Presentations and Handouts

- Speaker Biographies
- *Climate Change and Public Health Planning in Maryland*, Dr. Clifford S. Mitchell
- *Preparing New Jersey for Climate Change: Public Health and Climate Change,* Kevin McNally
- *Climate Change and Health in Philadelphia: Preparing for a Hotter, Wetter Future,* Jessica Caum
- Climate Change: Endangering Human Health and Well Being
- How Climate Change Affects Your Health
- What Climate Change Means for New Jersey
- What Climate Change Means for Pennsylvania
- New Jersey Climate Change and Public Health Working Group
- Climate Change, Allergies & You
- Climate Change & Heart Health
- Climate Change, Heat & You
- Resources
- Attendee List

Speaker Biographies

Clifford S. Mitchell, MS, MD, MPH, Director, Environmental Health Bureau, Prevention and Health Promotion Administration, Maryland Department of Health and Mental Hygiene

Dr. Clifford S. Mitchell is the Director of the Environmental Health Bureau in the Prevention and Health Promotion Administration, Maryland Department of Health and Mental Hygiene (MD DHMH). The Bureau's responsibilities include: food protection; environmental, occupational, and injury epidemiology; and a wide array of healthy homes programs. He joined MD DHMH in 2006, after 14 years on the faculty of Johns Hopkins Bloomberg School of Public Health. Dr. Mitchell received a B.A. from Williams College, an M.S. from the Massachusetts Institute of Technology, an M.D. degree from Case Western Reserve University, and his M.P.H. from the Johns Hopkins School of Hygiene and Public Health. Dr. Mitchell serves as Principal Investigator for a number of projects in the Department, including climate change, environmental public health tracking, occupational injury and illness surveillance, violent death surveillance, and the Department's Office of Food Protection Rapid Response Team. He also serves on a number of national and state advisory committees.

Kevin McNally, MBA, President, New Jersey Public Health Association

Kevin McNally is President of the New Jersey Public Health Association and a coadjutant with the Environmental Analysis and Communications Group of the Rutgers University Edward J. Bloustein School of Planning and Public Policy. He is also Chair of the Planning Board of the Borough of Roosevelt, NJ, and is a member of the Public Health and Climate Change Working Group of the New Jersey Climate Adaption Alliance. His professional experience includes 40 years working in healthcare and public health, including 31 years with the New Jersey Department of Health (NJDOH). At the time of his retirement from the Department, he was the Executive Assistant to the Assistant Commissioner in charge of the Division of Public Health Infrastructure, Laboratories and Emergency Preparedness. Other positions at the NJDOH included Special Assistant to the Director of the Office of Public Health Infrastructure, Program Manager of the Child and Adolescent Health Program, Childhood Lead Poisoning Prevention Coordinator, and Coordinator of the Perinatal AIDS Prevention Demonstration Project. His current volunteer activities include being a member of the Health Improvement Coalition of Monmouth County, community volunteer on the Monmouth County Medical Reserve Corps, and a Site Visitor for the Public Health Accreditation Board (PHAB). Mr. McNally has an M.B.A. in Health Care Management from the Wharton School of Business of the University of Pennsylvania.

Jessica Caum, MA, MPH, CPH, Assistant Program Manager, Public Health Preparedness, Philadelphia Department of Public Health

Jessica Caum is the Assistant Program Manager for Public Health Preparedness at the Philadelphia Department of Public Health (PDPH), where she has worked for six years planning for a variety of public health emergencies, ranging from extreme weather events to emerging infectious diseases. For the past year, she has been leading climate change and health planning for PDPH and has also been participating in a climate change and health learning collaborative facilitated by the Center for Climate Change and Health at the Public Health Institute. Ms. Caum has an M.P.H. from Drexel University Dornsife School of Public Health.

Climate Change and Public Health Planning in Maryland

February 7, 2017

Healthy Communities Task Force

Delaware Valley

9:00am - 12:00

MIAEH

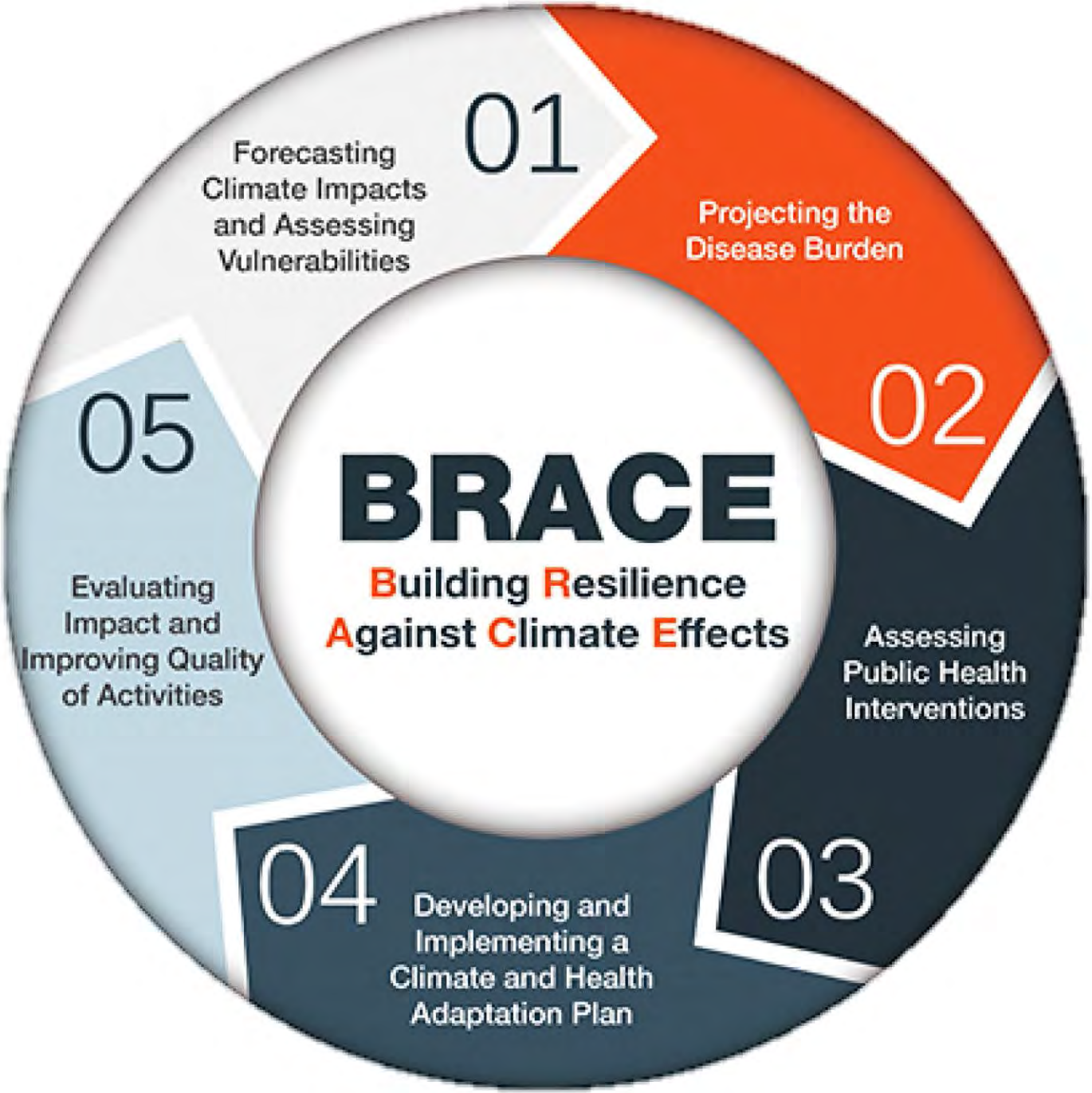
Maryland Department of Health & Mental Hygiene

GOALS FOR TODAY

- Provide an overview of CDC's **B**uilding **R**esilience **A**gainst **C**limate **E**ffects **(BRACE)**
- Discuss Maryland's Public Health Strategy for Climate Change
- Describe how the Public Health Strategy for Climate Change fits into the State's Climate Change Adaptation and Response Plan

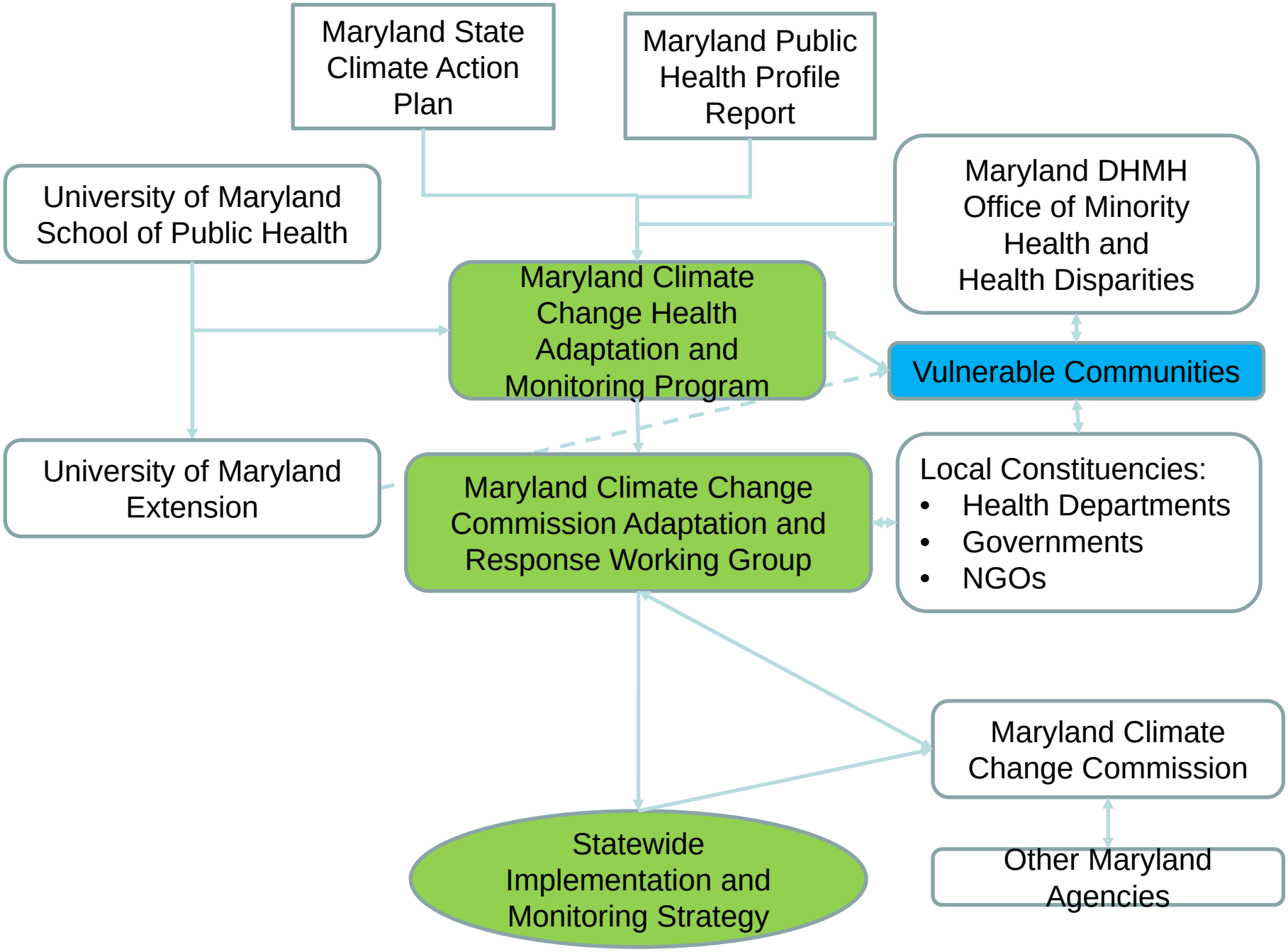
Building Resilience Against Climate Effects (BRACE)

- U.S. Centers for Disease Control and Prevention (CDC) 2014 framework to assist states and cities in developing resilience to climate effects
- Goal – use health data, forecast models to look at potential impacts, develop interventions and adaptations to climate impacts
- Assumes – involvement with affected communities, vulnerable populations


01
Forecasting Climate Impacts and Assessing Vulnerabilities
02
Projecting the Disease Burden
03
Assessing Public Health Interventions
04
Developing and Implementing a Climate and Health Adaptation Plan
05
Evaluating Impact and Improving Quality of Activities
BRACE
Building Resilience Against Climate Effects

MARYLAND'S PUBLIC HEALTH STRATEGY FOR CLIMATE CHANGE

- 2007 -- Maryland Climate Commission
- 2008 – Maryland Climate Action Plan
- 2012 –Department of Health and Mental Hygiene Public Health Strategy for Climate Change
- 2016 – Maryland Climate and Health Profile Report
- 2016 – New five-year CDC cooperative agreement on climate change with states, cities


Maryland State Climate Action Plan
Maryland Public Health Profile Report
University of Maryland School of Public Health
Maryland DHMH Office of Minority Health and Health Disparities
Maryland Climate Change Health Adaptation and Monitoring Program
Vulnerable Communities
University of Maryland Extension
Maryland Climate Change Commission Adaptation and Response Working Group
Local Constituencies:
• Health Departments
• Governments
• NGOs
Maryland Climate Change Commission
Statewide Implementation and Monitoring Strategy
Other Maryland Agencies

Amir Sapkota

MARYLAND HEALTH, COMMUNITIES, AND THE ENVIRONMENT

Maryland Health, Communities and Environment

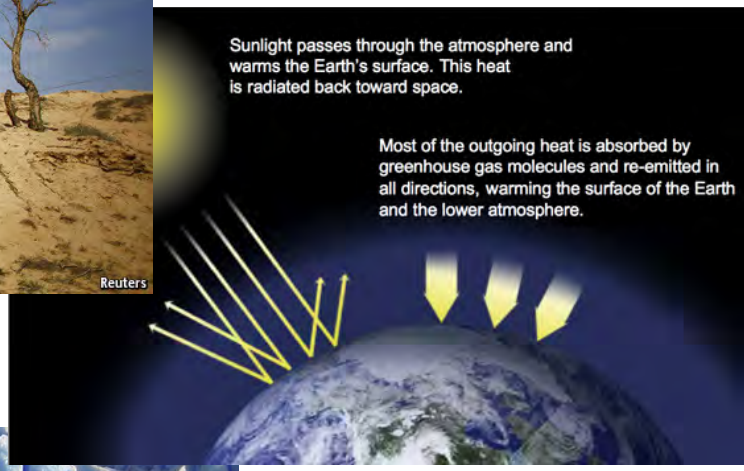
Who is most at risk & Where are the most vulnerable communities? Summary of results from DHMH-UMD Project.

Building Resilient Communities in Maryland: A Stakeholder Forum

Friday December 9, 2016

Amir Sapkota, PhD
Associate Professor
University of Maryland School of Public Health, College Park

Google Image for Climate Change



Source: Google image

What are the impacts in our backyard?

Source: google image

Weather vs Climate vs Climate Change

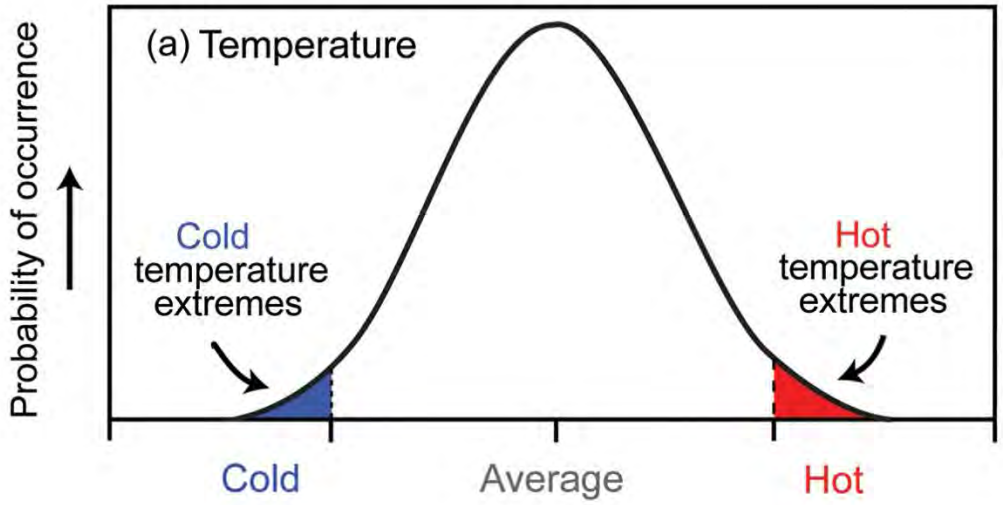
- **Weather:** It is what you get: look out of the window now.

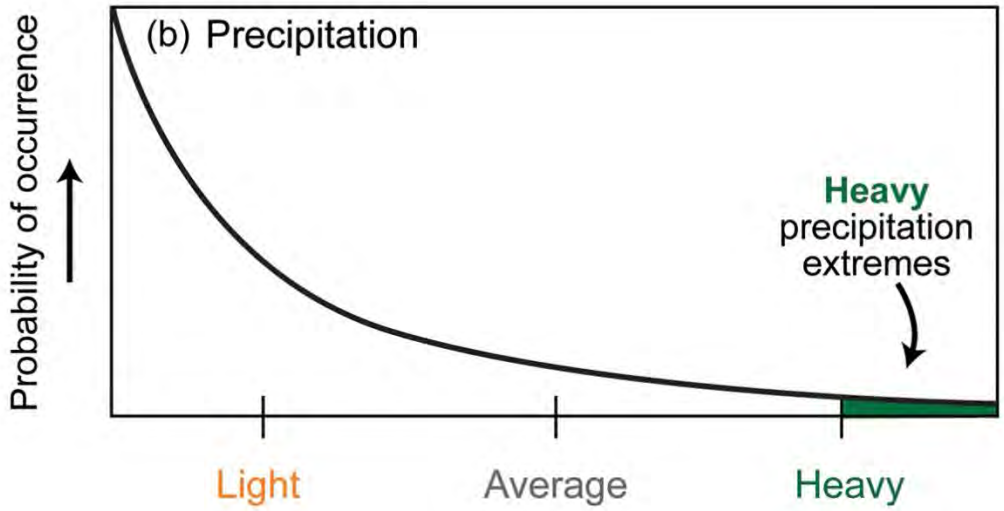
- **Climate:** Aggregated pattern of weather averages, extremes, timing, geographic distribution) of…
  - *hot & cold; cloudy & clear; humid & dry; drizzles & downpours; snowfall, snowpack, & snowmelt; blizzards, tornadoes, & typhoons*

- **Climate Change:** ***Altered patterns*** of Climate
  - Deviation from the long term averages
  - Global average temperature is just one measure of the state of the global climate, but perhaps the only measure that is talked about.

Extreme weather events

(heat waves, torrential downpours, Extreme cold, Draught, Hurricanes)

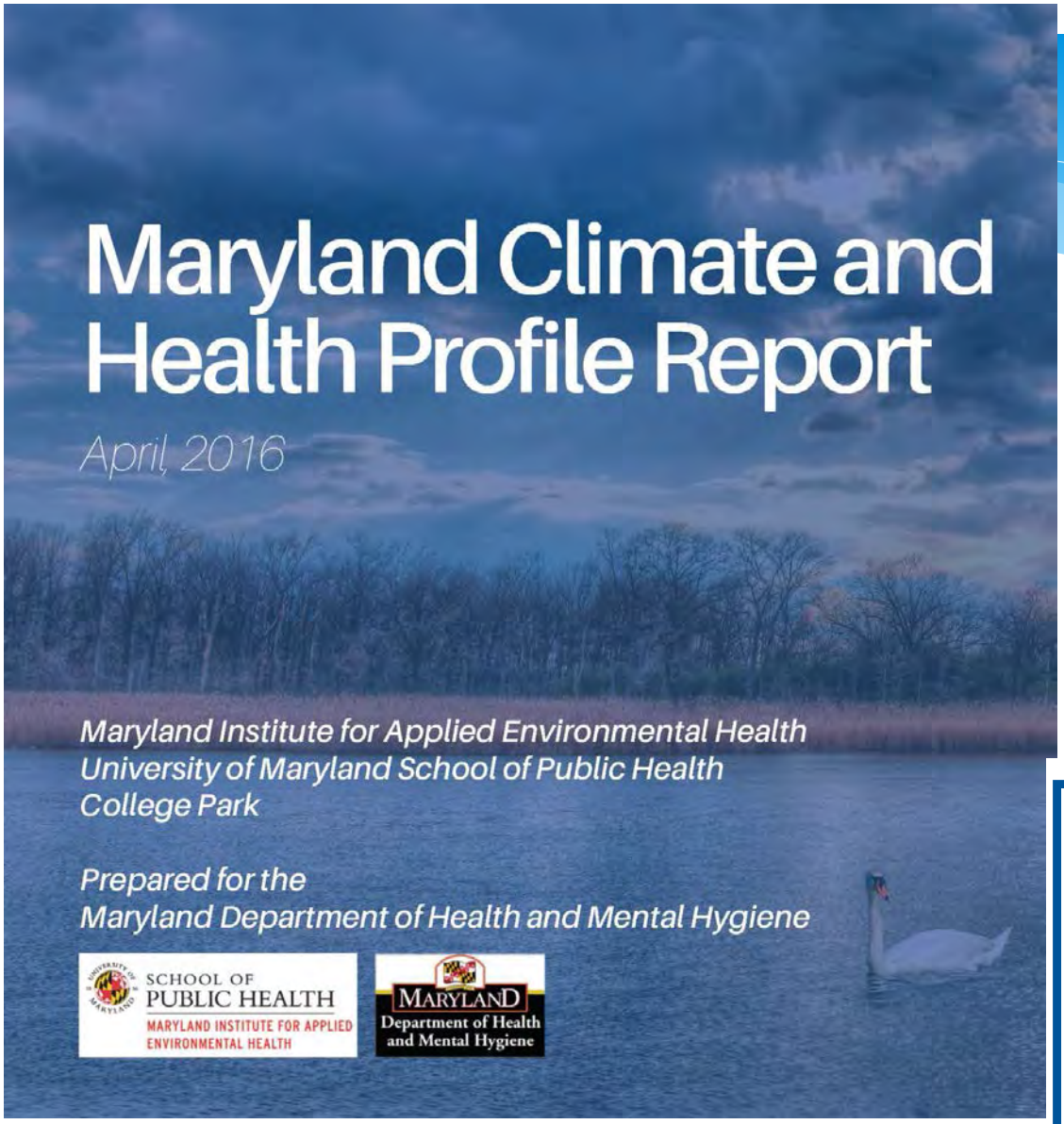




Extreme weather events are becoming:

- More frequent
- More intense
- Longer lasting

This trend is expected to continue in response to changing climate



http://phpa.dhmh.maryland.gov/OEHFP/EH/Shared%20Documents/Climate%20Change/MD_climate_and_health_FullReport_04182016%20Final.pdf

