Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma:

Using Data to Prioritize In-Home IEDOH Interventions

Hosted by

U.S. Environmental Protection Agency (EPA)

October 25, 2023, 1:00–2:30 p.m. EDT

Agenda

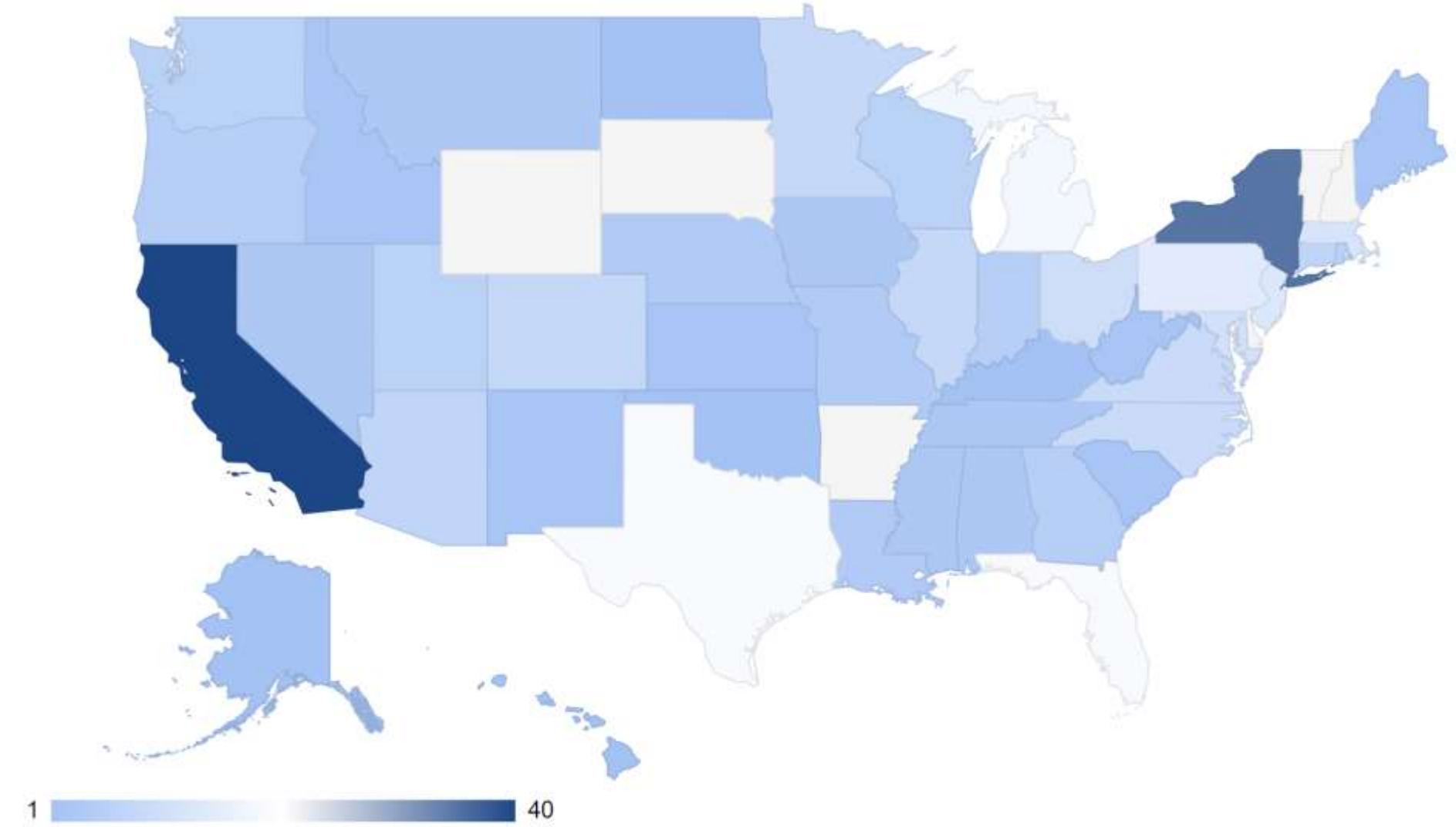
Welcome to the Webinar Series: Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma.....**1:00 p.m. EDT**

Webinar 1: *Using Data to Prioritize In-Home IEDOH Interventions*

Panel Discussion and Question-and-Answer Session.....**30 minutes**

Closing: Creating Systems to Address IEDOH.....**2:30 p.m. EDT**

Who Is Here Today?



