

# Addressing Climate Change Vulnerability from a Public Health Perspective

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Climate Change and Human Health Adaptation Workshop  
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## Overview

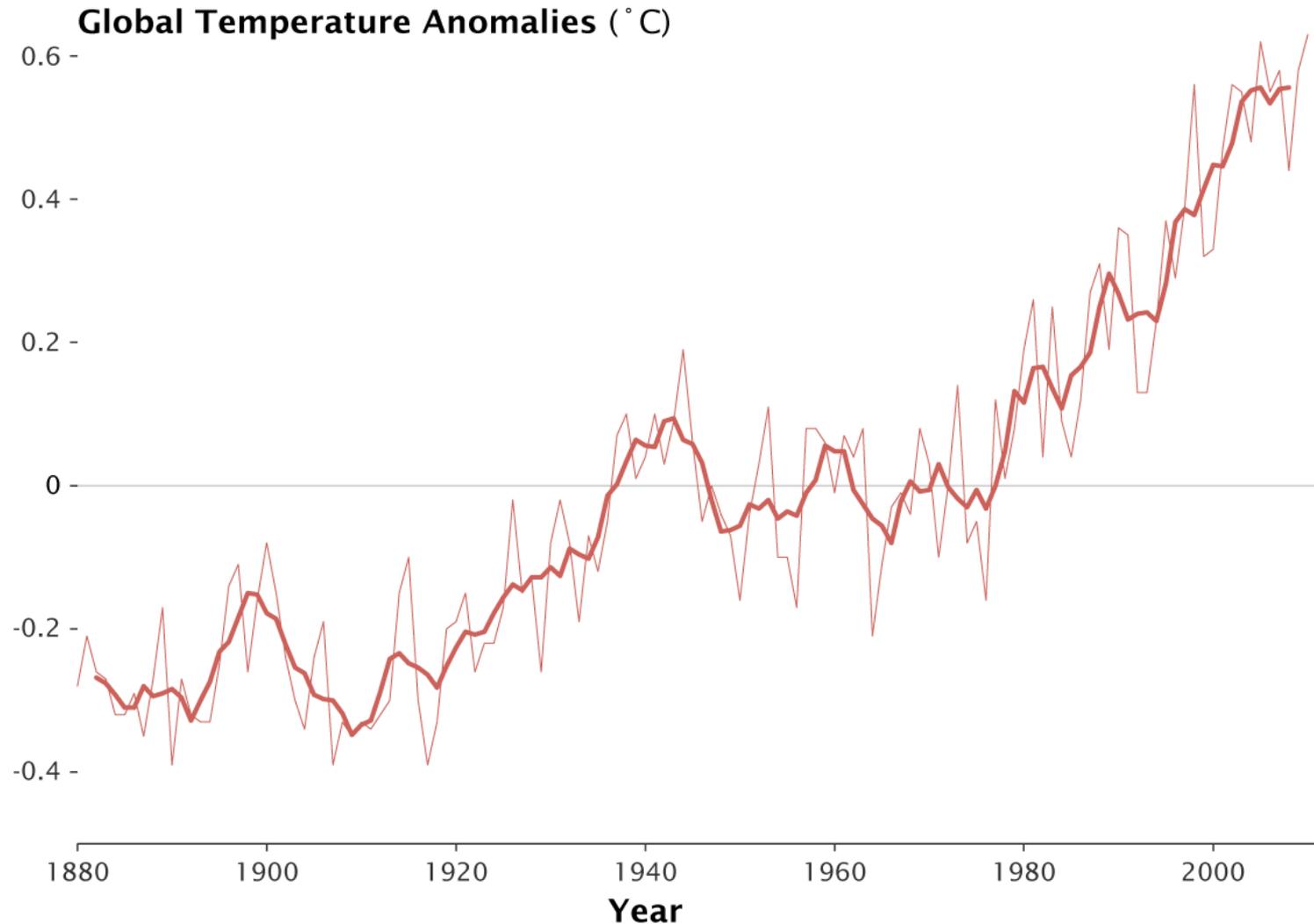
- Climate change and the HHS mission
- Key messages and current climate change and health policy initiatives
- Frameworks and approaches to health Vulnerability and Adaptation assessments
- Examples of community public health assessment activities
- Health care facilities and services vulnerability assessments

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*THE DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) is the United States government's principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves.*

