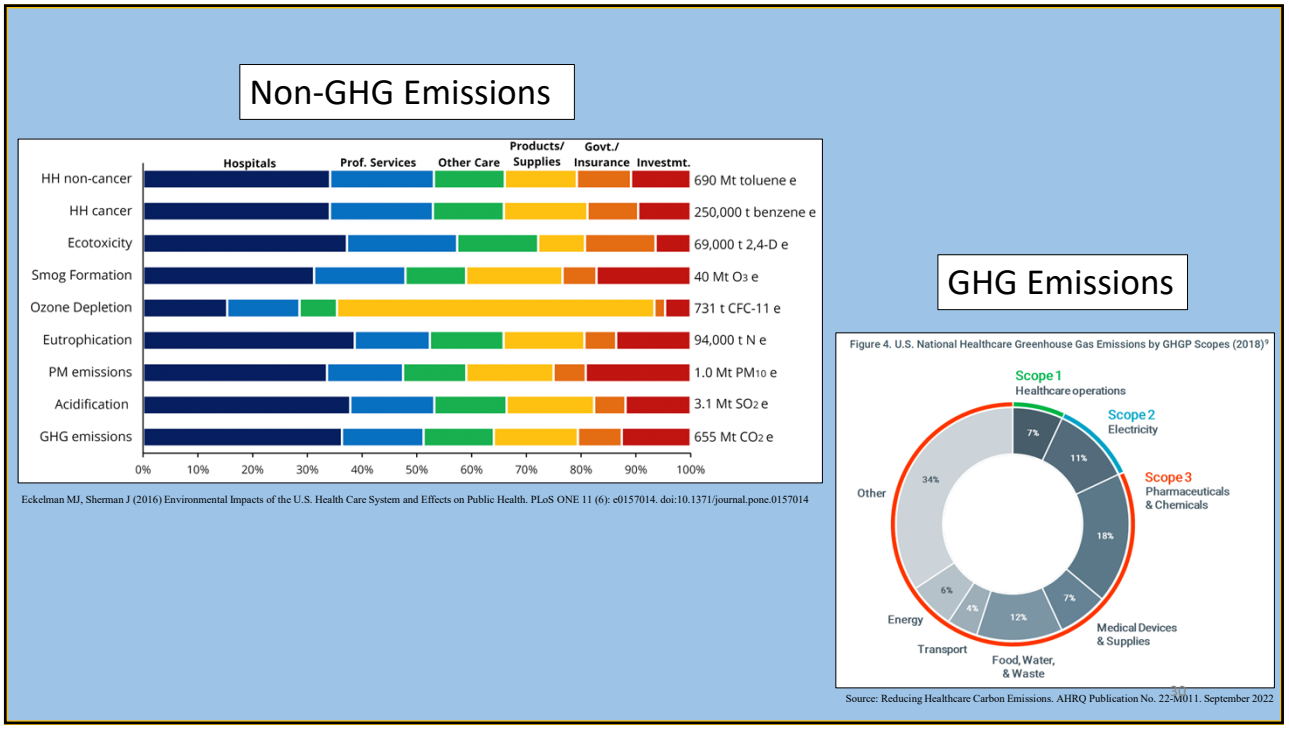
- Social determinants of health, health equity, advocacy
- Partnership opportunities
- Extension to other climate impacts (i.e. vector, food, water-borne diseases, mold, flooding, etc.) ?
- Funding opportunities

