Housing and Health:
New Opportunities for Dialogue and Action

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National Center for Healthy Housing

Housing and Health: New Opportunities for Dialogue and Action

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Renowned community developer and philanthropist Jim Rouse once said, "For many years, I have lived uncomfortably with the belief that most planning and architectural design suffers for lack of real and basic purpose. The ultimate purpose, it seems to me, must be the improvement of mankind."

The adoption of a new "health in all policies" approach by the federal government provides an historic opportunity to extend Jim Rouse's advice to the nexus of health and housing and foster a dialogue that can lead to new partnerships and stronger policies that advance health and housing objectives in equal measure. By developing a framework for improving those aspects of housing that impact health, this dialogue could help ensure that housing policy and neighborhood design make the maximum possible contribution to the health of children, older adults, and other community members.

To facilitate this dialogue, we have prepared a concept paper documenting the many ways in which housing affects health and outlining potential next steps for fostering greater collaboration between the public health and housing policy communities to advance shared goals.

I. Summary and Recommendations

Housing affects health in multiple ways:

- *Housing quality* can impact physiological health (e.g., lead, radon, mold, extreme temperatures), psychological health (e.g., noise, inadequate light), and safety (e.g., falls, fires).
- *Unaffordable housing costs* affect health by reducing the income that a household has available for nutritious

In partnership with

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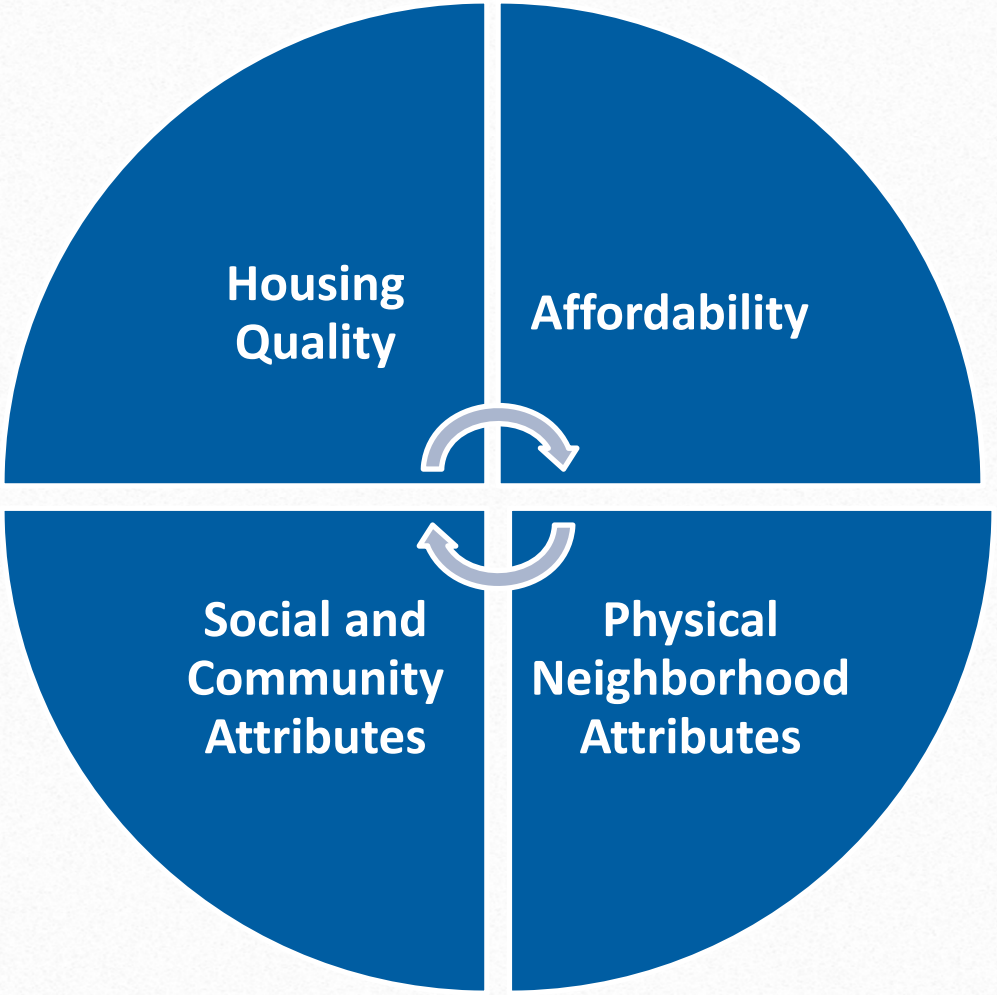
HOUSING AND HEALTH:

NEW OPPORTUNITIES FOR DIALOGUE AND ACTION

How Does Housing Affect Health?



Housing Quality

Impacts:

- **Physical Health**
- **Mental Health**
- **Safety**

The State of Healthy Housing

~NCHH 2013

35 million-- 40 percent – of metropolitan homes in the U.S. have one or more health and safety hazards.

Florence Nightingale

"The connection between health and the dwelling of the population is one of the most important that exists."

Cited in Lowry, S, BMJ, 1991, 303, 838-840

Miasma & Housing-Related Disease

The miasma that was thought to cause cholera was linked to the squalor of the poor.

Health in the Late 19th Century

- Challenge of Tuberculosis, Typhoid, Cholera Seemed Insurmountable
- Lessons for Public Health Officials, Architects and Planners: Light, Fresh Air, Reduce Crowding, Improve Sanitation.
- With Improved Living Conditions & Medical Interventions, Disease Rates Declined

Cuyahoga River ca. 1960

Is Housing a Shared Commons?

What is The Commons?

"The commons is everywhere. It is the air we breathe, the words we speak, the traditions we respect. It is tangible and intangible, ancient and modern, local and global. It is everything we inherit together, as part of a community, as distinct from things we inherit individually. It is everything that is not privately or state-owned. …"

Housing Market Price & Health: Unfinished Business

- Should a Healthy Home Cost More?
- Why are Healthy Homes Investments Unlike Other Home Improvements?
- Finding Market Vehicles to Provide Incentives to Promote Investment in Healthy Homes
- Cost of NOT Making Homes Healthy

Re-establish the Collaboration Between The Built Environment & Health

- Builders & Weatherization Professionals
- Green Developers
- Public & Environmental Health
- Housing Professionals
- Banks & Other Financial Institutions
- Government
- Rehab Professionals
- Many others

Health Hazards in the Home

Each year in the U.S. hazards in the home lead to:

- **Over 300,000** lead poisoning cases
- **18,000** injury deaths each year
- **21,000** lung cancer deaths due to Radon
- **450** deaths and **15,000** emergency department visits due to carbon monoxide poisoning
- **2 million** asthma-related emergency department visits

Surgeon General's Call to Action

The Surgeon General's Call to Action To Promote Healthy Homes

2009

A healthy home is sited, designed, built, renovated, and maintained in ways that support the health of residents.

Evidence of Health & Housing

- WHO Review of the Evidence
- CDC/NCHH Review of Intervention Effectiveness

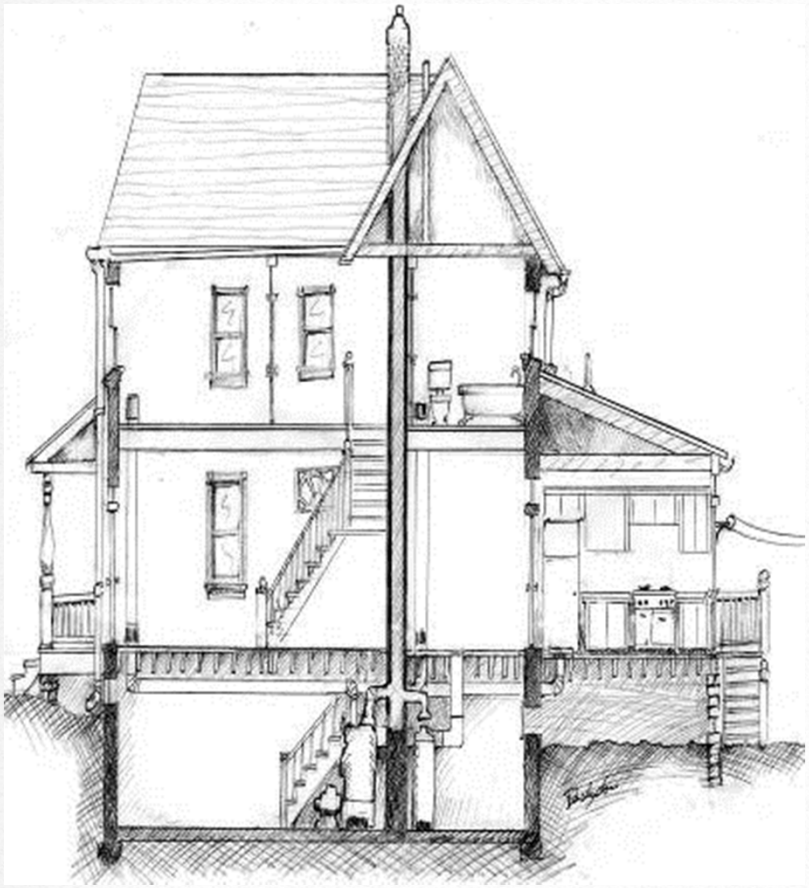
Sufficient Evidence (WHO, 2005)

- **PHYSICAL FACTORS:**
  - Heat and cold - excess winter & summer mortality
  - Energy efficiency of housing and respiratory health
  - Radon exposure in dwellings and lung cancer
  - Neighborhood and building noise and mental health
- **SOCIAL FACTORS:**
  - Multifamily housing, high-rise housing, housing quality and mental health
- **CHEMICAL FACTORS:**
  - ETS exposure in dwellings and respiratory and allergic effects
  - Lead-related health effects
- **BIOLOGIC FACTORS:**
  - Humidity and mold in dwellings and respiratory health effects
  - Hygrothermal conditions and house dust mite exposure (asthma)

Some Evidence (WHO, 2005)

- **PHYSICAL FACTORS:**
  - Ventilation in the dwelling and respiratory and allergic effects
- **CHEMICAL FACTORS:**
  - VOCs and respiratory, cardiovascular and allergic effects
- **BIOLOGICAL FACTORS:**
  - Cockroaches and rodents in dwellings and respiratory and allergic effects
  - Cats, dogs and mites in dwellings and respiratory and allergic effects
  - Pets and mites and respiratory, allergic or asthmatic effects
- **BUILDING FACTORS:**
  - Sanitation and hygiene conditions and related physical health effects
- **SOCIAL FACTORS:**
  - Social conditions of housing and fear/fear of crime
  - Poverty and social exclusion and related health effects
  - Crowding and related health effects
  - Social factors/social climate and mental health

