



Centering justice & community
voices in climate solutions

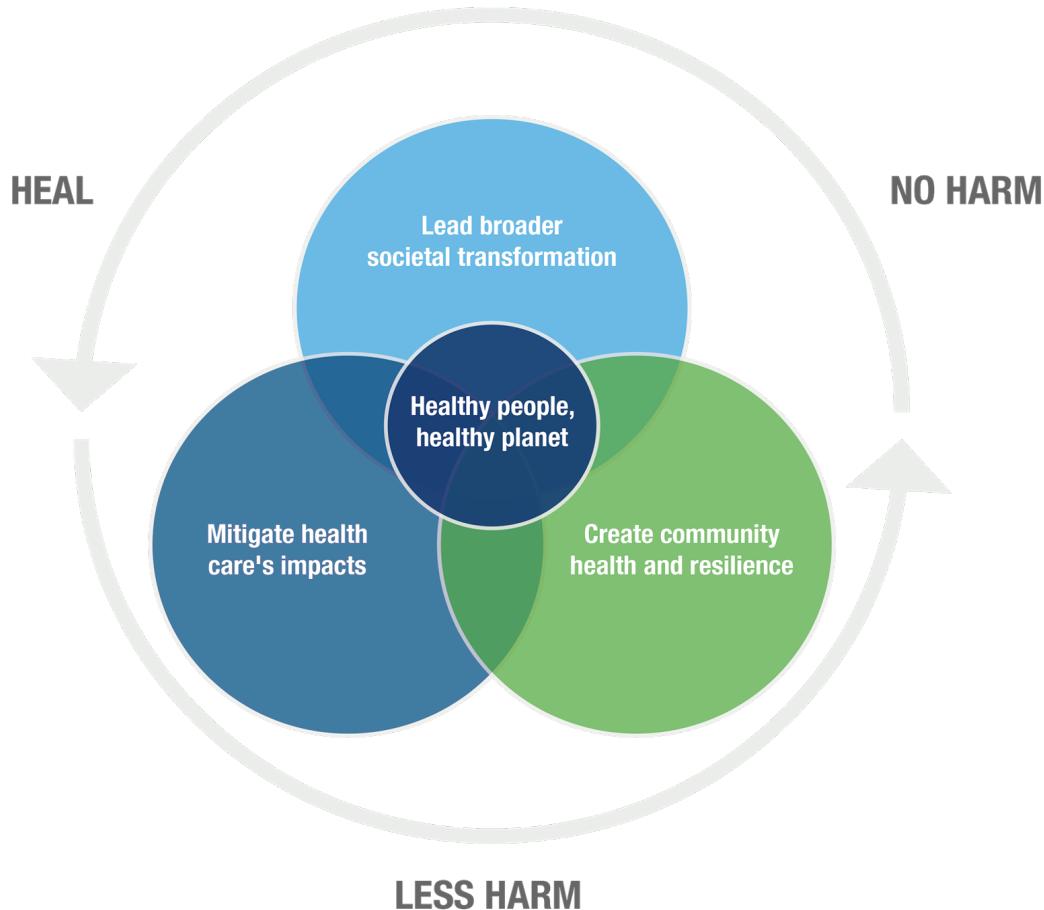
Wednesday, May 24, 2023 10:30 AM

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Health care's opportunity

Healthy people living in equitable and resilient communities on a thriving planet.



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[ENVIRONMENTAL JUSTICE](#)

JUSTICE40

[A WHOLE-OF-GOVERNMENT INITIATIVE](#)

"We'll create good jobs for millions of Americans...and we'll do it all to withstand the devastating effects of climate change and promote environmental justice."

PRESIDENT JOE BIDEN, 2022 STATE OF THE UNION

What is the Justice40 Initiative?

For the first time in our nation's history, the Federal Government has made it a goal that 40 percent of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. President Biden made this historic commitment when he signed Executive Order 14008 within days of taking office.

What kinds of investments fall within the Justice40 Initiative? The

[BRIEFING ROOM](#)

FACT SHEET: Inflation Reduction Act Advances Environmental Justice

AUGUST 17, 2022 • STATEMENTS AND RELEASES

Most Significant Climate Legislation in U.S. History Delivers for Overburdened Communities

By signing the Inflation Reduction Act, President Biden is delivering on his promise to build an economy that works for working families, including communities that have been underinvested and underserved for too long. President Biden and Congressional Democrats beat back special interests to pass this historic legislation that lowers energy costs, advance environmental justice while building a cleaner future, and grows the economy from the bottom up and the middle out.

For far too long, communities across our country have faced environmental injustices, bearing the brunt of toxic pollution, enduring underinvestment in infrastructure and critical services, and suffering disproportionate impacts

Tree Campus Healthcare

These champions of trees...

- Have a tree advisory committee
- Have a campus tree care plan
- Lead a community forestry project
- Educate their community about the connections between trees and health
- Invest in the care of their campus tree canopy



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Learn more at TreeCampusHealthcare.org