Polling Question 1

How familiar are you with using data and analytics to prioritize indoor environmental interventions for asthma health outcomes?

1. Very familiar. I use data and analytics to characterize our asthma burden and prioritize interventions.
2. Somewhat familiar. I plan to use data and analytics to support asthma program planning.
3. A little. I can imagine using data and analytics to prioritize in-home asthma services.
4. Not familiar. What do you mean by “use data and analytics”?

Solving for the Indoor Environmental Determinants of Health in Asthma

- EPA's Indoor Environments Division (IED) studies, supports and spotlights technical **solutions for the indoor environmental determinants of health**, the **IEDOH**, particularly in asthma.
- IEDOH are a subset of the social determinants of health, the SDOH, that **covary with housing quality and medical care**.
- For 15+ years, with 4,500+ champions, IED has helped **communities address and solve** for the IEDOH in asthma.

IED's System for High Quality Asthma Care

Using Data to Prioritize In-Home Environmental Interventions

- We will help **build community capacity to use data and analytics** to prioritize indoor environmental interventions and services to have the greatest impact on **asthma health outcomes and disparities**.
- We want to highlight communities that are using a range of data and analytics to **focus their built environment interventions toward health outcomes**, such as improved asthma outcomes, community health and health equity.

Using Data to Prioritize In-Home Environmental Interventions

- **Data are everywhere** and can help you tell the story of asthma in your community.
- **All data and analytics are valuable** and can be used to prioritize services and effect change at the community-level.
- **This webinar spotlights three different perspectives** at the hyper-local-, city- and county-levels.

Join the Asthma Community Network to access this webinar series and more at **AsthmaCommunityNetwork.org**

Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma:

Using Data to Prioritize In-Home IEDOH Interventions

CAROLYN FERGUSON
ENVIRONMENTAL JUSTICE MANAGER
RED HOOK INITIATIVE

KARA SMITH, LMSW
RED HOOK COMMUNITY HEALTH NETWORK MANAGER
RED HOOK INITIATIVE

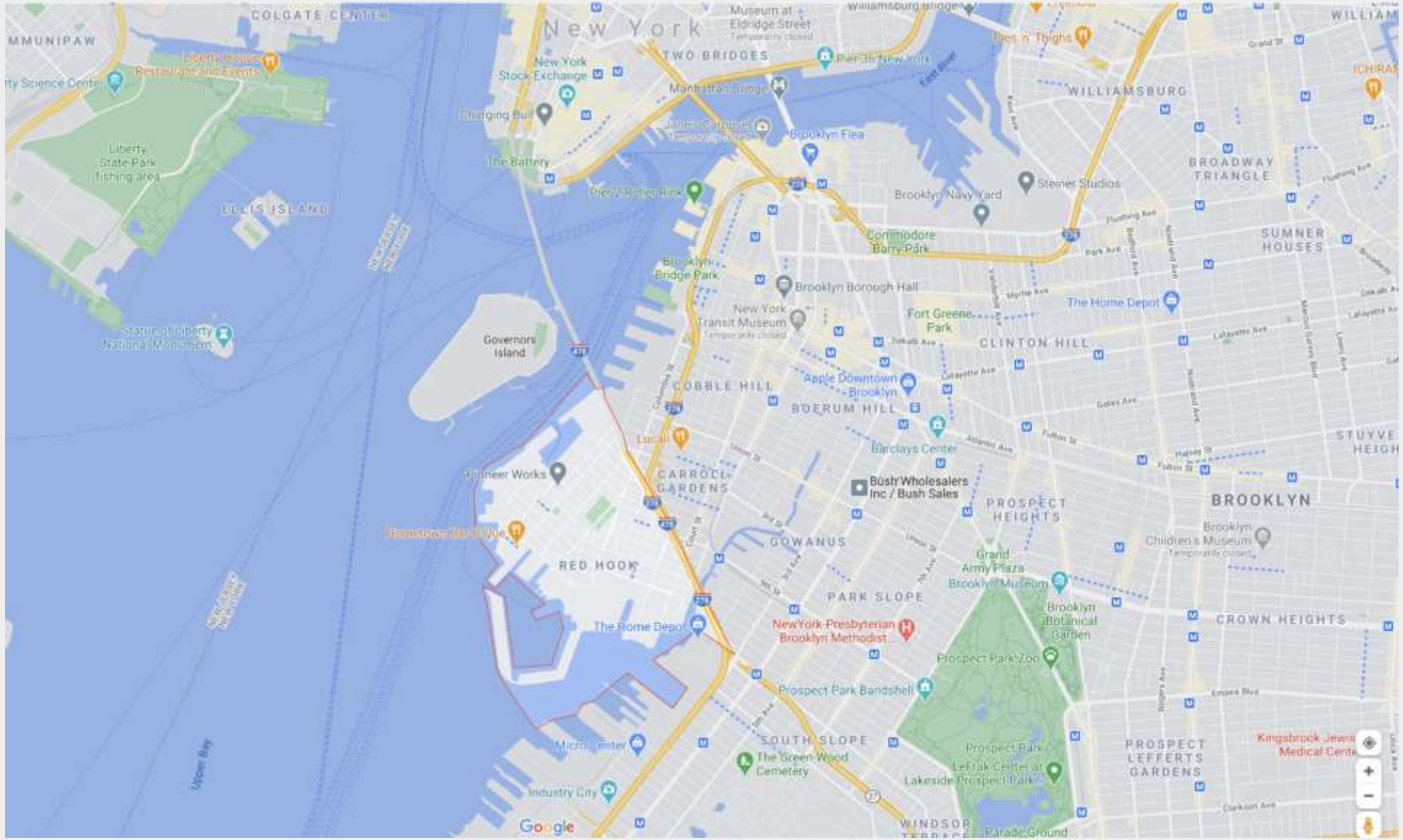
Understanding Asthma Rates in Brooklyn's Red Hook Houses