7 Healthy Homes Principles



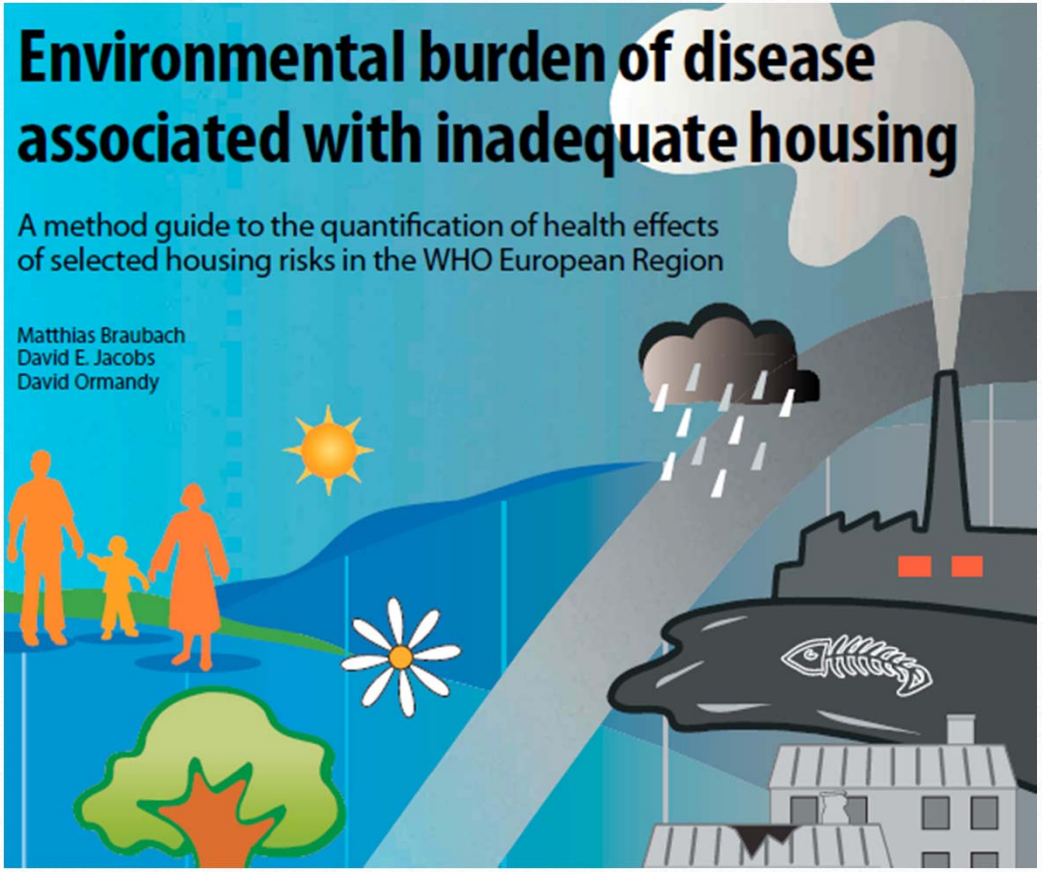
Keep It:

1. Dry
2. Clean
3. Ventilated
4. Pest-Free
5. Safe
6. Contaminant-Free
7. Maintained

Healthy Housing Holistic Approach

- Moisture
  - Lead Paint Deterioration
  - Injuries from Structural Rot
  - Asthma & Respiratory Disease from Mold
  - Pest Intrusion & Allergen/Asthma
  - Pest Intrusion & Pesticide Exposure
  - Radon Infiltration

WHO EBD Report 2011



EBD- 1

Summary of exposure, population-attributable fraction (PAF) and EBD from inadequate housing conditions

Exposure	Health outcome	Exposure–risk relationship	PAF	EBD from housing per year
Mould	Asthma deaths and DALYs in children (0–14 years)	RR = 2.4	12.3%	45 countries of the European Region: 83 deaths (0.06 per 100 000) 55 842 DALYs (40 per 100 000)
Dampness	Asthma deaths and DALYs in children (0–14 years)	RR = 2.2	15.3%	45 countries of the European Region: 103 deaths (0.07 per 100 000) 69 462 DALYs (50 per 100 000)
Lack of window guards	Injury deaths and DALYs (0–14 years)	RR = 2.0	33–47%	European Region: ~10 deaths (0.007 per 100 000) ~3310 DALYs (2.0 per 100 000)
Lack of smoke detectors	Injury deaths and DALYs (all ages)	RR = 2.0	2–50%	European Region: 7523 deaths (0.9 per 100 000) 197 565 DALYs (22.4 per 100 000)

EBD - 2

Crowding	Tuberculosis	RR = 1.5	4.8%	EURO B and EURO C subregions:[a] 15 351 cases (3.3 per 100 000) 3518 deaths (0.8 per 100 000) 81 210 DALYs (17.6 per 100 000)
Indoor cold	Excess winter mortality	0.15% increased mortality per °C	30%	11 European countries: 38 203 excess winter deaths (12.8 per 100 000)
Traffic noise	Ischaemic heart disease including myocardial infarction	RR = 1.17 per 10 dB(A)	2.9%	Germany only: 3900 myocardial infarcts (4.8 per 100 000) 24 700 ischaemic heart disease cases (30.1 per 100 000) 25 300 DALYs (30.8 per 100 000)
Radon	Lung cancer	RR = 1.08 per 100 Bq/m^3	2–12%	Three western European countries: France: 1234 deaths (2.1 per 100 000) Germany: 1896 deaths (2.3 per 100 000) Switzerland: 231 deaths (3.2 per 100 000)
Residential SHS	Lower respiratory infections, asthma, heart disease and lung cancer	Risk estimates range from 1.2 to 2.0 OR = 4.4	PAF estimates range from 0.6% to 23%	European Region: 64 700 deaths (7.3 per 100 000) 713 000 DALYs (80.7 per 100 000)

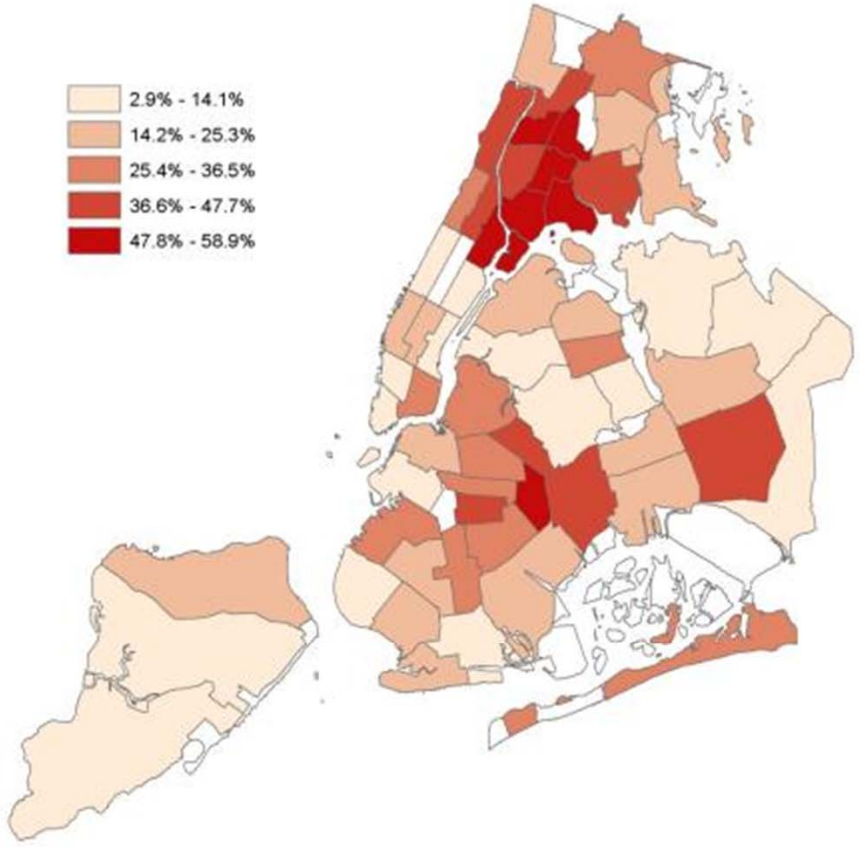
EBD - 3

Lead	Mental retardation, cardiovascular disease, behavioural problems	Case fatality rate 3%;	66%	European Region: 694 980 DALYs (79.2 per 100 000)
Indoor carbon monoxide	Headache, nausea, cardiovascular ischaemia/insufficiency, seizures, coma, loss of consciousness, death	DNS/PNS incidence 3–40%	50–64%	EURO A subregion: [a] 114–1545 persons with DNS/PNS (0.03–0.4 per 100 000) 114 ± 97 deaths (0.03 ± 0.02 per 100 000
Formaldehyde	Lower respiratory symptoms in children	OR = 1.4	3.7%	EURO A subregion: [a] 0.3–0.6% of wheezing in children
Indoor solid fuel use	COPD, ALRI, lung cancer	RR = 1.5–3.2	6–15%	European Region: 8490 ALRI deaths in children < 5 years (16.7 per 100 000) 293 600 ALRI DALYs in children < 5 years (577 per 100 000) 5800 COPD deaths in adults ≥ 30 years (1.1 per 100 000) 100 700 COPD DALYs in adults ≥ 30 years (19.3 per 100 000)

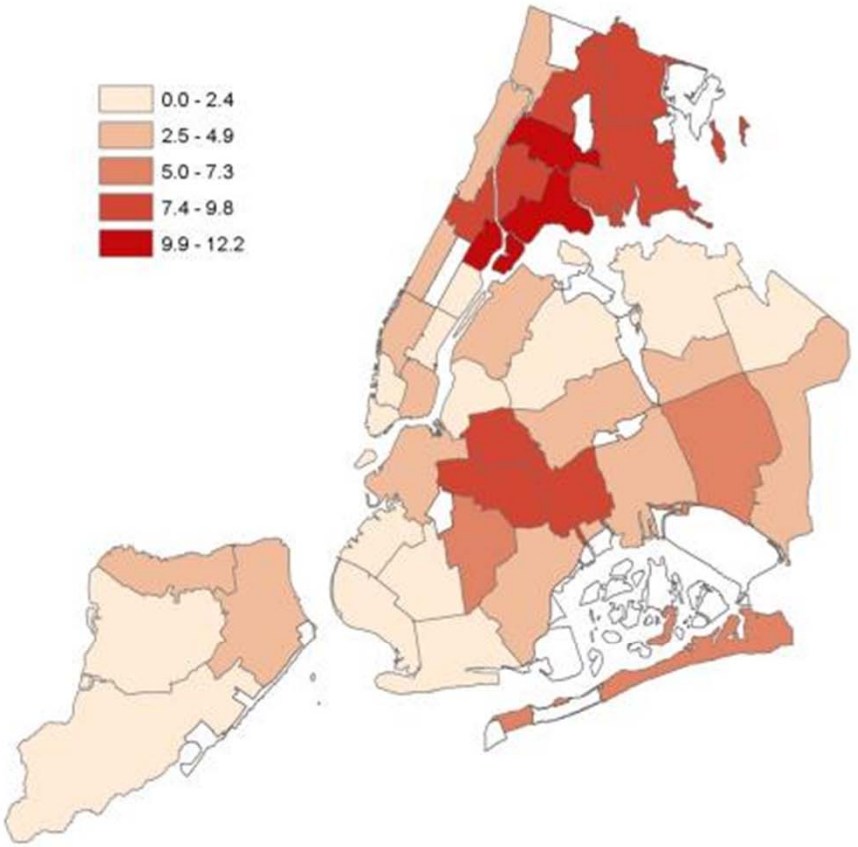
Note: OR = odds ratio; RR = relative risk; DALYs = disability-adjusted life years; N/A = not available; COPD = chronic obstructive pulmonary disease; ALRI = acute lower respiratory infections; DNS/PNS = delayed or persistent neurological sequelae.

