

Impact of Extreme Heat in the Region



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Outline

Extreme Heat in Florida

BRACE

Vulnerability Mapping



Older Adults (Aged 65+)



Infants, Children, Pregnant People



Chronic Conditions



Low Income, Unhoused

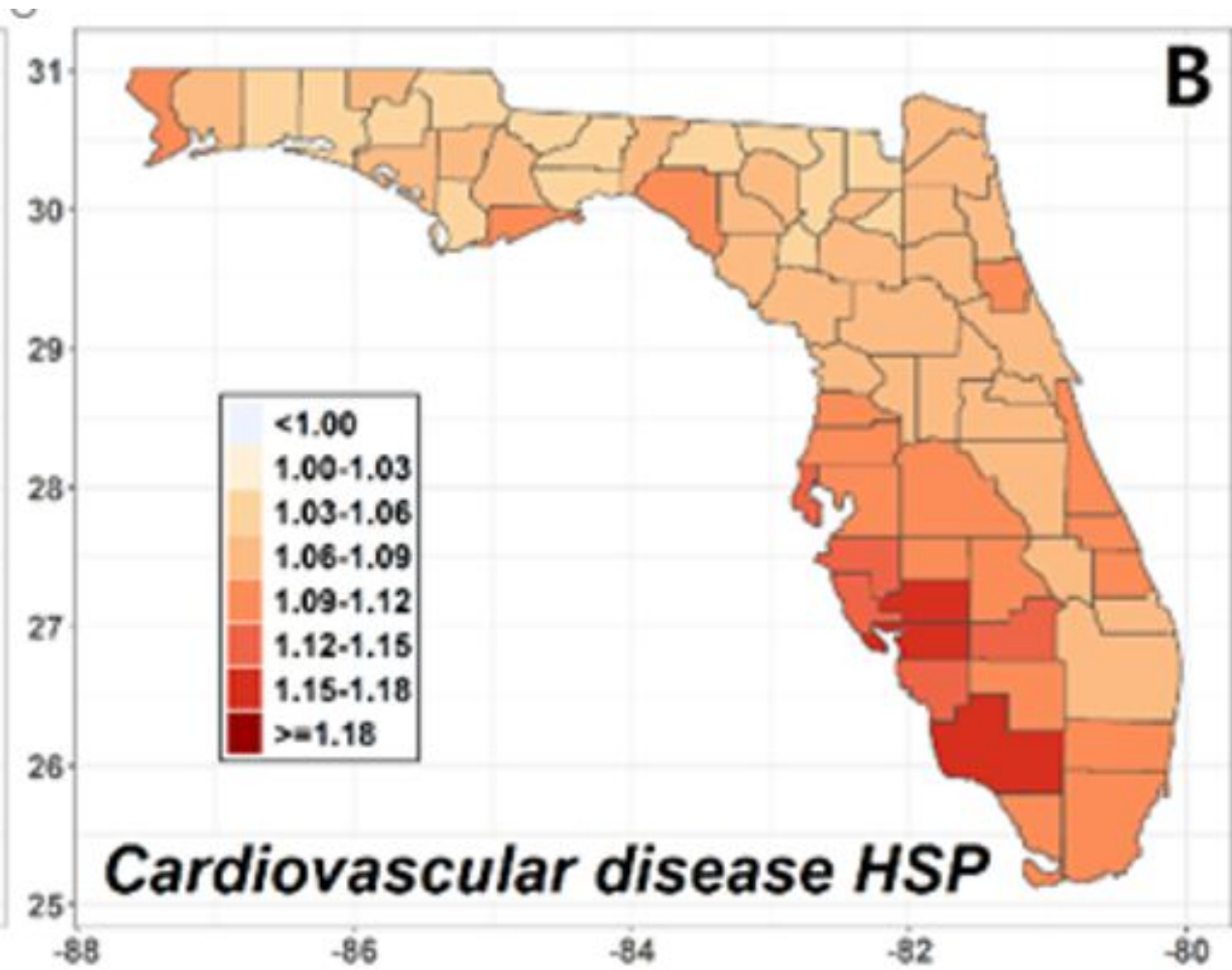
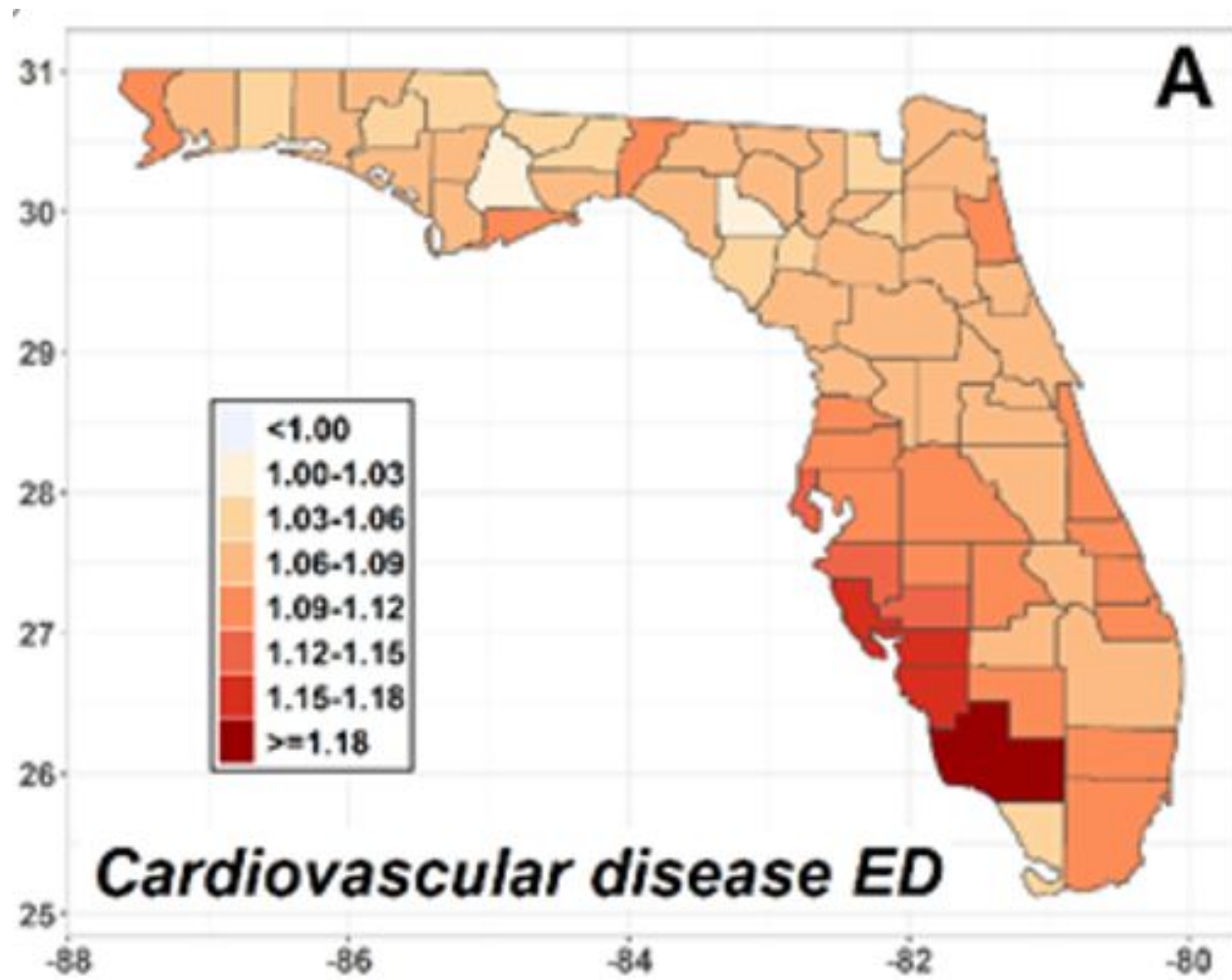