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2022 Tree Campus Healthcare

a recognition from the Arbor Day Foundation

UAB Medicine—Birmingham, AL

Orlando Health – Downtown Campus—Orlando, FL

OSF Saint Anthony Medical Center—Rockford, IL

OSF Saint Francis Medical Center—Peoria, IL

OSF Saint James—John W. Albrecht Medical Center—Pontiac, IL

Westminster Village—Bloomington, IL

IU Health Bloomington—Bloomington, IN

Masonic Homes Kentucky – Louisville—Masonic Home, KY

UK HealthCare—Lexington, KY

MedStar Harbor Hospital—Baltimore, MD

Perry Point Veterans Affairs Medical Center—Perry Point, MD

Penn State Health Milton S. Hershey Medical Center Hershey, PA

Corewell Health Blodgett Hospital—Grand Rapids, MI

Corewell Health Butterworth Hospital—Grand Rapids, MI

Mayo Clinic in Rochester, Minnesota—Rochester, MN

Edgerton Hospital and Health Services—Edgerton, WI

Westfields Hospital & Clinic—New Richmond, WI

Cleveland Clinic—Cleveland, OH

Cleveland Clinic Akron General—Akron, OH

Kendal at Oberlin—Oberlin, OH

The Ohio State University Wexner Medical Center—Columbus, OH

Coatesville Veterans Affairs Medical Center—Coatesville, PA

UPMC Children's Hospital of Pittsburgh—Pittsburgh, PA

The Medical University of South Carolina—Charleston, SC

CHRISTUS Mother Frances Hospital—Tyler, TX

UT Southwestern Medical Center—Dallas, TX

American Fork Hospital—American Fork, UT

Orem Community Hospital—Orem, UT

Riverton Hospital—Riverton, UT

Seattle Children's Hospital—Seattle, WA

Amery Hospital & Clinic—Amery, WI

Aspirus Wausau Hospital—Wausau, WI

Lincoln Regional Center—Lincoln, NE

Atrium Health Lincoln—Lincolnton, NC

Atrium Health Mercy—Charlotte, NC



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Learn more at: TreeCampusHealthcare.org

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Part 1: Root Causes and Current Health Impacts of Unjust Environmental Policies

Sheetal Khedkar Rao, MD

Internal Medicine Physician

Co-Founder and Chief Health Officer, Nordson Green Earth Foundation
Climate and Health Fellow, University of Colorado and Health Care Without Harm
Extreme Heat Fellow, Federal Emergency Management Agency (FEMA)

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“Our cities are not like tropical rainforests that developed on their own... People designed cities. And, unfortunately, they did not factor in the needs of everybody when doing so. The design process was far from inclusive.”

- Previous American Forests Senior Manager of Tree Equity Sarah Lillie Anderson.

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Environmental Justice

Environmental Racism

“any policy, practice, or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups, or communities based on race or color.”



Dr. Robert D. Bullard

Father of the environmental justice

<https://drrobertbullard.com/>

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Federal-Aid Highway Act of 1944



<https://elecenter.com/1394/highways-and-environmental-justice/>

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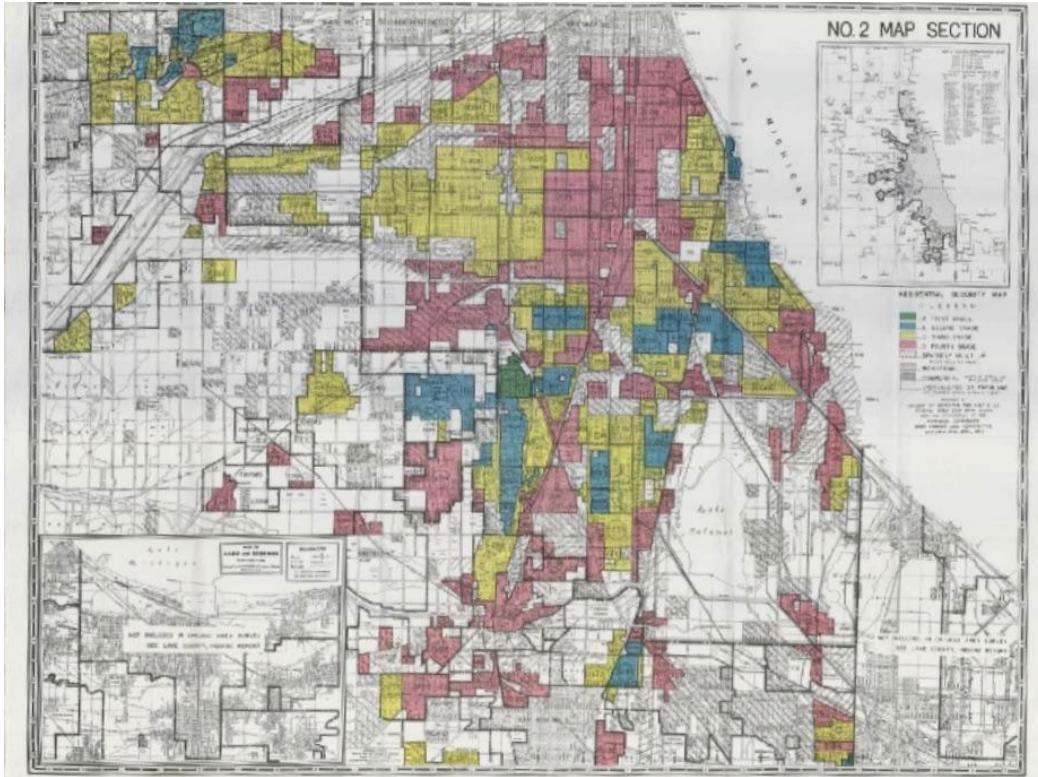
Redlining

An illegal, discriminatory practice in which a mortgage lender denies loans or an insurance provider restricts services to certain areas of a community, often because of the racial characteristics of the applicant's neighborhood.

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1933 Redlined Map of Chicago