Poorly-Maintained Housing & Asthma

Percent of Residents Who Rated Conditions of Residential Structures Fair or Poor
(2011, Community Districts)



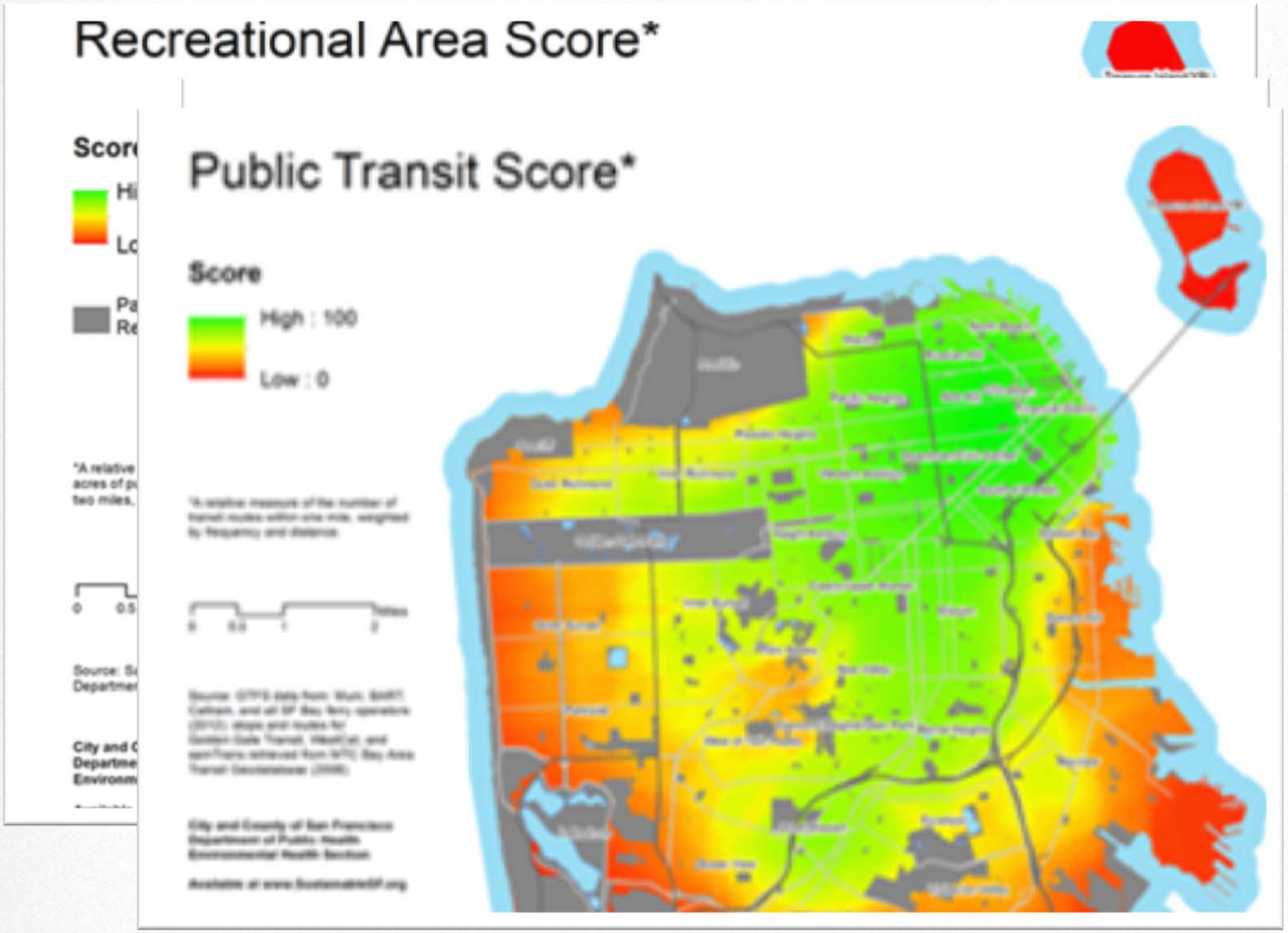
Asthma Hospitalizations per 1,000 Children*
(2010, United Health Fund Districts)



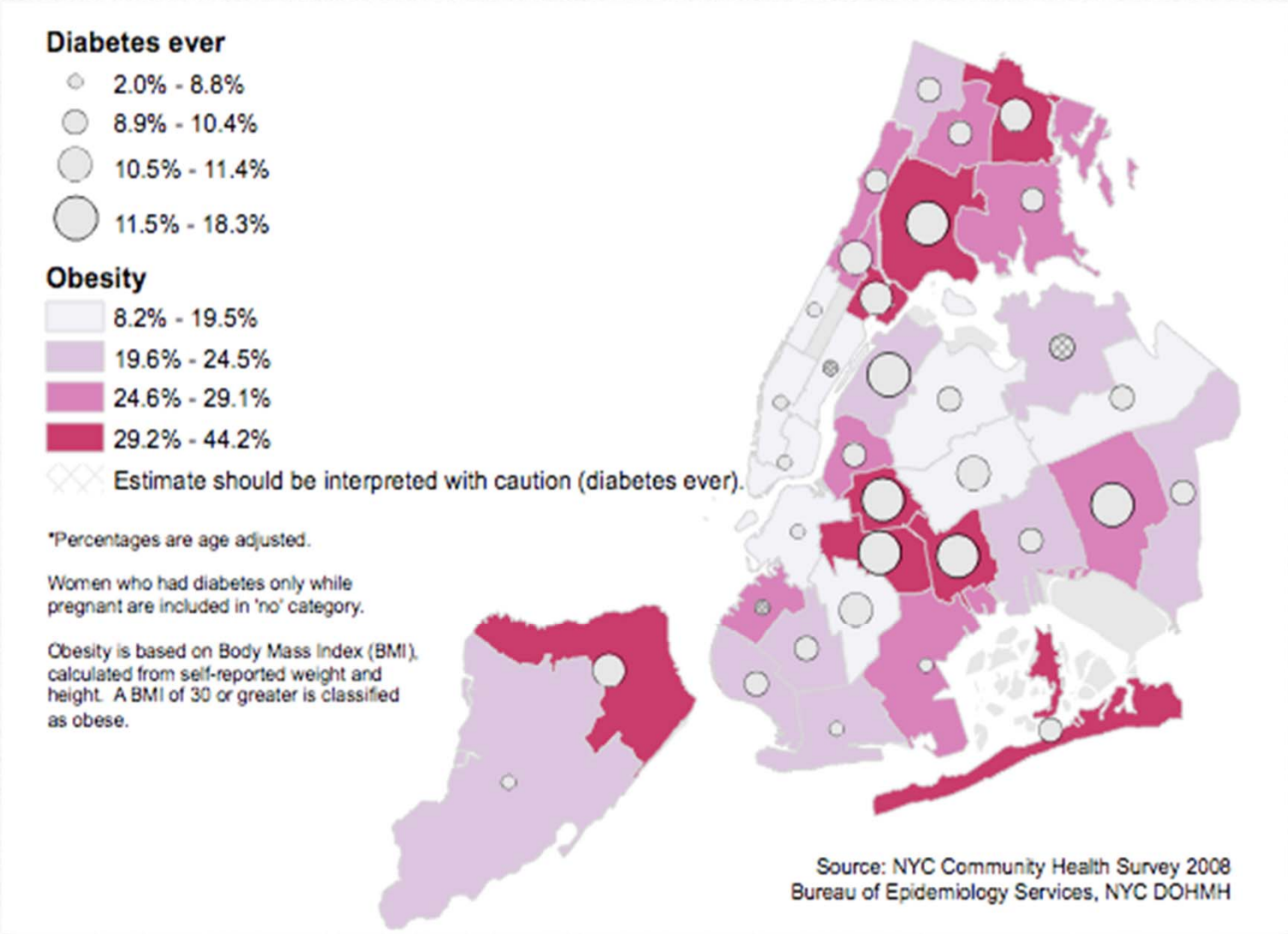
* Children under age 15.
Source: Citizens' Committee for Children of New York (2013), *Keeping Track of New York City's Children, Tenth Edition*; Figure 3.12 and Figure 4.15.

AFFORDABILITY

Physical Neighborhood Attributes



DIABETES AND OBESITY

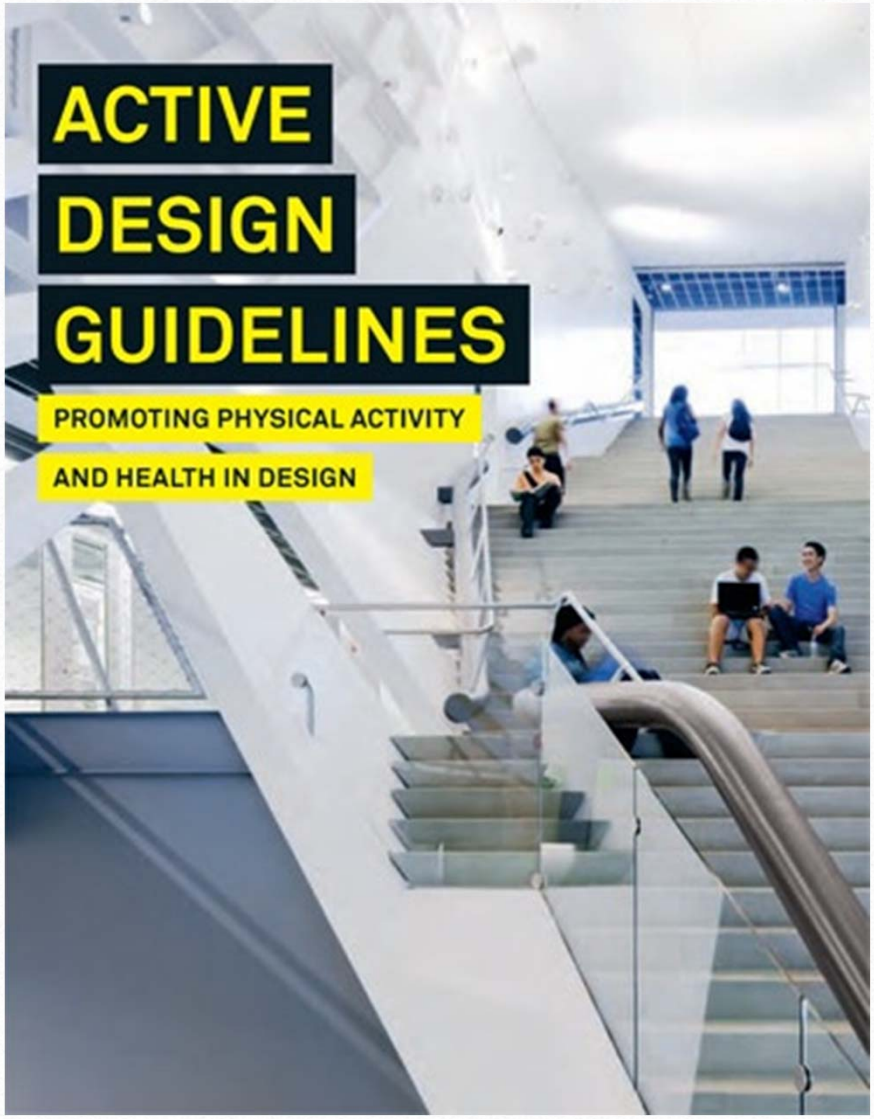


Fun Facts

- **2 minutes** of **stair climbing** a day burns enough calories to prevent weight gain.
- **Active commuting** can reduce the risk of cardiovascular disease by 11-31% and diabetes by 31%
- Adults are 25% more likely to be active when they think their **neighborhoods are safe**
- **Sidewalk and bicycle infrastructure** improvements increased physical activity by 161%.