Athletes

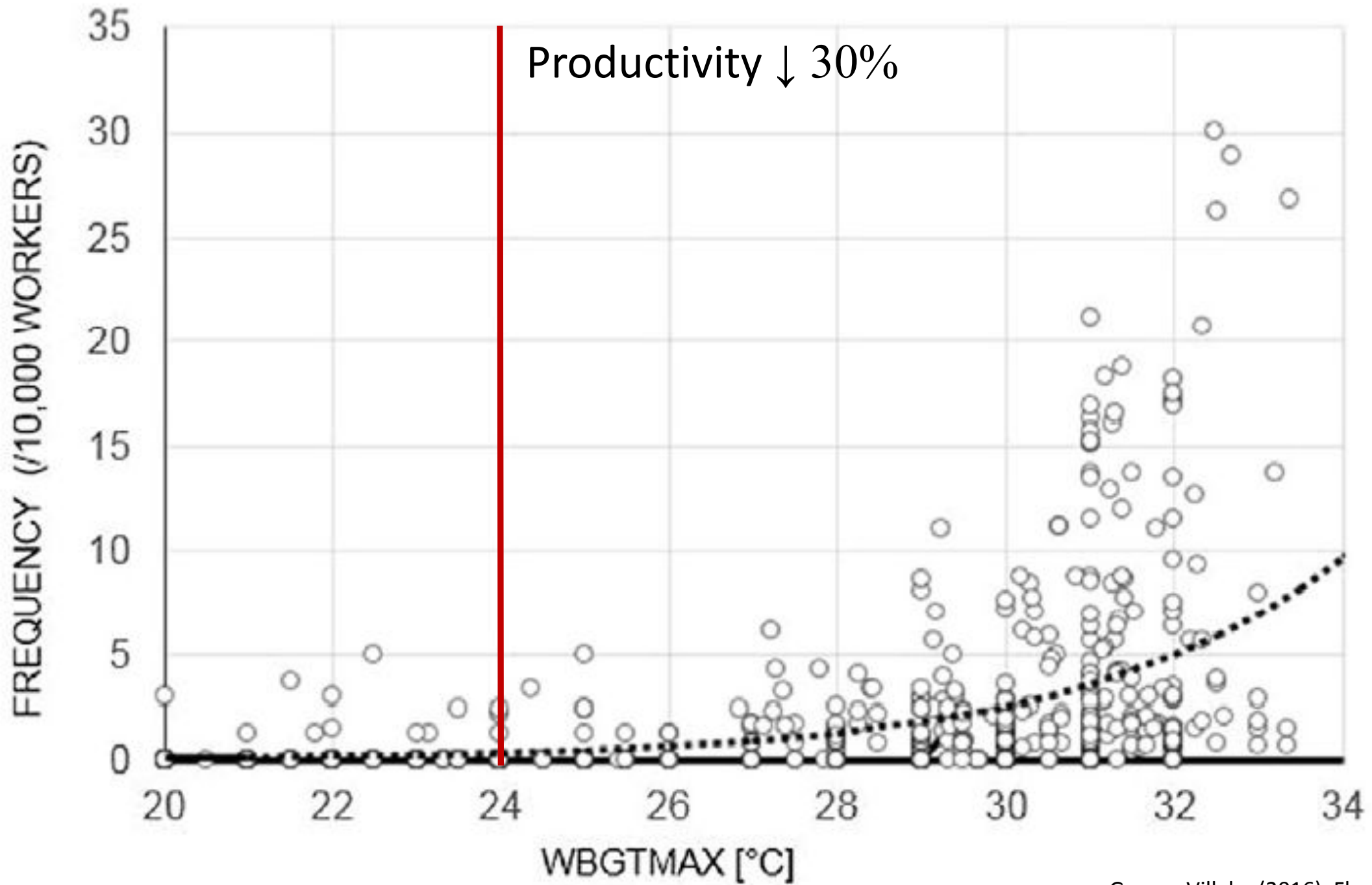


Outdoor Workers





	Cardiovascular disease	
	ED	HSP
Under 5 years	1.53*	
Over 65 years	2.52*	2.59*
Over 65 years in nursing facilities	1.02*	-
Female	-	-1.45*
Unemployment rate		-1.03*
Housing units with no automobile	-1.21*	-
Children under 18 years living in one-parent families	2.16*	-