RESEARCH TEAM

Maryland Institute of Applied Environmental Health University of Maryland, College Park

Amir Sapkota, PhD
Associate Professor

Chengsheng Jiang, PhD
Research Assistant Professor

Sutyajeet Soneja, PhD
Postdoctoral Fellow

Crystal Romeo Upperman, MPA
Program Manager

Jared Fisher, MPH
Graduate Student

Maryland Department of Health and Mental Hygiene

Clifford S. Mitchell, MS, MD, MPH
Director, Environmental Health Bureau

Ann Liu, PhD
Chief Epidemiologist, Environmental Health Bureau

Contributors

Rachel Hess-Mutinda, MSW
Environmental Health Bureau
Maryland Department of Health and Mental Hygiene

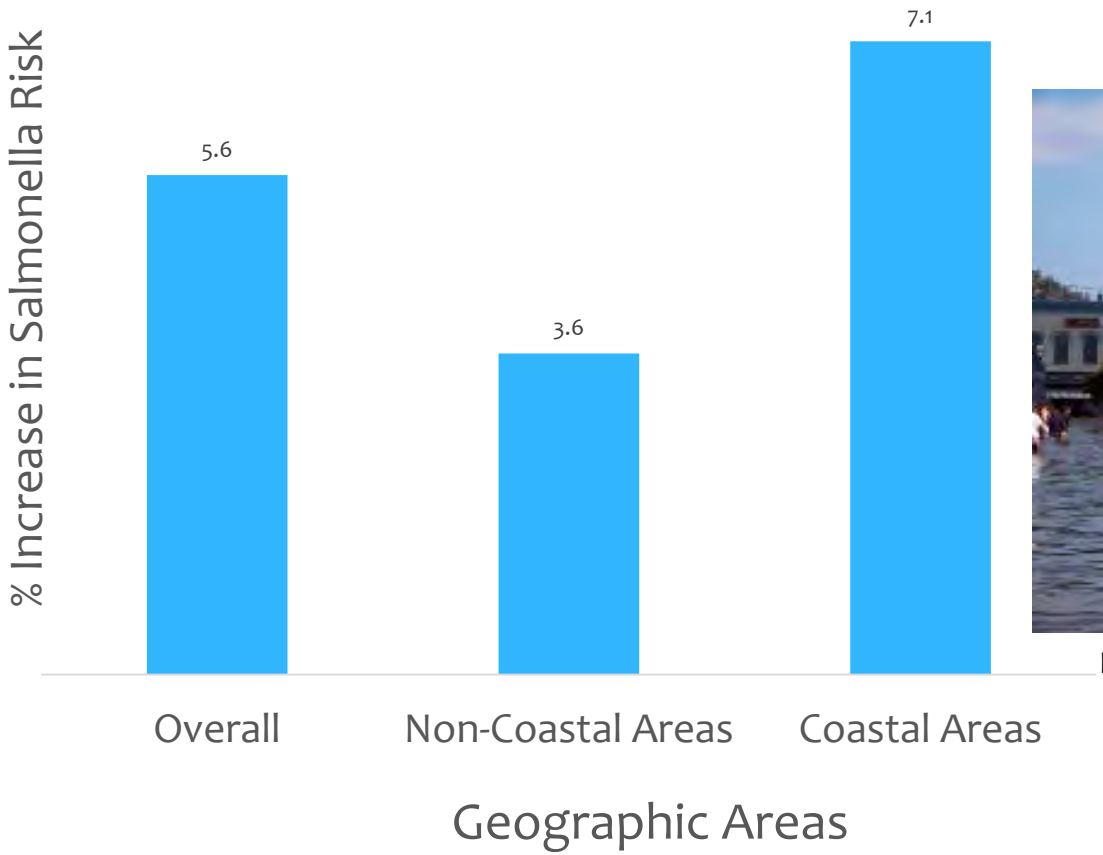
Nancy Servatius, PhD
Outreach Coordinator, Environmental Health Bureau Maryland Department of Health and Mental Hygiene

Jed Miller, MD, MPH
Medical Advisor, Science Services Administration Maryland Department of Environment

Steven Davis
Program Officer
Centers for Disease Control and Prevention

Xin-Zhong Liang, PhD
Professor, Department of Atmospheric and Oceanic Sciences
University of Maryland, College Park

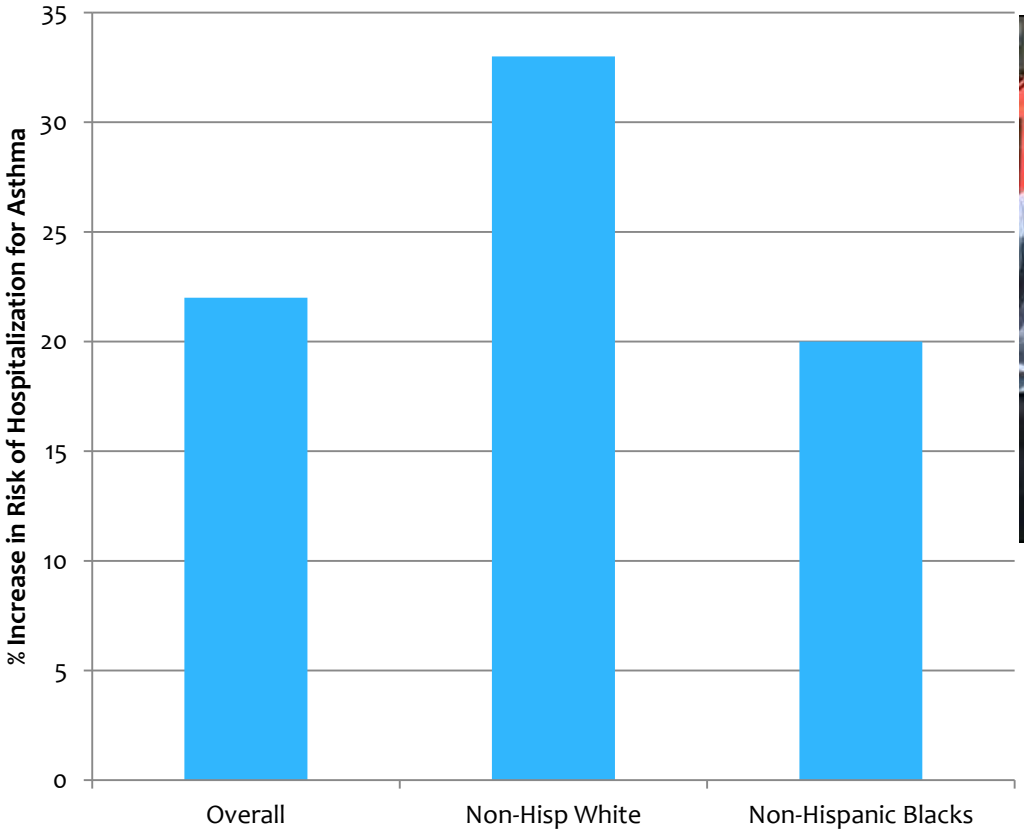
Increased Risk of Salmonella Associated with Extreme Precipitation



Picture: climatechange.maryland.gov/science/

Jiang et al Environ Int 2015

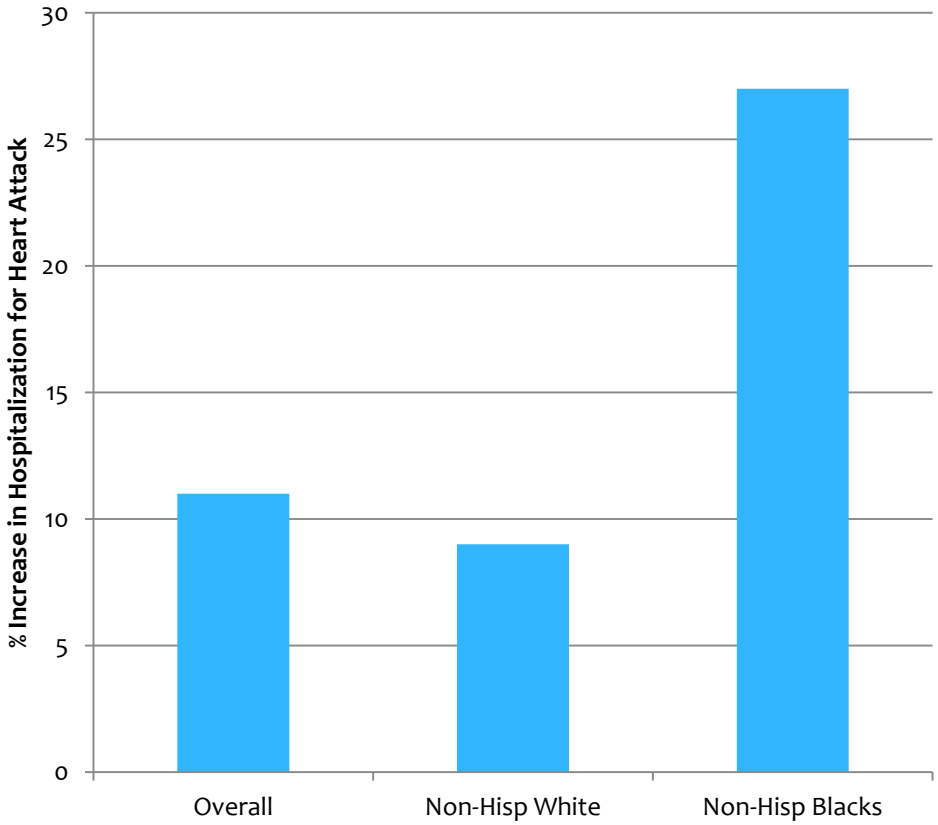
Extreme Heat Events and Risk of Hospitalization for Asthma



Baltimore.cbslocal.com

Soneja et al. Env. Health 2016

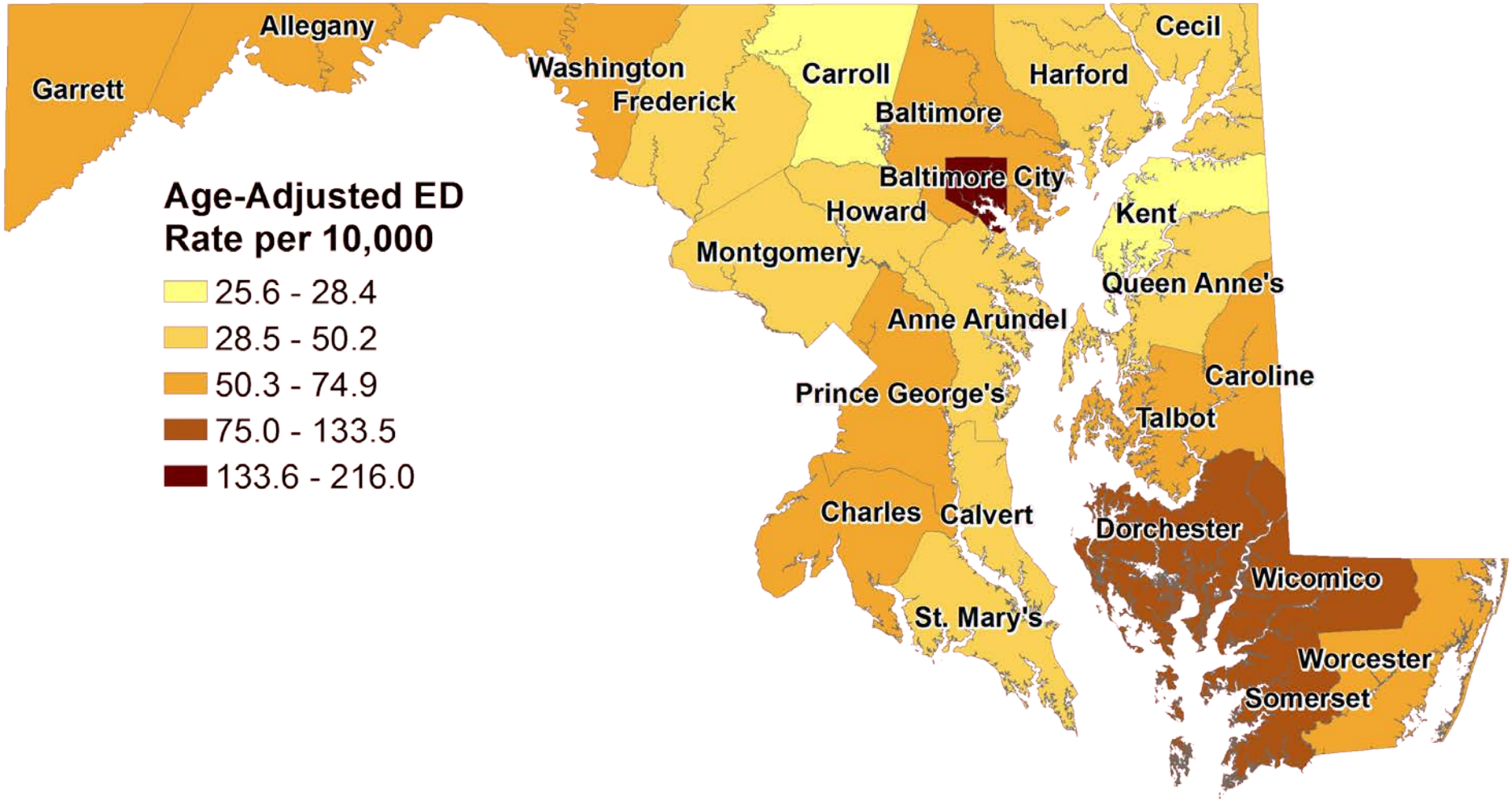
Extreme Heat Events and Risk of Hospitalization for Heart Attack



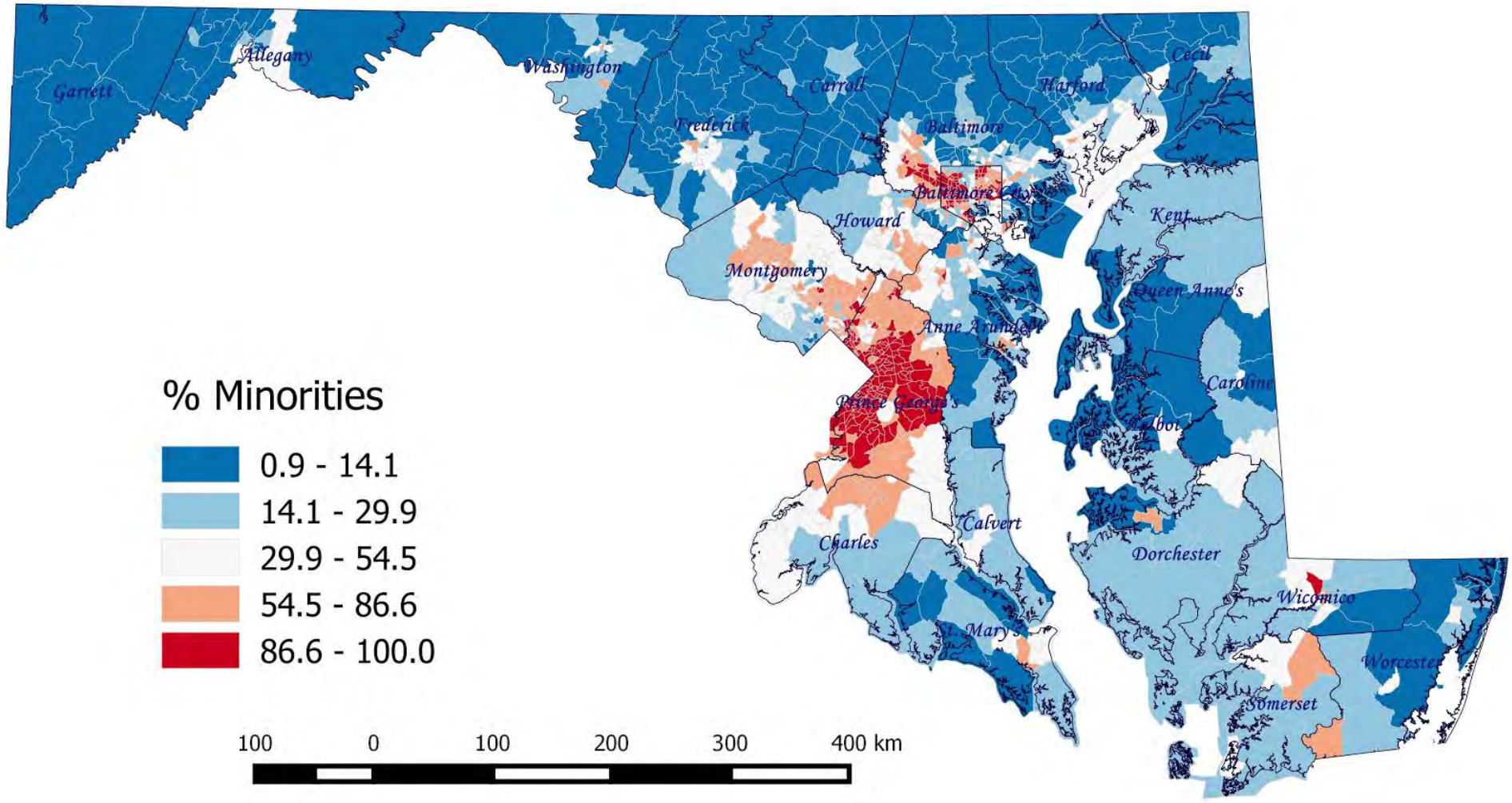
Cnn.com

Fisher et al. JESEE 2016

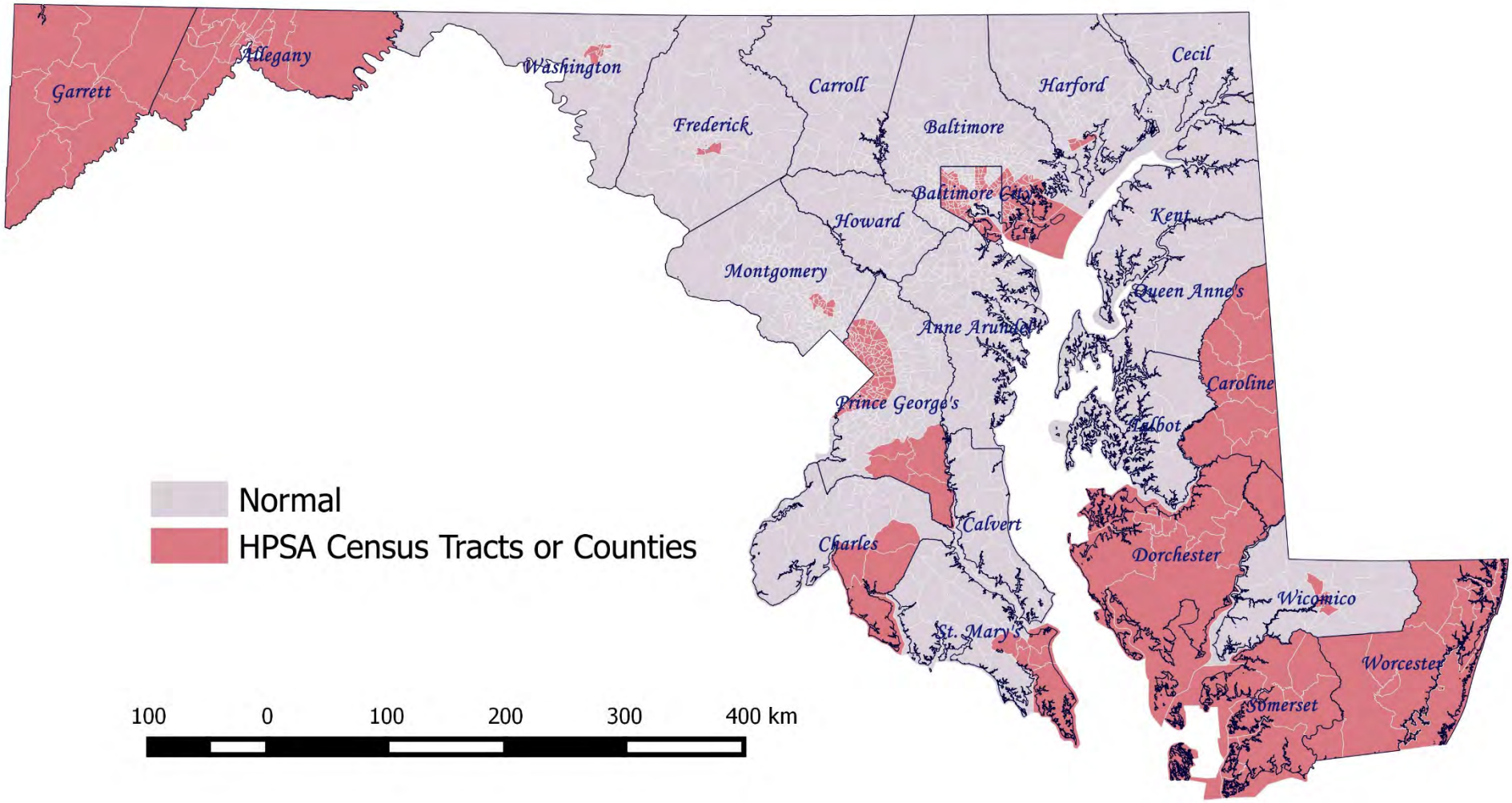
Asthma Hospitalization Rate by County



Percent Minority Population by Census Tract

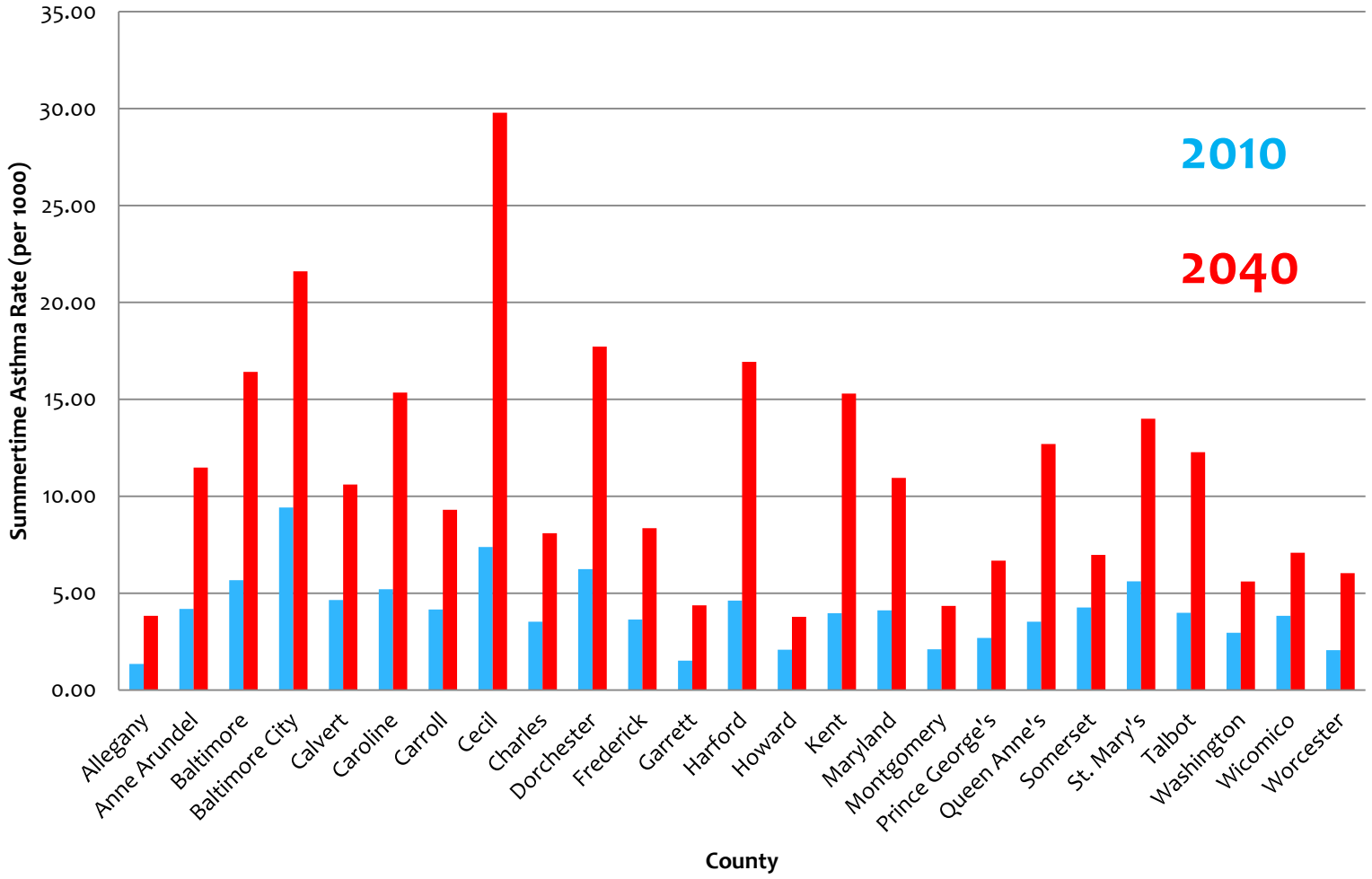


Health Professional Shortage Areas



Source: HPSA data updated on May 2016 and downloaded from https://datawarehouse.hrsa.gov/data/datadownload.aspx#MainContent_ctl00_gvDD_lbl_dd_topic_ttl_0

Summertime Asthma Hospitalization Rate by County



Maryland Climate and Health Profile, 2016

Summary

- Health of our communities is being impacted by extreme weather events
  - Recall that such extreme events are becoming more common, more intense, and longer lasting.
- The adverse health impact experienced by Marylanders is not equally distributed across geographic areas or population groups.
- The impact at local level will be exacerbated by existing disparities, individual sensitivity, preexisting conditions, and capacity to adapt.
- Planning is critical for building resilience. Must engage local stakeholders: planners, community leaders, faith groups, community health workers, citizen groups and non-profits.