The Basics of Active Design

- **Provide opportunities for physical activity**
  - **Outdoor** active **recreational** facilities
  - Readily accessible secure **bicycle storage** areas
  - Locate building where possible, within walking distance of **parks, open space, and shopping**
  - **Indoor** active **recreation** space
  - Create **community garden** space
  - Offer **exercise/fitness training** classes and education

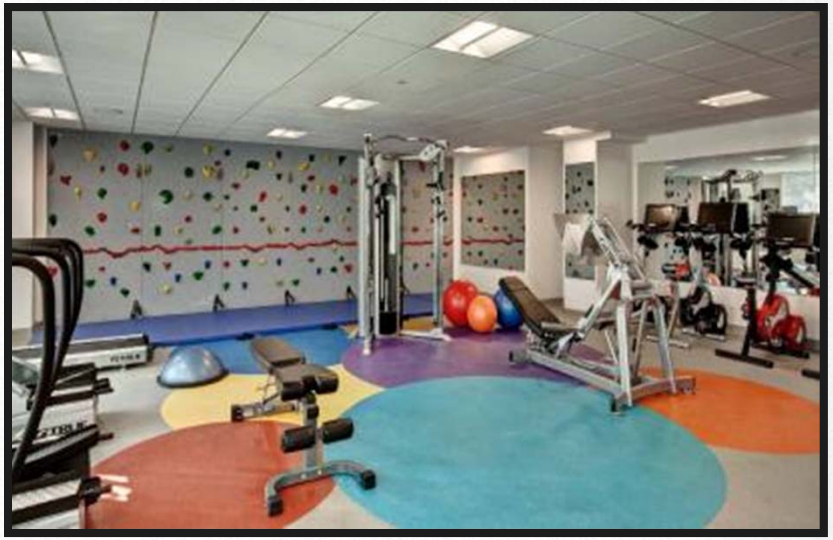


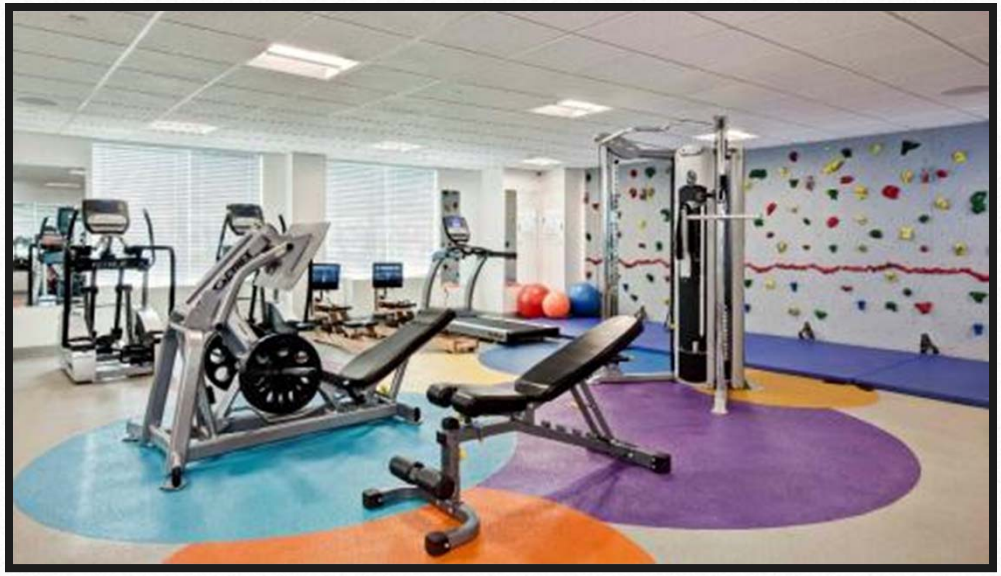
WWW.CENTERFORACTIVEDESIGN.ORG/GUIDELINES/

A Sustainable Green Building

Arbor House received LEED Platinum, National Green Building Standard Gold, Energy Star Multifamily, and American Cancer Society Healthy High Rise certifications

Indoor Fitness Center

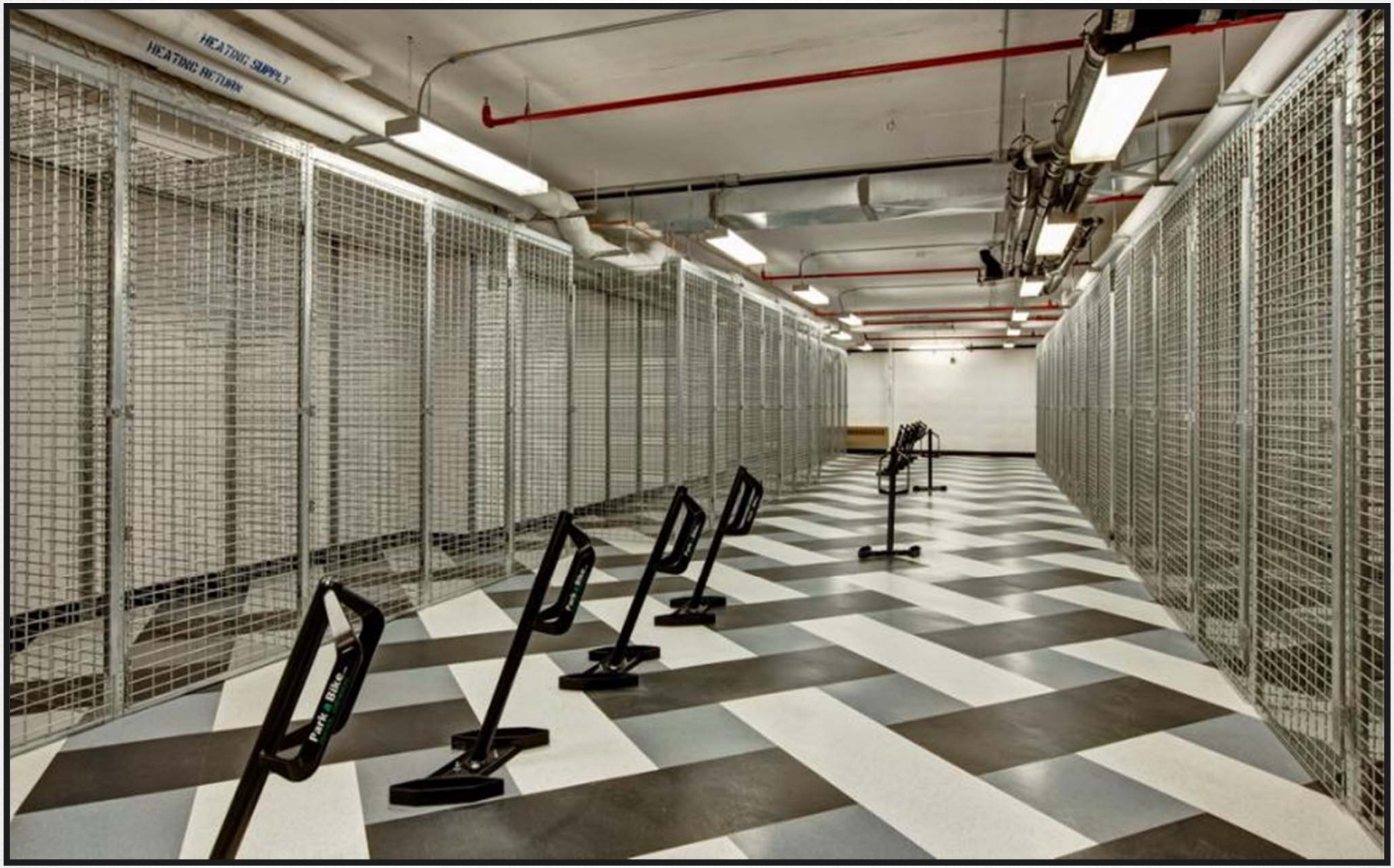




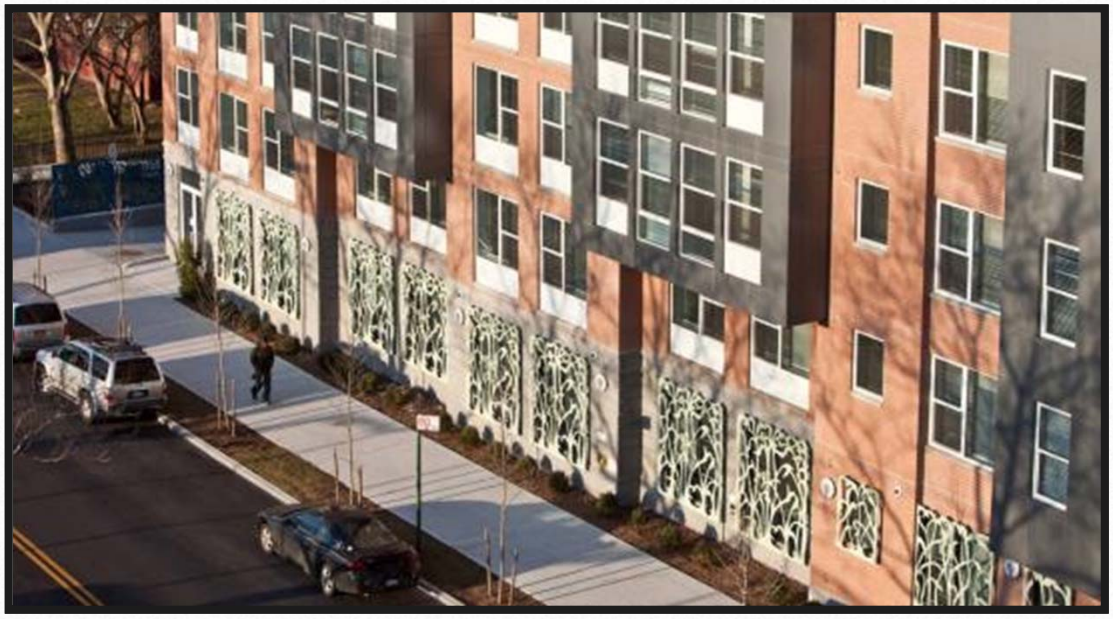
$85,720

Active Design Outdoor Area

Secure Accessible Bicycle Storage



Promote Walking



Rooftop Hydroponic Farm

AND THE HARVEST

The Basics of Active Design

- **Encourage the use of stairs instead of elevators**
  - Locate the stairs to be equal or more prominently **visible** from entrance
  - Make the stairwells more enticing to use through **lighting, music, artwork, and security cameras**
  - Slow down elevator speed and increase door opening times
  - Widen stairs, reduce stair riser height, add **natural daylight and ventilation**
  - Use **signage** to help encourage and remind residents about the benefits of using the stairs

Promote Stair Use

$25

$60

$1,200

What Does this All Cost?

Description	Cost
Locate Elevators Away from Lobby/Reduce Speed	$0
Outdoor Activity /Fitness Area/Landscaping	$283,652
Large Fire Rated Glass Stairwell Doors	$32,000
Enhanced Stairwell Lighting	$4,000
Stairwell Music and Artwork	$20,000
Indoor Activity/Fitness Room	$85,720
Signage	$1,350
Bicycle Storage	$15,000
Security Cameras	$62,750
Total	$504,472
Total Hard Costs	$27,448,260
Active Design Guidelines as percentage of hard costs	1.8%

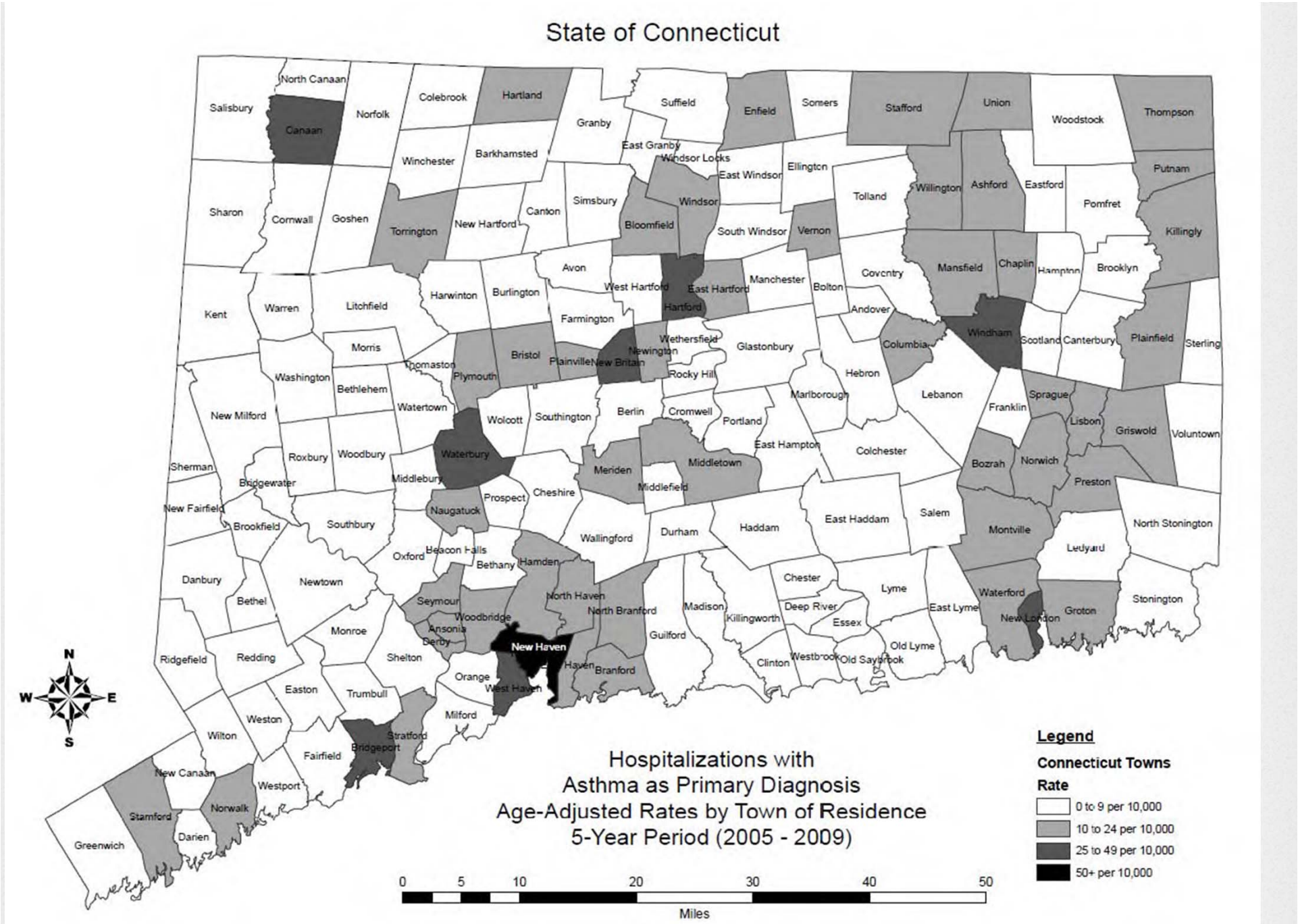


Image from “The Burden of Asthma in Connecticut 2012 Surveillance Report” page 120