Outdoor Workers

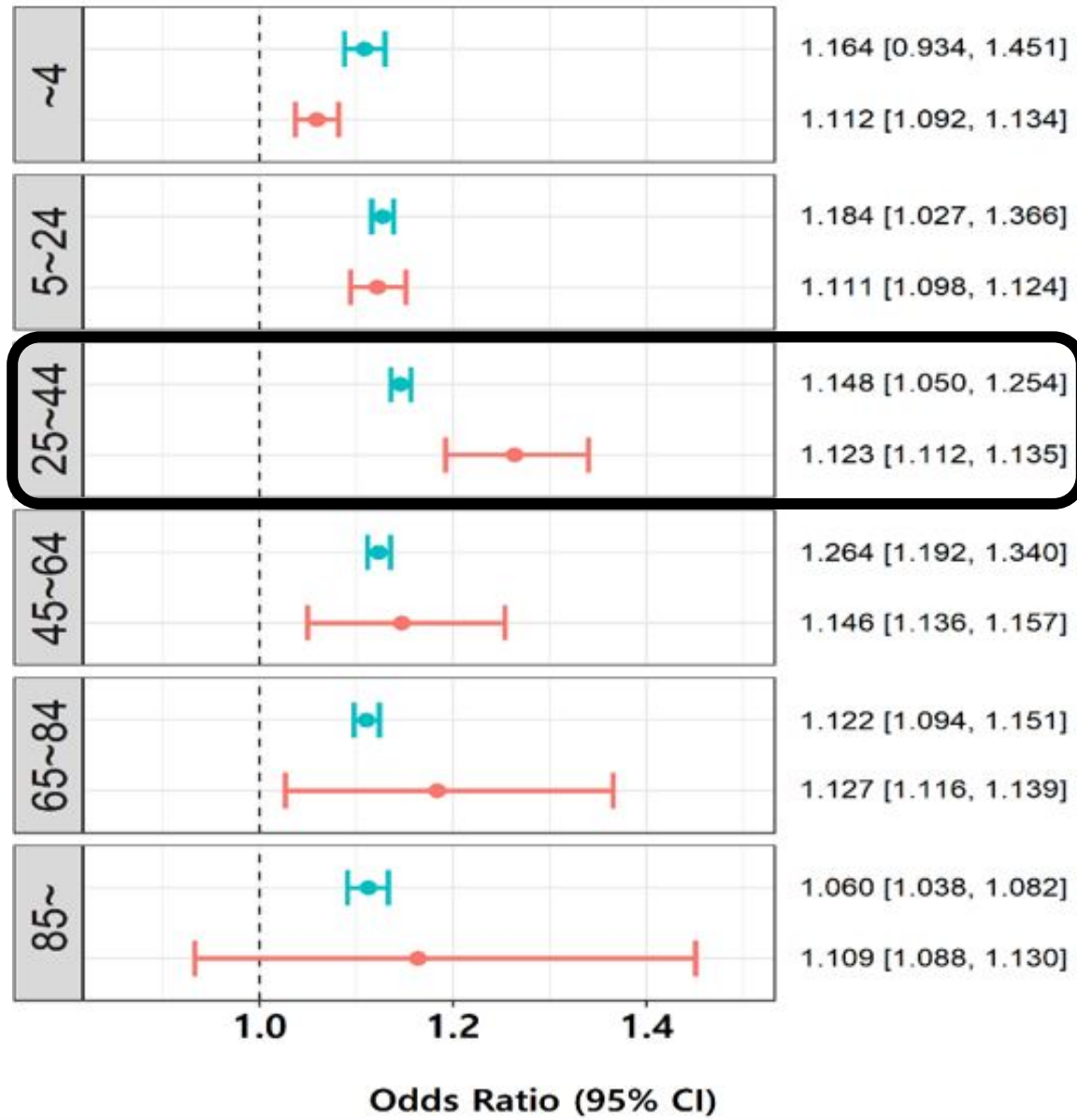
- class of worker
- gender and job roles
- compensation
- citizenship



Municipal Workers

Department	Temp. (C)	Temp. range	Heat index	Heat index range	Outdoor (%)
Fleet	0.1 (1.9)	-5.8 to 2.8	0.3 (2.9)	-7.7 to 5	41.9
Parks and recreation	0.7 (3.8)	-7.4 to 6.5	1.3 (5.7)	-11.6 to 10.1	74.7
Public works	3.3 (0.7)	2.0 to 4.5	5.2 (1.2)	3.0 to 7.1	100.0
Solid waste	0.6 (3.3)	-8.1 to 8.8	0.2 (5.1)	-11.5 to 13.1	60.0
Underground utility	-0.2 (2.7)	-5.5 to 3.4	0.3 (3.4)	-6.4 to 3.8	63.8

a. ED



◆ Patients reporting SSN ◆ Patients not reporting SSN

Direct + Indirect Health Costs

\$667 Million

Outline

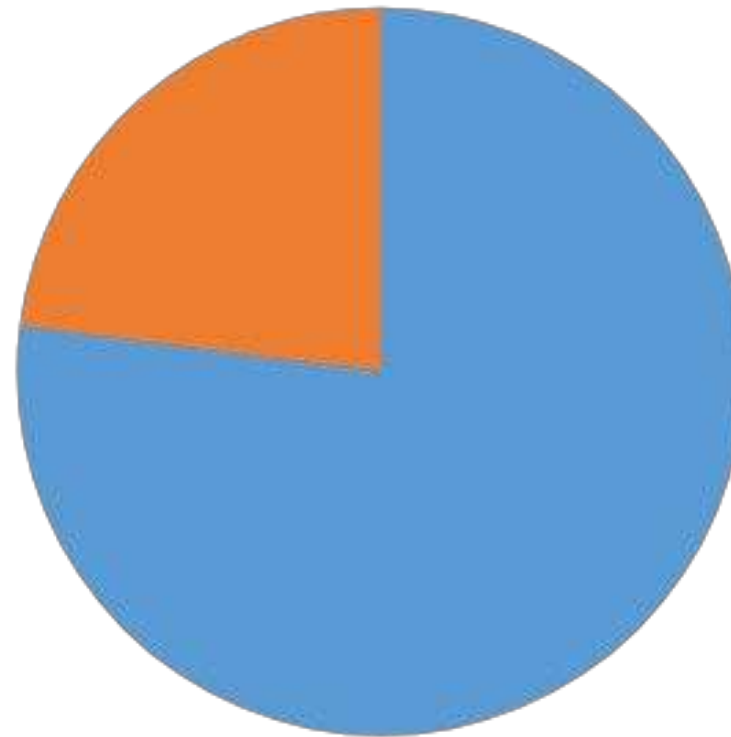
A wide, tree-lined street at sunset. The sky is a mix of orange, yellow, and blue. The street is paved with cobblestones and has a central median. There are cars and pedestrians on the street. The trees are lush and green. The overall scene is a busy urban street during the golden hour.