- Climate Change will affect the HHS mission through both supply and demand sides
  - Impacts on the health and well-being of communities, especially those most vulnerable
  - Impacts on departmental operations and facilities

# The '00's were our hottest decade, with 2005 and 2010 as the hottest years



# April 2011 has been the cruelest month...

*The extreme weather and climate events of April 2011 were far reaching. ...Preliminary estimates place the total damage of property and economic impacts at over 20 billion U.S. dollars .... The individual extreme events ...have all been compared to the worst such events in U.S. history. In each of the previous 'worst cases in history', they occurred during different years, while several of these historical records were broken during the month of April 2011.*

*NOAA Special Report: Spring 2011 U.S. Climate Extremes  
<http://www.ncdc.noaa.gov/special-reports/2011-spring-extremes/index.php>*

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## Key Messages for Climate Change and Human Health

- Changes occurring in the world's climate are **affecting our health** and will have even greater impacts in the future.
- Climate change makes many **existing diseases and conditions worse**, although it may also lessen some cold-weather diseases.
- The **most vulnerable** among us—children, elderly people, those living in poverty, with underlying health conditions, or in certain geographic areas—are likely to have **less ability to cope or adapt**.
- Climate change places **stress on our health care systems**, public health infrastructure, and ability to deliver and receive health services.
- **We can take steps now** to prepare for changes in our climate that will protect our health, the health of our children, and that of future generations.
- Many actions to address and prepare for climate change will yield **extra benefits** for our health, our environment, our economy, and our society.

## U.S. Department of Health and Human Services Statement on Sustainable and Responsible Development In 2011

As required by the President's Executive Order on Sustainable and Responsible Development, we are releasing a statement that commits our agency to addressing the impacts climate change will have on our operations and assets through adaptation planning.

### U.S. Department of Health and Human Services (HHS) Sustainability and Climate Change Adaptation Policy Statement

June 3, 2011



“A number of scientific panels, including the U.S. Global Change Research Program, and International Panel on Climate Change, have published data indicating that climate change is already negatively affecting human health in the United States, and is likely to continue impacting human health in the future.”

A number of scientific panels, including the U.S. Global Change Research Program, and International Panel on Climate Change, have published data indicating that climate change is already negatively affecting human health in the United States, and is likely to continue impacting human health in the future. Hazards linked to climate change include increases in the frequency and severity of heat waves, droughts, wildfires, heavy rainfall, and flooding; changes in rates and ranges of infectious and allergic diseases; and threats to communities

from rising sea levels and coastal erosion. Although climate change may reduce certain health risks, most likely it will worsen many existing health threats, as well as introduce new ones. Individuals and communities with underlying vulnerabilities that contribute to poor health, such as poverty, being very young or old, having pre-existing health (including behavioral health) conditions, and living in vulnerable geographic areas will be the most at risk of harm. HHS's responsibility is to

[HHS FY2010 Sustainability Scorecard](#)



**2010 HHS Strategic Sustainability Performance Plan**

[Key Terms](#)

## President's Climate Adaptation Task Force: Health Recommendation

- Protect human health by addressing climate change in public health activities
  - Enhance the ability of Federal decision makers to incorporate health considerations into adaptation planning
  - Build integrated public health surveillance and early warning systems to improve detection of climate change health risks
  - Promote resilience of individuals and communities to climate-related health risks



THE WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY

*Progress Report of the Interagency  
Climate Change Adaptation Task  
Force: Recommended Actions in  
Support of a National Climate  
Change Adaptation Strategy*

*October 5, 2010*



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## Key elements of the HHS approach to incorporating climate change adaptation

- integrating climate change and environmental impact considerations into internal management functions and policies
- collecting, analyzing, and utilizing state of the science data
- enhancing issue awareness and specialty training for our employees
- leveraging HHS regional and preparedness programs and existing healthy community and climate change initiatives
- enhancing collaboration with other federal agencies, State, Local, and Tribal governments

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## A Framework for health Vulnerability and Adaptation assessments (adapted from Ebi and Kovats, 2006, and PAHO, 2010)

- Frame and scope the assessment
  - Define geographic range and health outcomes
  - Identify questions to be addressed
  - Identify context for the assessment
  - Establish a project team and management plan
  - Develop a communications plan
  - Establish a stakeholder process

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## V and A Framework, cont.