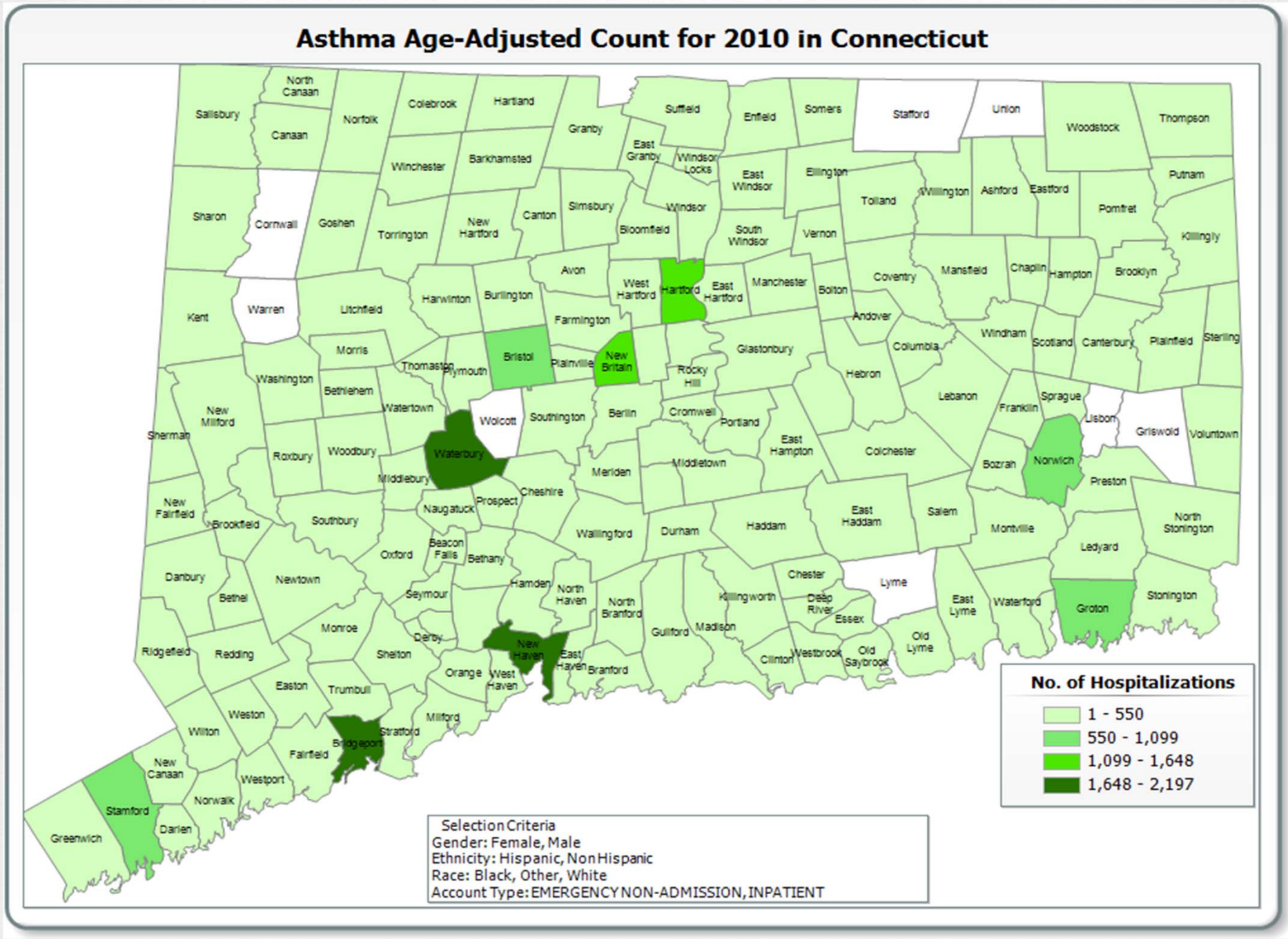
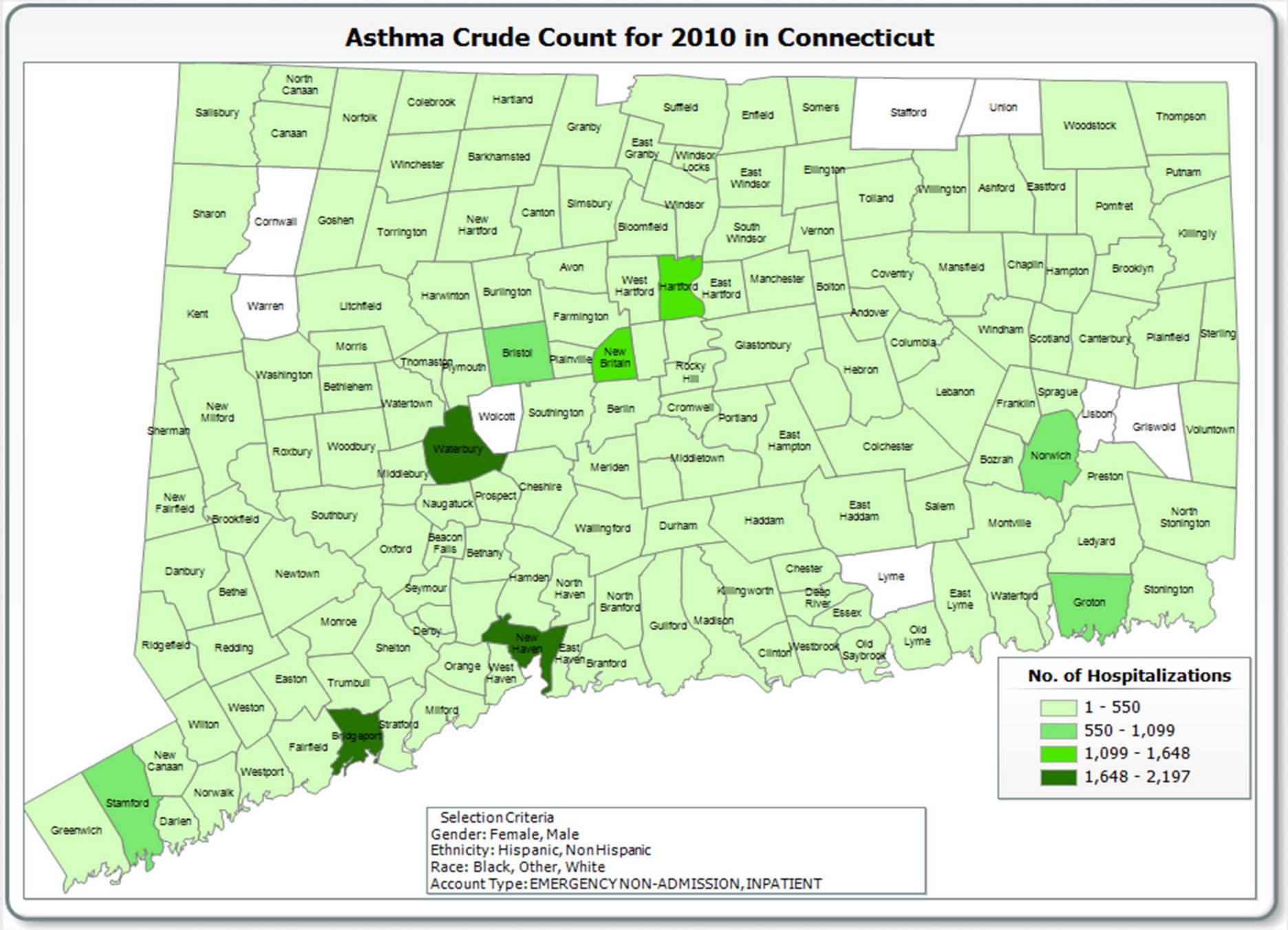


Image generated from the Connecticut Environmental Public Health Tracking Network



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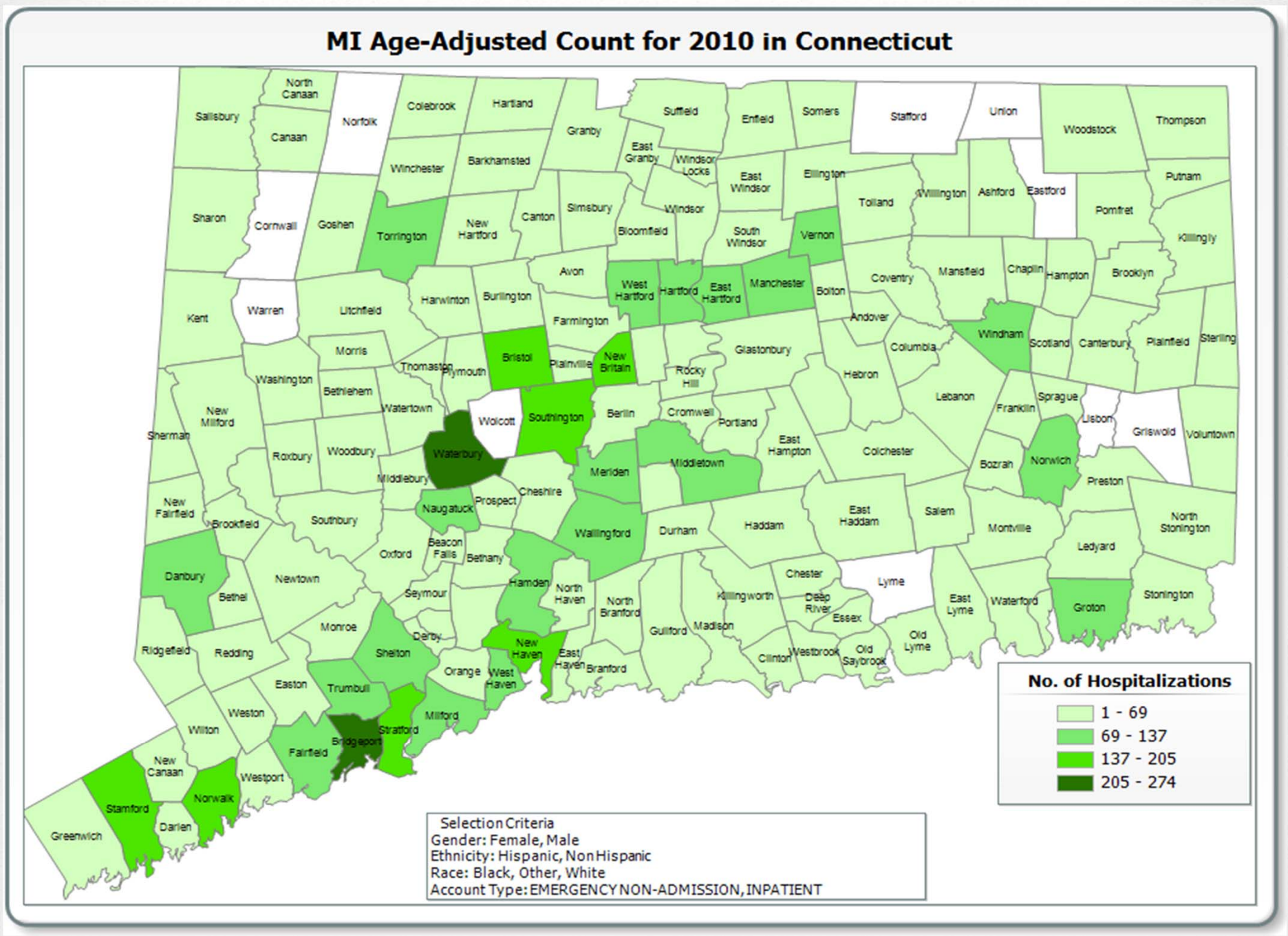