28

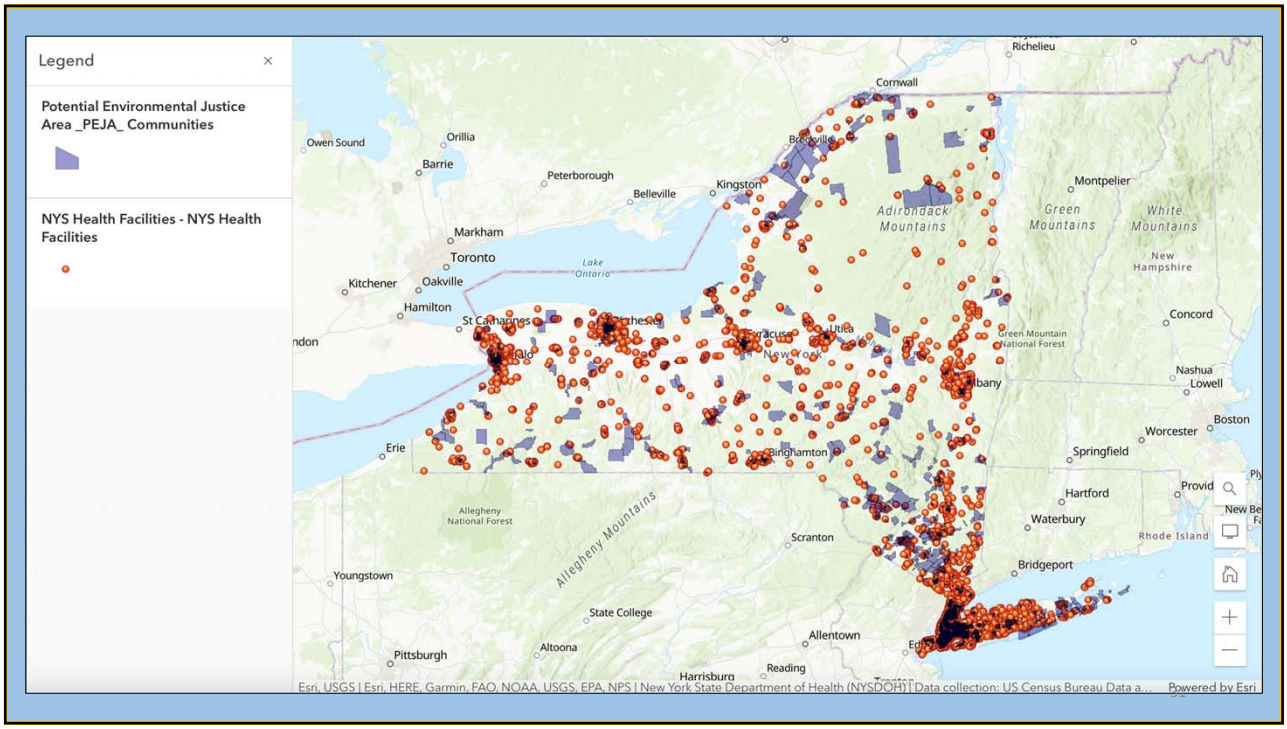
28


HHS Launches Pledge Initiative to Mobilize Health Care Sector to Reduce Emissions
American College of Physicians issues urgent call to action on climate change to avert major threat to public health
ACP Unveils Toolkit to Help Doctors Combat Climate Change
Doctors can advocate with their health systems, hospitals, and own practices to institute steps to reduce carbon emissions
WHY CANADA NEEDS A NET-ZERO HEALTH SYSTEM
NATIONAL ACADEMY of MEDICINE
ACTION COLLABORATIVE ON DECARBONIZING THE U.S. HEALTH SECTOR
The NEW ENGLAND JOURNAL of MEDICINE
SOUNDING BOARD FOSSIL-FUEL POLLUTION AND CLIMATE CHANGE
Mandatory Reporting of Emissions to Achieve Net-Zero Health Care
Hardeep Singh, M.D., M.P.H., Matthew Eckelman, Ph.D., Donald M. Berwick, M.D., M.P.P., and Jodi D. Sherman, M.D.
GREEN RECOVERY
Net zero healthcare: a call for clinician action
Health professionals are well positioned to effect change by reshaping individual practice, influencing healthcare organisations, and setting clinical standards, argue Jodi Sherman and colleagues
KEY RECOMMENDATIONS
29