ADAPTATION AND RESPONSE PLAN

MARYLAND COMMISSION ON CLIMATE CHANGE

ADAPTATION & RESPONSE WORKING GROUP 2016 ACTION PLAN

APRIL 18, 2016

Maryland's Commission on Climate Change is charged with advising the Governor and General Assembly on ways to mitigate the causes of, prepare for, and adapt to the consequences of climate change and maintaining and strengthening the State's existing Greenhouse Gas Reduction Plan. The Commission is supported by a Steering Committee and four working groups. The Adaptation and Response Working Group is charged with developing a Comprehensive Strategy for Reducing Maryland's Climate Change vulnerability. The Strategy includes both short-and long-term measures that State and local governments may undertake in planning for and adapting to diverse impacts of climate change.

HUMAN HEALTH ADAPTATION AND RESPONSE WORK PLAN 2016

CHALLENGE: HUMAN HEALTH

Enhancing preparedness to protect human health, safety, and welfare.

Solutions	
7	Conduct vulnerability assessments to gain a better understanding of risks and inform preventative responses.
8	Integrate impact reduction strategies into State and local planning practices.
9	Streamline and revise data collection and information dissemination channels.

MIAEH Maryland Institute for Applied Environmental Health

Maryland Department of Health & Mental Hygiene

WHAT MARYLAND IS DOING

- Engaging with stakeholders – “Building Resilient Communities in Maryland: A Stakeholder Forum” – Dec 9, 2016
- Working within existing networks of community engagement and collaboration to bring additional resources
- Identifying vulnerable communities and trusted messengers to work with us in the vulnerable communities
- Creating an Implementation and Monitoring Strategy to track interventions and adaptations, provide tools for local communities, and facilitate data dissemination
- Working with planners on master plans

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Preparing New Jersey For Climate Change: Public Health and Climate Change

Kevin McNally, New Jersey Public Health Association
Jeanne Herb, Rutgers University, Bloustein School of Planning & Public Policy
Marjorie Kaplan, Rutgers Climate Institute

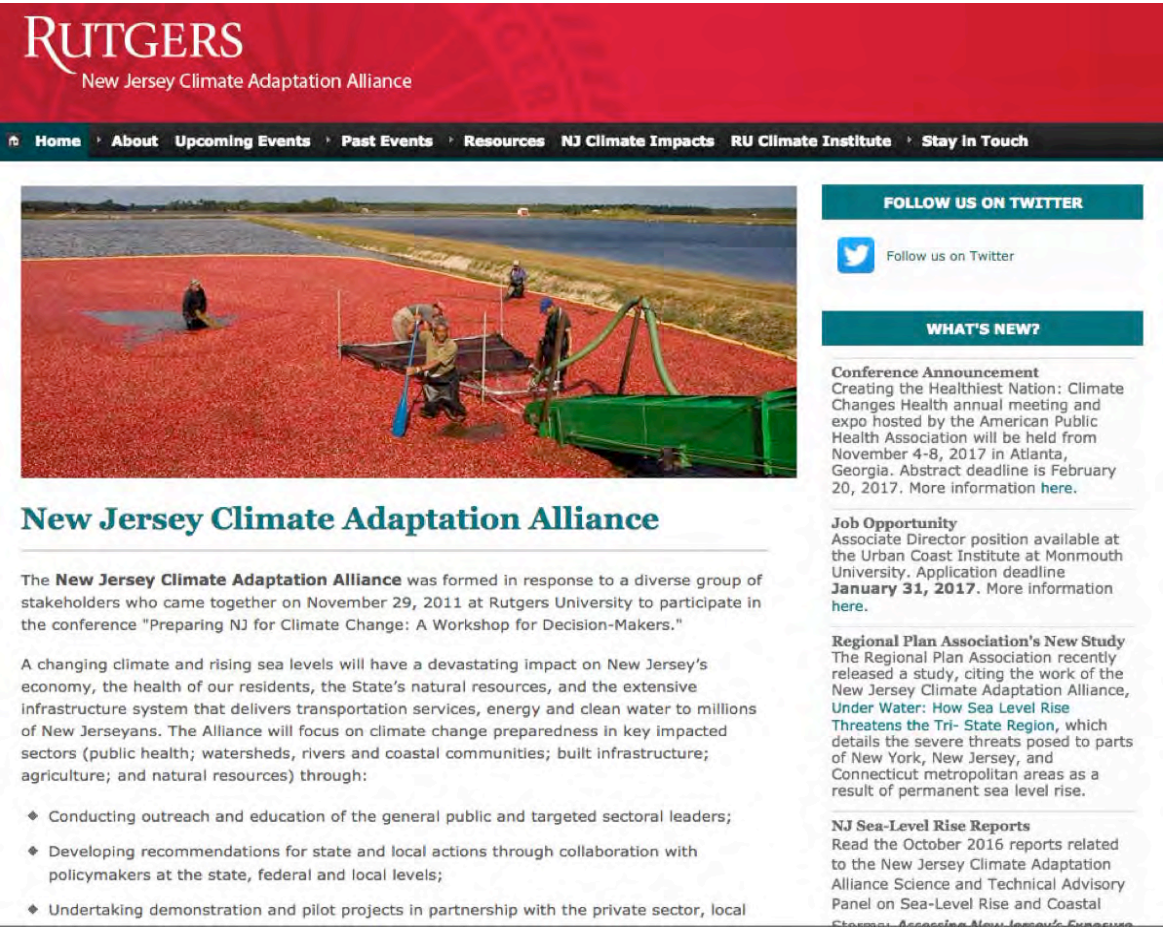
February 7, 2017

Climate change…it's real, it's happening now, and it's affecting New Jersey.

Climate Change in New Jersey

- More warm extremes and fewer cold extremes
- Heavy rains become more intense
- More frequent dry spells
- Rising sea level with increased frequency and intensity of coastal flooding

Preparing New Jersey For Climate Change
"New Jersey Climate Adaptation Alliance"
njadapt.rutgers.edu



- Policymakers
- Private & Public Sector Practitioners
- Business Leaders
- Nongovernmental Organizations
- Academics
- Work Via Existing Delivery Systems
- Facilitated by Rutgers University
- Pre-dated Sandy
- Follows Strategic Workplan and Advisory Committee Direction

RUTGERS

Honorary Co-Chairs: Governors James J. Florio and Thomas Kean
Co-Chairs: Michael Catania, Duke Farms and Kathleen Ellis,New Jersey Natural Gas

Academy of Natural Sciences of Drexel University
American Littoral Society
Barnegat Bay Partnership
Bayshore Recycling
Climate Central
Delaware River Basin Commission
Duke Farms
Edgewood Properties
Ferriero Engineering
Ironbound Community Corporation
Isles, Inc.
Kinsey & Hand, Planning
Leckner Consulting
Middlesex Water Company
Milano School of International Affairs
Monmouth County Regional Health Department
Monmouth University
Mott MacDonald North America
New Jersey Farm Bureau
New Jersey Future
New Jersey Natural Gas
New Jersey Work Environment Council
NJ Association for Floodplain Management
NJ Audubon
NJM Insurance Group
North Jersey Transportation Planning Authority
Partnership for the Delaware Estuary
PlanSmart NJ
PSEG Services Corporation
Regional Plan Association
Rutgers Robert Wood Johnson Medical School
Rutgers School of Public Health
Sustainability Institute at TCNJ
Swiss Reinsurance America Holding Company
Terhune Orchards
The Louis Berger Group
The Nature Conservancy of New Jersey
Thomas Edison State College

Work to date

- **Sector specific reports:** impacts, best practices, tentative recommendations.
- **Stakeholder engagement:** two-way communication, identification of policy gaps.
- **Analyses to "make the case":** evidence-based, wide-ranging.
- **Community-based decision support:** tools, assistance, demonstration projects.
- **Communications:** materials, workshops, conferences,, videos, etc. Available to all!

Sector-Based Approach

- Working Briefs
- Stakeholder Engagement Report
- Gap Analysis
- Policy Considerations
- Other supporting analyses
- Best Practices guides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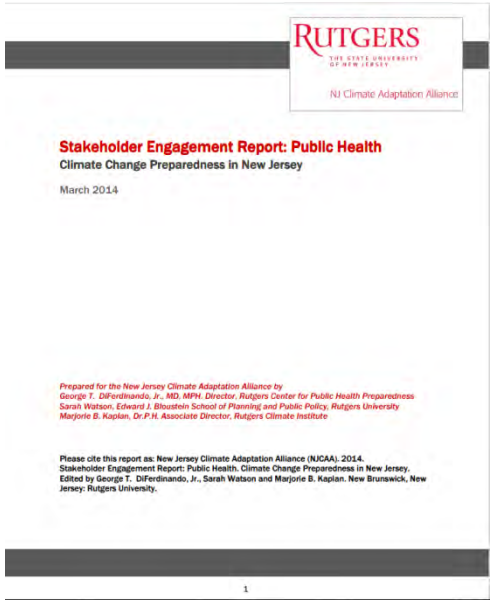
NJ Climate Adaptation Alliance

A Summary of Climate Change Impacts and Preparedness Opportunities for the Public Health Sector in New Jersey

Public Health Resources in New Jersey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NJ Climate Adaptation Alliance

Stakeholder Engagement Report: Public Health
Climate Change Preparedness in New Jersey

March 2014

Prepared for the New Jersey Climate Adaptation Alliance by
George T. DiFerdinando, Jr., MD, MPH, Director, Rutgers Center for Public Health Preparedness
Sarah Watson, Edward J. Bloustein School of Planning and Public Policy, Rutgers University
Marjorie B. Kaplan, Dr.P.H. Associate Director, Rutgers Climate Institute

Please cite this report as: New Jersey Climate Adaptation Alliance (NJCAA). 2014. Stakeholder Engagement Report: Public Health. Climate Change Preparedness in New Jersey. Edited by George T. DiFerdinando, Jr., Sarah Watson and Marjorie B. Kaplan. New Brunswick, New Jersey: Rutgers University.


RUTGERS

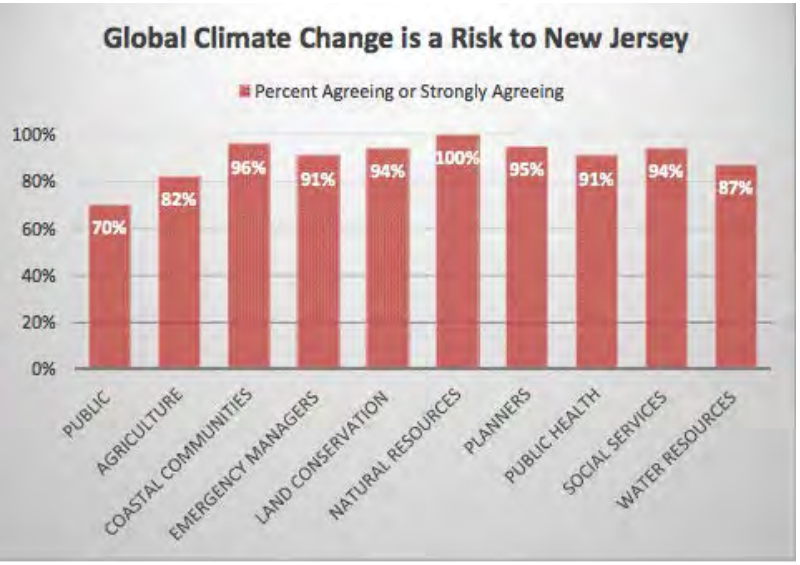
Climate Change Preparedness in New Jersey: Best Practices for Public Health Officers

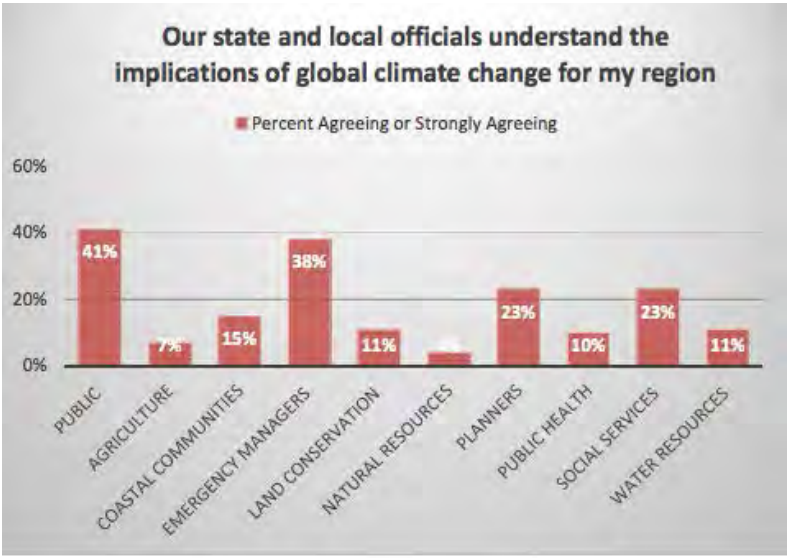
Prepared by the New Jersey Climate Adaptation Alliance
May 2014


Resilience
Preparing New Jersey for Climate Change
Policy Considerations from the New Jersey Climate Adaptation Alliance

http://njadapt.rutgers.edu/resources/njcaa-reports

Comparison Among Sector Stakeholders





Source: NJCAA 2013 *Surveys of Stakeholder Groups Climate Change Preparedness in NJ*

Public Health Stakeholders

- **Public Health Focus Group and On-line survey (NJACCHO)**

- **Targeted Interviews Reps**
  - **NJ Hospital Association**
  - **NJ Primary Care Association**
  - **Health Care Association NJ**
  - **LeadingAge**
  - **NJ ACOG**
  - **NJ AA Pediatrics**
  - **NJ AA Family Practice**
  - **NJ AC of Physicians**

- **Expert Interviews**
  - **Occupational Health MD (Rutgers)**
  - **Risk Analysis & Public Health (Rutgers)**
  - **Vector-Borne Disease (Rutgers)**
  - **Toxic Materials (Rutgers)**
  - **Epidemiologist (CDC)**
  - **U.S. EPA Program Manager**

See: NJCAA 2014 *Stakeholder Engagement Report: Public Health Climate Change Preparedness in NJ*

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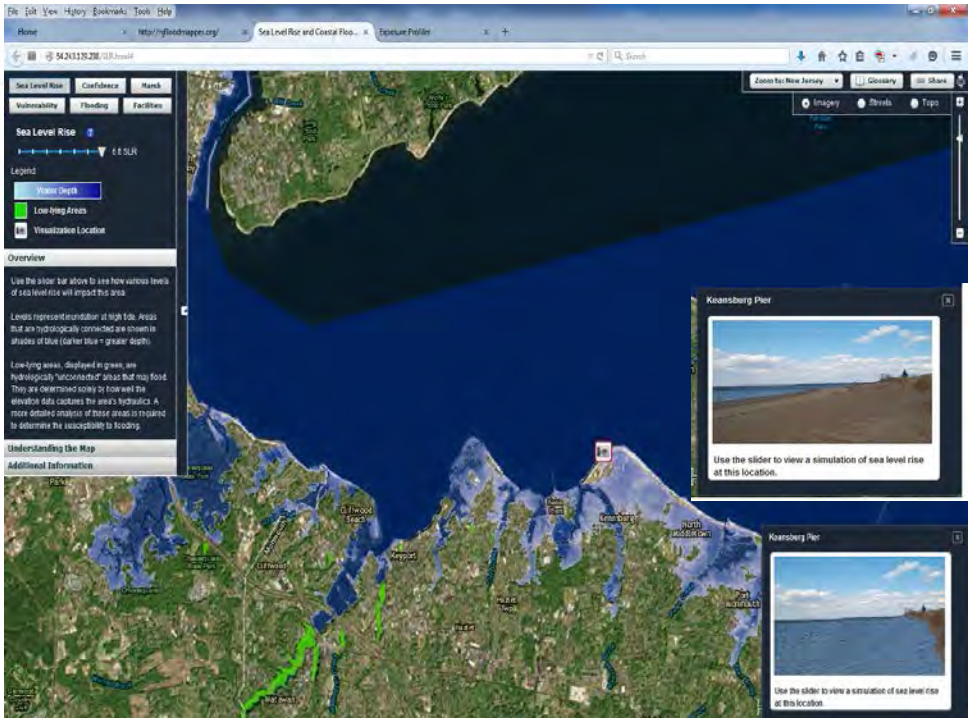
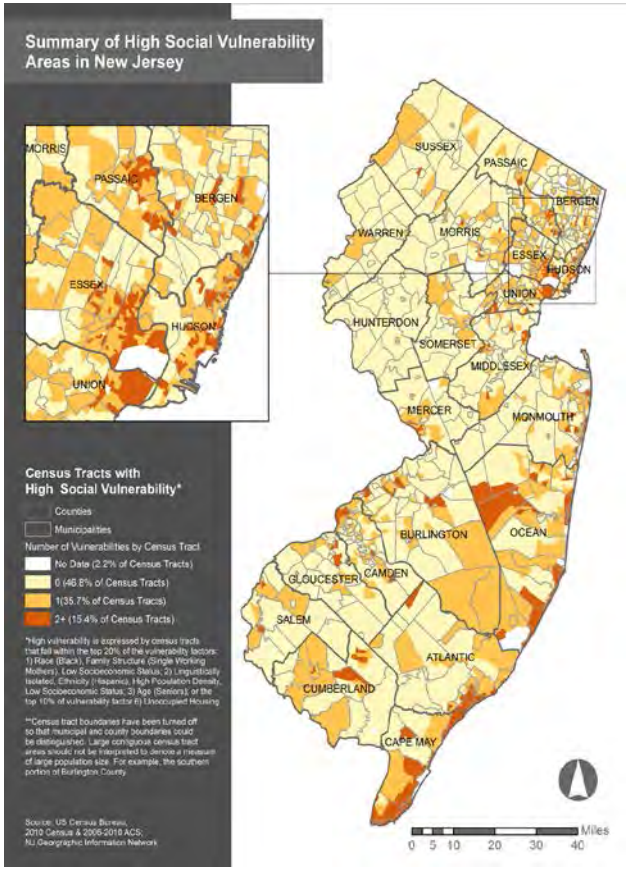
NJADAPT.ORG

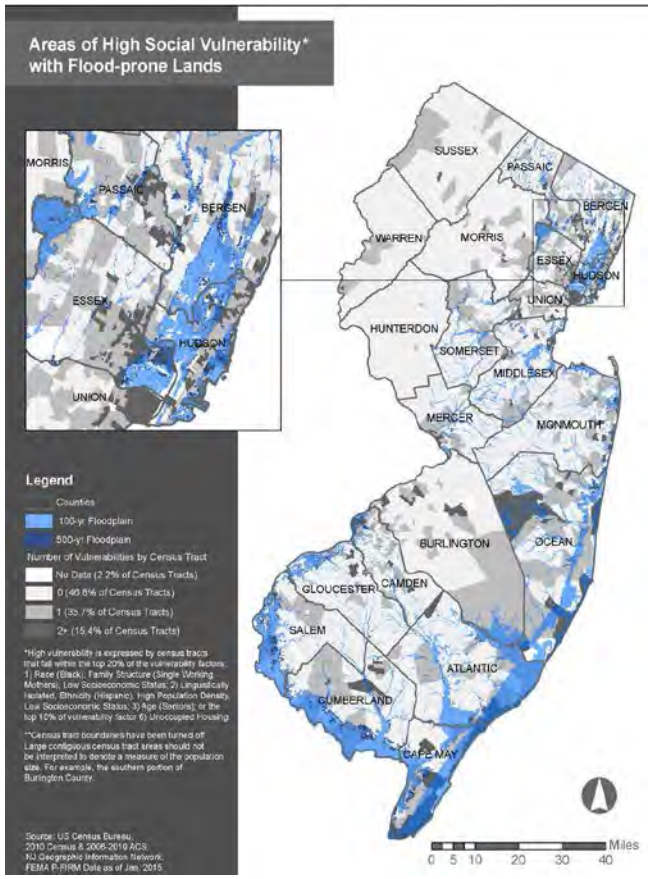
Coastal Hazard Profiler

NJ FLOODMAPPER



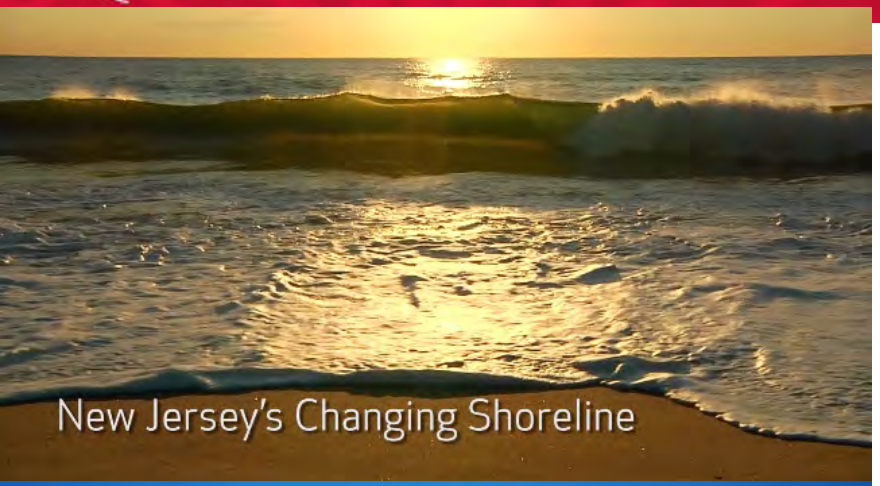
High Social Vulnerability and Flood Risk