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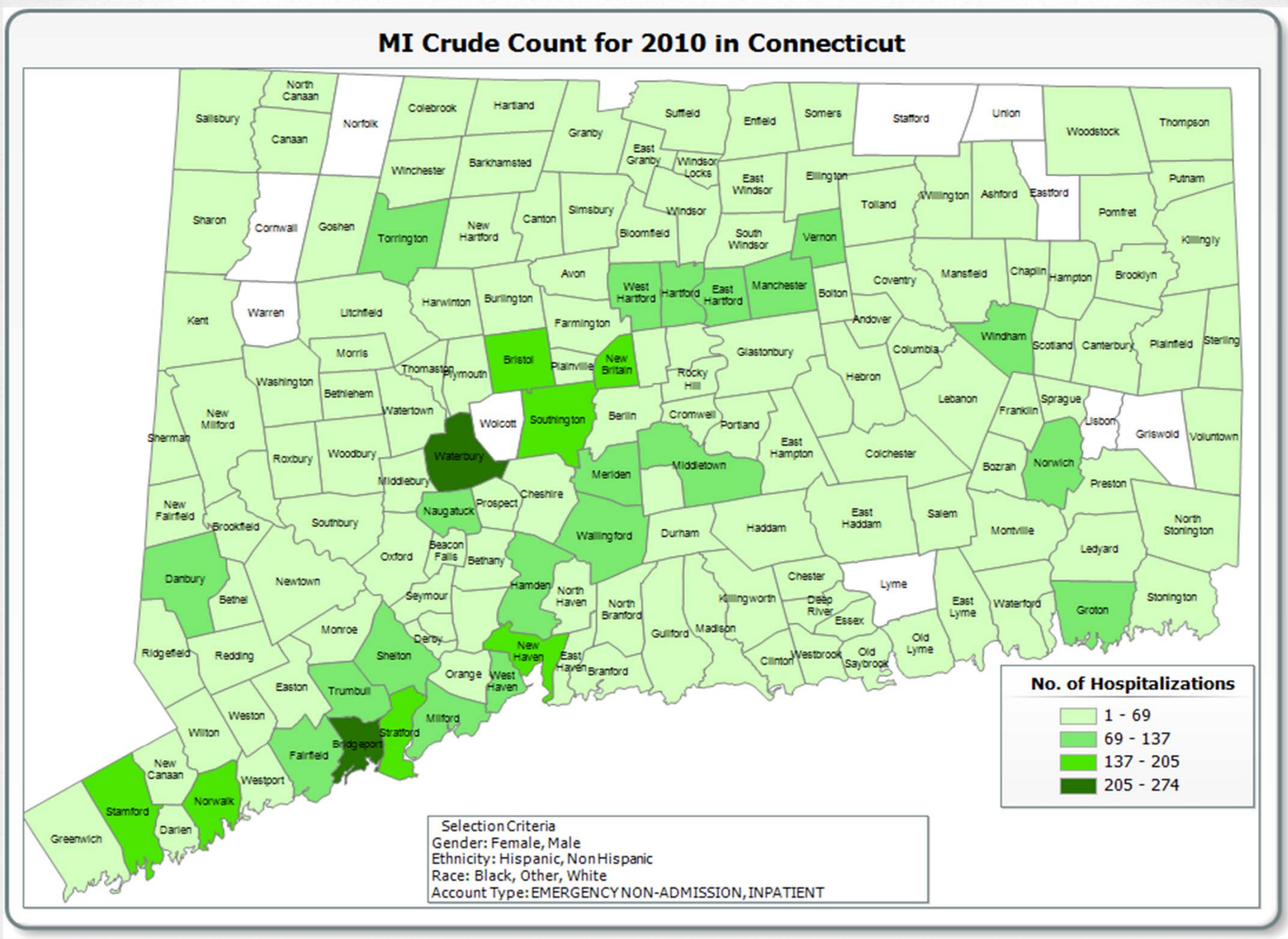
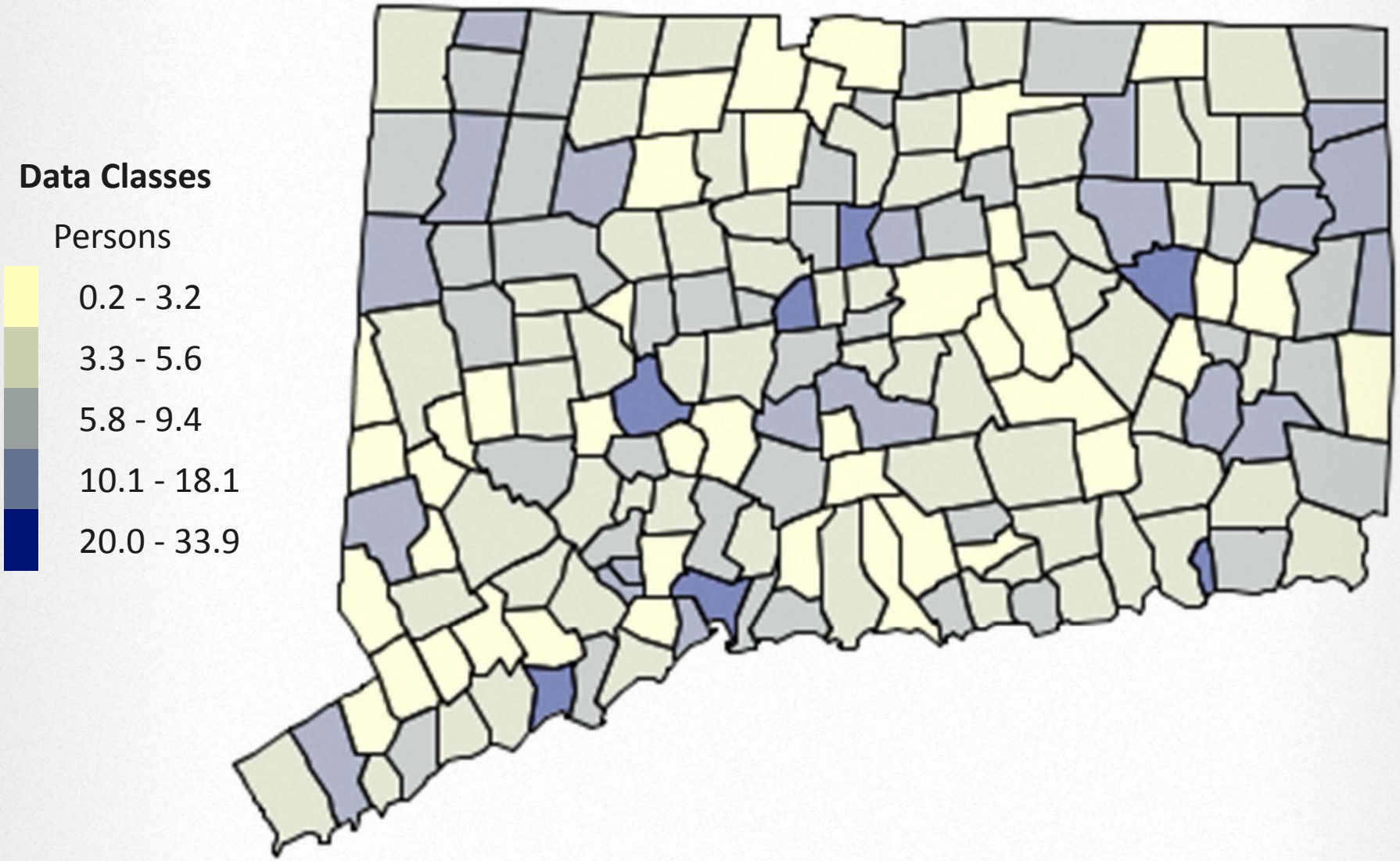
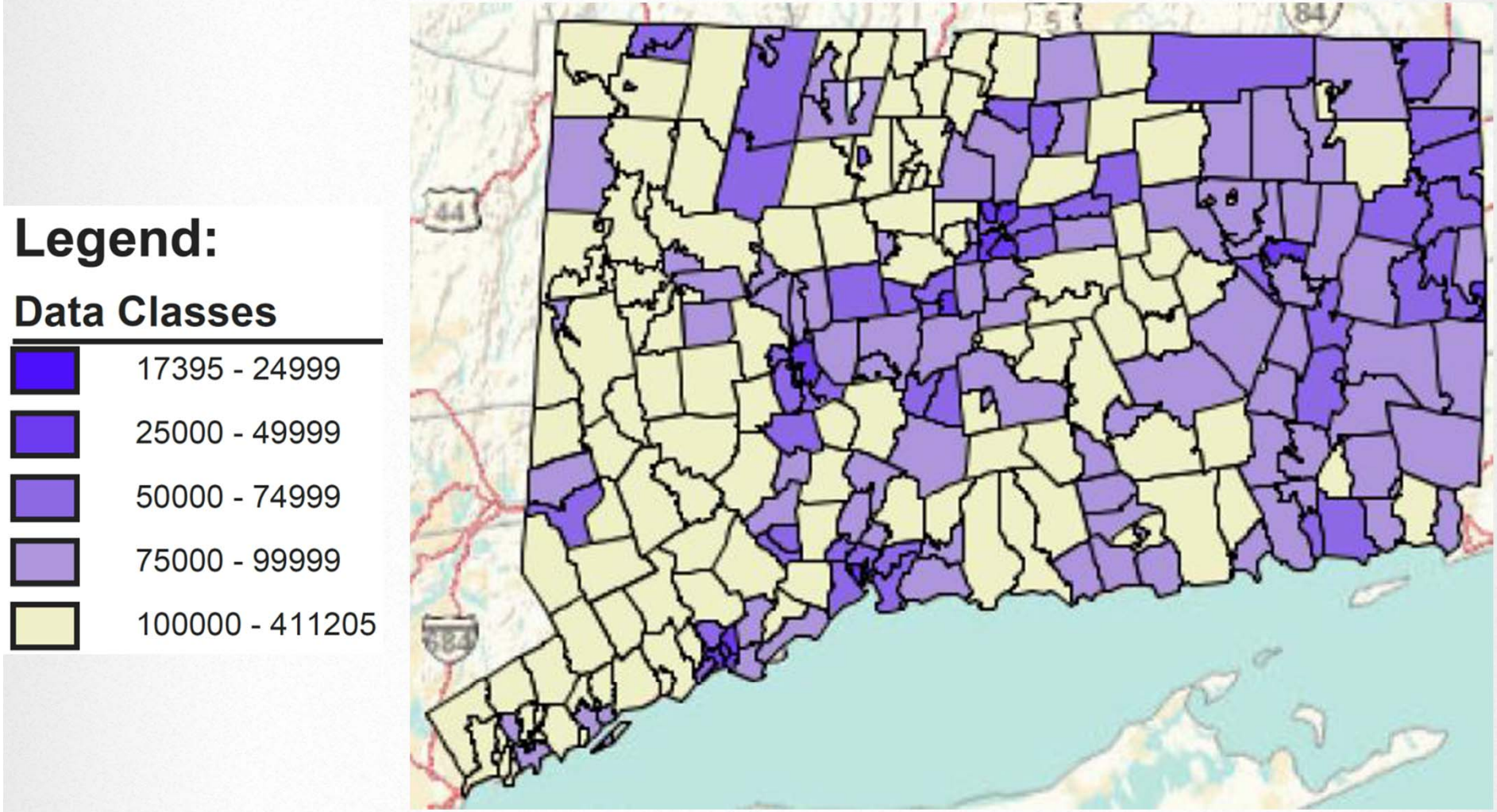


Image generated from the Connecticut Environmental Public Health Tracking Network

Percent of People Below Poverty Level in the Past 12 Months. Data Set 2008-2012 American Community Survey 5-Yeart Estimates. United States Census Bureau.