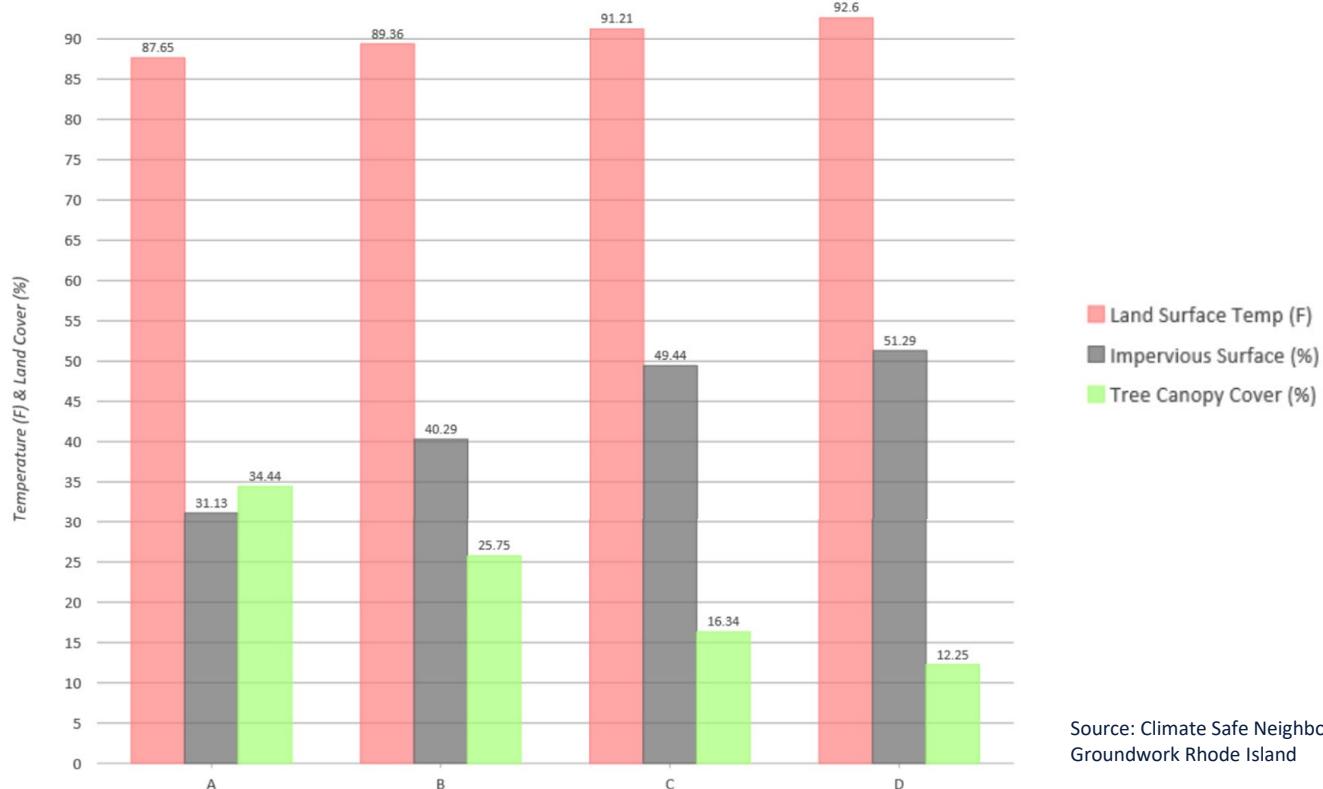


The size of each circle represents the area in that city that HOLC graded, with each color representing the proportion of the city graded and colored.

- A "Best"
- B "Still Desirable"
- C "Definitely Declining"
- D "Hazardous"

**Environment
Risk Factors by
Home Owner's
Loan
Corporation
Neighborhood
Grades**

Redlining and Tree Canopy



Source: Climate Safe Neighborhoods & Groundwork Rhode Island

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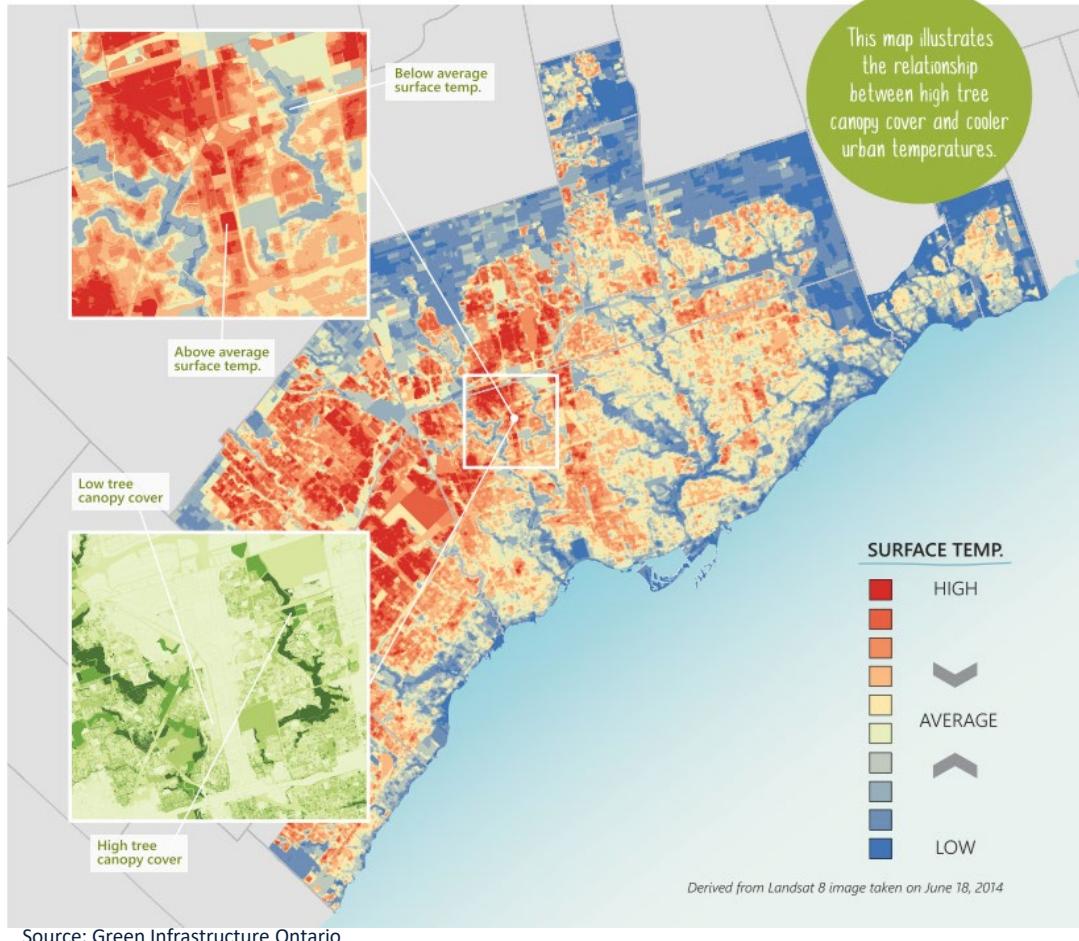