Carolyn Ferguson, *Environmental Justice Manager*

Kara Smith, *Red Hook Community Health Network Manager*

Red Hook Initiative

- Established in 2002
  1. Empowering Youth
  2. Building Community
  3. Investing in Residents


New York
COLGATE CENTER
MMUNIPAW
Liberty Science Center
Liberty House Restaurant and Events
Liberty State Park fishing area
ELLIS ISLAND
Statue of Liberty National Monument
Governors Island
Museum at Eldridge Street
Temporarily closed
New York Stock Exchange
TWO BRIDGES
Pier 36 New York
Manhattan Bridge
Charging Bull
The Battery
Pier 2 Bridge Park
Brooklyn Flea
Brooklyn Navy Yard
Steiner Studios
Commodore Barry Park
Brooklyn Bridge Park
Brooklyn Borough Hall
New York Transit Museum
Temporarily closed
Fort Greene Park
The Home Depot
CLINTON HILL
COBBLE HILL
BOERUM HILL
Apple Downtown Brooklyn
Barclays Center
Lucali
Pioneer Works
CARROLL GARDENS
Bush Wholesalers Inc / Bush Sales
PROSPECT HEIGHTS
BROOKLYN
Brooklyn Children's Museum
Temporarily closed
GOWANUS
Grand Army Plaza
Brooklyn Museum
RED HOOK
PARK SLOPE
Brooklyn Botanical Garden
CROWN HEIGHTS
The Home Depot
NewYork-Presbyterian Brooklyn Methodist
Prospect Park Zoo
Prospect Park Bandshell
SOUTH SLOPE
Prospect Park
LeFrak Center at Lakeside Prospect Park
PROSPECT LEFFERTS GARDENS
The Green-Wood Cemetery
Industry City
Upper Bay
WINDSOR TERRACE
Parade Ground
Google

Report Finds Mold Problem at Red Hook Houses Has Intensified Since Sandy

BY NY1 NEWS | BROOKLYN
PUBLISHED 12:34 PM ET OCT. 28, 2016

Saturday marks four years since Hurricane Sandy made landfall in the city and a new report says residents of the Red Hook Houses in Brooklyn are suffering with long-term health problems caused by storm-related damage.

The Red Hook Initiative says Sandy made an already-existing mold problem at the public housing complex worse.

A recent survey shows 81 residents were found to have mol
storm.

Undark Magazine

In Public Housing, a Battle Against Mold and Rising Seas

FEMA has funded roof repairs, which will help alleviate the problem, but it did not directly fund mold remediation in the Red Hook Houses.