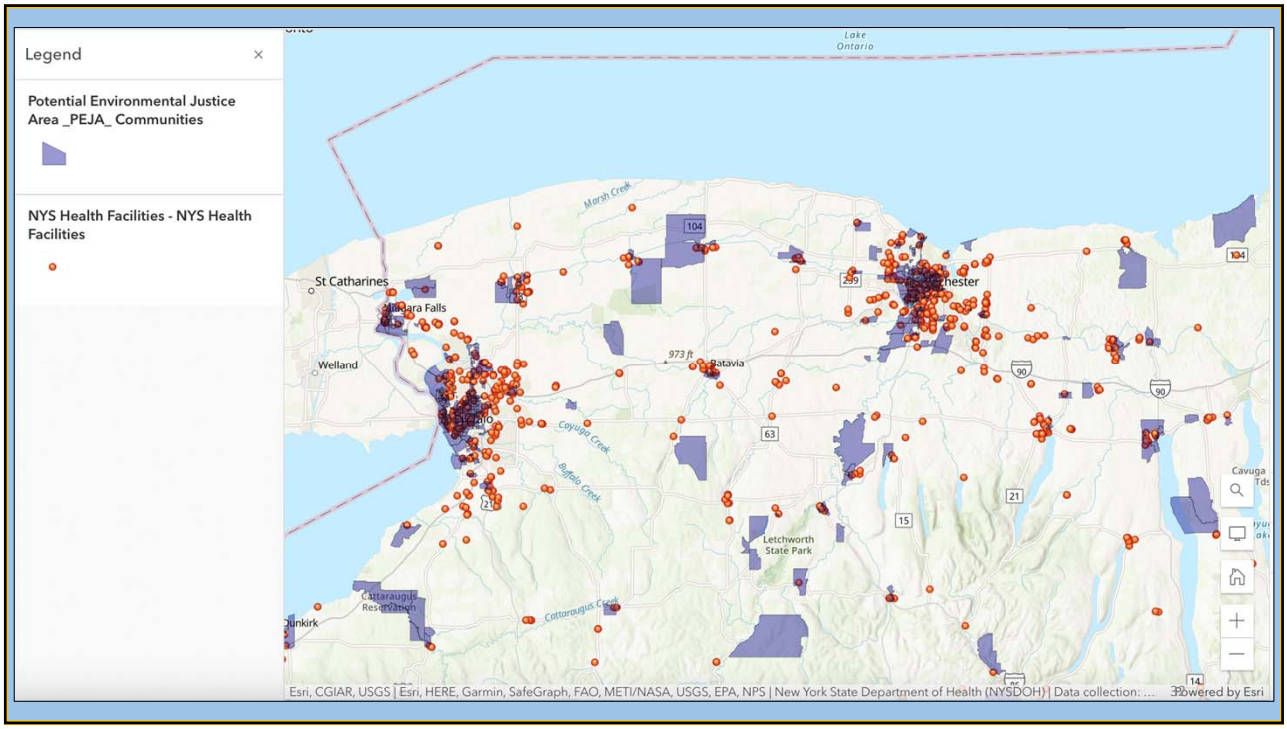
29


Non-GHG Emissions
Hospitals
Prof. Services
Other Care
Products/ Supplies
Govt./ Insurance
Investmt.
HH non-cancer
HH cancer
Ecotoxicity
Smog Formation
Ozone Depletion
Eutrophication
PM emissions
Acidification
GHG emissions
690 Mt toluene e
250,000 t benzene e
69,000 t 2,4-D e
40 Mt O3 e
731 t CFC-11 e
94,000 t N e
1.0 Mt PM10 e
3.1 Mt SO2 e
655 Mt CO2 e
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Eckelman MJ, Sherman J (2016) Environmental Impacts of the U.S. Health Care System and Effects on Public Health. PLoS ONE 11 (6): e0157014. doi:10.1371/journal.pone.0157014
GHG Emissions
Figure 4. U.S. National Healthcare Greenhouse Gas Emissions by GHGP Scopes (2018)[9]
Scope 1
Healthcare operations
Scope 2
Electricity
Scope 3
Pharmaceuticals & Chemicals
Medical Devices & Supplies
Food, Water, & Waste
Transport
Energy
Other
7%
11%
18%
7%
12%
4%
6%
34%
Source: Reducing Healthcare Carbon Emissions. AHRQ Publication No. 22-M011. September 2022