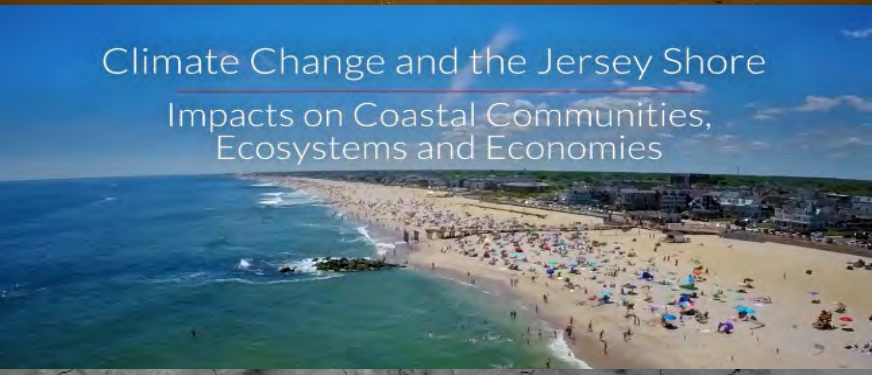




Factors Related to High Social Vulnerability

-race (black), family structure (single parent, female-headed), and low socioeconomic status
-linguistic isolation, ethnicity (Hispanic), high population density, and low socioeconomic status
-age (seniors)
-high percentages of unoccupied housing (Source: Pflicke et al. 2015)





Videos and Story Maps

See njadapt.rutgers.edu and njadapt.org

Two Key Reports
Sea-Level Rise and Coastal Storms for NJ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NJ Climate Adaptation Alliance

Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel

October 2016

Please cite this report as:
Kopp, R.E., A. Broccoli, B. Horton, D. Kreeger, R. Leichenko, J.A. Miller, J.K. Miller, P. Orton, A. Parris, D. Robinson, C.P. Weaver, M. Campo, M. Kaplan, M. Buchanan, J. Herb, L. Auermuller and C. Andrews 2016. Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel. Prepared for the New Jersey Climate Adaptation Alliance. New Brunswick, New Jersey.

Science and Technical Advisory Panel Report


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NJ Climate Adaptation Alliance

Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: A Companion Report to the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel Report

October 2016

Please cite this report as:
Kaplan, M., M. Campo, L. Auermuller, and J. Herb. 2016. Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: A Companion Report to the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel Report. Prepared for the New Jersey Climate Adaptation Alliance. New Brunswick, NJ: Rutgers University.

Companion Report

Climate Change and Public Health Working Group

Mission: to work in partnership with New Jersey's public health community to help enhance the public health community's climate preparedness.

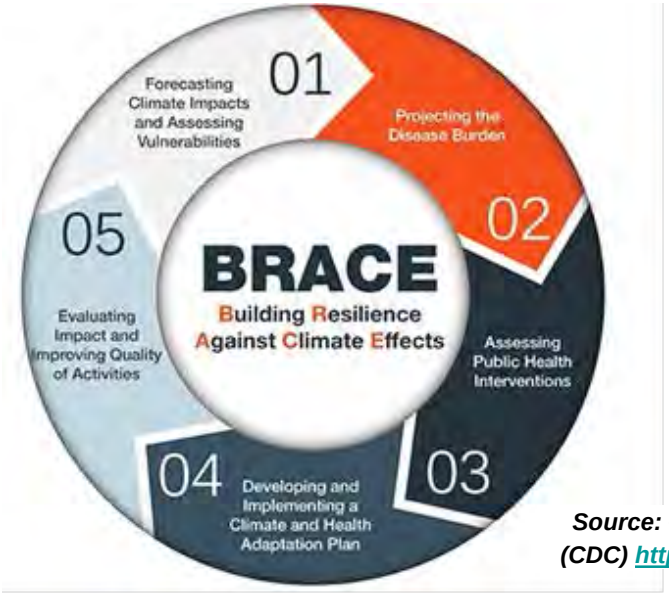
-Builds Upon NJCAA work (2011 – present)

-Rutgers participates in CDC Community of Practice (2015 – present)

-Workgroup Convened Fall 2015

-Public Health and Climate Change Workshop for Public Health Practitioners June 2016 (http://njadapt.rutgers.edu/past-events/june-3-2016-public-health-workshop)

-Follows CDC Building Resilience Against Climate Effects (BRACE) Framework to address climate change effects on public health in NJ



Source: Centers for Disease Control and Prevention (CDC) http://www.cdc.gov/climateandhealth/brace.htm

Climate Change And Public Health Working Group

NJ Public Health Association

NJ Association of County and City Health Officials

Rutgers School of Public Health

NJ Society for Public Health Education

NJ Department of Health

NJ Mental Health Association

NJ Local Boards of Health Association

NJ Visiting Nurse Association

NJ Association of Public Health Nurse Administrators

NJ Hospital Association

County Health Rankings and Roadmaps

NJ Chapter American Academy of Pediatrics

NJ Environmental Justice Alliance

NJ Health Initiatives

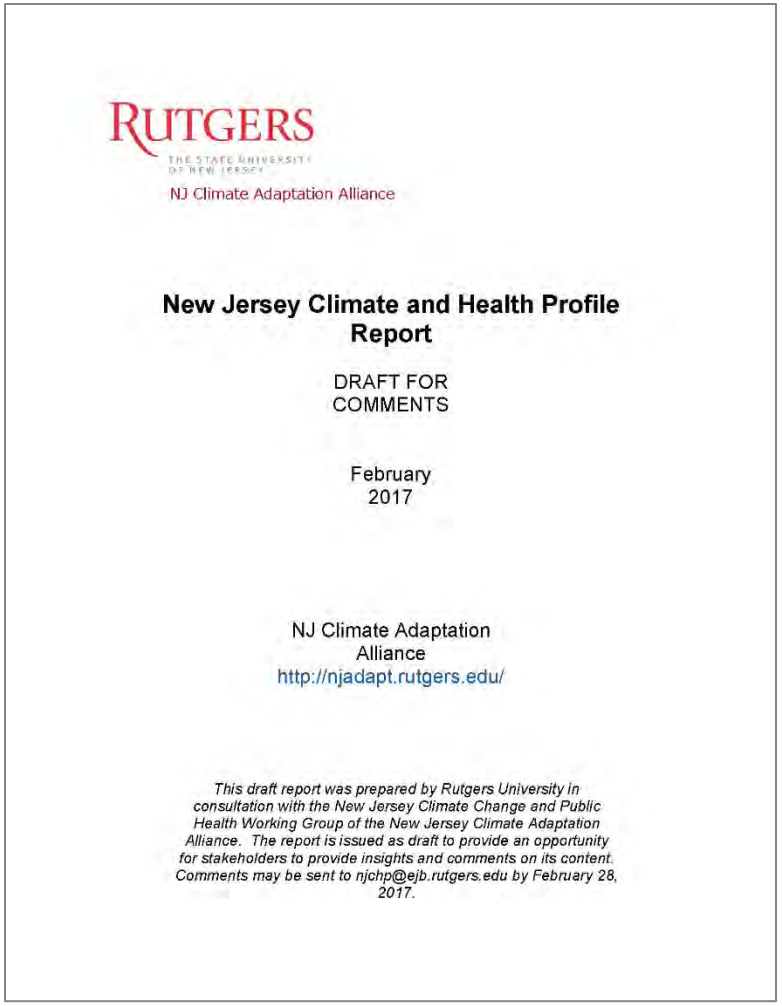
Drexel University School of Public Health

NJ Environmental Heath Association

NJ Medical School

Rutgers Robert Wood Johnson Medical School

NJ Climate Change and Health Profile Report



RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY
NJ Climate Adaptation Alliance

New Jersey Climate and Health Profile Report

DRAFT FOR COMMENTS

February 2017

NJ Climate Adaptation Alliance
http://njadapt.rutgers.edu/

This draft report was prepared by Rutgers University in consultation with the New Jersey Climate Change and Public Health Working Group of the New Jersey Climate Adaptation Alliance. The report is issued as draft to provide an opportunity for stakeholders to provide insights and comments on its content. Comments may be sent to njchp@ejb.rutgers.edu by February 28, 2017.

Primary Sections

Baseline Climate Assessment
Climate Projections
Causal Pathways
Vulnerable Populations
Next Steps

Topics Covered

-Temperature
-Precipitation
-Sea-Level Rise
-Air Quality
-Extreme Precipitation and Storms
-Ecosystem Changes and Threats

Table 1. Overview of Projected Climate Change and Health Impacts in New Jersey

Hazard	Climate Impact	Health Impacts
Air Quality Changes	• Increased ground-level ozone • Fine particulate matter changes • Pollen and allergen production	• Respiratory illness • Cardiovascular disease • Mortality
Extreme Heat	• Increased frequency and intensity of heat waves	• Heat-related illness and mortality • Exacerbation of existing medical conditions • Greater stress on electricity systems potentially leading to health outcomes associated with power outages
Precipitation Changes and Storms	• Flooding • Storms • Drought • Wildfire	• Injuries and fatalities • CO2 poisoning • Food and water contamination • Stress and mental health impacts • Respiratory illnesses • Mold exposure • Food insecurity
Ecosystem Changes and Threats	• Changes in Disease Vector Reproduction and migration patterns	• Vector borne illnesses • Food and water borne illnesses • Harmful Algae Blooms (HABs)

DRAFT RECOMMENDATIONS

Act	•Implement specific initiatives identified in consultation with public health community
Plan	•Integrate climate science and consideration of climate change impacts into existing public health planning, programs and decision making processes
Assess	•Assess disease burden as a result of a changing climate and identify vulnerable populations and appropriate interventions
Support	•Develop and assist in the deployment of tools and other resources to support local public health practitioners
Build Capacity	•Expand the ability of NJ's public health practitioners to undertake interventions to address public health-related climate change impacts

PUBLIC COMMENTS THRU END OF FEBRUARY

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For more information

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Department of Public Health
CITY OF PHILADELPHIA
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CLIMATE CHANGE AND HEALTH IN PHILADELPHIA: PREPARING FOR A HOTTER, WETTER FUTURE

DVRPC Healthy Communities Task Force Meeting
February 7, 2017

Presented by Jessica Caum, Assistant Program Manager,
Public Health Preparedness, Philadelphia Department of Public Health

Presentation Overview

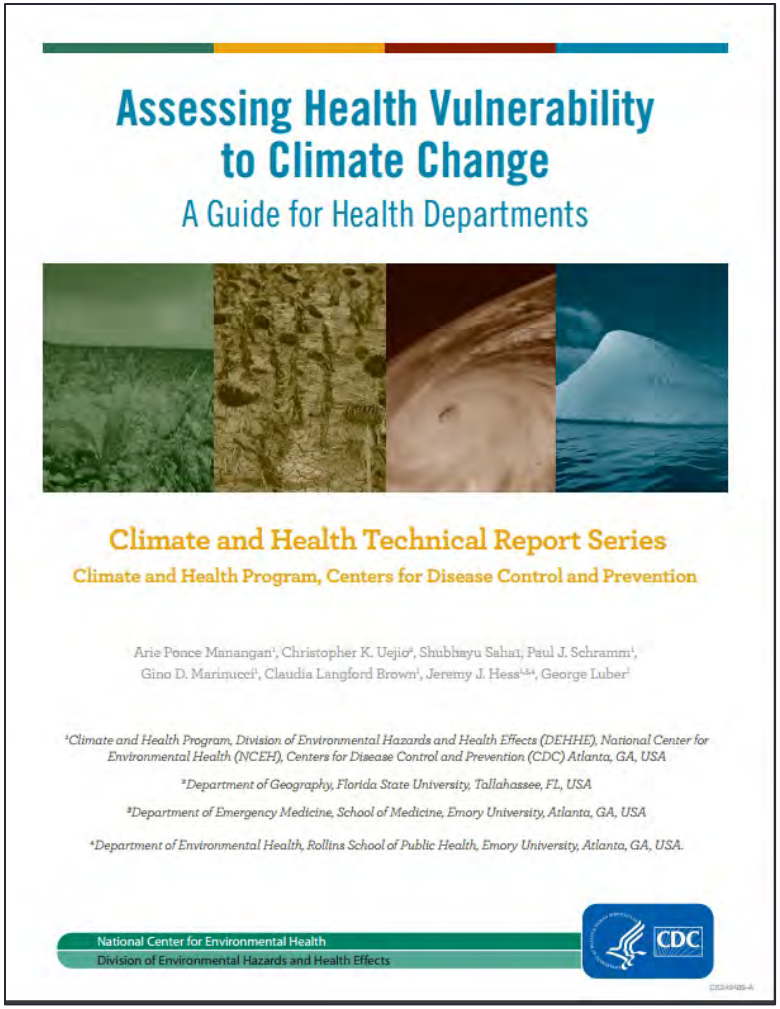
- Project background and current status
- Climate change projections for Philadelphia, expected health outcomes, and PDPH Climate Change and Health Adaptation Plan
- Extreme heat planning in Philadelphia

Building Resistance Against Climate Effects (BRACE)

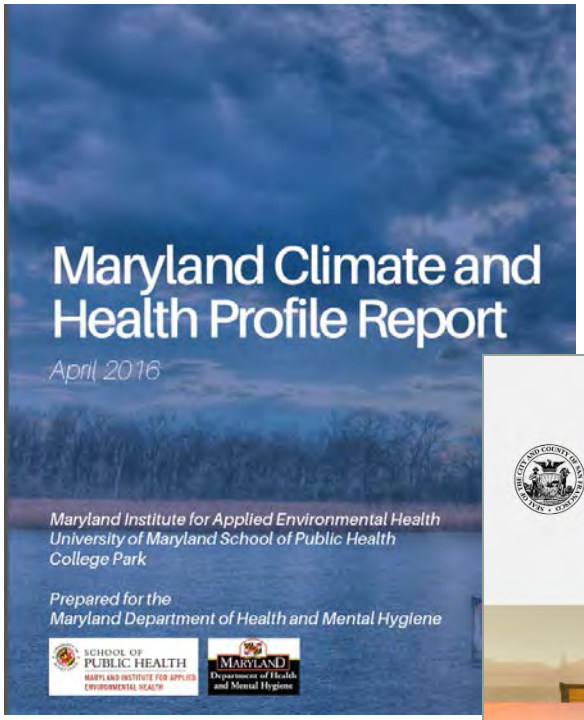
- PDPH is developing a Climate Change and Health Adaptation Plan using CDC's BRACE framework
- Office of Sustainability has documented the climate projections
- PDPH's role:
  - Identify likely health impacts based on climate projections
  - Identify vulnerable populations
  - Quantify and estimate disease burden
  - Develop and implement adaptation strategies to minimize health impacts

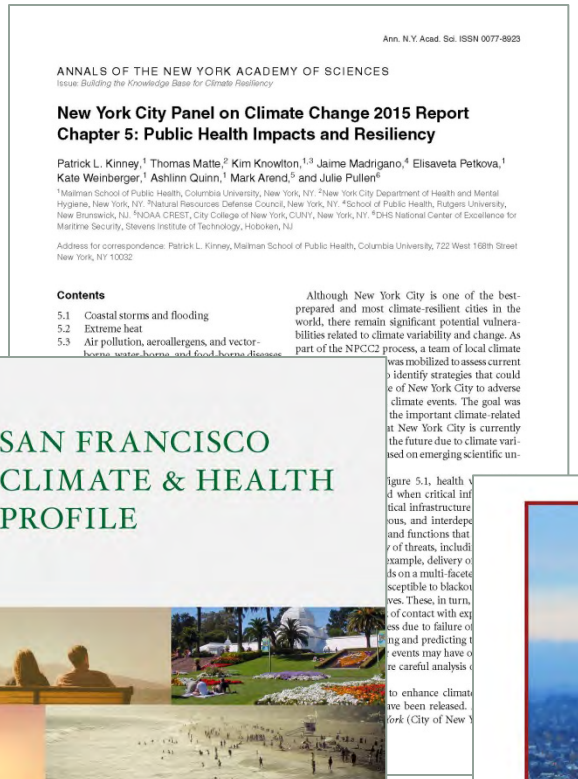
Project Background

- Public Health Preparedness Program at PDPH received a small grant from the Public Health Institute to develop outreach materials about climate change and asthma
  - Led to broader thinking about climate change and health impacts in Philadelphia
  - Role of LHDs in preparing jurisdictions for health effects of climate change



State/Local Health Department Planning




Ann. N.Y. Acad. Sci. ISSN 0077-8923

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Issue: Building the Knowledge Base for Climate Resiliency

New York City Panel on Climate Change 2015 Report
Chapter 5: Public Health Impacts and Resiliency

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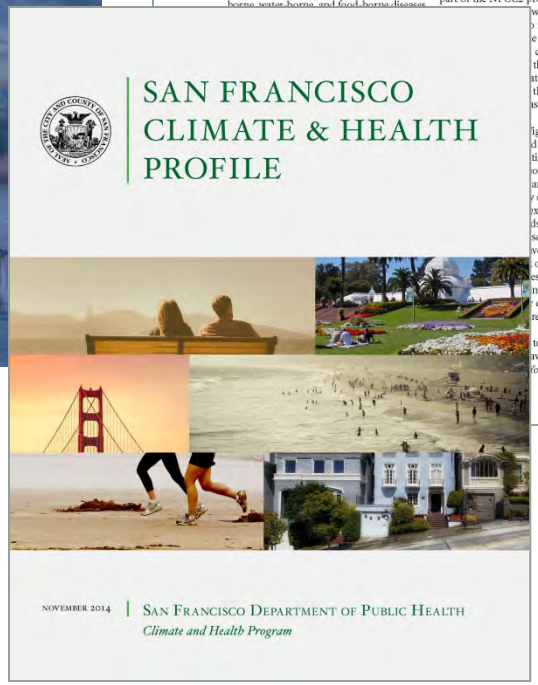
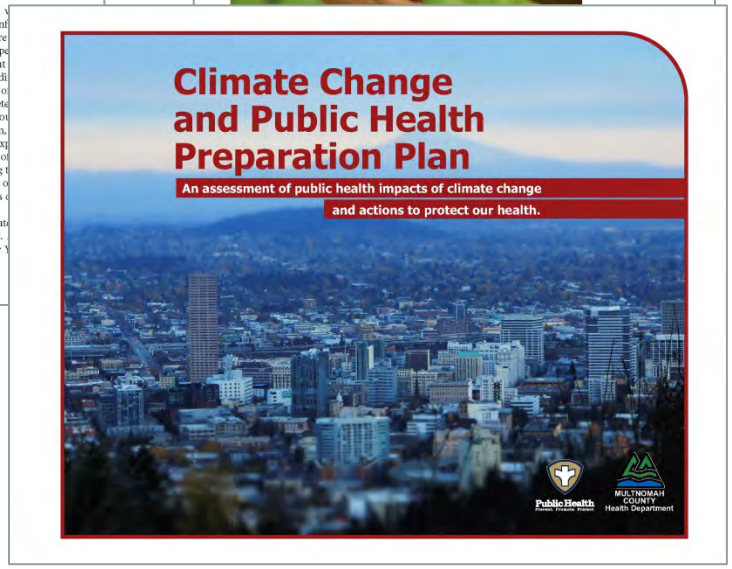
Contents

5.1 Coastal storms and flooding
5.2 Extreme heat
5.3 Air pollution, aeroallergens, and vector-

Although New York City is one of the best-prepared and most climate-resilient cities in the world, there remain significant potential vulnera-bilities related to climate variability and change. As part of the NPCC2 process, a team of local climate