Extreme Heat in Florida

Building Resilience Against Climate Effects

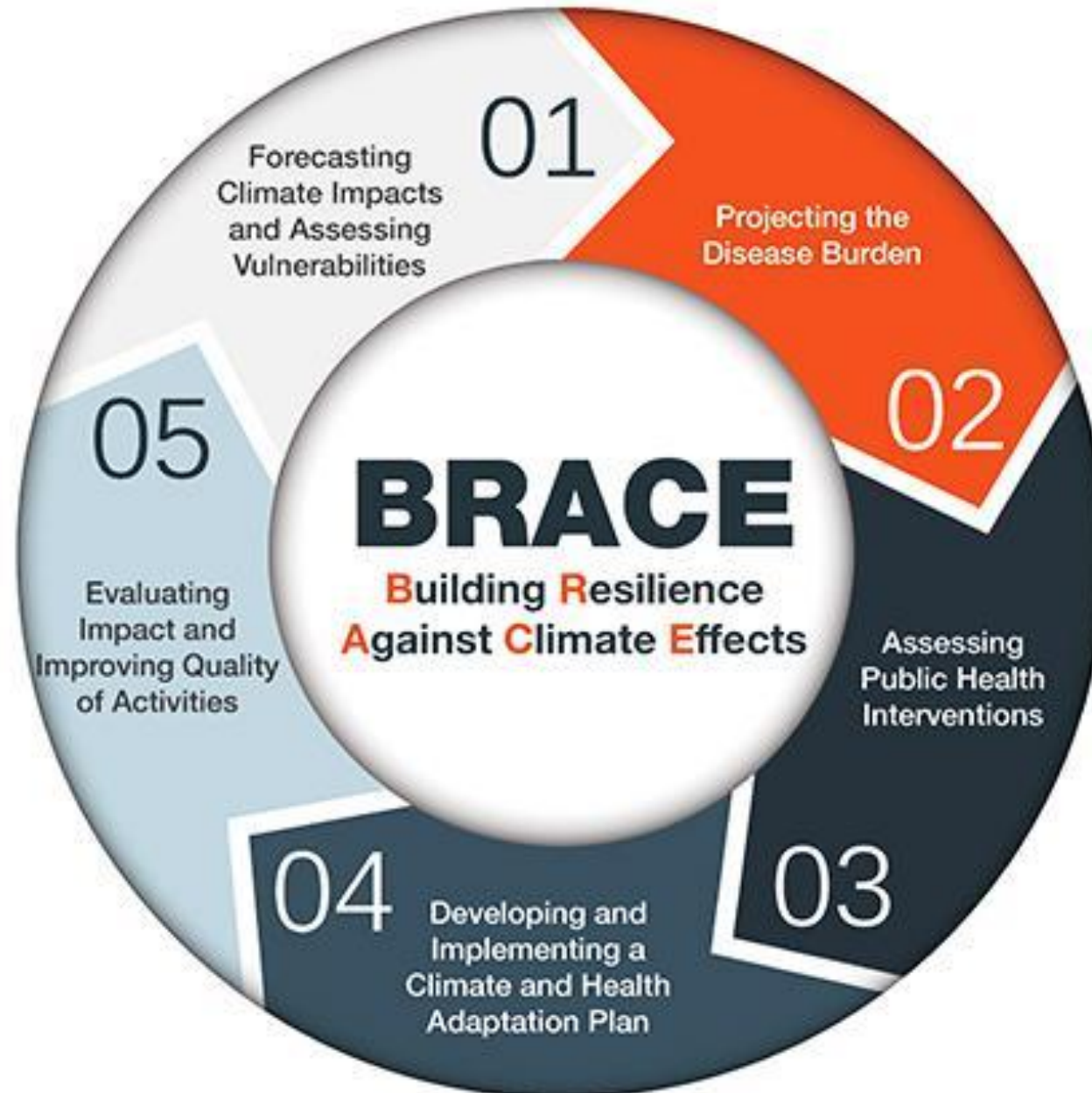
Vulnerability Mapping

“My health department has ample expertise to assess public health impacts associated with climate change”



■ Disagree ■ Agree

Building Resilience Against Climate Effects



EMBRACE Workshops

What is Your Plan? Important Issues

- Communication: who to call, contacts, local help numbers
- Transportation: maps, evacuation and alternate routes, public or medical
- Safety: personal/family, dwelling, possessions, avoiding illness and injury
- Food: special dietary needs for all family members and pets, enough for all
- Water: 3 gallons per person per day, Pets 1 gallon per 3 days, extra for medications, hydrating meals, etc.



Outline

A wide, tree-lined street at sunset. The sky is a mix of orange, yellow, and blue. The street is filled with cars and pedestrians. The trees are lush green. The overall scene is a busy urban street during the golden hour.