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Tree Canopy and Land Surface Temperature in Toronto

Heat Island: *An urban area having higher average temperature than its rural surroundings owing to the greater absorption, retention, and generation of heat by its buildings, pavements, and human activities.*



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Redlining and Heat Islands



Article

The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas

Jeremy S. Hoffman ^{1,2,*}, Vivek Shandas ³ and Nicholas Pendleton ^{1,2}

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² Center for Environmental Studies, Virginia Commonwealth University, Richmond, VA 23220, USA

³ Nohad A. Toulan School of Urban Studies and Planning, Portland State University, Portland, OR 97201, USA; vshandas@pdx.edu

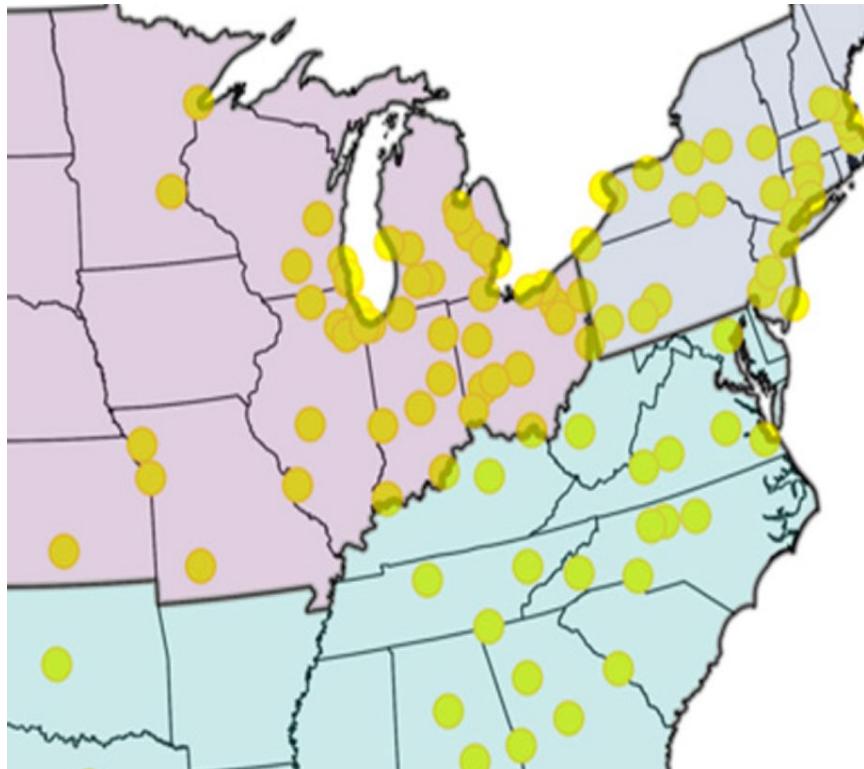
* Correspondence: jhoffman@smv.org

Received: 5 November 2019; Accepted: 3 January 2020; Published: 13 January 2020



US Census Bureau Regions

- Midwest (n=41)
- Northeast (n=26)
- South (n=29)
- West (n=12)
- HOLC Map City (n=108)



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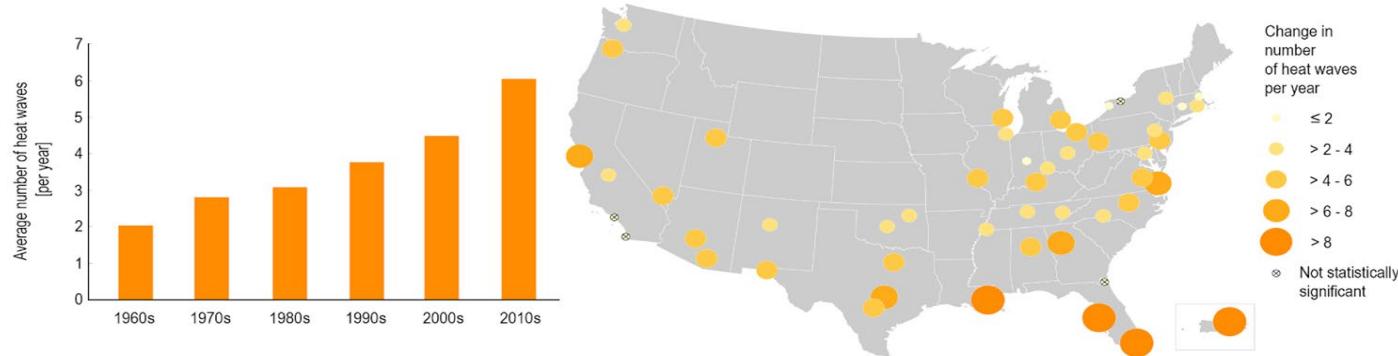


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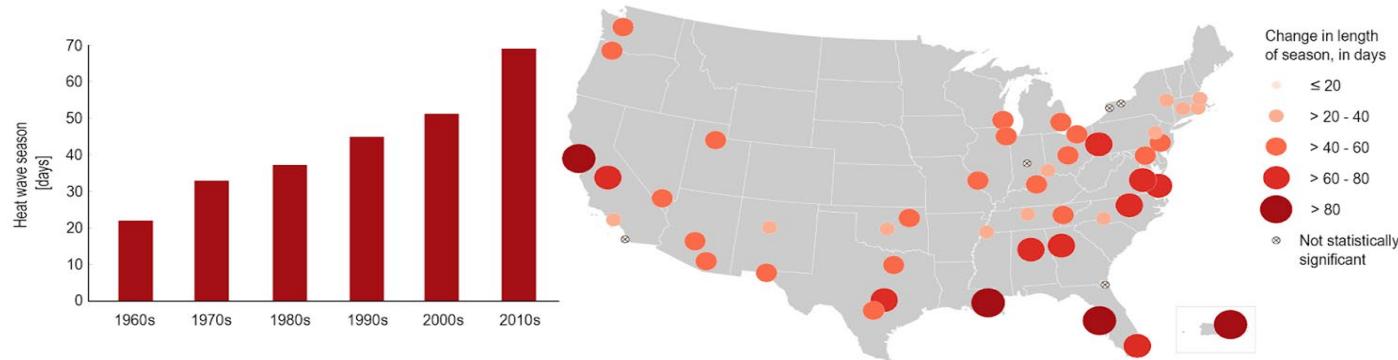
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Heat Wave Characteristics in 50 Large U.S. Cities, 1961-2018