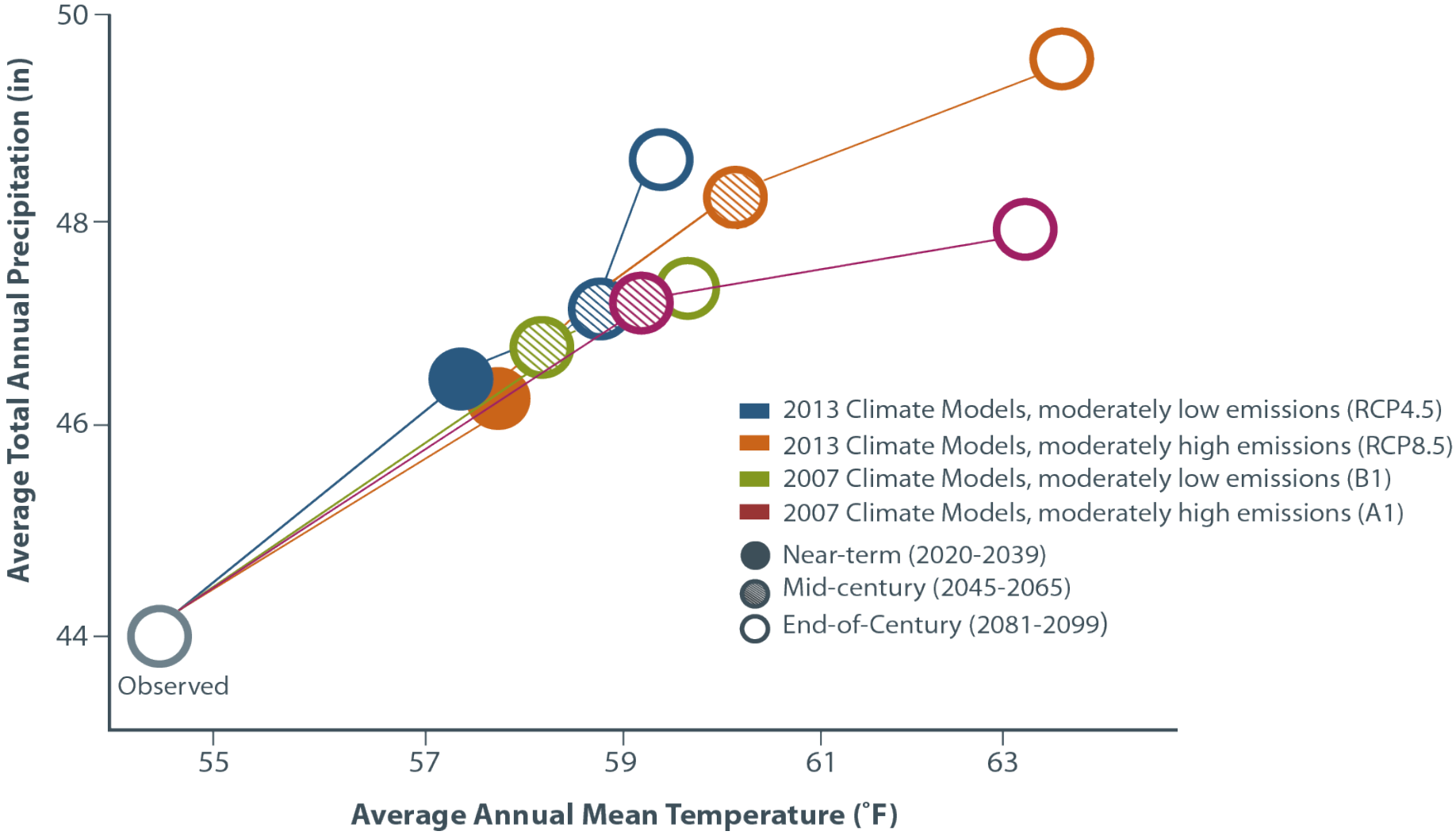




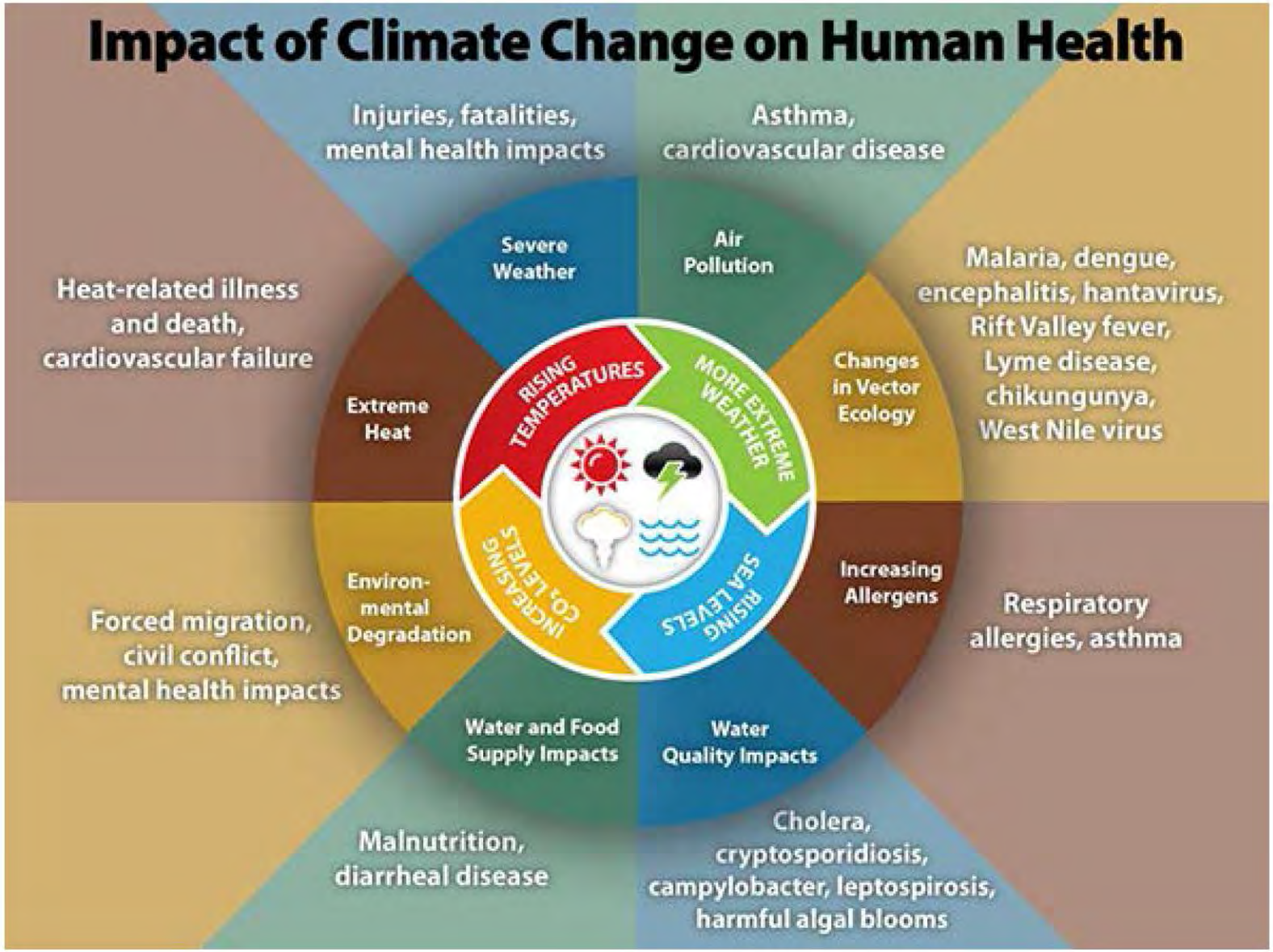
Project Status

- 50+ person Advisory Group meets quarterly
- PDPH outreach materials
- Drexel/PDPH ozone and asthma study
- Revision of Citywide Excessive Heat Plan
- Development of PDPH Climate Change and Health Adaptation Plan

Philadelphia Climate Projections



From Growing Stronger: Toward A Climate-Ready Philadelphia (p. 11), by the Mayor's Office of Sustainability and ICF International, 2015, Philadelphia.


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

Health Impacts of Climate Change in Philadelphia

Hazard	Environmental Impact	Human Health Impact	Vulnerable Populations
More days of extreme heat; more consecutive "extremely hot" days per year	• Urban heat island effect • Decreased air quality due to increases in ground-level ozone	• Heat-related illness, including dehydration and heat stroke • Heat-related mortality • Respiratory disease exacerbations	• Elderly • Children • People with chronic diseases, including diabetes, cardiovascular and respiratory conditions • Low socioeconomic status • Outdoor occupations • Homeless
Increased mean temperature; fewer days below freezing	• Increases in ground-level ozone, airborne allergens and other pollutants	• Respiratory disease exacerbations (COPD, asthma, allergic rhinitis, bronchitis)	• Elderly • Children • People with respiratory conditions
	• Changes in vector ecology	• Vector-borne disease increases/changes	• Various

Extreme weather events (e.g., hurricanes)	• Flooding
	  o Damage to infrastructure and residences
	  o Mold and mildew
		• Injuries
		• Displacement
		• Mental health
		• Vector-and water-borne diseases
		• Asthma exacerbations
			• Residents in low-lying areas
			• Low socioeconomic status
			• People with respiratory conditions

Increased precipitation	• Flooding o Mold and mildew • Decreased drainage	• Injuries • Displacement • Asthma exacerbations	• Residents in low-lying areas • Low socioeconomic status
	• Changes in vector ecology	• Vector-and water-borne diseases	• Various

Climate and Health Vulnerability

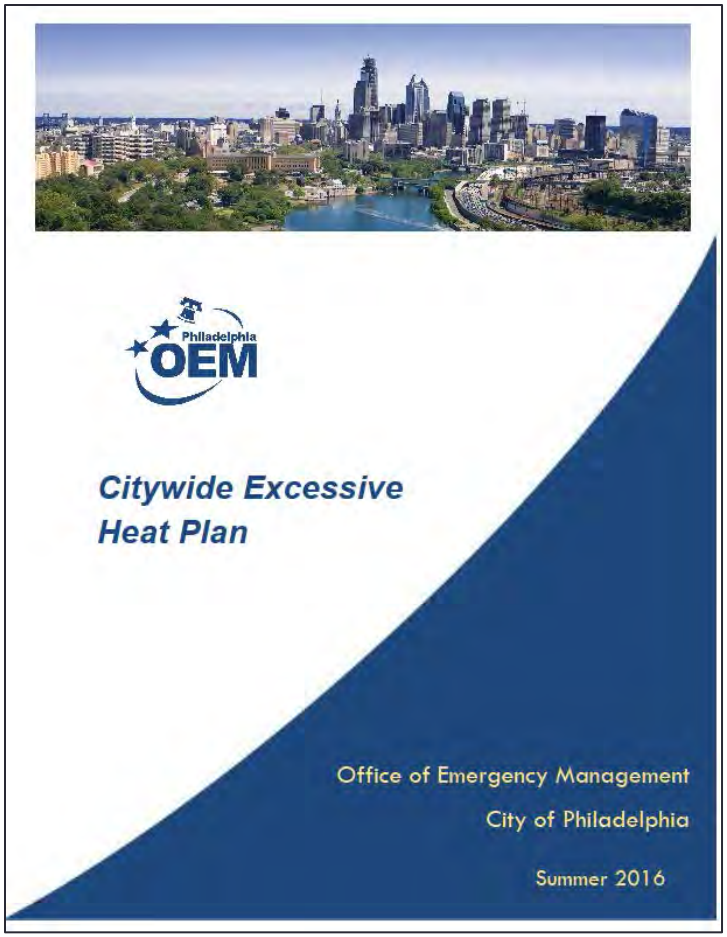
- Vulnerability to climate change: “the degree to which geophysical, biological and socioeconomic systems are susceptible to, and unable to cope with, adverse impacts” (IPCC, 2007).
- Populations with an increased risk of poor health outcomes:
  - Seniors (Age 65+ in Philadelphia: 12.5%)
  - Children
  - Low SES (Persons below poverty level in Philadelphia: 26.5%)
  - Language other than English spoken at home: (21.5% in Philadelphia)
  - Pregnant women
  - Individuals with chronic health conditions, such as obesity and asthma
  - Individuals with outdoor occupations
  - Homeless persons
- Having multiple factors increases risk

PDPH Climate Change and Health Adaptation Plan: Key Sections

- Climate Change Projections for Philadelphia, Health Impacts, and Vulnerable Populations
  - Focus on extreme heat, air quality, severe storms, and vector-borne disease
- Adaptation Strategies
  - Specific, practical and achievable actions, interventions and/or policy changes to build resilience within the City's population to better cope with expected health effects
  - Most strategies will be actions that PDPH can implement/facilitate
  - Some will be individual/family actions or policy recommendations

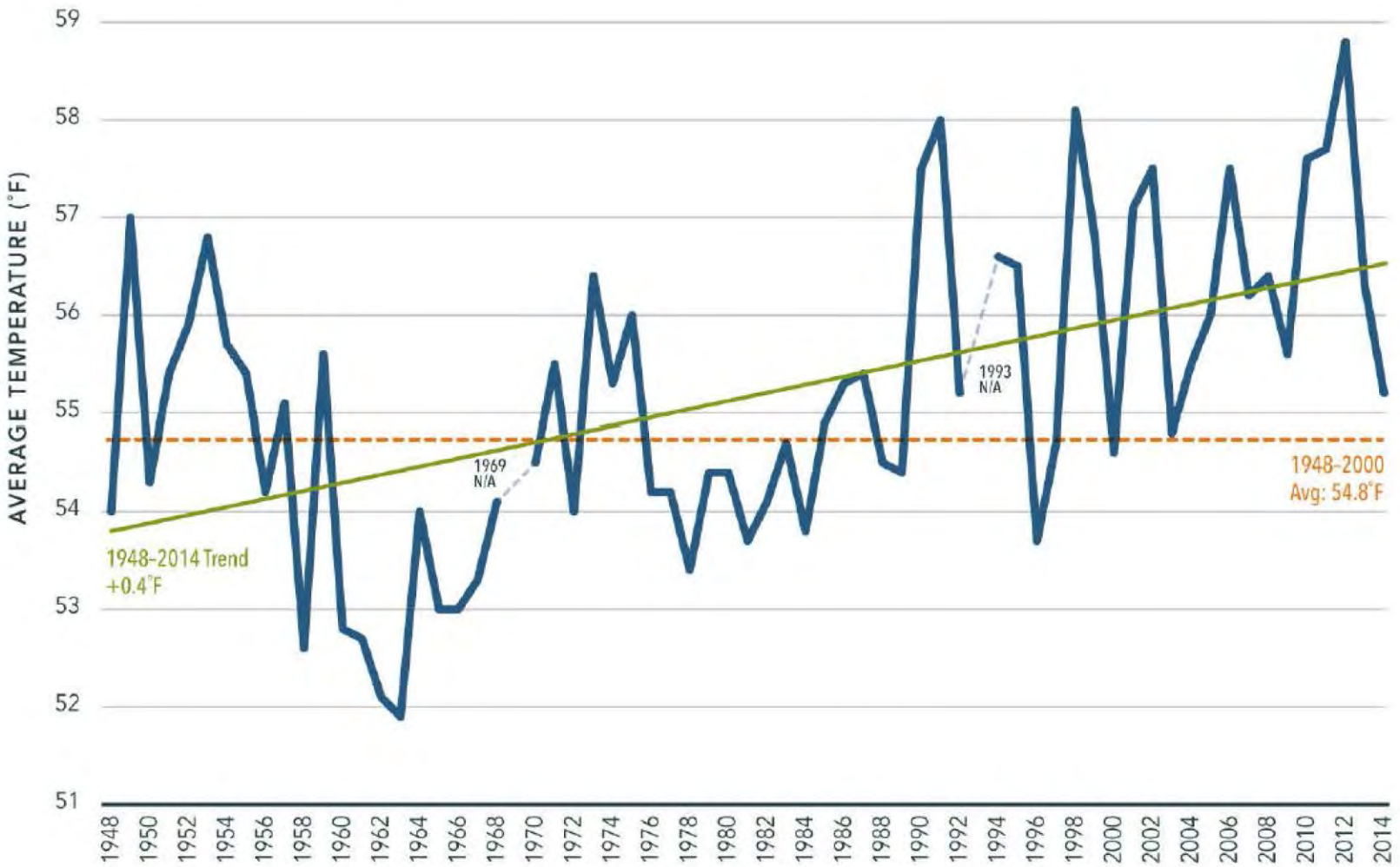
EXTREME HEAT PLANNING

Citywide Excessive Heat Plan



- Citywide Response Actions
  - Internal notifications
  - Public notifications
  - Ozone and air action alerts
  - Excessive heat warning declaration and activation of mobile teams
    - PCA Heatline: refers callers to PDPH EHS/AHS assessment team
  - Outreach for homeless persons
  - Cooling centers

ANNUAL TEMPERATURE TREND FOR PHILADELPHIA, 1948–2014

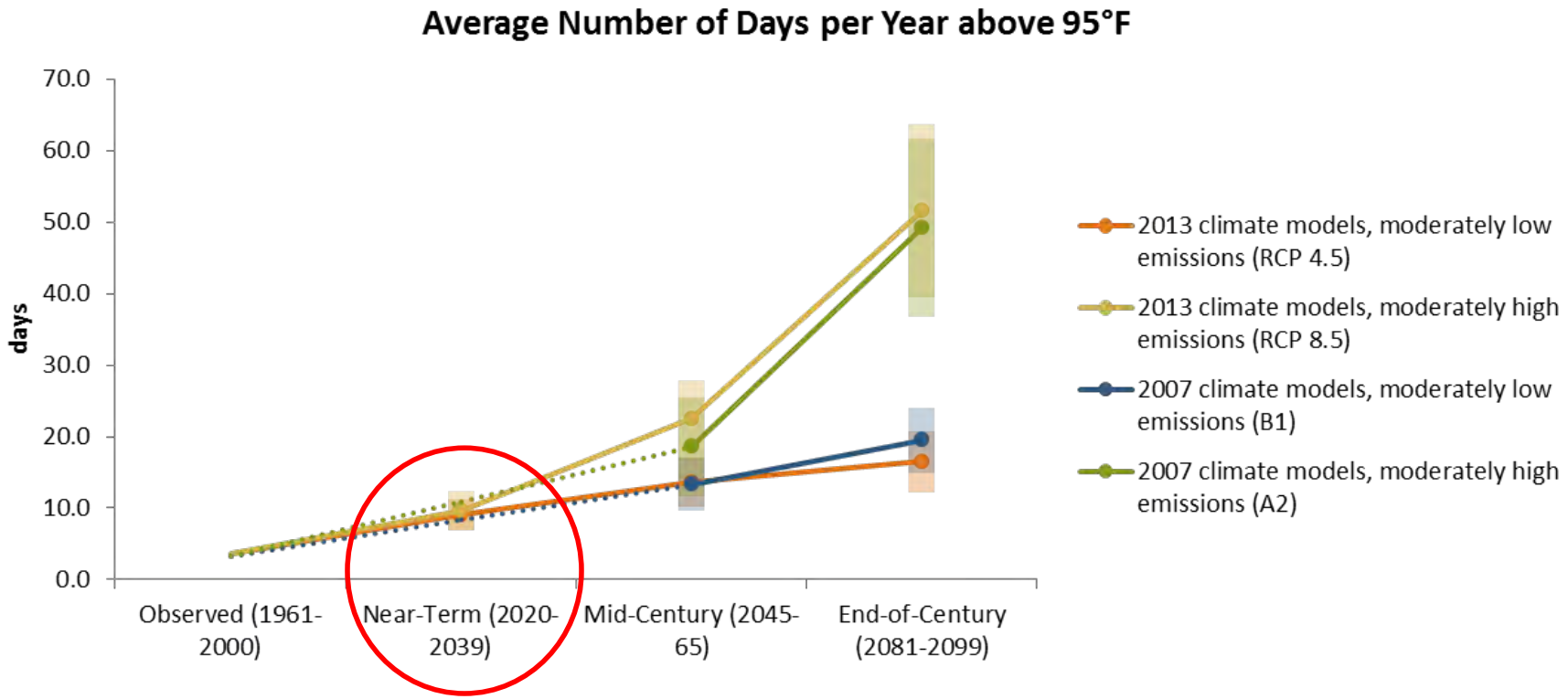


The horizontal line represents the average temperature in Philadelphia from 1948–2000.[2]

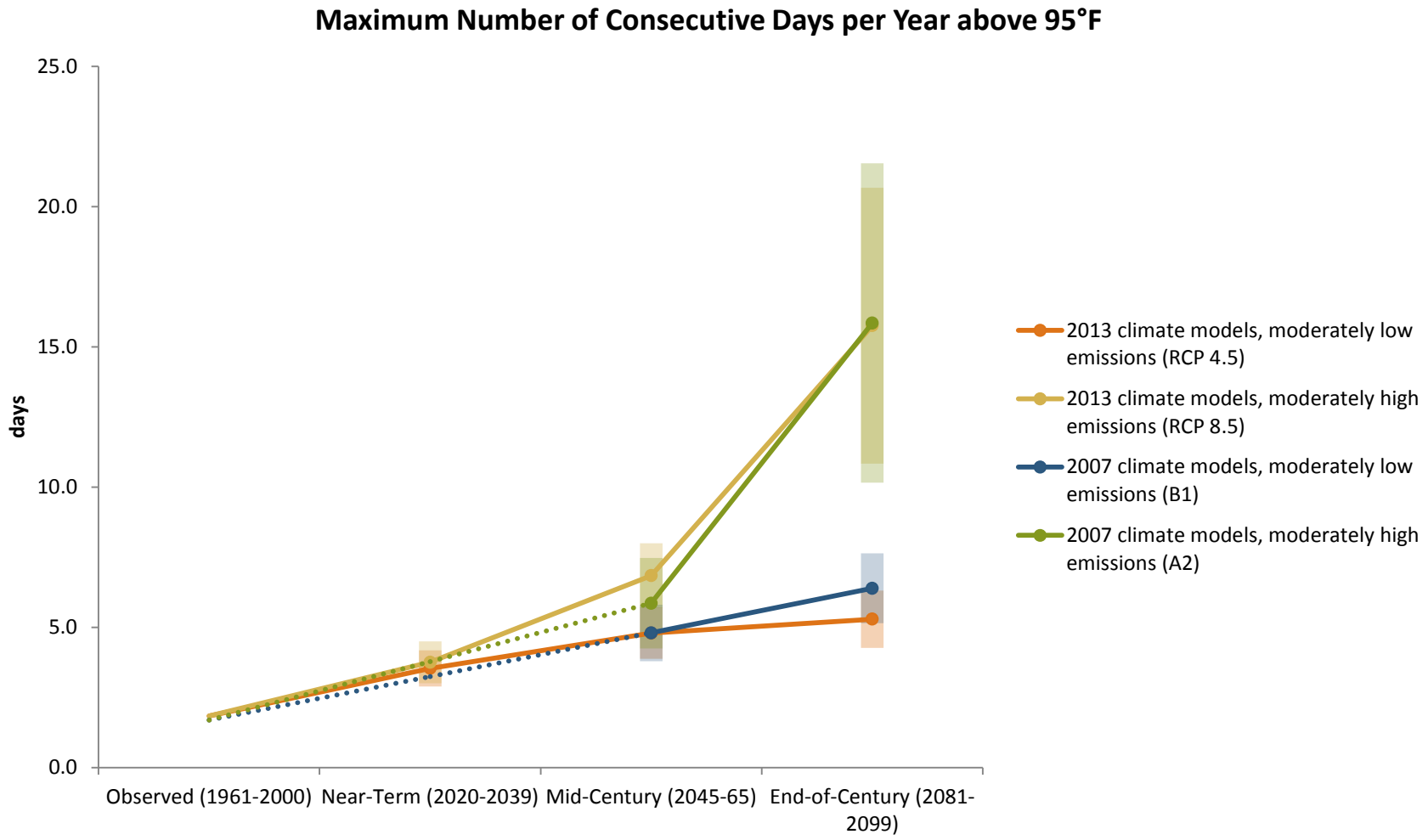
From Growing Stronger: Toward A Climate-Ready Philadelphia (p. 5), by the Mayor's Office of Sustainability and ICF International, 2015, Philadelphia.