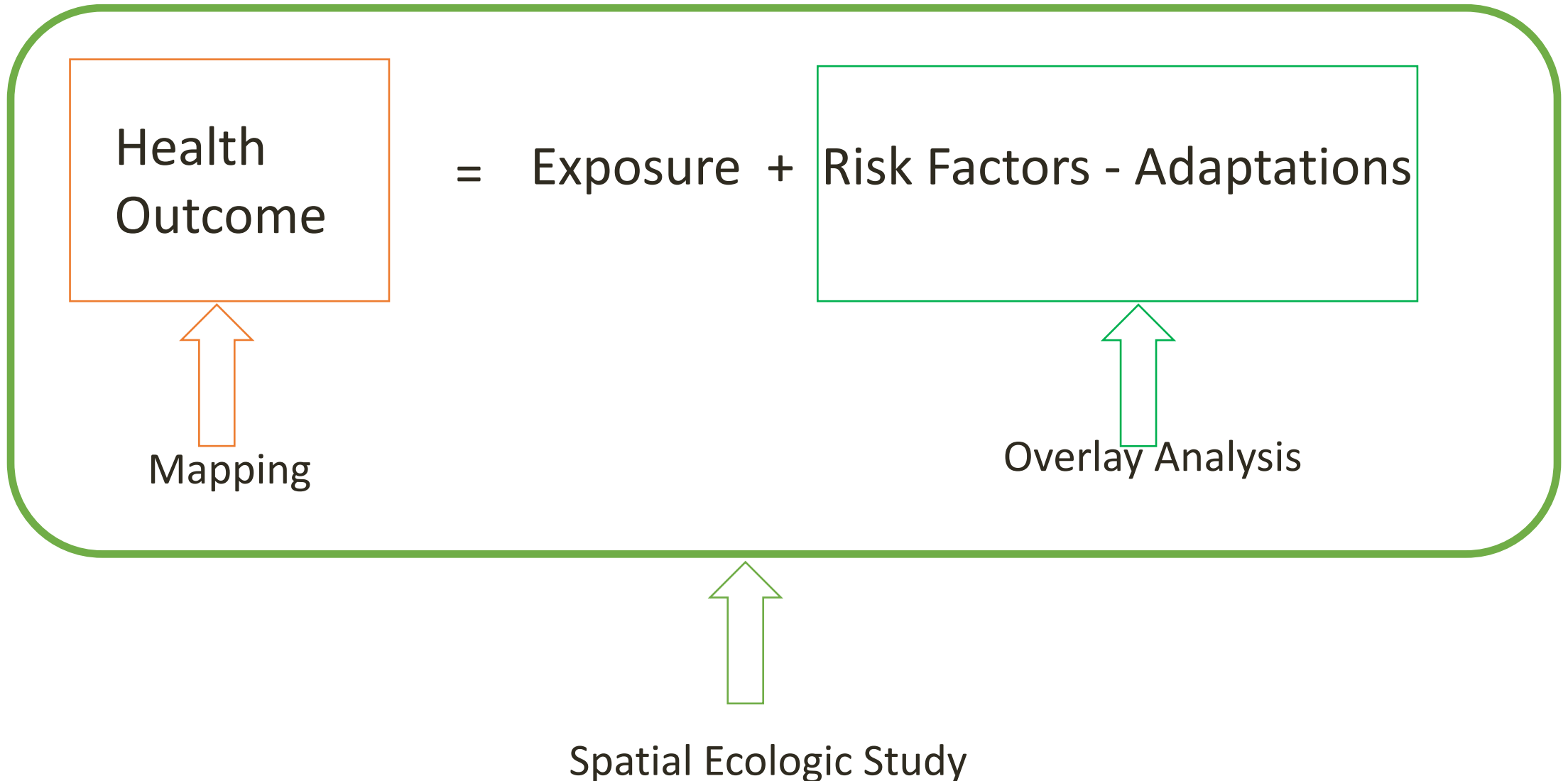
Extreme Heat in Florida

Building Resilience Against Climate Effects

Vulnerability Mapping

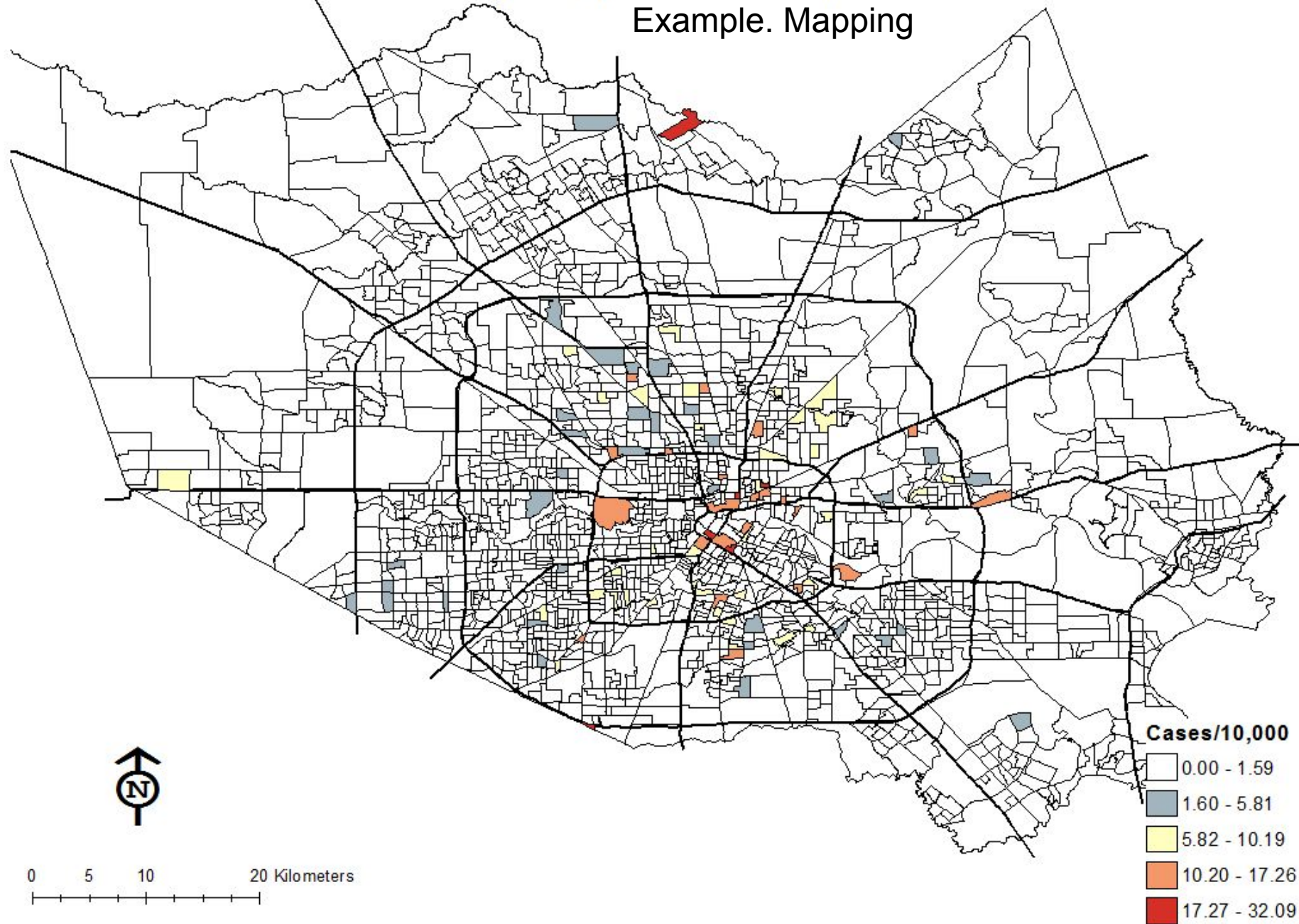
Causes of Extreme Heat Mortality	Mechanism	Treatment/ Intervention
Individual	Overheating Body's Systems Fail	Cooling Body Down Rehydration
Societal	Homelessness Living Alone Crime Historical Zoning	Coordinate Public Broadcasts Cooling Refuge Energy Subsidy A/C Dissemination