Heat Wave Frequency

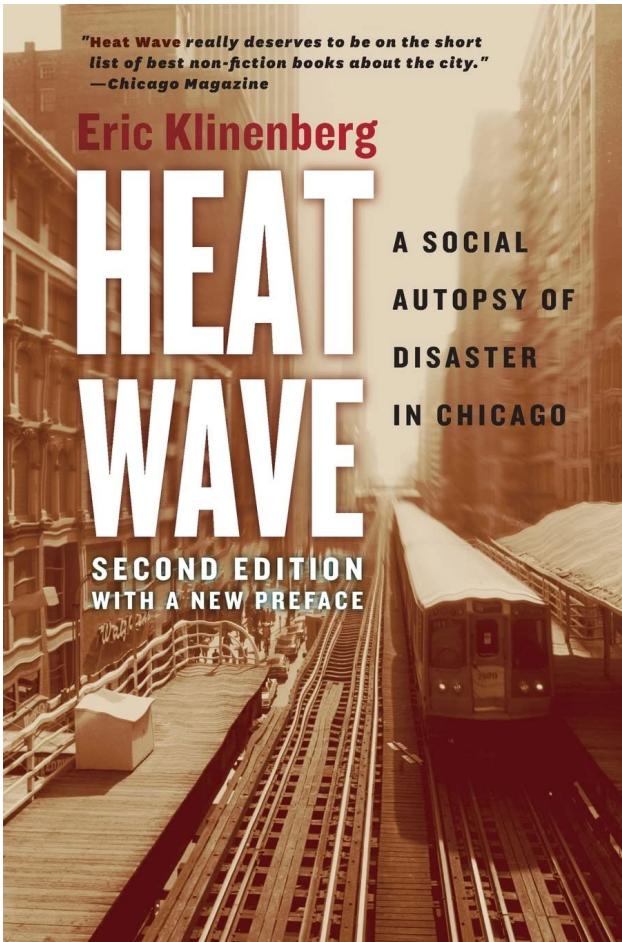


Heat Wave Season Length



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CHICAGO HEAT WAVE – JULY 1995

- Temps > 100°F for five days (heat index > 120)
- >800 Chicagoans killed and hundreds more in the Midwest
 - Seniors
 - Socially isolated
 - Minorities
 - No A/C and/or sealed windows
- Failure of healthcare infrastructure:
 - Thousands with heat-related illness
 - 23 hospitals on bypass
 - EMS overwhelmed

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Part 2: WHAT IS THE POWER OF TREES?