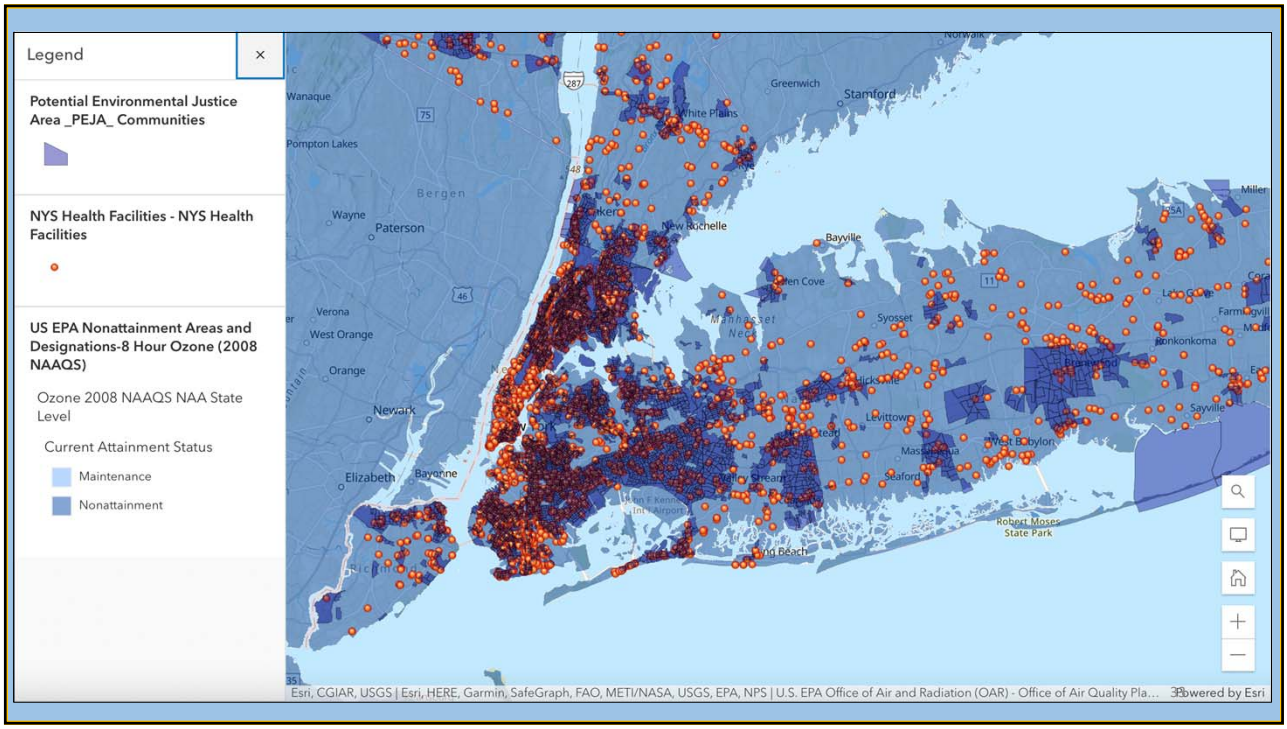
30


Legend
Potential Environmental Justice Area _PEJA_ Communities
NYS Health Facilities - NYS Health Facilities
Richelieu
Cornwall
Owen Sound
Orillia
Barrie
Peterborough
Belleville
Kingston
Montpelier
Adirondack Mountains
Green Mountains
White Mountains
Markham
Toronto
Lake Ontario
New Hampshire
Kitchener
Oakville
Hamilton
St Catharines
Concord
Green Mountain National Forest
Nashua
Lowell
Boston
Worcester
Erie
Springfield
Binghamton
Hartford
Waterbury
Rhode Island
Allegheny National Forest
Allegheny Mountains
Scranton
Youngstown
Bridgeport
State College
Allentown
Pittsburgh
Altoona
Harrisburg
Reading
Esri, USGS | Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | New York State Department of Health (NYSDOH) | Data collection: US Census Bureau Data a...
Powered by Esri