2016: A Record-breaking Year

- NOAA and NASA: 2016 was the hottest year on record globally
  - July 2016 was Earth's warmest month on record
- 2016 was hottest year on record in U.S.
  - In Philadelphia: 17 days with temperatures at or above 95°F



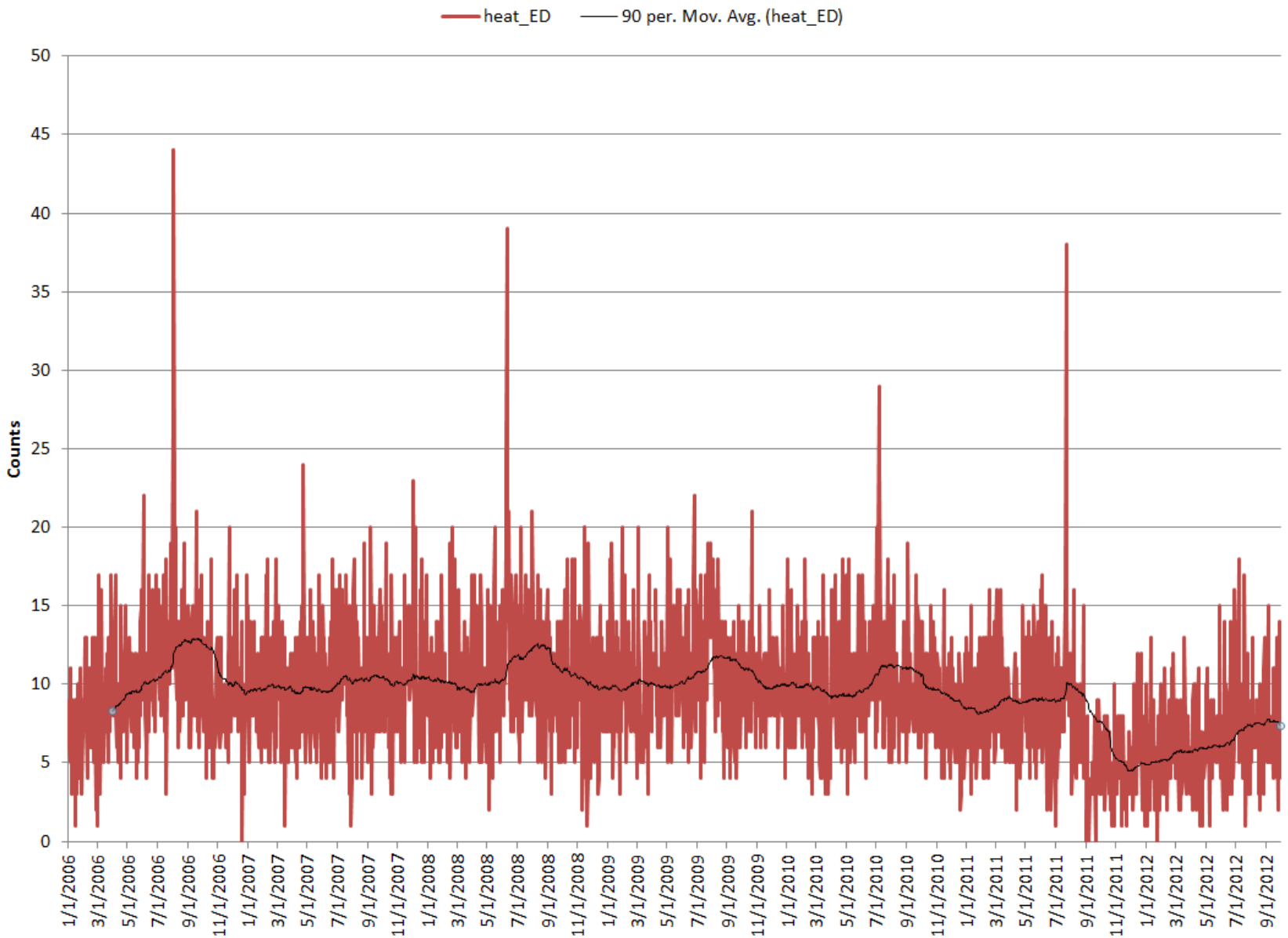
More Consecutive Days of 95°F or Above



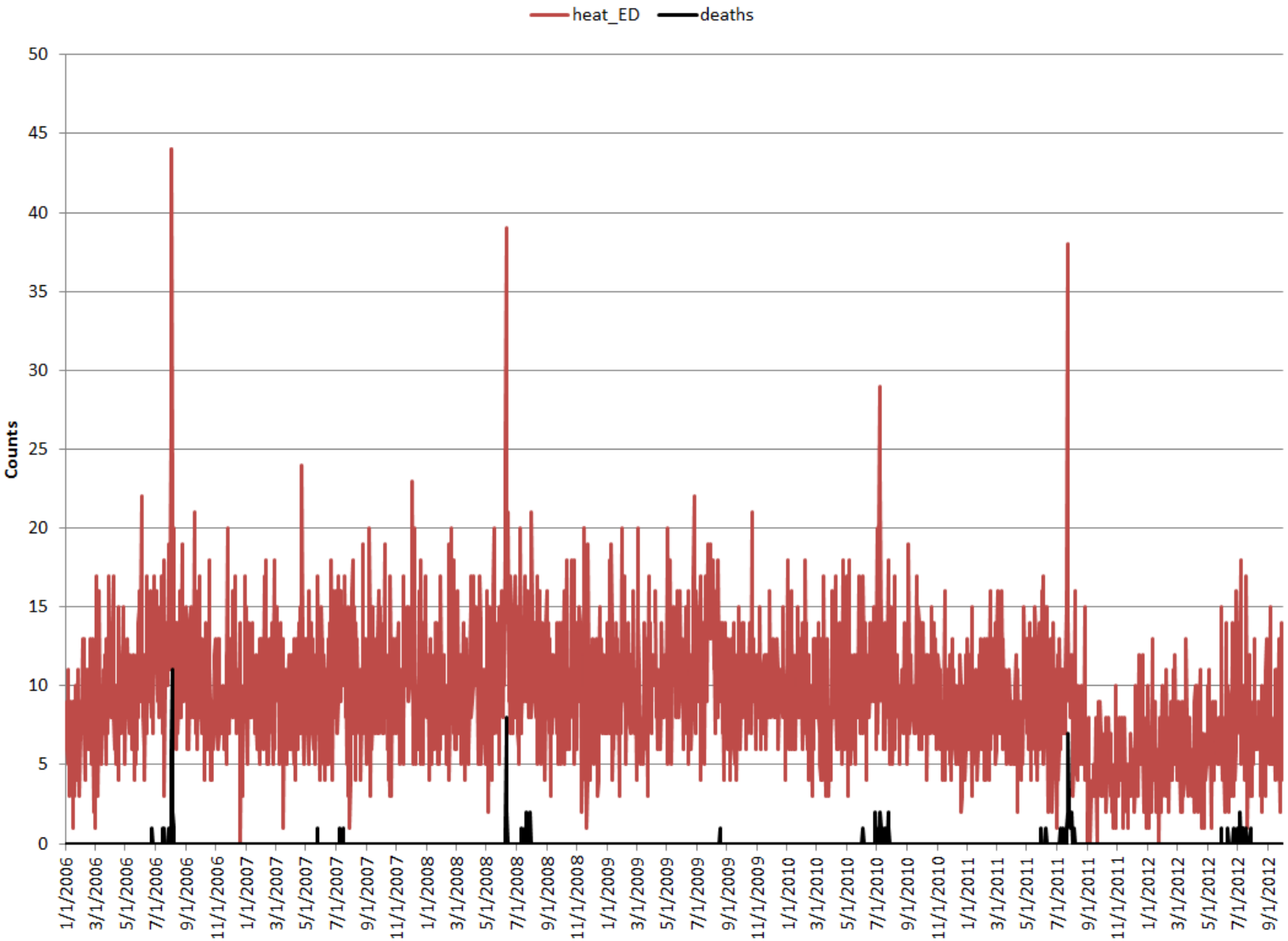
Heat and Health

- Temperature extremes compromise the body's ability to thermo-regulate, which can result in:
  - Dehydration, heat cramps, heat exhaustion
  - Heat stroke
  - Exacerbation of existing conditions:
    - Cardiovascular disease
    - Diabetes
    - Respiratory conditions
      - High temps increase ground-level ozone and enhance formation of some pollutants
    - Kidney disease
    - Mental health conditions (e.g., mood disorders, substance abuse)
- Greater health impacts expected in places where temps are typically cooler

Philadelphia Heat-related Morbidity



Philadelphia Heat-related Mortality



Future Heat-related Morbidity and Mortality in the Northeastern U.S.

Study by Petkova, et al. (2013):

- Northeast region of U.S. expected to be particularly vulnerable to increased heat-related mortality as a result of climate change
- Study projected future heat-related mortality in New York City, Boston, and Philadelphia
  - By 2080s, three-fold increase in heat-related mortality in Philadelphia under RCP4.5 and six-fold increase under RCP8.5

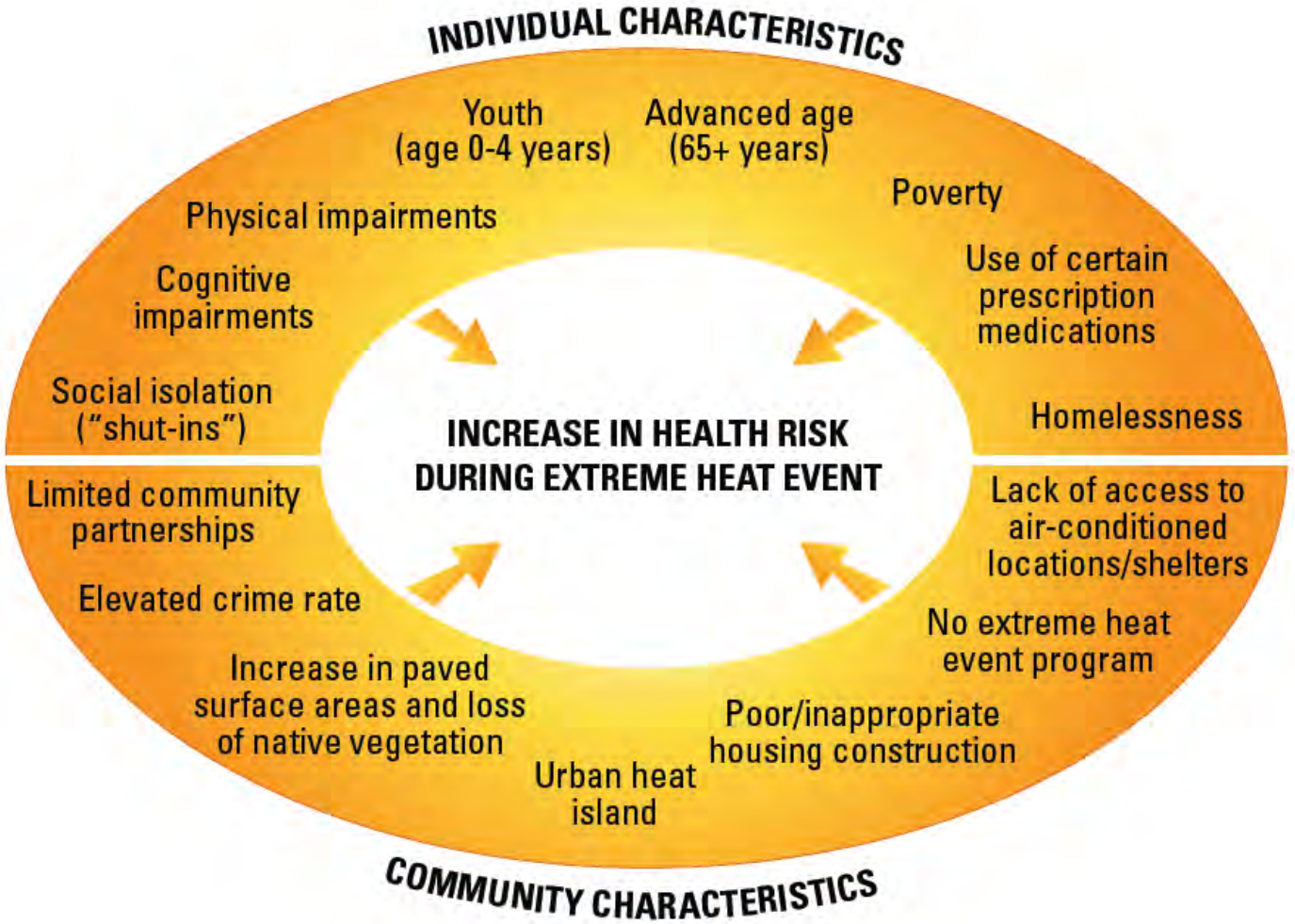
Study by Schwartz et al. (2015)

- Map shows projected increase in death rates due to warming in the warmer months

Focus of 2017 Heat Planning

- Preparing for an extreme heat event greater than we have experienced previously
  - High intensity
  - Long duration
- Enhanced response strategies now will prepare us for future extreme heat events
- Update the Citywide Excessive Heat Plan
  - Goal date: Memorial Day weekend 2017
  - Emphasis on outreach to vulnerable populations, both pre-event and during event

Individual and Community Risk Factors

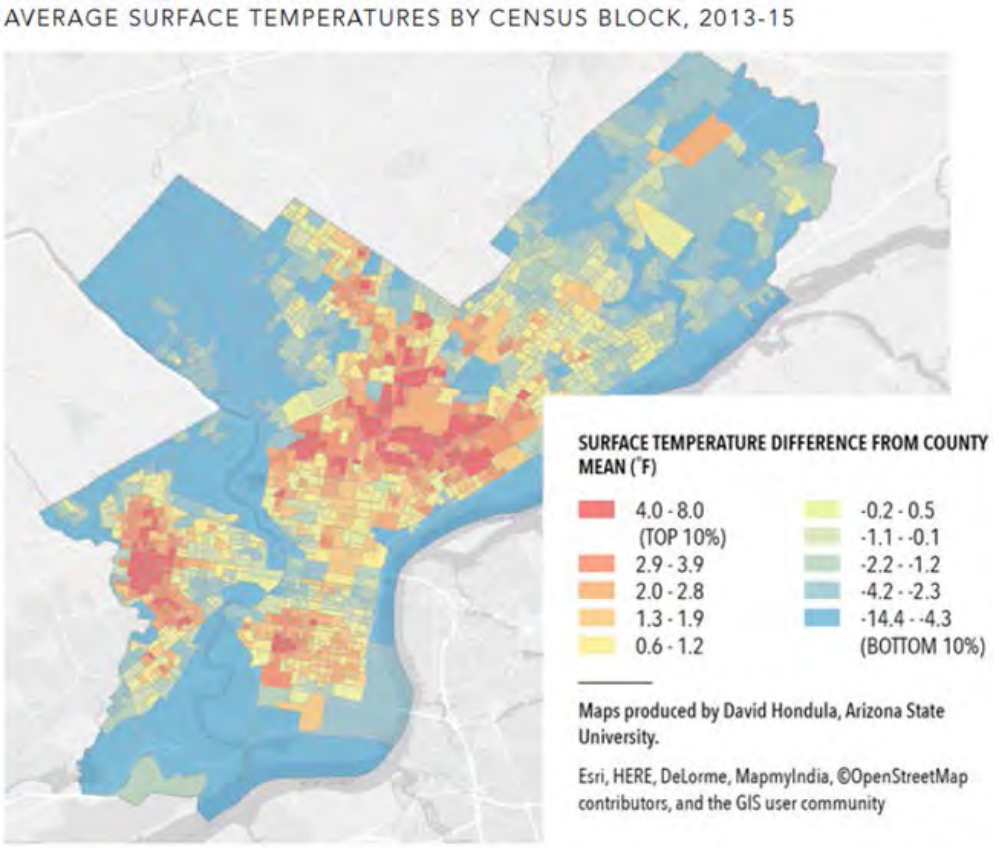


Extreme Heat and Chronic Conditions

- Obesity
  - Overweight (33.4% of adult population in Philadelphia)
- Diabetes
  - Diabetes (15.5% of adult population in Philadelphia)
- Cardiovascular disease
  - Hypertension (38.3% of adult population in Philadelphia)
- Respiratory disease
  - PADOH estimated 2013 citywide pediatric asthma prevalence at 22% percent
- Renal disease
- Mental health conditions

Urban Heat Island

- Difference between air and surface temps in urban area vs. temps in suburban/rural areas
  - Annual mean air temp of a city with 1 million people can be 1.8–5.4°F warmer than surrounding areas (EPA)
  - In the evening, the difference can be as high as 22°F (12°C)
    - Limits potential relief of cooler nighttime temps
- Heat islands can increase energy demand and costs, air pollution, heat-related illness and mortality

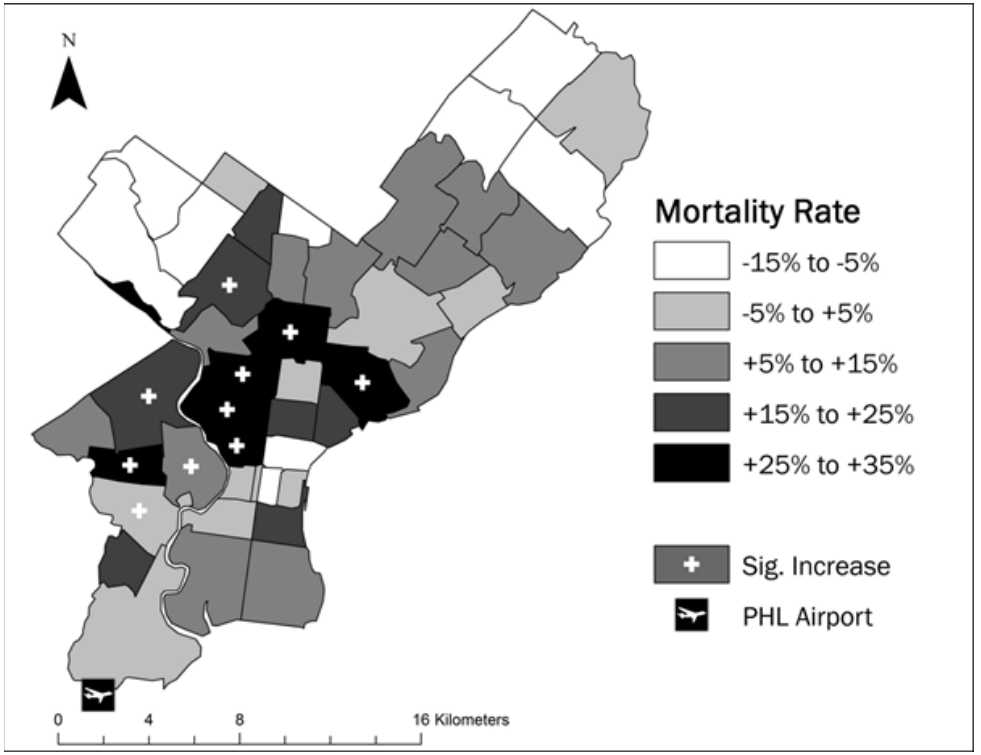


Data are for the seven hottest days on which mostly cloud-free Landsat imagery was available. *Image courtesy of David Hondula, Arizona State University*

Heat-Related Mortality Risk

- Study by Hondula et al. (2012) of years 1983-2008 in Philadelphia:
  - Elevated mortality rates observed for some parts of city in response to high temperatures
  - Factors related to high heat mortality risk:
    - Proximity to high surface temperatures
    - Low socioeconomic status
    - High density residential zoning
    - Age

- Recommendation: Future interventions should target high-risk areas



Social Environmental Approach for Mapping Heat Vulnerability in Philadelphia

- Social Vulnerability Factors:
  - Age 65 and over
  - Living alone
  - Age 65 and over + living alone
  - Low SES (Unable to afford air conditioning, poor housing conditions, lack of adequate health care)
  - Limited English proficiency
  - Low education (less than high school diploma)
- Environmental Factors:
  - High surface temps
  - Lack of nearby green space
  - Lack of cool spaces

Considerations for Excessive Heat Plan Update

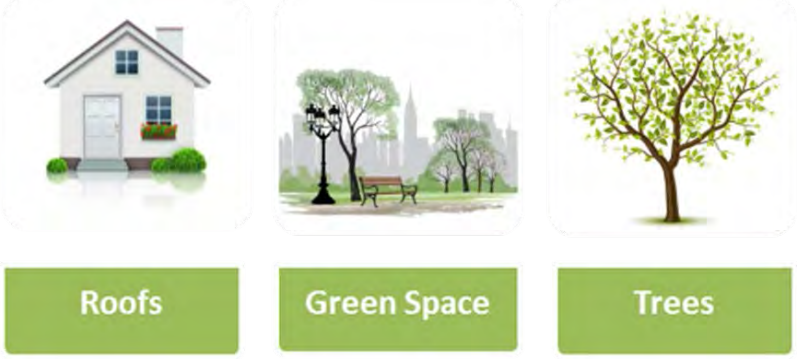
- Education and Pre-season Preparedness
  - Conduct targeted pre-season community workshops about extreme heat preparedness
  - Communicate with vulnerable populations about heat safety through healthcare and other service providers
- Excessive Heat Response
  - Neighborhood canvassing immediately prior to a heat event
  - Assess locations of cooling centers, ensure citywide accessibility
  - PCA Heatline, PDPH mobile teams
  - Block captains, buddy systems
  - Coordinated public information campaign

PDPH Short-term Strategies for Extreme Heat Adaptation

- Continue to conduct heat-related morbidity and mortality surveillance
- Educate community members about extreme heat and adverse impacts on health, including distributing culturally competent outreach materials focused on preventing heat-related illness
- Educate healthcare providers about impacts of extreme heat on health and risks for patients with chronic health conditions

Longer Term Strategies

- EPA'S Heat Island Cooling Strategies
  - **Trees and vegetation**: increasing tree and vegetation cover lowers surface and air temps
  - **Green roofs**: growing a vegetative layer (plants, trees, etc.) reduces temp of the roof surface
  - **Cool roofs**: installing a cool roof reduces roof temps and lowers energy demand
  - **Cool pavements**: more reflective paving materials cool the pavement surface and surrounding air
  - **Smart growth**: development and conservation strategies help protect the natural environment and make communities more livable



Closing Thoughts

- Raise awareness about climate change and expected health impacts across all sectors:
  - Government agencies and officials
  - Community-based organizations
  - Healthcare providers
  - All communities, and especially vulnerable populations
  - Families and individuals
- Frame the issue in new ways
  - Health is a great focus because it's relatable
- Emphasize the importance of increasing resilience and other co-benefits of adaptation activities
  - Biking/walking have positive environmental and health benefits