Trees as a Low Cost/High Impact Public Health Intervention

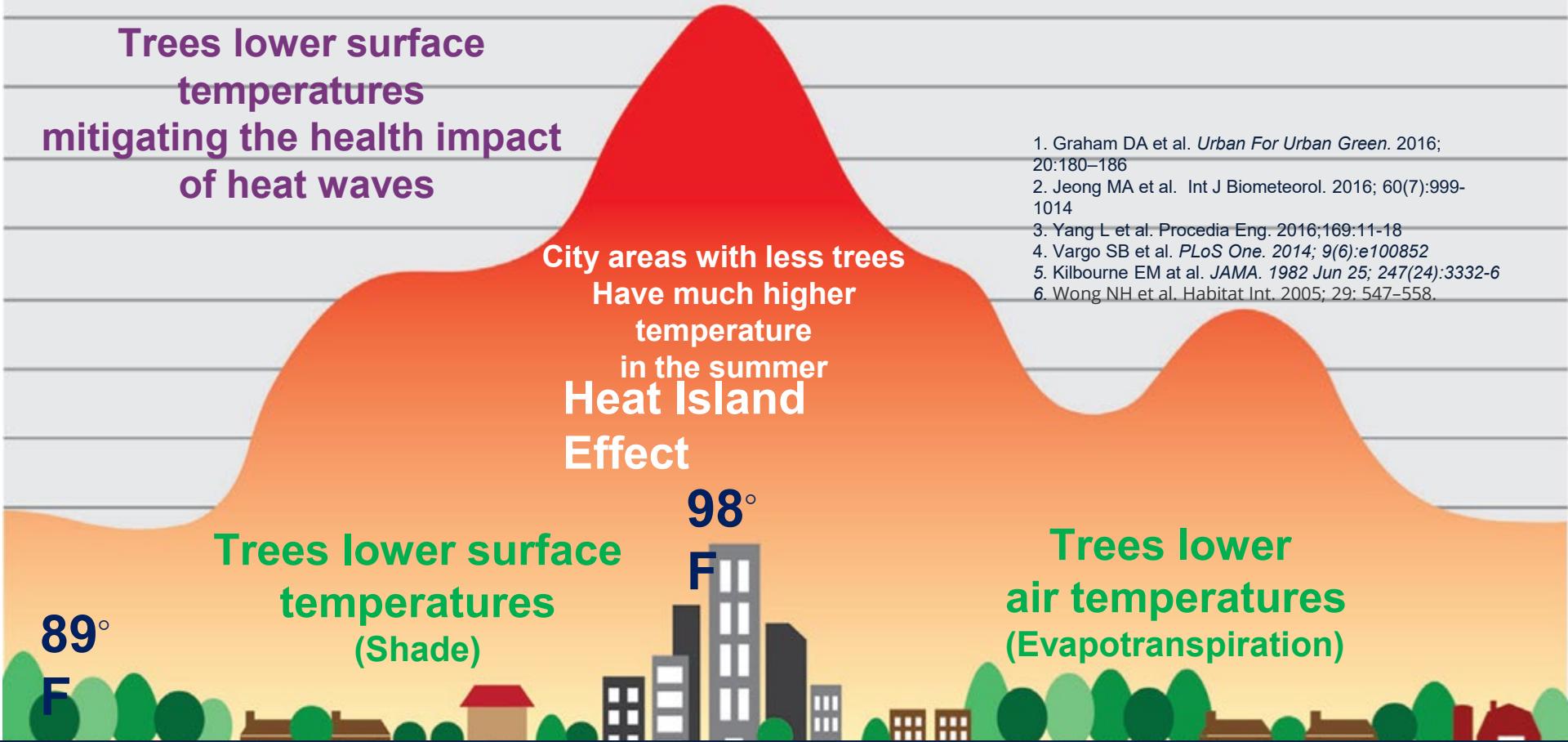
Isabela (Cajiao) Angelelli, MD

Pediatrician – UPMC Children's Hospital of Pittsburgh

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Trees lower surface temperatures mitigating the health impact of heat waves



City areas with less trees
Have much higher
temperature
in the summer
**Heat Island
Effect**

89°
F

Trees lower surface
temperatures
(Shade)

Trees lower
air temperatures
(Evapotranspiration)

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1. Graham DA et al. *Urban For Urban Green*. 2016; 20:180–186
2. Jeong MA et al. *Int J Biometeorol*. 2016; 60(7):999–1014
3. Yang L et al. *Procedia Eng*. 2016;169:11-18
4. Vargo SB et al. *PLoS One*. 2014; 9(6):e100852
5. Kilbourne EM et al. *JAMA*. 1982 Jun 25; 247(24):3332-6
6. Wong NH et al. *Habitat Int*. 2005; 29: 547-558.

Trees are social determinants of health



**TREES ARE
GREEN INFRASTRUCTURE**

Trees have been linked to:

Less respiratory disease

Less cardiovascular disease

Less diabetes

Decreased heat waves

Less

obesity

Better pregnancy outcomes

Improved attention

Improved mental health

Less gun violence/crime

Improved ADHD symptoms

Less Cancer

Less migraines

Improved healing after surgery

Increase in social ties

Better sleep

Decreased overall mortality

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AIR, TREES, RESPIRATORY ILLNESS



Urban trees remove large amounts of air pollution, improving urban air quality (1-5)

In an urban area
Extra 343 trees per km² associated with
29% lower prevalence of childhood **asthma** (5-7)
Lovasi G. et al. J Epidemiol Community Health 2008

Green Heart Study - Louisville (KY)

Dr. Ted Smith – Center for Health Air, Water and Soil
Envirome Institute, U of Louisville

This experimental study is underway.
TREES are the “medicine” in this study
The study is looking at trees and diverse health outcomes

1. Nowalk DJ et al. *Urban For Urban Green* 2006. 4: 115–123
3. Nowalk DJ et al. *Urban For Urban Green*. 2018. 29: 40-4
4. Fares S et al. *Environ Pollut*. 2016;218:1278-1286
5. Chen G et al. *Urban For Urban Green*. 2021; 127230
6. Lovasi GS et al. *J Epidemiol Community Health* 2008. 62(7):647-92008
7. Alcock I et al. *Environment International* 2017. 109: 29-41.
8. Rao M et al. *Environ Pollut*. 2014; 194: 96-104

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The Problem of Trees, Pollen and Allergies

Agglomeration of air pollutants on pollen surface (2, 3)



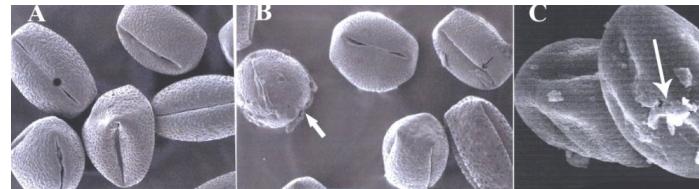
(1)

May 2020

How urban planners' preference for male trees has made your hay fever worse



1. Cariñanos P et al. Landscap and Urban Plan. 2011; 101 (3): 205-214
2. Ouyang Y et al. Int Forum Allergy Rhinol. 2016; 6 (1): 95-100
3. Rezanejad F. and Majd A. Advanced Topics in Environmental Health and Air Pollution. 2011.



Air pollutants

- Change the pollen and make it allergenic
- Together with pollen help stimulate allergic response

A problem created by us – We can solve it:

RIGHT TREE RIGHT PLACE

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Trees can decrease floods



Trees are part of Pittsburgh's
Stormwater Green Infrastructure Plan



Bathurst JC. Hydrological Processes. 2020; 34:3295–3310
Farrugia S et al. Int J Biodivers Sci Ecosyst Serv Manag. 2013; 9(2):136-145

A typical community forest of
10,000 trees will retain
approximately 10 million
gallons
of rainwater per year

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Trees decrease crime and gun violence (1-4)

Dr. Eugenia South - University of Pennsylvania, Center for Health Initiatives and Behavioral Economics

541 vacant lots randomized to
Remediation – No intervention
(control)
Tracked police reported crime for 3 years (1)

Crime	Gun assaults	Burglaries
-9.2%, P < 0.01	-5.8%, P < 0.05	-13.7%, P < 0.001



58% reduction in people's fear of going outside due to safety
concerns
and 76% increase in use of outdoor space (1)



1. Branas C et al. PNAS 2018; 115 (12)
2. Kuo FE et al. Environ. Behav. 2001; 33:543-71
3. Kondo MC et al. Am J Epidemiol. 2017; 186:289-96
4. Kondo MC et al. Am. J. Public Health. 2015;105:e114-21

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School Performance Grows in Trees



Observational studies

Dr. Ming Kuo's - University of Illinois
Dpt. of Natural Resources and Environmental Sciences

- Kids in greener schools have higher test scores, even after taking income into account (1)
- Planting trees within 250m may boost scores most (1)

Experimental studies

- Window view of nature - Better exam performance (2)
- Attention Restoration Theory: Exposure to natural environments improves attention scores (3-5).