Common Approaches



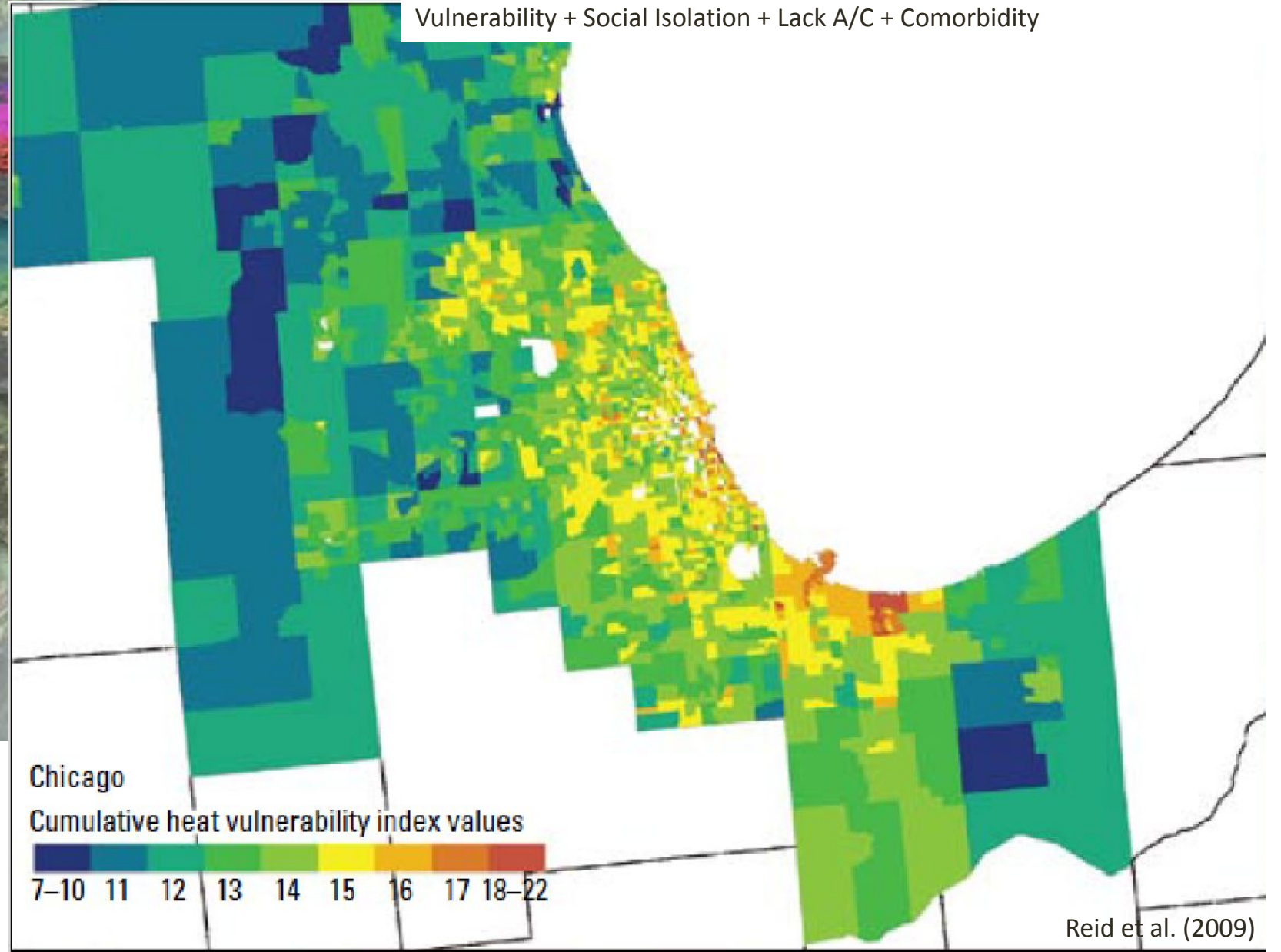
Extreme Heat Mortality Hyperthermia, Houston 1999-2008

Example. Mapping

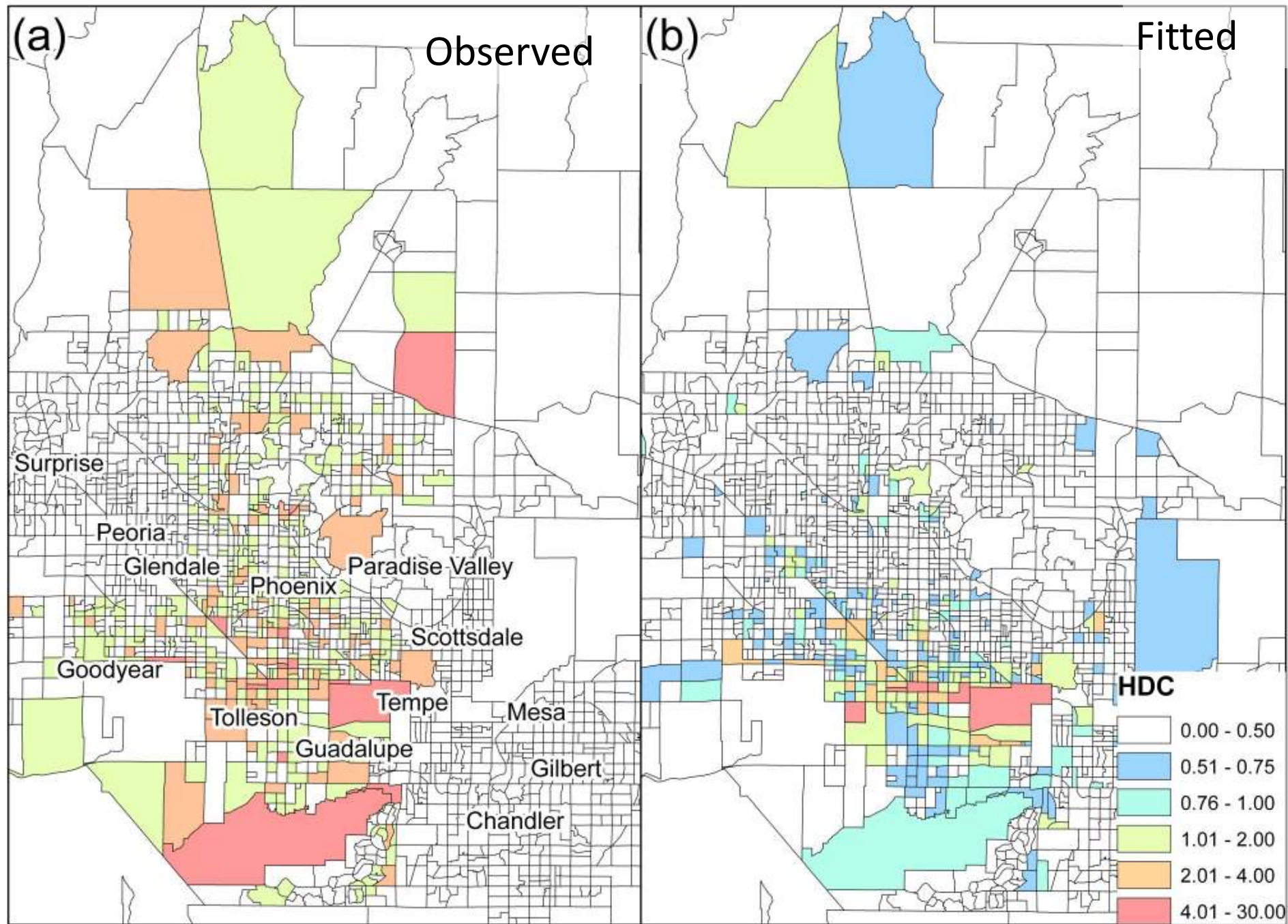


Ex: Overlay Analysis

Vulnerability + Social Isolation + Lack A/C + Comorbidity



Reid et al. (2009)



	Odds Ratio	Std.Err	95% CI	p-value
Night time Surface Temperature (°C)	1.17	0.040	1.09 : 1.25	<0.001
Imperviousness Surface (%)	1.01	0.004	1.01 : 1.02	0.001
Housing Density (100 houses/km ²)	0.82	0.033	0.76 : 0.89	<0.001
Renting (%)	1.01	0.022	1.00 : 1.01	0.003
Linguistically Isolated (%)	1.01	0.000	1.00 : 1.02	0.010
Population aged 65 or older (per 100 people)	0.86	0.045	0.78 : 0.95	0.003
Hispanic (%)	1.01	0.003	1.01 : 1.02	<0.001
People Living Alone (%)	1.03	0.005	1.02 : 1.04	<0.001
Black (%)	1.03	0.007	1.01 : 1.04	<0.001
Asian (%)	0.93	0.030	0.87 : 0.99	0.015
Vacant Households (%)	1.03	0.005	1.02 : 1.04	<0.001
Total Population (per 1000 people)	1.36	0.077	1.21 : 1.51	<0.001
Imperviousness Surface X Housing Density	1.002	0.001	1.001 : 1.003	<0.001