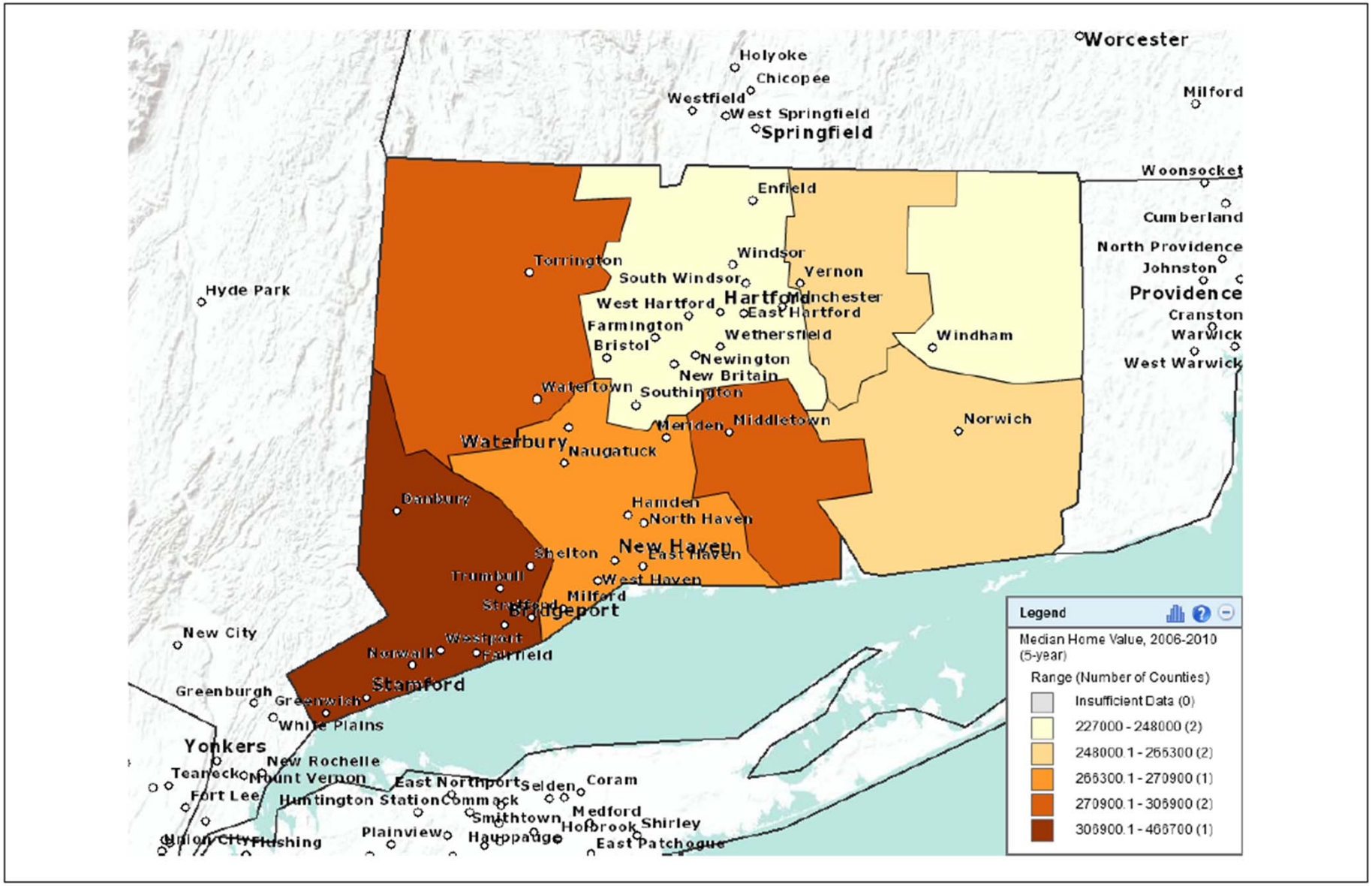


Connecticut Mean Household Income: 2011 inflation-adjusted dollars .



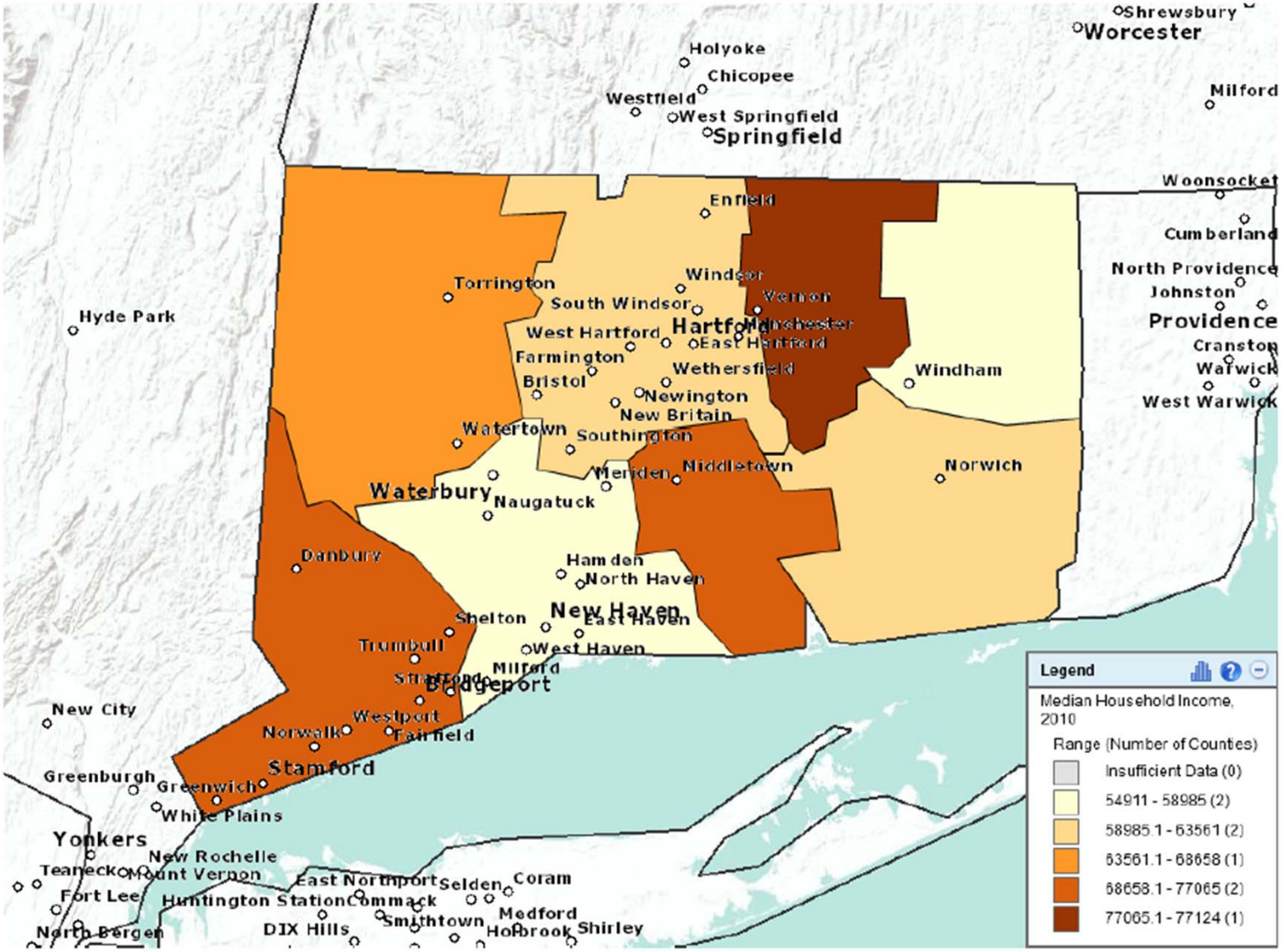
Source: U.S. Census Bureau, 2007-2011 American Community Survey 5-Yerar Estimates.

Connecticut: Median Home Value, 2006-2010 (5-year)



This map was created using the Interactive Atlas of Heart Disease and Stroke, a website developed by the Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. http://www.cdc.gov/dhdsp/maps

Connecticut: Median Household Income, 2010



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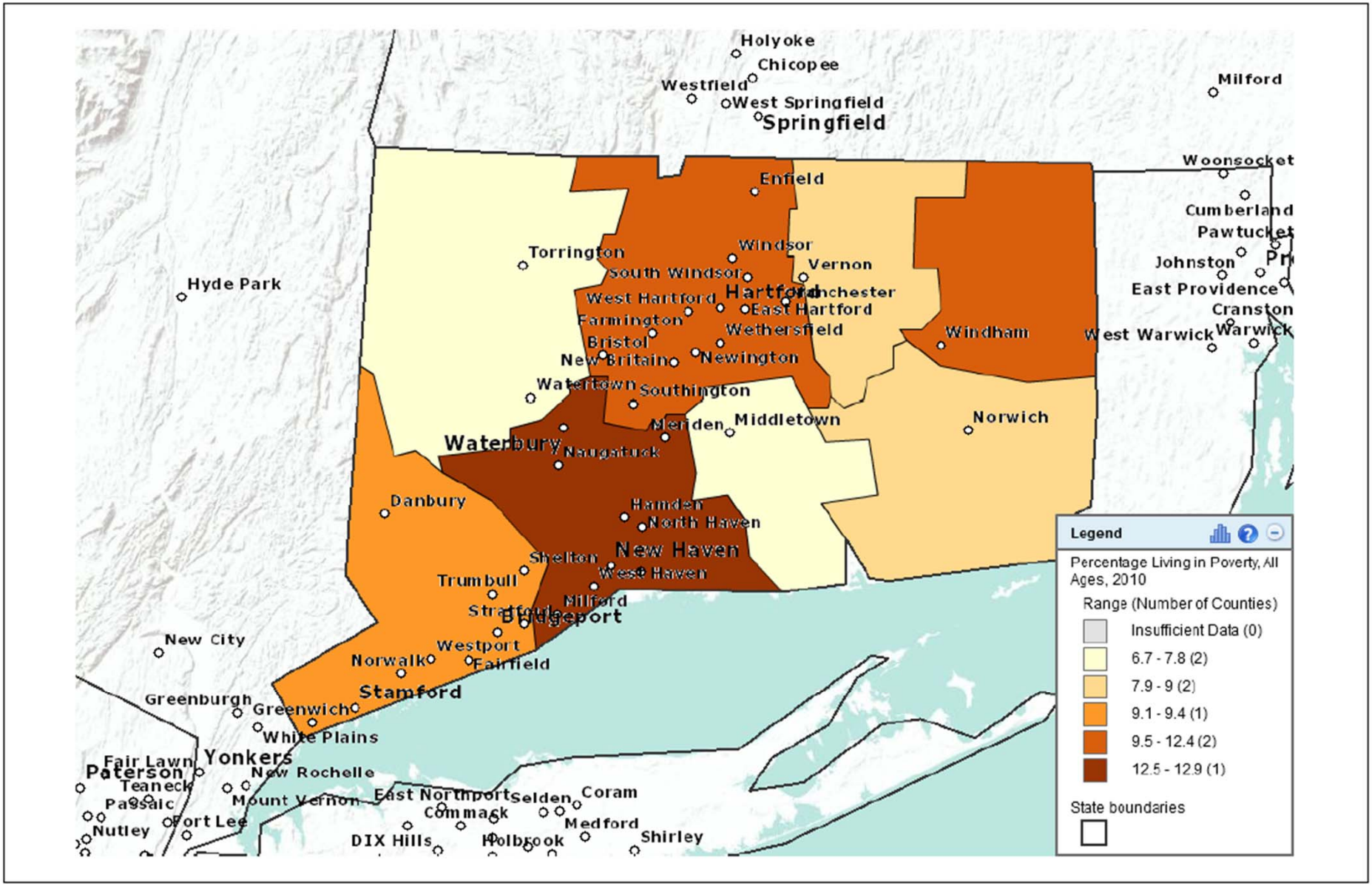
Connecticut: Percentage Living in Poverty, All Ages, 2010