1. Landscape and Urban Planning, 2021. 206 (1039662)
2. Benfield J et al. Environment and Behavior. 2015. 47 (2)

3. Ohly H et al. J Toxicol Environ Health, 2016. Online.
4. Taylor AF. J Atten Disord. 2009; 12:402–09
5. Berman MG. J Affect Disord. 2012; 140:300–05



Trees improve mental health outcomes



Walk in a forest (forest bathing) compared to a walk in the city (1-4)

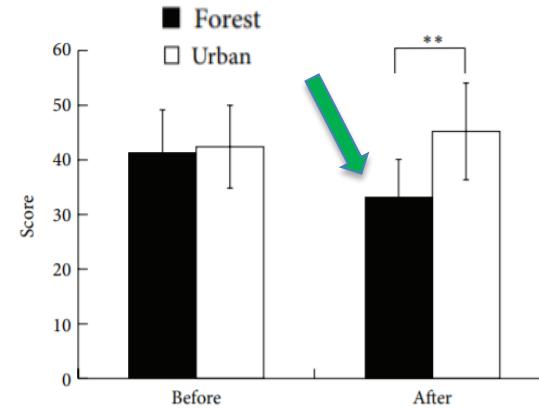
- Hostility and depression scores decreased
- Increased vitality scores
- Decreased HR and Blood pressure (relaxation)
- Lower cortisol levels (stress hormone)
- Increased depression remission

1. Morita E et al. Public Health. 2007;121, 54–6
2. Berman M et al. J Affect Disord. 2012;140(3):300-5
3. Park BJ et al. Environ Health Prev Med. 2010; 15(1): 18–26
4. Hartig T et al. 2003. J Environ Psychol 23: 109–123

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Trees improve mental health outcomes

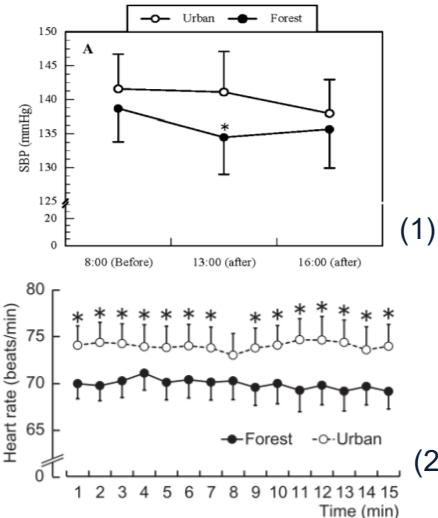


Improved **anxiety score** after forest walk
compared to urban walk

* Views of forests:
Decreased pre-frontal cerebral activity (3)

Trees improve cardiovascular outcomes

Experimental

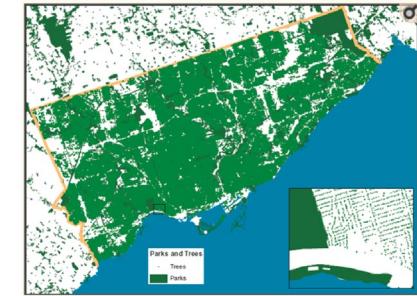


Decrease in BP and HR after walk in a forest compared to walk in urban setting

Observational studies / Natural



Emerald Ash borer caused tree loss and this accounted for 15,080 cardiovascular related deaths (3)



Study in Toronto, Canada

More trees =

↓ Hypertension

↓ Myocardial infarction

↓ Heart disease

↓ Sudden Cardiac Death (3,4)

1. Li Q et al. Eur. J. Appl. Physiol. 2011, 111, 2845–2853. Donovan GH et al. Am. J. Prev. Med. 2013; 44: 139–145
2. Park B et al. Silva Fenn. 2009, 43, 291–301
3. Pereira G et al. BMC Public Health. 2012; 12: 466

Increased tree canopy in neighborhoods is associated with less obesity

Observational cross-sectional studies



Greater neighborhood tree canopy

↓ Prevalence of overweight and obese populations
12% lower prevalence of obesity in preschool children

Street trees and parks are associated with more physical activity (4)

1. Lee et al. *Obes. Sci. Pract.* 2017; 3(3): 333-41
2. Ulmer JM et al. *Health Place.* 2016; 42: 54–62
3. Lovasi GS et al. *Prev. Med.* 2013; 57: 189–93
4. Lovasi GS et al. *J Urban Health.* 2011; 88(6): 1143-57

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Trees Promote Social Cohesion – Sense of Community



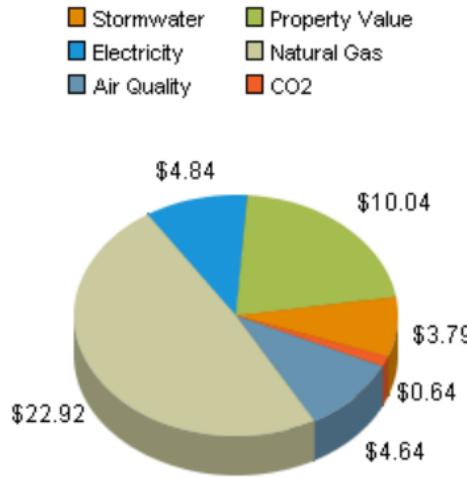
Jennings V. et al. *Int. J. Environ. Res. Public Health.* 2016;13:196.

Cattell V. et al. *Health Place.* 2008;14:544–561

Jennings V. et al. *Int J Environ Res Public Health.* 2019 Feb 4;16(3):452.