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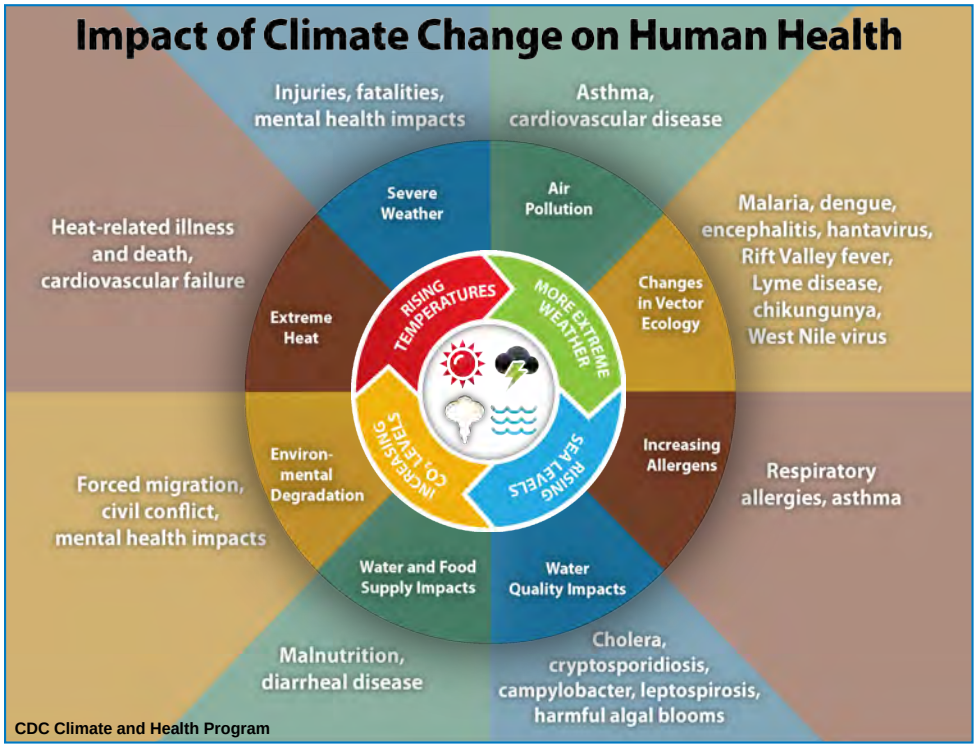
Point of contact

- For more information, please contact:
  - Jessica Caum, Assistant Program Manager, Public Health Preparedness, jessica.caum@phila.gov

Climate Change

Endangering human health and well being

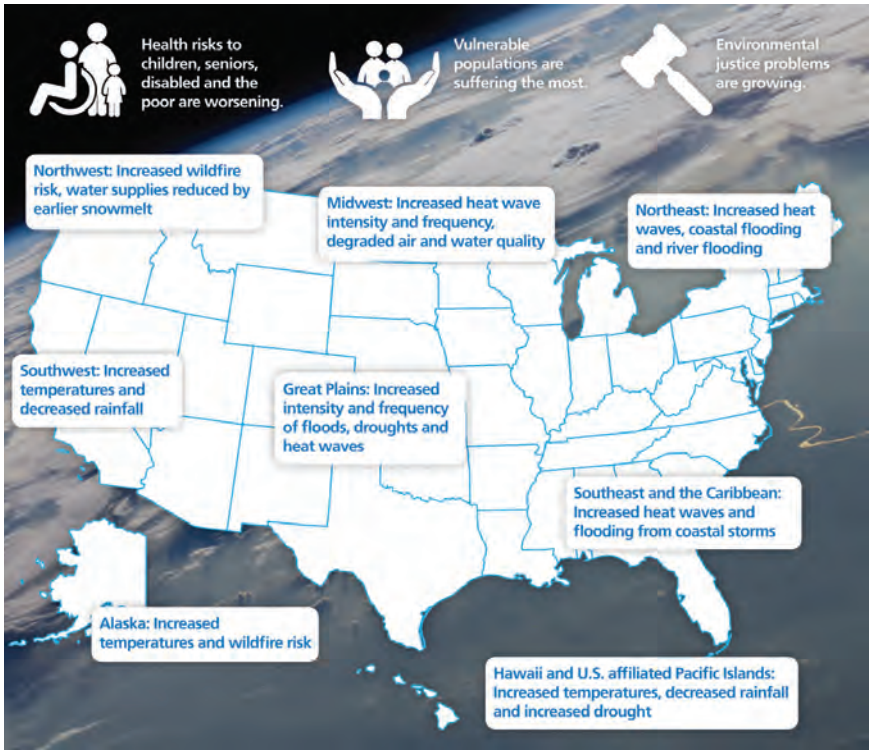
Climate change and extreme weather events are threatening our health today, and if left unchecked, will lead to increases in disease and death. Immediate action can and must be taken to slow climate change and prepare the public health system to protect our communities from negative health impacts.



Vulnerable Populations are Most at Risk

Vulnerable populations, such as communities of color, the elderly, young children, the sick and the poor, bear the greatest burden of disease and death related to climate change. The existing conditions that cause worse health among these populations – unhealthy air, water and living conditions, heat, drought, flooding and mental health stresses – are exacerbated by the adverse effects of climate change.

Communities located in ecologically sensitive areas – arid states, coastal communities and permafrost regions – are also uniquely vulnerable to the effects of climate change. These communities are not only at increased risk for disease, they are also the least able to prepare, respond to and recover from the effects of climate change and extreme climate events.

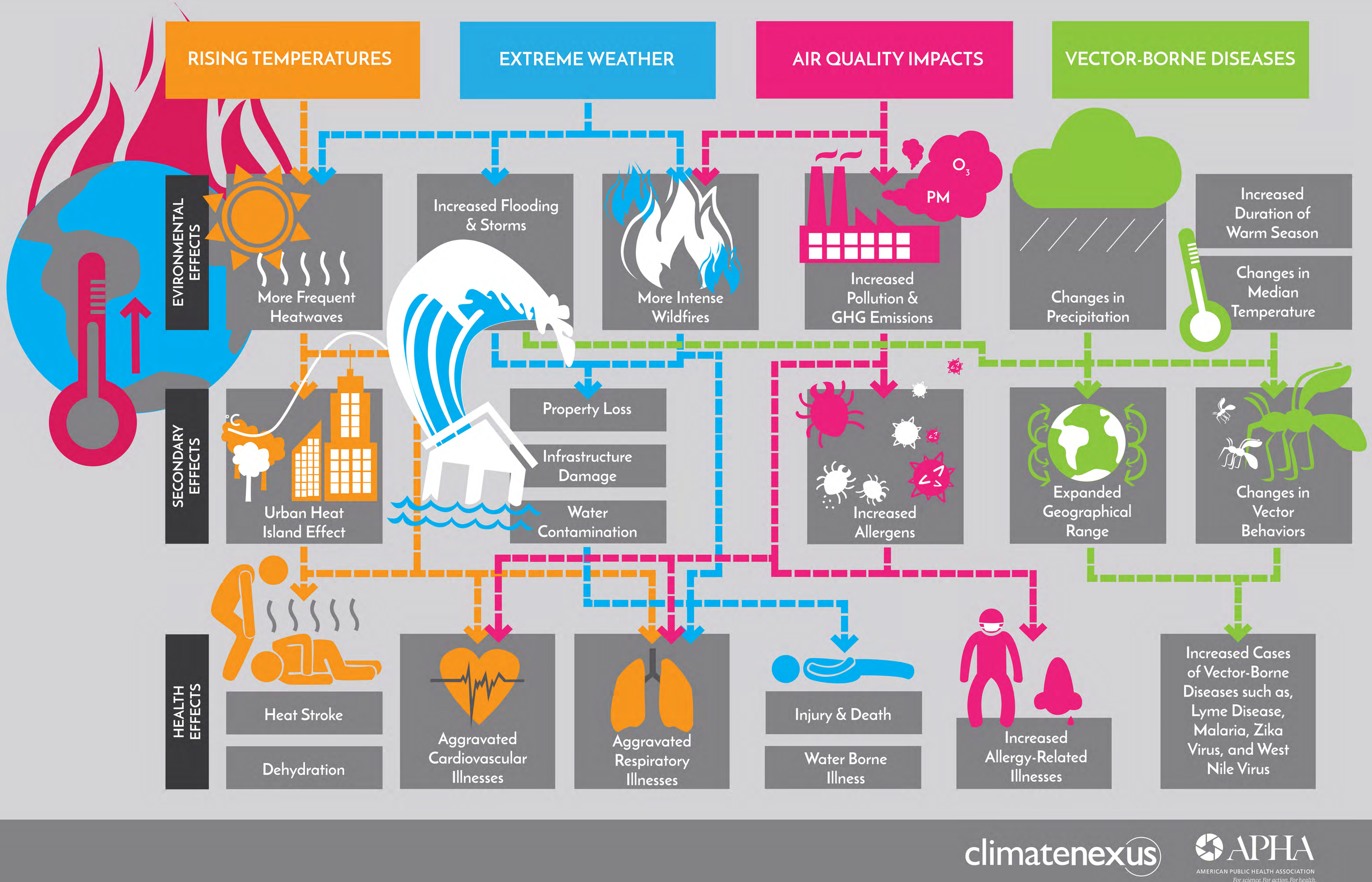


Source: Third National Climate Assessment: Climate Change Impacts in the United States.

To better protect the public from the negative health impacts of climate change, APHA supports the following legislative, regulatory and policy efforts:

- **The Centers for Disease Control and Prevention's Climate and Health Program,** which provides critical guidance, technical support and funding to help prepare and protect the nation from the harmful impacts of climate change.
- **The Environmental Protection Agency's Clean Power Plan,** which will reduce carbon emissions and slow climate change and reduce other harmful air pollutants.
- **The Climate Change Health Protection and Promotion Act,** which addresses negative health effects related to climate change by supporting research, surveillance, planning and interagency coordination to develop national plan for action.
- **Non-health sector policies that can offer co-benefits** – by reducing harmful air emissions and promoting healthy living – such as transitioning to cleaner energy, healthy community design and healthy food production and consumption.

HOW CLIMATE CHANGE AFFECTS YOUR HEALTH



climatenexus

APHA
AMERICAN PUBLIC HEALTH ASSOCIATION
For science. For action. For health.

EPA United States Environmental Protection Agency

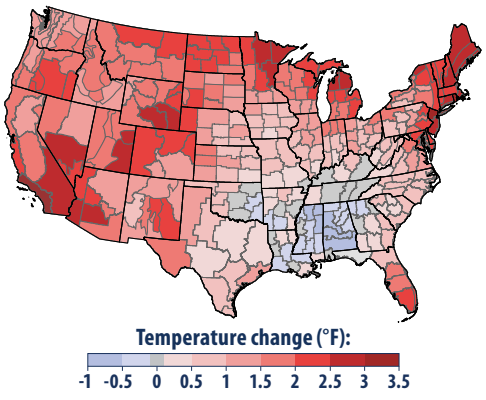
August 2016
EPA 430-F-16-032

What Climate Change *Means for* New Jersey

New Jersey's climate is changing. The state has warmed by about three degrees (F) in the last century, heavy rainstorms are more frequent, and the sea is rising about one inch every six years. Higher water levels are eroding beaches, submerging low lands, exacerbating coastal flooding, and increasing the salinity of estuaries and aquifers. In the coming decades, changing the climate is likely to increase coastal and inland flooding, harm coastal and inland ecosystems, disrupt fishing and farming, and increase some risks to human health.

Our climate is changing because the earth is warming. People have increased the amount of carbon dioxide in the air by 40 percent since the late 1700s. Other heat-trapping greenhouse gases are also increasing. These gases have warmed the surface and lower atmosphere of our planet about one degree during the last 50 years. Evaporation increases as the atmosphere warms, which increases humidity, average rainfall, and the frequency of heavy rainstorms in many places—but contributes to drought in others.

Greenhouse gases are also changing the world's oceans and ice cover. Carbon dioxide reacts with water to form carbonic acid, so the oceans are becoming more acidic. The surface of the ocean has warmed about one degree during the last 80 years. Warming is causing snow to melt earlier in spring, and mountain glaciers are retreating. Even the great ice sheets on Greenland and Antarctica are shrinking. Thus the sea is rising at an increasing rate.



Rising temperatures in the last century. New Jersey has warmed more than twice as much as most of the nation. Source: EPA, Climate Change Indicators in the United States.

Increasing Temperature and Changing Precipitation Patterns

Rising temperatures and shifting rainfall patterns are likely to increase the intensity of both floods and droughts. Average annual precipitation in New Jersey has increased 5 to 10 percent in the last century, and precipitation from extremely heavy storms has increased 70 percent in the Northeast since 1958. During the next century, annual precipitation and the frequency of heavy downpours are likely to keep rising. Precipitation is likely to increase during winter and spring, but not change significantly during summer and fall. Rising temperatures will melt snow earlier in spring and increase evaporation, and thereby dry the soil during summer and fall. So changing the climate is likely to intensify river flooding during winter and spring, and drought during summer and fall.

Rising Seas and Retreating Shores

Sea level is rising more rapidly along the New Jersey shore than in most coastal areas because the land is sinking. If the oceans and atmosphere continue to warm, the sea is likely to rise eighteen inches to four feet along the New Jersey shore in the next century.

As sea level rises, the lowest dry lands are submerged and become either tidal wetland or open water. Many wetlands will be submerged, but not all: the freshwater wetlands along the Delaware River upstream from the Commodore Barry Bridge build their own land by capturing sediments carried by the river, and these wetlands are likely to keep pace with the rising sea during the next century. Nevertheless, most salt marshes between Cape May and the Meadowlands are unlikely to keep pace if sea level rises three feet. Wetlands along Delaware Bay in Cumberland County are even more vulnerable, and likely to be lost if the sea rises two feet. Tidal flats are also likely to become open water.

Beaches erode as sea level rises. A higher ocean level makes it more likely that storm waters will wash over a barrier island or open new inlets. The United States Geological Survey estimates that barrier islands of the New Jersey shore from Bay Head to Cape May would be broken up by new inlets or lost to erosion if sea level rises three feet by the year 2100, unless people take actions to reduce erosion. Bay beaches may also be eliminated in some areas. Many of Delaware Bay's beaches are narrow, with wetlands immediately inland. Along parts of Delaware Bay and bay sides of most barrier islands, people have built walls and other shore protection structures that eliminate the beach once the shore erodes up to them.

This beach in Pennsville along the Delaware River could be lost as sea level rises, if the shore erodes up to the shore protection wall to the right. © James G. Titus; used by permission.

Coastal Ecosystems

The loss of tidal marshes could harm fish and birds that depend on a marsh for food or shelter. Blue crab, perch, weakfish, flounder, and rockfish rely on the tidal marshes in Delaware Bay to hide from predators and to feed on mussels, fiddler crabs, and other species. Sea turtles and shorebirds also feed on some of the species that inhabit these marshes. Great blue herons, black ducks, ospreys, red-winged blackbirds, and several other bird species also use the salt marshes in Delaware Bay. As marshes erode, fish may benefit initially as more tidal channels form, which would make more of the marsh accessible. But after a point, the continued erosion would make less marsh available, so populations of fish and birds could decline. In Barnegat Bay and Little Egg Harbor, the rising sea is already eroding and submerging small marsh islands, which are important nesting areas that protect common terns, black skimmers, and oystercatchers from land-based predators.

The loss of bay beaches and tidal flats would also threaten some species. Delaware Bay is a major stopover area for six species of migratory shorebirds that feed on its beaches and tidal flats, including most of the Western Hemisphere's red knot population. Nearly a million birds feed on the horseshoe crab eggs on the bay's sandy beaches. Diamondback terrapin nest on estuarine beaches in New Jersey.

Changing temperatures could also disrupt ecosystems. For example, if water temperatures exceed 86°F during summer, eelgrass could be lost, which would remove a key source of food for many fish.

Saltwater Intrusion

As sea level rises, salt water can mix farther inland or upstream in bays, rivers, and wetlands. Because water on the surface is connected to ground water, salt water can also intrude into aquifers near the coast. Soils may become too salty for the crops and trees that currently grow in low-lying areas.

Storms, Homes, and Infrastructure

As sea level rises, coastal homes and infrastructure flood more often because storm surges become higher as well. Although hurricanes are rare, homes along the ocean are vulnerable to erosion and storm waves. The bay sides of several barrier islands are so low that some streets and yards flood at high tide when strong winds blow from the east. During Hurricane Sandy, flooding and storm waves destroyed coastal homes and recreational facilities, washed out roads, inundated rail tunnels, and damaged essential power and wastewater management infrastructure.

A flooded restaurant on Long Beach Island. © James G. Titus; used by permission.

Seaside Heights in the aftermath of Hurricane Sandy. Official White House photo by Sonya N. Herbert.

Wind speeds and rainfall intensity during hurricanes and tropical storms are likely to increase as the climate warms. Rising sea level is likely to increase flood insurance rates, while more frequent storms could increase the deductible for wind damage in homeowner insurance policies.

Fishing and Farms

Changing the climate may harm commercial fishing in New Jersey. Higher ocean acidity would impair the ability of young scallops and surf clams to build shells, and potentially reduce the populations of these two shellfish, which account for about two-thirds of New Jersey's commercial fishing revenues. Higher acidity in estuaries, as well as the loss of wetlands and eelgrass, could harm crabs and hard shell clams, which account for another 15 percent of fishing revenues. As ocean temperatures rise, some fish species are moving northward or into deeper waters to remain within their normal temperature ranges.

Climate change may also pose challenges for agriculture: some farms may be harmed if more hot days and droughts reduce crop yields, or if more flooding and wetter springs delay their planting dates. Other farms may benefit from a longer growing season and the fertilizing effect of carbon dioxide.

Human Health

Hot days can be unhealthy—even dangerous. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. High air temperatures can cause heat stroke and dehydration, and affect people's cardiovascular and nervous systems. Warmer temperatures can also increase the formation of ground-level ozone, a component of smog that can contribute to respiratory problems. Rising temperatures may also increase the length and severity of the pollen season for plants such as ragweed.

The risk of some diseases carried by insects may also increase. The ticks that transmit Lyme disease are active when temperatures are above 45°F, so warmer winters could lengthen the season during which ticks can become infected or people can be exposed to the ticks. Higher temperatures would also expand the area that is warm enough for the Asian tiger mosquito, a common carrier of West Nile virus. The number of cases may or may not increase, depending on what people do to control insect populations and avoid insect bites.

The sources of information about climate and the impacts of climate change in this publication are: the national climate assessments by the U.S. Global Change Research Program, synthesis and assessment products by the U.S. Climate Change Science Program, assessment reports by the Intergovernmental Panel on Climate Change, and EPA's *Climate Change Indicators in the United States*. Mention of a particular season, location, species, or any other aspect of an impact does not imply anything about the likelihood or importance of aspects that are not mentioned. Depiction of trade names does not constitute endorsement of the product. For more information about climate change science, impacts, responses, and what you can do, visit EPA's Climate Change website at www.epa.gov/climatechange.

EPA United States Environmental Protection Agency

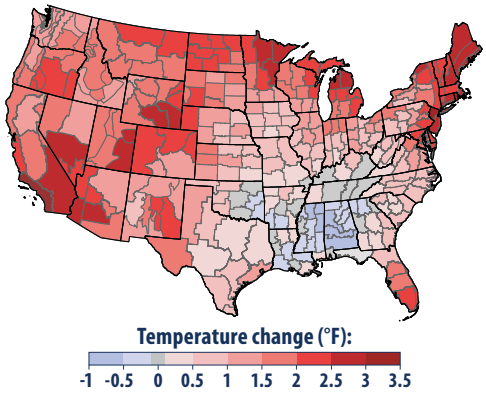
August 2016
EPA 430-F-16-040

What Climate Change Means for Pennsylvania

Pennsylvania's climate is changing. The commonwealth has warmed more than half a degree (F) in the last century, heavy rainstorms are more frequent, and the tidal portion of the Delaware River is rising about one inch every eight years. In the coming decades, changing the climate is likely to increase flooding, harm ecosystems, disrupt farming, and increase some risks to human health.

Our climate is changing because the earth is warming. People have increased the amount of carbon dioxide in the air by 40 percent since the late 1700s. Other heat-trapping greenhouse gases are also increasing. These gases have warmed the surface and lower atmosphere of our planet about one degree during the last 50 years. Evaporation increases as the atmosphere warms, which increases humidity, average rainfall, and the frequency of heavy rainstorms in many places—but contributes to drought in others.

Greenhouse gases are also changing the world's oceans and ice cover. Carbon dioxide reacts with water to form carbonic acid, so the oceans are becoming more acidic. The surface of the ocean has warmed about one degree during the last 80 years. Warming is causing snow to melt earlier in spring, and mountain glaciers are retreating. Even the great ice sheets on Greenland and Antarctica are shrinking. Thus the sea is rising at an increasing rate.



Rising temperatures in the last century. All regions of Pennsylvania have warmed. Source: EPA, Climate Change Indicators in the United States.

Increasing Temperature and Changing Precipitation

Rising temperatures and shifting rainfall patterns are likely to increase the intensity of both floods and droughts. Average annual precipitation in Pennsylvania has increased 5 to 10 percent in the last century, and precipitation from extremely heavy storms has increased 70 percent in the Northeast since 1958. During the next century, annual precipitation and the frequency of heavy downpours are likely to keep rising. Precipitation is likely to increase during winter and spring, but not change significantly during summer and fall. Rising temperatures will melt snow earlier in spring and increase evaporation, and thereby dry the soil during summer and fall. As a result, changing the climate is likely to intensify flooding during winter and spring, and drought during summer and fall.

In 2011, Hurricane Irene caused the Schuylkill River to overflow its banks, flooding a rail line, bike path, and other infrastructure in Philadelphia. Credit: Sarah Clark Stuart, Bicycle Coalition of Greater Philadelphia.

Higher Tides Along the Delaware River

Sea level is rising more rapidly along Pennsylvania's shoreline than in most coastal areas because the Delaware Valley is sinking. If the oceans and atmosphere continue to warm, the tidal portion of the Delaware River is likely to rise one to four feet in the next century. Parts of Philadelphia International Airport and neighborhoods to the north are within two or three feet above the average high tide on the Delaware River. In downtown Philadelphia, Penn's Landing and the Northeast Corridor railroad tracks at 30th Street Station are currently in the 100-year floodplain. Along the Delaware and Schuylkill rivers, a higher sea level could increase the extent of flooding caused by either coastal storms or severe rainstorms, unless communities take measures to hold back the rising rivers.

Tidal marshes like this one at Tinicum are vulnerable to destruction and saltwater intrusion as sea level rises. Credit: Partnership for the Delaware Estuary.

The tidal freshwater wetlands along the Delaware River are likely to capture enough sediment for their land surfaces to keep pace with rising sea level. But both rising sea level and increasing drought enable salt water to mix farther up the Delaware River, which could kill wetland plants. In places where that occurs, wetlands might be replaced by either salt-tolerant wetland plants or shallow waters. Higher salinity could also create problems for Philadelphia's water supply during droughts, if salty water moves upstream to the city's drinking water intake at Torresdale.

Inland Waters

Extraordinarily high river flows occasionally cause problems for commercial navigation along the Ohio and Allegheny rivers, and riverfront communities along the Susquehanna River and smaller tributaries occasionally flood. Heavier storms and greater river flows could make these problems worse. In 2011, heavy rainfall caused record flooding on the Susquehanna and the evacuations of Wilkes-Barre. Conversely, lower summer rainfall and higher evaporation could leave some rivers too shallow for navigaton during droughts.