- Determine and describe the current state of climate and health (using current variability and past climate change as stressors)
  - Describe current risks of climate sensitive health outcomes
    - Identify vulnerable populations and regions
  - Describe the current capacity of health and other sectors to address risks

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## V and A Framework, cont.

- Understand future climate change impacts on health
  - Describe future trends in climate sensitive health outcomes irrespective of climate change
  - Project future health risks and impacts under climate change
  - Estimate possible additional burden of adverse health outcomes due to climate change

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## V and A Framework, cont.

- Identify and monitor health adaptation initiatives
  - Identify priorities and program to address current and projected health risks
  - Prioritize public health and health care policies and programs
  - Identify human and financial resources needed
  - Estimate the costs of action and inaction to protect health
  - Identify possible actions to reduce the potential health risks of adaptation and GHG mitigation measures in other sectors
- Establish an iterative evaluation and adaptive management process

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## CDC's Climate Ready Cities and States Initiative

- Objective: To enhance the capability of state and local public health agencies to address the challenges of climate change
  - Funded 8 States and 2 Cities through cooperative agreements
  - Developing Decision Support Tools
    - Education and Communications
    - Vulnerability Mapping Tools

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# Using NASA Data and Models to Improve Heat Watch Warning Systems for Decision Support



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# Our Approach

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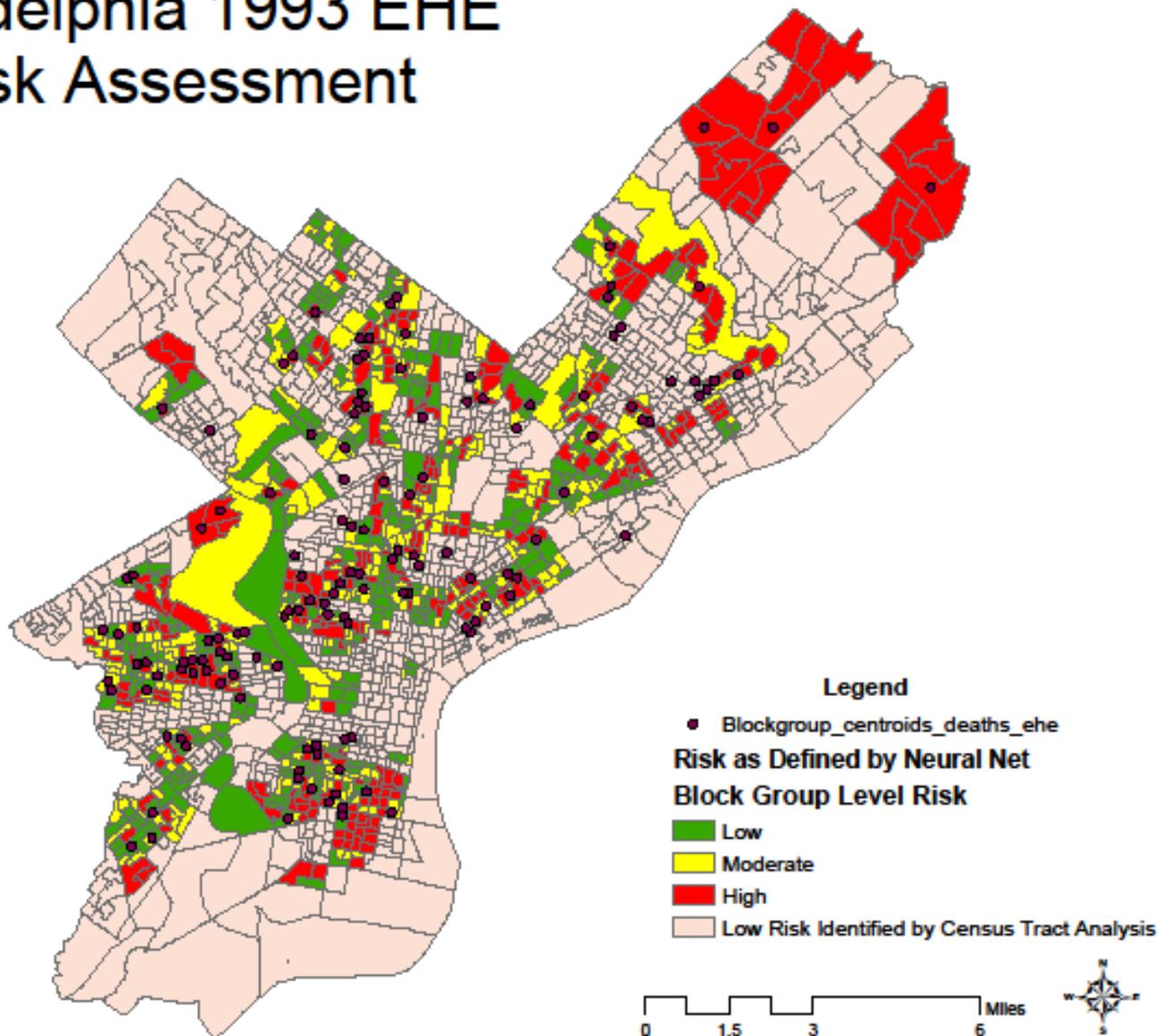
- Utilized meteorological, mortality, remotely sensed, and sociodemographic data from 1995-2005
- Assume that increased surface thermal characteristics lead to an increase in risk
- Model variables using logistic regression and artificial neural networks
- Create spatially specific risk maps for the cities in the study area (Philadelphia, Dayton/Cincinnati, Phoenix)