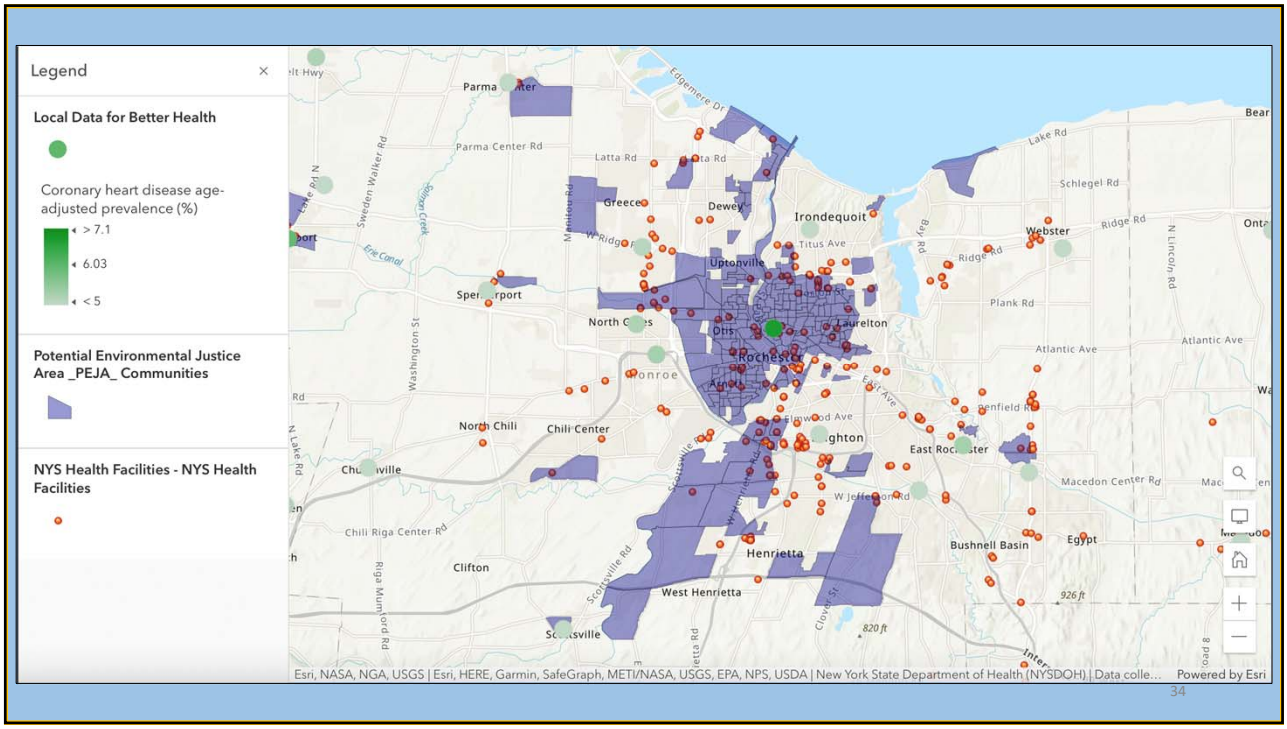
31


Legend
Potential Environmental Justice Area _PEJA_ Communities
NYS Health Facilities - NYS Health Facilities
Lake Ontario
Marsh Creek
104
St Catharines
Welland
973 ft
Batavia
Cayuga Creek
Buffalo Creek
63
21
15
90
Letchworth State Park
Cattaraugus Reservation
Cattaraugus Creek
Esri, CGIAR, USGS | Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | New York State Department of Health (NYSDOH) | Data collection: ...
Powered by Esri

32


Legend
Potential Environmental Justice Area _PEJA_ Communities
NYS Health Facilities - NYS Health Facilities
US EPA Nonattainment Areas and Designations-8 Hour Ozone (2008 NAAQS)
Ozone 2008 NAAQS NAA State Level
Current Attainment Status
Maintenance
Nonattainment
Esri, CGIAR, USGS | Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Pla...
Powered by Esri

