

### Urban Heat: Rising Temperatures and Population Vulnerability in Cities

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# Heat, health, and inequality

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### Health impacts of heat exposure



- Mortality
- Fluid and electrolyte imbalance
- Renal disease
- Cardiovascular disease
- Respiratory illness
- Heat-related illness
- Pre-term birth
- Learning



Wellenius et al. Environ Res. 2017

# Health impacts of heat exposure: renal disease and heat related illness





Sun et al, in preparation

### Health impacts of heat exposure: renal disease

PILAR



Brick makers





By Madeleine K. Scammell

November 6, 2017

FOLLOW

Climate Disease and Kidney Injustice



Some have proposed the disease be named heat stress nephropathy. Further, it has been suggested that the cause is climate change.

### Health impacts of heat exposure: pre-term birth



Butler et al, in preparation

#### Health impacts of heat exposure: miscarriage





Wesslink, PRESTO preliminary data

#### **Study: Hotter Classrooms Make it Harder for Students to Learn**

SAT z-score (0.01σ)

Test scores suffered in years after more hot days, especially when classrooms don't have air conditioning.









Goodman et al, 2020

#### Health effects of compound extreme climate events











### Unequal impacts of heat on health



From the Noun Project: "Elderly" by Gan Khoon Lay; "home alone" by Miguel C Balandrano, MX; "Language" by ATOM, TH; "disability" by Nathaniel S.; "money" by Luiz Caravalho; "unemployment" by Aneeque Ahmed; "buildings" by Yu Luck; "house" and "clock" by Dinose



### Identify areas of highest vulnerability



Heidari et al

CRESS

Data Dashboard

#### C-HEAT:

A study of heat exposure in Chelsea and East Boston, Massachusetts

GreenRoots and the **Boston University School of** Public Health.

The main goal of the project is to build the capacity for these communities to respond to extreme heat events. Our research considers heat exposure and related health concerns among the most vulnerable populations in the Chelsea Creek communities

#### c-heatproject.org Twitter:<u>@C HEATProject</u>



Celebrating 25 Years of Fighting for Social and Environmental Justice!



#### Mapping vulnerability, urban heat islands, and adaptation resources

![](_page_12_Figure_1.jpeg)

https://www.c-heatproject.org/datadashboard

#### Decision tools for the city: greenspace cooling versus population demand and vulnerability

![](_page_13_Figure_1.jpeg)

Affordable housing complex

234

0.5

#### Decision tools: tree equity

#### **Exploring Tree Equity in Boston**

#### A Map Series about Trees and People in Boston

#### Welcome

![](_page_14_Picture_4.jpeg)

Speak for the Trees, Boston is proud to present this Map Series to help residents, organizations, and municipal officials explore the distribution of canopy across Boston and the relationship between trees, demographics, and environmental justice.

We encourage you to explore your neighborhood and share the results with your friends, neighbors, and elected officials with the hashtag

#TreeEquityBoston

#### Introduction

1. Tree Canopy in Boston

#### 2. Boston's Environment

#### 3. Boston's People

![](_page_14_Picture_12.jpeg)

Mapping tool built by Raquel Jimenez, BU URBAN

### How is the community adapting to extreme heat? What do residents care about?

Hydration

![](_page_15_Picture_1.jpeg)

Air conditioning presence and use

![](_page_15_Picture_3.jpeg)

![](_page_15_Figure_4.jpeg)

![](_page_15_Picture_5.jpeg)

![](_page_15_Picture_6.jpeg)

![](_page_15_Picture_8.jpeg)

Ambient temperature sensing for fine scale ambient temperature mapping and heat resilience planning

![](_page_16_Picture_1.jpeg)

Temperature sensors in trees around the city

![](_page_16_Picture_3.jpeg)

**Community partner** 

## Indoor and personal temperature exposure and biometrics

![](_page_16_Picture_6.jpeg)

![](_page_16_Picture_7.jpeg)

#### Air conditioning and safety

"My fan is used in my living room because of safety reasons: one, because of intruders might break in on the first floor. But it keeps me cool on hot days. My air-condition is used in my bedroom on the second floor which it is much needed. I have four windows which give me a lot of sun." Participant

![](_page_17_Picture_2.jpeg)

Credit: Leila Heidari, Speak about Heat!