# Model Variables

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- Estimate land surface temperature (LST) utilizing remote sensing assets (MODIS, ASTER, Landsat TM, Landsat ETM+)
- Use census socioeconomic data at the census tract level
  - Minority populations, lower income, lower educational attainment, and aged population
  - Extract residential land use for population density calculation
- Retrospective analysis of death certificates for past events
  - Geocoded locations of death

# Philadelphia 1993 EHE Risk Assessment





# Example #2

## Central Texas Climate Change Environmental Public Health Indicators Tracking Tool

- Partnering with the City of Austin Climate Protection Program to create health indicators related to local Climate Change mitigation strategies



# AUSTIN'S ENVIRONMENTAL HAZARDS

## Travis County, TX

	Mortality
FLOODING	29
SEVERE WEATHER	17
HEAT/DROUGHT	11
TORNADO	4
WINTER WEATHER	2
LIGHTNING	1

source: SHELDUS,  
1970-2004



Pop: 1,026,158

Texas:  
24,782,302

(2009 U.S.  
Census est.)



# FLOODING

## EPHI tool baseline (1999-2005)

### Exposure Indicator

- 4” precipitation in 24 hours (Grice and Maddox 1982)

### Vulnerability Indicators

*vulnerability map at census block group resolution*

#### Built and Natural Environment

- DFIRM FEMA 100-Year Flood Plains
- Low Water Crossings

#### Socio-Economic

- Renters Status
- Hispanic
- Socially isolated
- Population density



# FLOODING

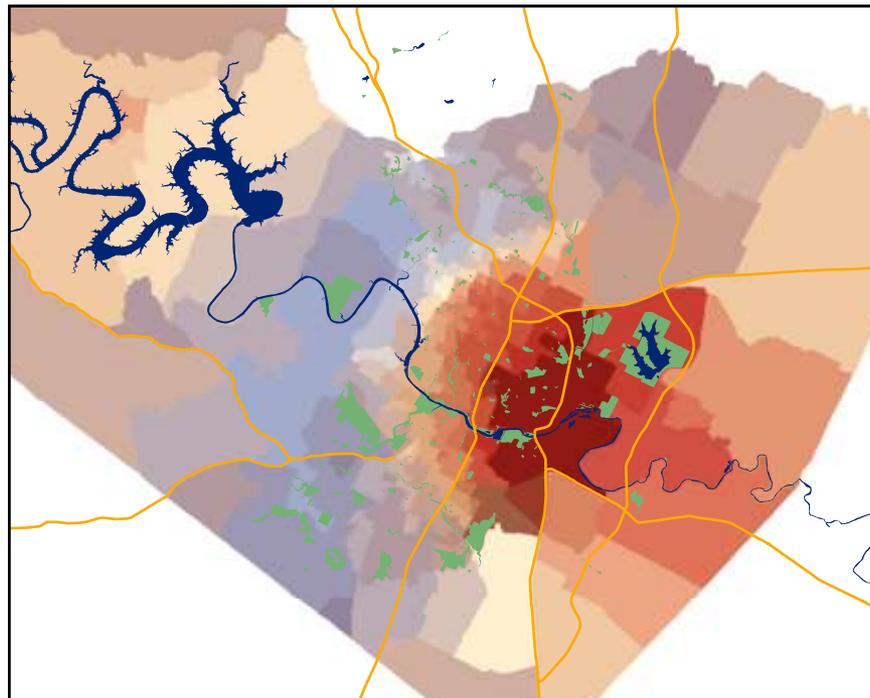
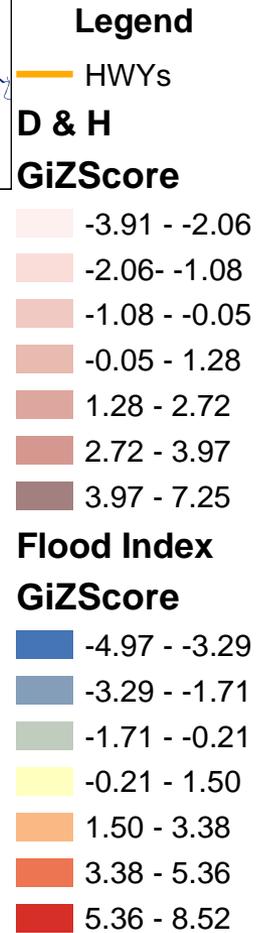
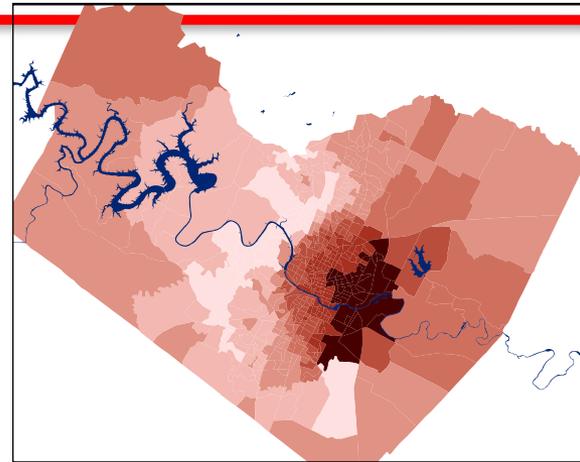
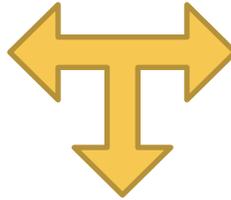
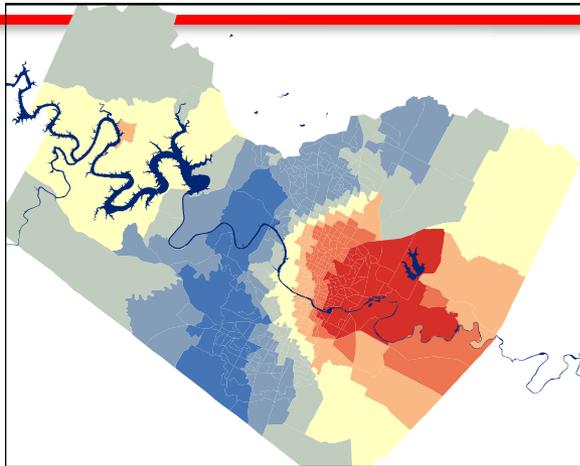
EPHI tool baseline (1999-2005)

## Age Adjusted Mortality Indicators

*by census block group*

- Stress-induced Cardiac Arrest
- Trauma/Injury
- Accidental drowning and submersion ~ aggregated death count (small event size)