One advantage of climate change is that warmer winters reduce the number of days that ice prevents navigation on rivers and in the Great Lakes. Between 1994 and 2011, reduced ice cover lengthened the shipping season on the Great Lakes by eight additional days. The Great Lakes are likely to warm another 3° to 7°F in the next 70 years, which will further extend the shipping season. The impact of climate change on water quality is less likely to be beneficial. Warmer temperatures tend to cause more algal blooms, which can be unsightly, harm fish, and degrade water quality. Severe storms also increase the amount of pollutants that run off from the land into the water, further increasing the risk of algal blooms.

Ecosystems

Changing the climate threatens ecosystems by disrupting the existing relationships between species. Wildflowers and woody perennials are blooming—and migratory birds are arriving—sooner in spring. Not all species adjust in the same way, however, so the food that one species needs may no longer be available when that species arrives on its migration. As a result, for example birds in western Pennsylvania have had lower body weights during warm years. Warmer temperatures allow deer populations to increase, leading to a loss of forest underbrush, which, in turn, makes some animals more vulnerable to predators. Rising temperatures also enable invasive species to move into areas that were previously too cold.

Agriculture

Changing climate will have both beneficial and harmful effects on farming, but the net effect is unknown. Longer frost-free growing seasons and higher concentrations of atmospheric carbon dioxide would increase yields for many crops during an average year, notably soybeans. But increasingly hot summers are likely to reduce yields of corn, Pennsylvania's most important crop. The earlier arrival of spring may increase populations of major crop pests, such as the corn earworm and aggressive weeds. Higher temperatures cause cows to eat less and produce less milk, so a warming climate could reduce the output of milk and beef, which together account for more than one-third of the commonwealth's farm revenues.

Human Health

Hot days can be unhealthy—even dangerous. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. High air temperatures can cause heat stroke and dehydration, and affect people's cardiovascular and nervous systems. Warmer temperatures can also increase the formation of ground-level ozone, a key component of smog that can contribute to respiratory problems. Rising temperatures may also increase the length and severity of the pollen season for plants such as ragweed.

The risk of some diseases carried by insects may also increase. The ticks that transmit Lyme disease are active when temperatures are above 45°F, so warmer winters could lengthen the season during which ticks can become infected or people can be exposed to the ticks. Higher temperatures would also expand the area that is warm enough for the Asian tiger mosquito, a common carrier of West Nile virus. The number of cases may or may not increase, depending on what people do to control insect populations and avoid insect bites.

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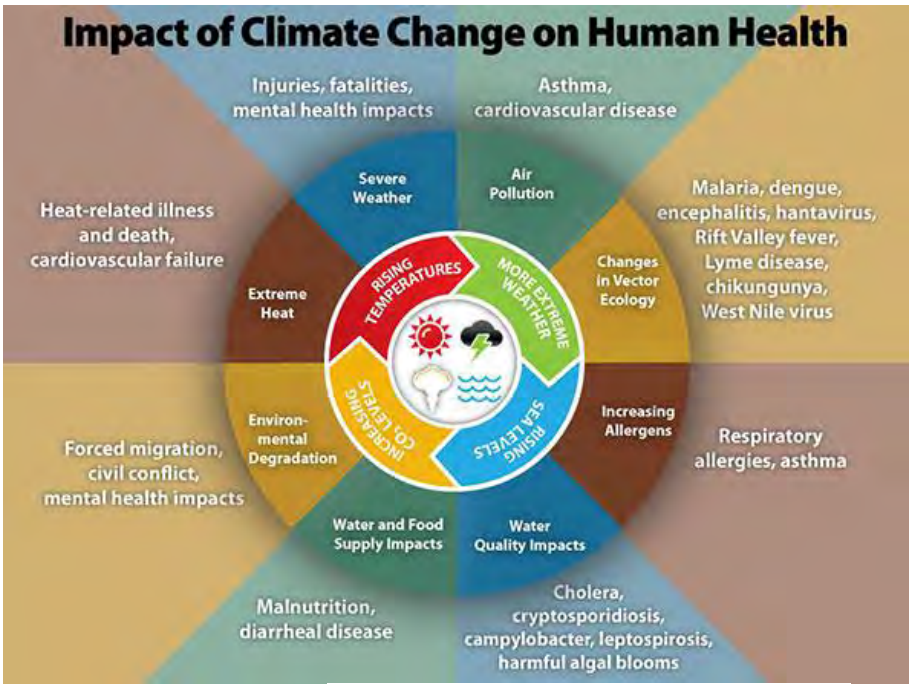
New Jersey Climate Change and Public Health Working Group:

A Partnership Facilitated by the New Jersey Climate Adaptation Alliance

Climate change presents serious challenges to public health in New Jersey as well as in the United States and around world. The multidimensional impacts of climate change include direct health effects of more frequent, intense, and longer-lasting extreme heat events that also worsen risks of drought, wildfire, and air pollution risks; increasingly frequent extreme precipitation, intense storms, and changes in precipitation patterns that lead to drought and ecosystem changes, and rising sea levels that intensify coastal flooding and storm surge.

In the coming decades, New Jersey can expect an increase in average annual temperature and precipitation, with more rain in the winter. More intense extreme weather events are anticipated, including heat waves, hurricanes, and extreme precipitation events with subsequent flooding. New Jersey is also at risk of more frequent and severe coastal flooding due to sea level rise. [1]



U.S. Centers for Disease Control and Prevention

Predicted health effects from conditions of a changing climate include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and waterborne illnesses and other infectious diseases, and threats to mental health. Not everyone is equally at risk. Important considerations include demographic conditions (e.g. age, race) socioeconomic status and availability of economic resources, current level of health and exposure to additional health stressors, and location (e.g. floodplains, coastal zones, and urban areas).[2]

The New Jersey Climate Adaptation Alliance is a network of diverse organizations from throughout the State that have come together to build capacity in New Jersey to prepare for impacts of a changing climate.[3] The Alliance is participated in and facilitated by several programs at Rutgers University including the Rutgers Climate Institute, the Edward J. Bloustein School of Planning and Public Policy, the School of Public Health and the Rutgers Robert Wood Johnson Medical School. Under the umbrella of the Alliance, these partners, in collaboration with the New Jersey Public Health Association and the New Jersey Association of County and City Health Officials, are convening a ***Public Health and Climate Change Working Group*** to build capacity to address public health impacts of climate change in New Jersey.

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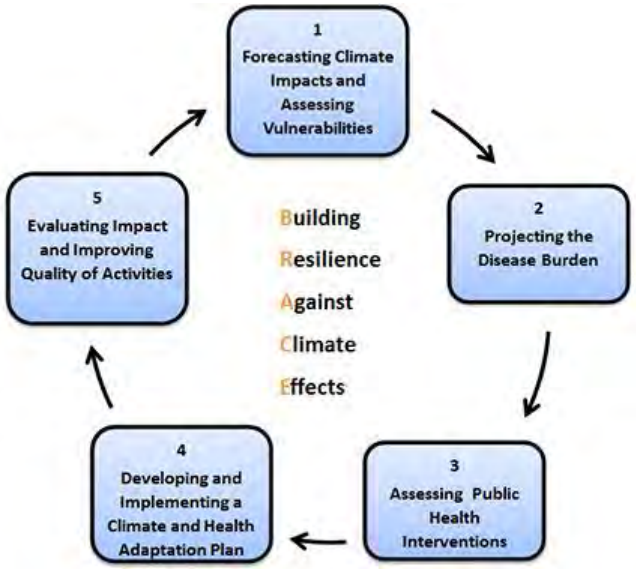
[1] http://climatechange.rutgers.edu/resources/state-of-the-climate-new-jersey-2013

[2] http://nca2014.globalchange.gov/report/sectors/human-health

[3] http://njadapt.rutgers.edu/

The United States Center for Disease Control and Prevention (CDC) is working with 16 states and 2 cities as part of CDC's "Climate-Ready States and Cities Initiative" to prepare comprehensive programs that predict and prepare for health impacts of climate change. [4] CDC's effort is guided by five sequential steps, the Building Resilience Against Climate Effects (BRACE) framework that is designed to increase climate change preparedness in the public health community. The BRACE framework applies a risk management approach to allow a state to use the best available science to project likely climate change health impacts and prioritize interventions. Adopting BRACE reinforces the public health community's established commitment to evidence-based practice and institutional learning, both of which are central to successfully engaging the significant new challenges that climate change presents.[5]



U.S. Centers for Disease Control and Prevention

While New Jersey does not currently participate in the CDC "Climate-Ready States and Cities Initiative," CDC is prepared to provide technical support to a new ***New Jersey Public Health and Climate Change Working Group*** and to bring CDC's scientific expertise and the experiences of the other participating jurisdictions to support a collaborative effort in New Jersey under the umbrella of the Climate Adaptation Alliance. The ***Public Health and Climate Change Working Group*** will be focusing on several initial efforts during Fall 2015 and winter 2016. The Group will:

- Advise Rutgers on the development of a New Jersey *Climate and Health Profile Report (CHPR)* that will serve to qualitatively describe likely impacts of climate change and anticipated ways in which those impacts will influence health outcomes in New Jersey. The CHPR will present a broad, statewide assessment of demographic, geographic and occupational vulnerability to climate change risks. The CHPR will serve as an initial "framing" document to educate practitioners, decision-makers and the general public as well as to inform a subsequent, more detailed and quantitative assessment of vulnerable populations, projections of disease burden and identification of likely interventions to reduce negative health impacts;
- Provide Rutgers with input on initial development of approaches to quantitatively assess vulnerability and projected disease burden beginning with a proof in concept on compilation of data on temperature and heat;
- Serve as a planning committee for a January 2016 statewide public health and climate change workshop and work session; and
- Identify any immediate efforts (e.g. development of outreach and educational materials) that can and should be undertaken in New Jersey to attain short-term gains of increasing the State's capacity to prepare for public health impacts from climate change.

In addition to the Working Group, Rutgers has assembled an internal team of expert reviewers who are available to provide technical consultation and review of materials under development. These combined efforts are expected to better position New Jersey to receive future support and assistance in its efforts to increase capacity to address public health impacts of climate change. More information can be found at http://climatechange.rutgers.edu.

For more information, contact Jeanne Herb (jherb@ejb.rutgers.edu) or Dr. Marjorie Kaplan ((kaplan@envsci@rutgers.edu)

[4] http://www.cdc.gov/climateandhealth/climate_ready.htm
[5] http://www.cdc.gov/climateandhealth/brace.htm

CLIMATE CHANGE, ALLERGIES & YOU

What does climate change have to do with my allergies?

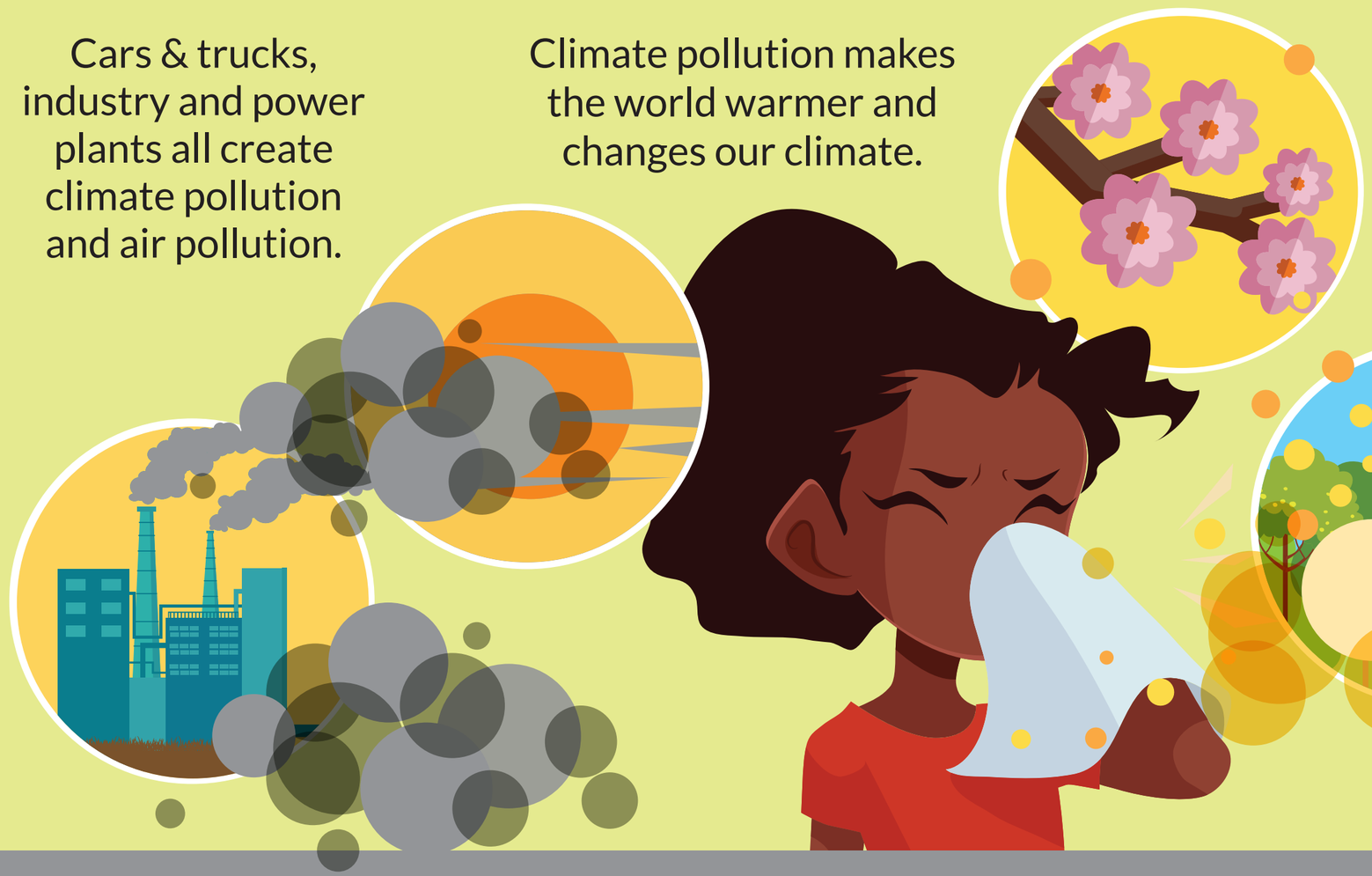
Cars & trucks, industry and power plants all create climate pollution and air pollution.

Climate pollution makes the world warmer and changes our climate.

Climate pollution in the atmosphere causes plants to make more pollen.

Warmer temperatures mean spring comes earlier, so the allergy season is longer.

Pollen from weeds, grasses and trees can cause allergies.



Who is most at risk? People with asthma may experience attacks on high pollen days.

You can take action today to make sure we have a healthy planet with healthy places for healthy people!

- Check daily pollen reports online at www.pollen.com
- When pollen counts are high:
  - Spend less time outdoors
  - Keep car and house windows shut
- Remove pollen from yourself and your environments:
  - Shower after being outside on high pollen days
  - Wash bedding and clothing often
  - Vacuum regularly and use a high efficiency particulate (HEPA) filter if you can
- Talk to your doctor about how to treat allergies
- Find out how you can be energy efficient or buy clean energy, like wind or solar
- Ask your city to plant low pollen trees, shrubs and grasses in your neighborhood
- Ask your local officials to move your community to clean energy now
- Vote for elected leaders that will act to cut climate pollution
- Join local efforts to fight climate pollution

Center for Climate Change & Health

To learn more and take action, visit:
www.climatehealthconnect.org/takeaction

PUBLIC HEALTH INSTITUTE®

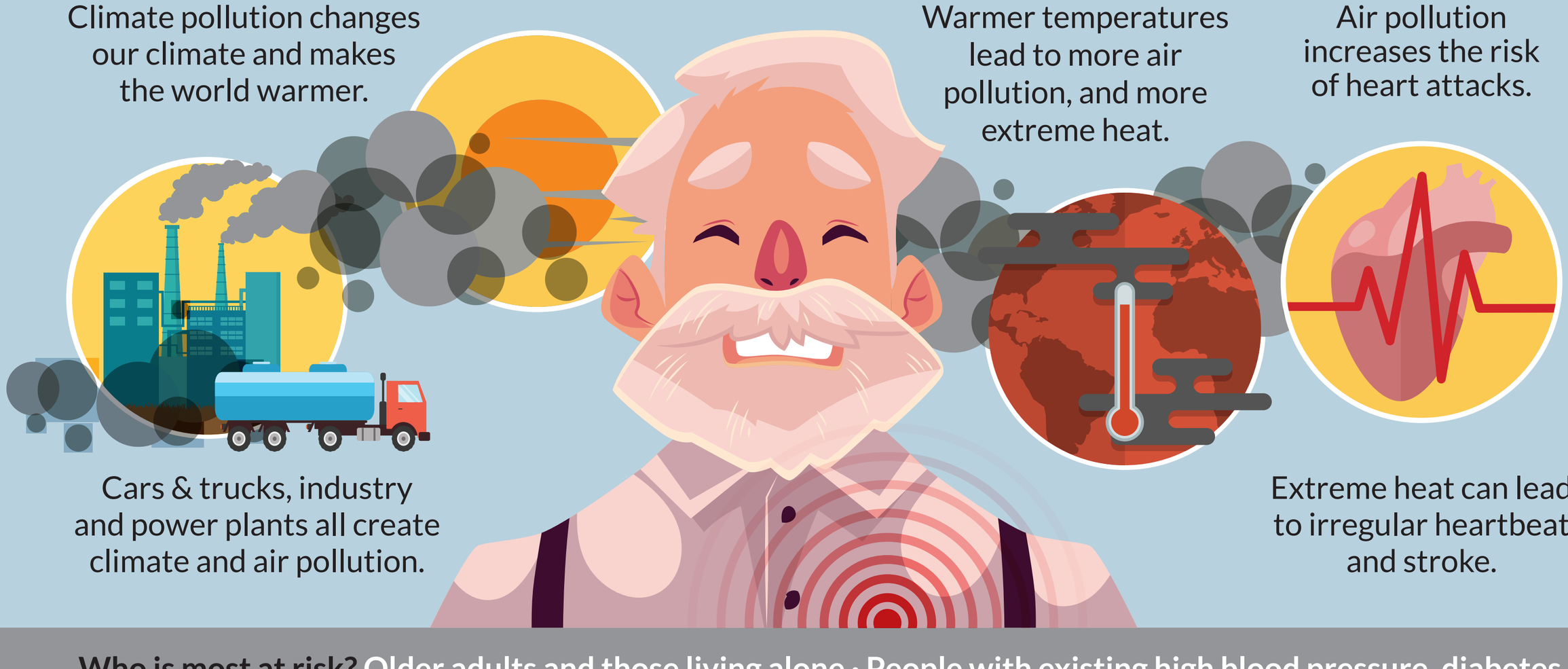
CLIMATE CHANGE, & HEART HEALTH

What does climate change have to do with heart disease?

Climate pollution changes our climate and makes the world warmer.

Warmer temperatures lead to more air pollution, and more extreme heat.

Air pollution increases the risk of heart attacks.



Cars & trucks, industry and power plants all create climate and air pollution.

Extreme heat can lead to irregular heartbeat and stroke.

Who is most at risk? Older adults and those living alone · People with existing high blood pressure, diabetes or obesity · People who smoke and people who drink too much · People who don't get enough exercise

You can take action today to make sure we have a healthy planet with healthy places for healthy people!

- Take a brisk 10-minute walk, 3 times a day if it is not too hot or polluted outside
- If you smoke, quit as soon as possible. Visit www.smokefree.gov
- Talk to your doctor about staying safe and healthy on extreme heat days
- Replace car trips with biking, walking and public transit
- Find out how you can be energy efficient or buy clean energy, like wind or solar
- Eat more locally grown fruits and vegetables, eat less red meat and processed foods
- Ask your state and local officials for:
  - Farmer's markets and community gardens in your neighborhood
  - Safe places to walk and bike
  - More trees, parks and green spaces
  - Clean energy, like wind or solar, in your community
- Vote for elected leaders that will act to cut climate pollution
- Join local efforts to fight climate pollution

Center for Climate Change & Health

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www.climatehealthconnect.org/takeaction

PUBLIC HEALTH INSTITUTE®

CLIMATE CHANGE, HEAT & YOU

What does heat have to do with my health?

Cars & trucks, industry and power plants all create climate pollution and air pollution.

Climate pollution makes the world warmer and changes our climate.

Climate change will lead to more extreme heat.

Extreme heat can cause heart attacks, asthma attacks, and problems with diabetes, kidney disease, and mental health.

THE URBAN HEAT ISLAND EFFECT

If you live in a city, it can get a lot hotter than if you lived in nearby suburb or rural area. Trees and green space provide shade and keep your neighborhood cool.

Who is most at risk? Older adults and young children · People with existing health problems like heart, lung and kidney disease and diabetes · People who live alone · People taking medicines for mental health problems · People who work or play outdoors, like farm and construction workers or athletes · People without air conditioning or cool shade

You can take action today to make sure we have a healthy planet with healthy places for healthy people!

- Cool off by using air conditioning or going to an air conditioned public space, taking more breaks when playing or working outdoors, and taking cool showers and baths
- Drink more water than normal and avoid alcohol and sugary or caffeinated drinks
- Check local news for alerts and safety tips
- Check on family, friends, neighbors and animals
- Find out how you can be energy efficient or buy clean energy, like wind and solar
- Ask for your local officials to plant trees and provide more parks and green spaces
- Ask your local officials to move your community to clean energy now
- Vote for elected leaders that will cut climate pollution
- Join local efforts to fight climate pollution

Center for Climate Change & Health

To learn more and take action, visit:
www.climatehealthconnect.org/takeaction

PUBLIC HEALTH INSTITUTE®

Resources

Speakers' Organizations' Websites

Maryland Department of Health and Mental Hygiene
dhmh.maryland.gov/pages/index.aspx

Maryland Public Health Strategy for Climate Change
phpa.dhmh.maryland.gov/OEHFP/EH/Pages/Climate_Change.aspx

New Jersey Climate Adaptation Alliance
njadapt.rutgers.edu/

Philadelphia Department of Public Health
www.phila.gov/health//index.html

Programs and Resource Collections

American Public Health Association – Climate Change
www.apha.org/topics-and-issues/climate-change

Public Health Institute – Center for Climate Change and Health
climatehealthconnect.org - or -
www.phi.org/focus-areas/?program=center-for-public-health-and-climate-change

Rutgers Climate Institute
climatechange.rutgers.edu/

U.S. Climate and Health Alliance
usclimateandhealthalliance.org/

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention – Climate and Health
www.cdc.gov/climateandhealth/

U.S. Environmental Protection Agency – Climate Change Impacts: Human Health
www.epa.gov/climate-impacts/climate-impacts-human-health

Reports

American Public Health Association and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention: *Climate Change Increases the Number and Geographic Range of Disease-Carrying Insects and Ticks*. Available at: www.cdc.gov/climateandhealth/pubs/vector-borne-disease-final_508.pdf.

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