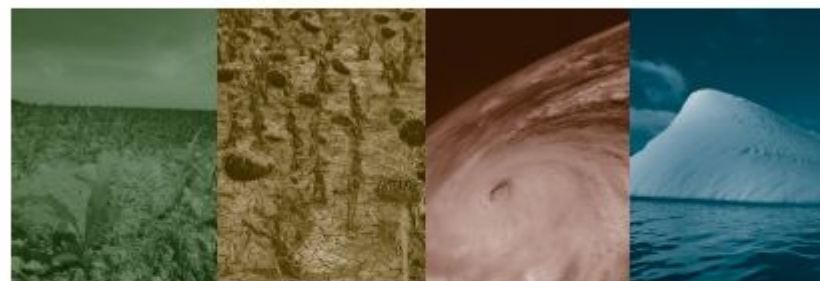
Applications

Everyone @ risk

Guiding decision making

Assessing Health Vulnerability to Climate Change

A Guide for Health Departments



Climate and Health Technical Report Series

Climate and Health Program, Centers for Disease Control and Prevention

Arie Ponce Manangan¹, Christopher K. Uejio², Shubhayu Sahai, Paul J. Schramm³,
Gino D. Marinucci⁴, Claudia Langford Brown⁵, Jeremy J. Hess^{6,7}, George Luber¹

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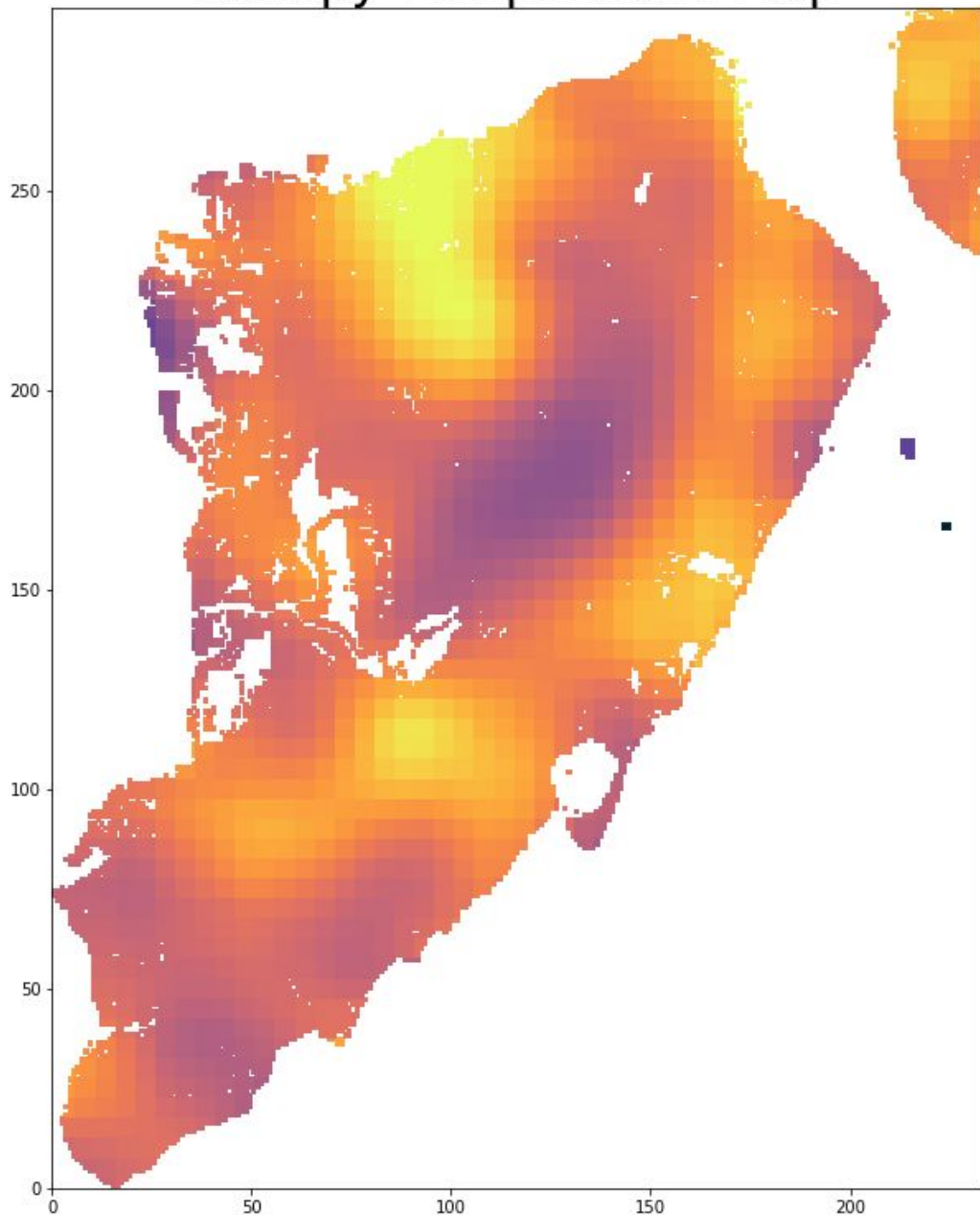
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Division of Environmental Hazards and Health Effects