33

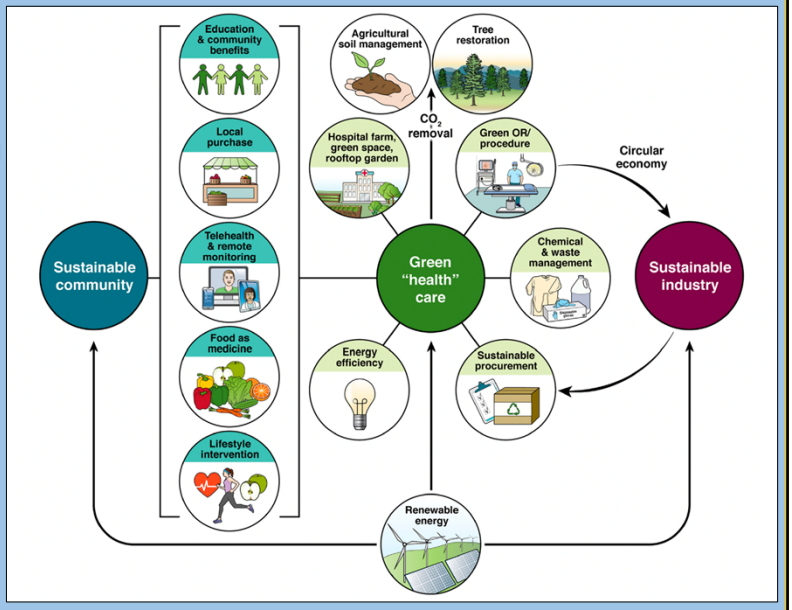

Legend
Local Data for Better Health
Coronary heart disease age-adjusted prevalence (%)
> 7.1
6.03
< 5
Potential Environmental Justice Area _PEJA_ Communities
NYS Health Facilities - NYS Health Facilities
Esri, NASA, NGA, USGS | Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA | New York State Department of Health (NYSDOH) | Data colle...
Powered by Esri

34

SEVEN HIGH-IMPACT ACTIONS:

1. **Power health care with 100% clean, renewable electricity.**
2. **Invest in zero emissions buildings and infrastructure.**
3. **Transition to zero emissions, sustainable travel and transport.**
4. **Provide healthy, sustainably grown food.**
5. **Incentivize and produce low-carbon pharmaceuticals.**
6. **Implement circular health care and sustainable health care waste management.**
7. **Establish greater health system effectiveness**

Source: Global Road Map for Health Care Decarbonization. Health Care Without Harm Climate-Smart Health Care Series



Setoguchi et al. Climate Change, Health, and Health Care Systems: A Global Perspective. Gastroenterology. 2022 May;162(6):1549-1555.

35

35

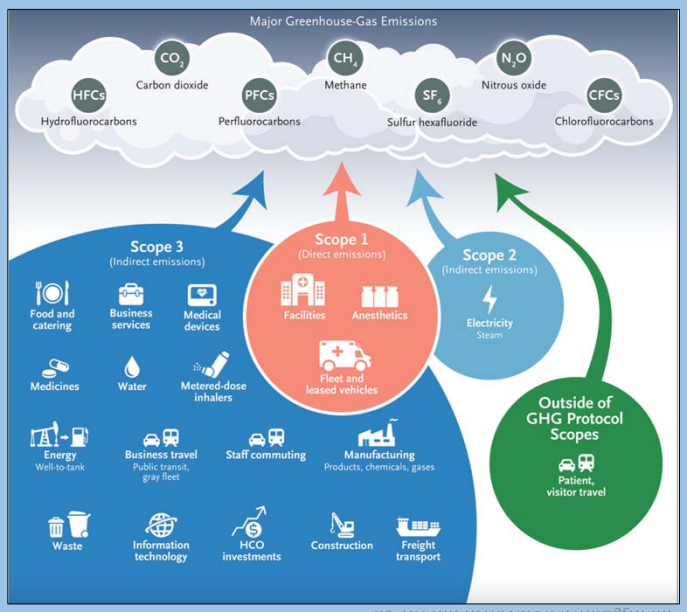
Data: Critical Enabler

Adaptation

- Social determinants of health
- Environmental determinants of health
- Current and future climate impacts
- Geospatial data

Mitigation

- Scope 1, 2, 3 emissions
- Air quality data



N Engl J Med 2022; 387:2469-2476. DOI: 10.1056/NEJMsb2210022

36

Thank You

- **Lindsay Farrell**, Executive Director Open Door Family Medical Center
- **Grace Battaglia, Denise Egan**, Open Door Family Medical Center
- **Dr. Michael Shakarjian**, Assistant Professor for the Public Health Programs at New York Medical College's School of Health Sciences and Practice
- **Peter McCartt**, Westchester County Director of Energy and Sustainability, Climate Crisis Task Force
- New York State Department of Health

37

37