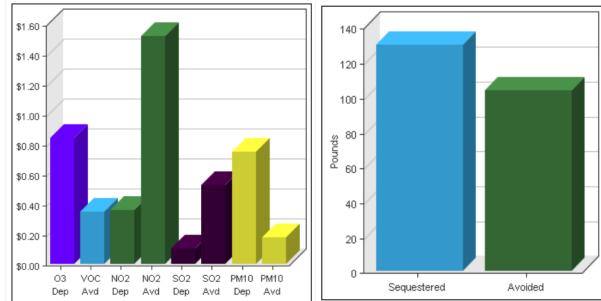
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Benefits of \$65 every year

- ✓ It will intercept **474 gallons** of stormwater runoff this year
- ✓ It will conserve **35Kw/h** of electricity for cooling
- ✓ It will reduce consumption of **oil or natural gas by 16 Therm(s)** (468 Kw/h)



The VALUE of TREES



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Sean Russell

Poems on Pittsburgh's Air
<https://express.adobe.com/page/XmffrRIJFRnaP/>

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Discussion

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Prioritize & Compromise

Quality schools	Public safety	Anti-litter strategies	Play spaces	Healthcare	Nutritional foods	Plant more street trees
Stormwater management	Bike-friendly infrastructure	Reduce energy burden	Improve soil quality	Improve air quality	Street parking for residents	Include youth in vision and planning
Manage & reuse vacant lots	Community Benefits Agreements	Quality after school programs	Pet friendly facilities (e.g., dog parks)	Aging-in-place strategies	Mixed commercial & residential	Anti-displacement strategies
Pedestrian-friendly infrastructure	Attractive to development investors	Affordable quality housing	Welcoming plan for new residents	Return vacant properties to tax roster	Culturally relevant food options	Economic opportunities for residents
Respect needs of long-term residents	Strengthen police-community relations	Affordable, reliable, & efficient public transit	Resident engagement/participation strategies	Establish & follow development metrics	Manage vacant properties & blight	Culturally relevant entertainment

UrbanKind
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A Collective Impact Strategy for Healthy Communities

**Small interventions – Build trust
Low cost BUT high impact effects through communities**

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Street View - Sep 2016



UPMC Community
HealthChoices

UPMC *for You*
Affiliate of UPMC Health Plan

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Why Would We Not Try Trees?

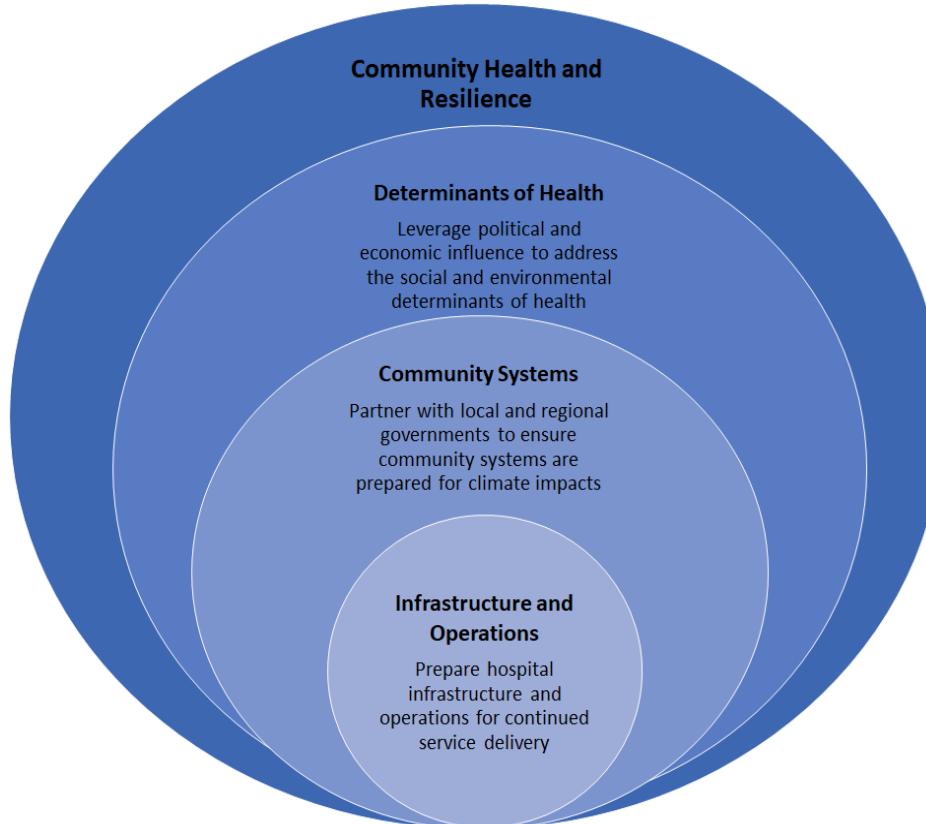


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Building A New Social Contract for Health Care

Integrating efforts that address climate and environmental health with those addressing other determinants of health



Knowledge and Action on Climate Change and Environmental Justice

1. KNOWLEDGE BUILDING

- Health Care Without Harm Climate Resilience for Health Care and Communities: Strategies and Case Studies
- Arbor Day Foundation Tree benefits calculator
- American Forests Tree Equity Score calculator
- Heat Wave the book:

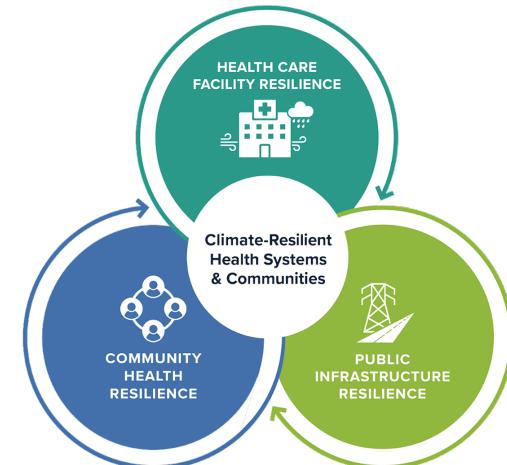
2. ENVIRONMENTAL JUSTICE COMMUNITY IDENTIFICATION

- Climate and Economic Justice Screening Tool from White House Council on Environmental Quality (CEQ)
- Environmental Protection Agency (EPA) EJSCREEN 2.0
- Environmental Justice Index from Center for Disease Control

3. CONNECTING WITH LOCAL ENVIRONMENTAL JUSTICE COMMUNITIES

4. CONNECTING WITH HEALTH SECTOR ACTION AND SUPPORT

- Practice Greenhealth: www.PracticeGreenhealth.org



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