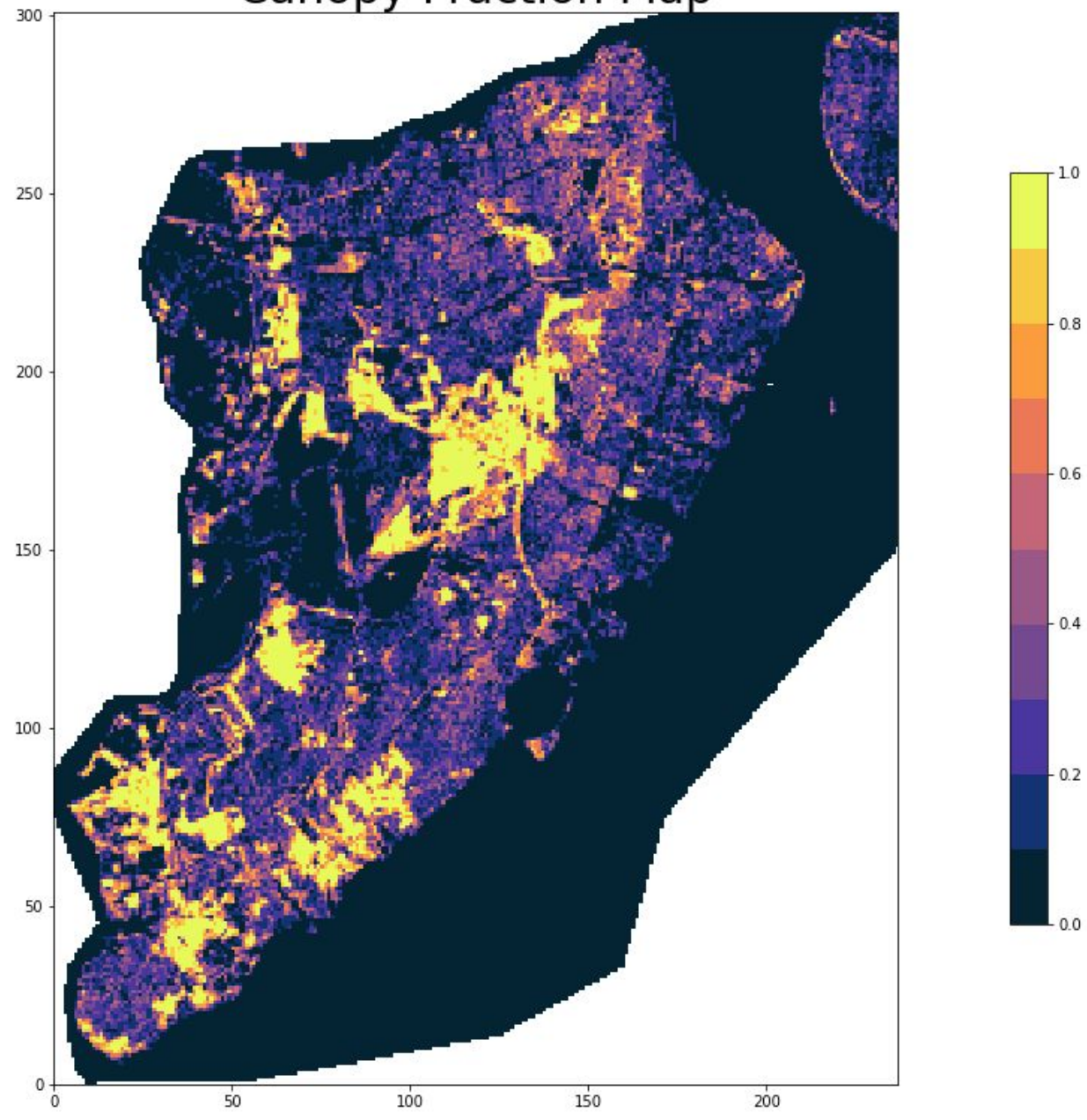


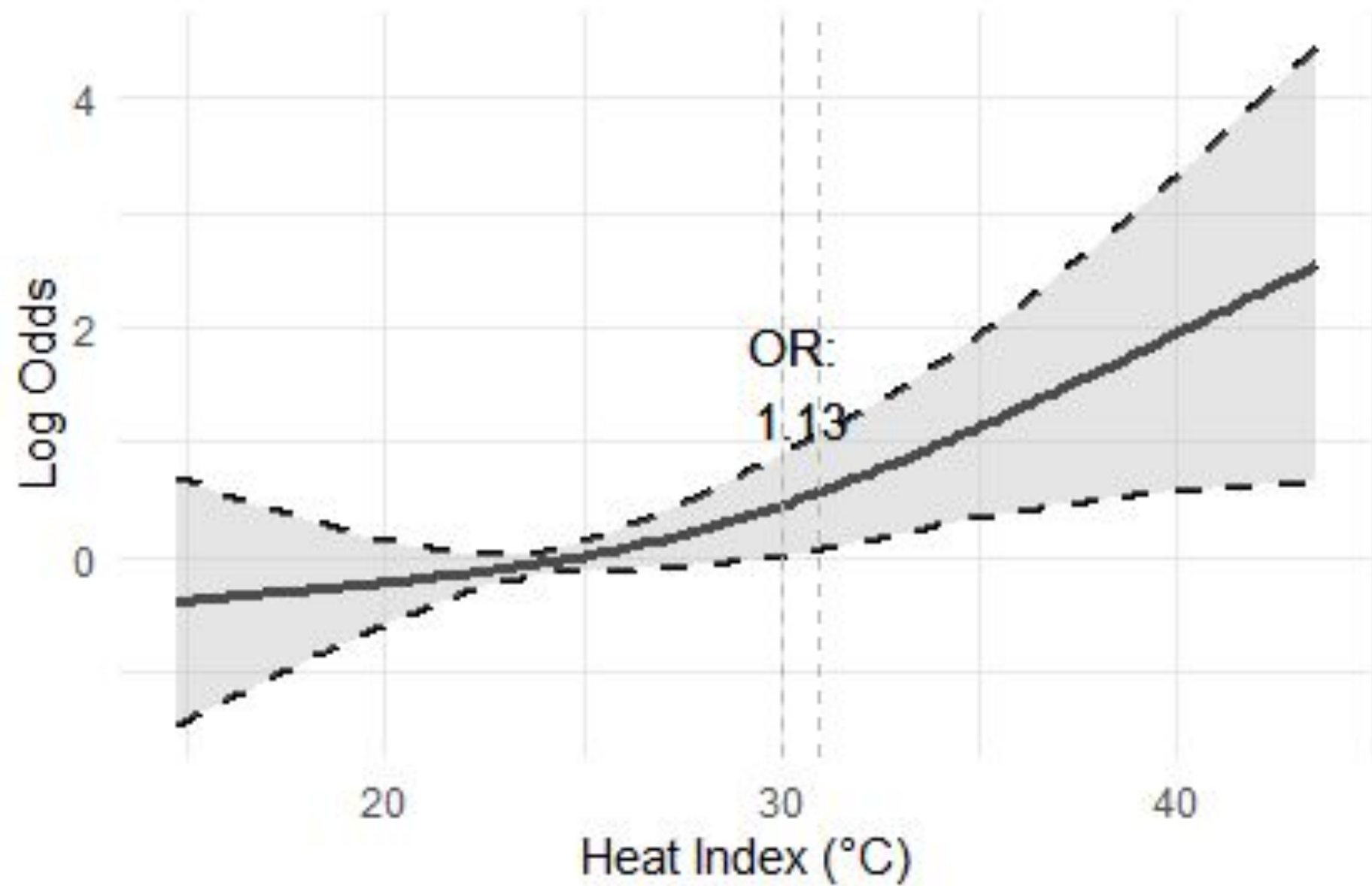
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Canopy Temperature Map



Canopy Fraction Map





Thanks!

Dr. Jihoon Jung (University Washington)

Yoonjung Ahn

Dr. Leiqiu Hu (University of Alabama Huntsville)

Dr. Arthur Yancey II (Grady)

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APPLIED SCIENCES TEAM**
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