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IDEAS FROM NASHVILLE HHFF MEETING

- **Convene philanthropists**
- Conduct Rapid Health Impact Assessment
- Map health issues, safety/crime, community resources in neighborhoods under consideration for housing
- Develop “surveillance” questions to judge the impact of this new housing on the life of residents
- Develop mitigation strategies if any of the impacts are trending in the negative direction.
- Explore creation of a Task Force
- Follow Enterprise Green Communities
- Encourage a Wellness Trust as part of process
- Encourage partnerships with medical institutions; this is part of their community responsibility when there are part of Payment in Lieu of Taxes (PILOT) programs
- Focus on wellness centers in housing (e.g., gyms, social interaction areas) instead of just focusing on medical care (e.g., on-site clinics/pharmacies)

Breathe Easy Home Health Improvements in Asthma

Health Outcome	Change
Symptom-free days/2 weeks	4.8 fewer days/2 weeks (p=0.004)
Urgent Clinical Care Trips (% reduction)	41.2% (p=0.002)
Asthma Triggers in House Dust	2.0 before/0.03 after
Caretaker Quality of Life Score	4.9 before/5.8 after

Green Communities
Minnesota Case Study

Green Communities Criteria

1. Integrated Design Process
2. Location and Neighborhood Fabric
3. Site
4. Water Conservation
5. Energy Conservation
6. Materials and Resources
7. Healthy Living Environment
8. Operations and Management

Minnesota Health Findings (Adults)

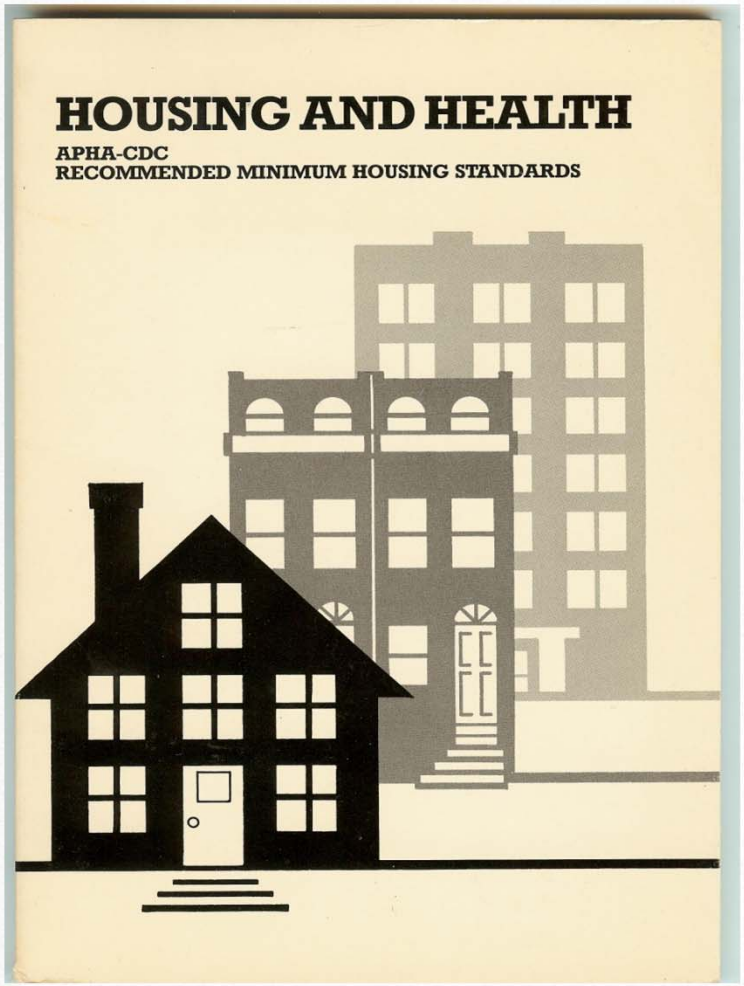
- General health reported as either very good or excellent increased from 33% to 62% (p=0.052)
  - Chronic bronchitis 10% → 0% (p=0.025);
  - Hay fever (12% → 4% (p=0.046);
  - Sinusitis (12% → 2%; p=0.025);
  - Asthma (12% → 4%; p=0.046);
  - Hypertension (10% → 4%; p=0.083).

Energy & Water Consumption

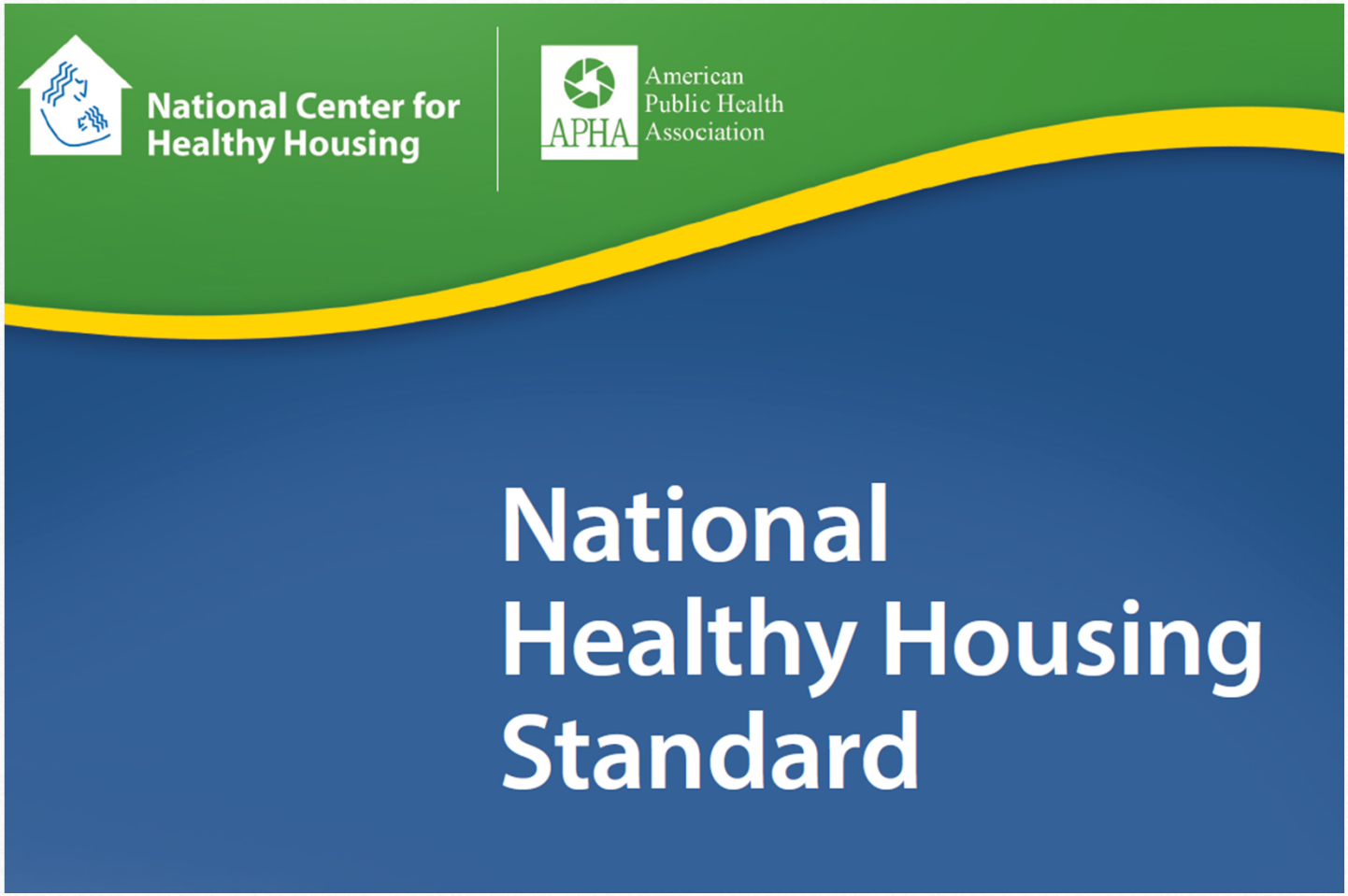
- 46% reduction in total energy use
- An estimated 39% reduction in CO_2 emissions from power plants.

Statistically Significant Mental Health Improvements

- Sadness
- Nervousness
- Restlessness
- Child behavior


HOUSING AND HEALTH
APHA-CDC
RECOMMENDED MINIMUM HOUSING STANDARDS

2014


National Center for Healthy Housing
APHA
American Public Health Association
National Healthy Housing Standard

Key Elements

1. Duties of Owners and Occupants

2. Structures, Facilities, Plumbing, and Space Requirements

- Kitchen
- Bathroom
- Minimum Space
- Floors and Floor Coverings
- Noise

Key Elements

3. Safety and Personal Security

- 3.1. Egress
- 3.2. Locks/Security
- 3.3. Smoke Alarm
- 3.4. Fire Extinguisher
- 3.5. Carbon Monoxide
- 3.6. Walking Surfaces
- 3.7. Guards
- 3.8. Chemical Storage
- 3.9. Pools, Hot Tubs, and Other Water Features

4. Lighting and Electrical Systems

- 4.1. Electrical System
- 4.2. Outlets
- 4.3. Natural Lighting
- 4.4. Artificial Lighting

Key Elements

5. Thermal Comfort, Ventilation, and Energy Efficiency

- 5.1. Heating, Ventilation, and Air-Conditioning Systems
- 5.2. Heating System
- 5.3. Ventilation
- 5.4. Air Sealing

6. Moisture Control, Solid Waste, and Pest Managment

- 6.1. Moisture Prevention and Control
- 6.2. Solid Waste
- 6.3. Pest Management

7. Chemical and Radiological Agents

- 7.1. General Requirements
- 7.2. Lead-Based Paint
- 7.3. Asbestos
- 7.4. Toxic Substances in Manufactured Building Materials
- 7.5. Radon
- 7.6. Pesticides
- 7.7. Methamphetamine
- 7.8. Smoke in Multifamily Housing

National Healthy Housing Standard

2014

7.5. Radon.

Requirement:

Radon present at levels at or above the EPA action level of four picocuries radon per liter of air (pCi/L) in the lowest habitable level of the dwelling shall be deemed hazardous. Radon levels shall be determined by an approved testing method in accordance with state and local requirements. Radon levels exceeding four pCi/L shall be mitigated by a qualified radon mitigation professional who meets state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

Stretch Provision:

- Radon present at levels at or above two pCi/L in the lowest habitable level of the dwelling shall be deemed hazardous. Radon determined by an approved testing method to exceed two pCi/L shall be mitigated by qualified radon mitigation professionals in accordance with state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

References:

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Conclusions

- High Costs of Health Care/Health Insurance
- Mortgage Crisis & Affordable Housing
- Economic Recovery
- Energy Retrofits and Climate Change

Article 25(1) of the Universal Declaration of Human Rights

"Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control".

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