# Flash Flood Index w/ baseline age adjusted mortality



# Lessons from Katrina: NOLA Health Care System pre and post

**EXHIBIT 1**  
**Selected Characteristics Of The New Orleans Area Before And After Hurricane Katrina**

Characteristic	Pre-Katrina	Post-Katrina	
		Number/amount	Change
<b>Population</b>			
Orleans Parish	437,186	262,200	-40.0%
Jefferson Parish	448,578	363,309	-19.0
<b>Medicaid enrollment</b>			
Aged, blind, and disabled	214,264	198,194	-7.5
Children and parents	724,528	750,673	3.6
Orleans Parish	134,249	122,308	-8.9
St. Bernard Parish	12,214	11,497	-5.9
Plaquemines Parish	5,389	5,170	-4.1
Jefferson Parish	83,101	86,498	4.1
East Baton Rouge Parish	80,711	87,022	7.8
West Baton Rouge Parish	4,151	4,426	6.6
<b>Adult nonelderly uninsured</b>			
Orleans Parish	26%	35-50%	
Jefferson Parish	21	35-50	
Plaquemines Parish	23	35-50	
St. Bernard Parish	22	35-50	
<b>Staffed inpatient bed capacity</b>			
Greater New Orleans area	4,083	1,971	
Orleans Parish	2,269	479	
Regional inpatient psychiatric beds	462	160	
<b>Hospital daily census</b>			
Safety-net clinics	2,500	1,877 <sup>a</sup>	
	90	19	
<b>Health professionals<sup>b</sup></b>			
Physicians	4,486	1,200	
<b>Emergency medical services units</b>			
	15-17	7	
<b>Long-term care services<sup>c</sup></b>			
Nursing home providers	51	29	
Nursing home beds	4,954	2,735	
Long-term acute care beds	575	97	

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## Health care facilities and services: How is climate adaptation different from usual Hazards Vulnerability Analysis?

- Historical data may not be sufficient
  - Greater severity of heat, floods, winds
    - Availability of back-up facilities
    - Transportation issues
    - Capacity and redundancy of risk control measures
  - Risk of concurrence
    - E.g., extreme heat and flooding combined with loss of power
  - Potential for heavier patient loads
    - Allergic/respiratory diseases
    - Renal failure

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## Consideration of time scales

- Short-term measures
  - Back-up generators, sand-bags
  - Community partnerships and education
  - Surge staffing and supplies
- Medium-term measures
  - Upgrade capacity of HVAC
  - Flood control systems
- Long term measures
  - Facility siting (coastal zones, riverine flood plains)

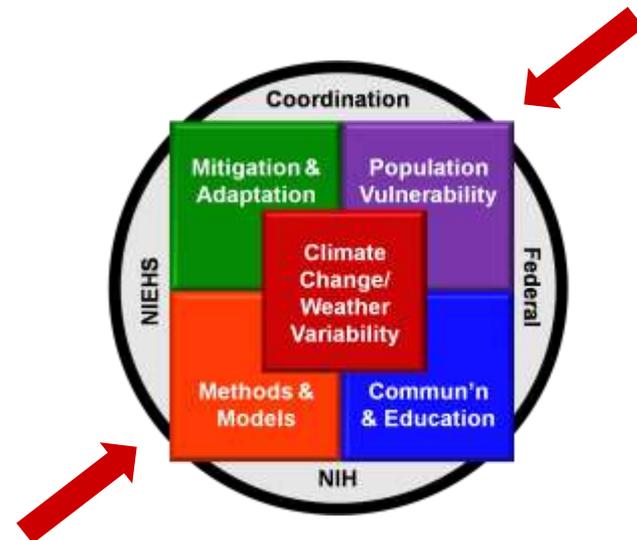
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## Special patient care considerations

- Critical Care
  - Need for prolonged extensive back-up electricity systems
    - Not just ventilators
    - Elevators, lighting,, etc. needed for evacuation of critical care patients
- End-stage Renal Disease
  - Lessons from Katrina- vulnerability of patients on hemodialysis
  - Peritoneal-vs. hemo dialysis
- Pscyhiatric Patients
  - Greater vulnerability to heat-related illness from certain medications

## NIH climate change and health research: focus on population vulnerability

- NIH Program Announcement with Special Review
- Participation by eight NIH Institutes and Centers in 2011
- Small research projects with potential immediate impact
- Initial set of grantees to be announced in summer 2011



# A Human Health Perspective on Climate Change

- Identifies research needed to better understand the health effects of climate change, and choose the healthiest mitigation and adaptation strategies:
  - 11 Health Consequences Categories
  - Crosscutting issues
- Use by individual agencies to inform their research agendas and to develop a coordinated federal research agenda on climate change and health



[www.niehs.nih.gov/climatereport](http://www.niehs.nih.gov/climatereport)

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## Summary

- The Health Sector has critical roles to play in climate change adaptation
  - Both the “supply” and the “demand” sides
  - Health care and public health
- Existing planning and preparedness activities provide structure; climate change provides additional stressors
  - Critical need to assess contingencies, backup capacities
- Information, analysis tools, guidance, ongoing research and evaluation are all needed
- Partnerships and sharing of best practices essential



**Thank you!**

**Questions?**