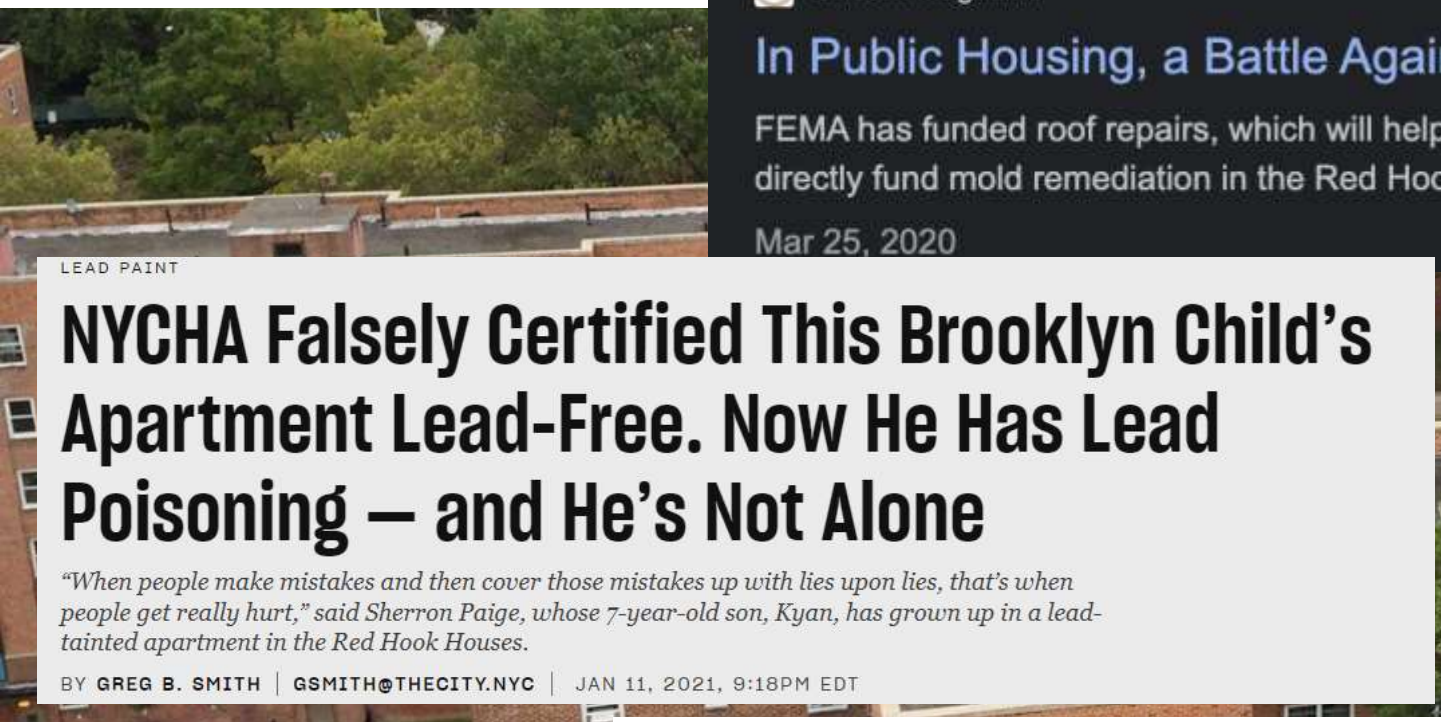
Mar 25, 2020

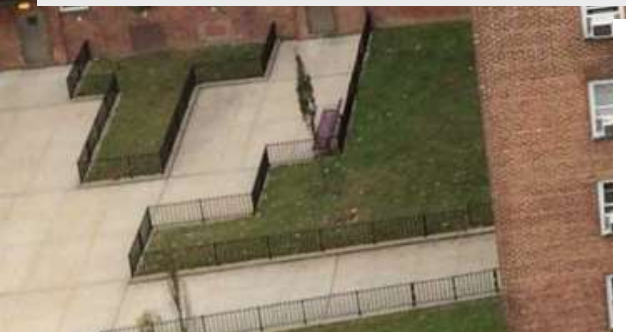
LEAD PAINT

NYCHA Falsely Certified This Brooklyn Child's Apartment Lead-Free. Now He Has Lead Poisoning — and He's Not Alone

"When people make mistakes and then cover those mistakes up with lies upon lies, that's when people get really hurt," said Sherron Paige, whose 7-year-old son, Kyan, has grown up in a lead-tainted apartment in the Red Hook Houses.

BY **GREG B. SMITH** | **GSMITH@THECITY.NYC** | JAN 11, 2021, 9:18PM EDT





Red Hook mother says plumbing issues in apartment are impacting her family's quality of life

EPA Soil Investigation Results

Ball Fields 5-8 and 9: Elevated contaminants **related to Columbia lead facility**

- EPA removal action (cleanup) required; NYC Parks completing under EPA oversight

Average Lead Levels per Area (parts per million)

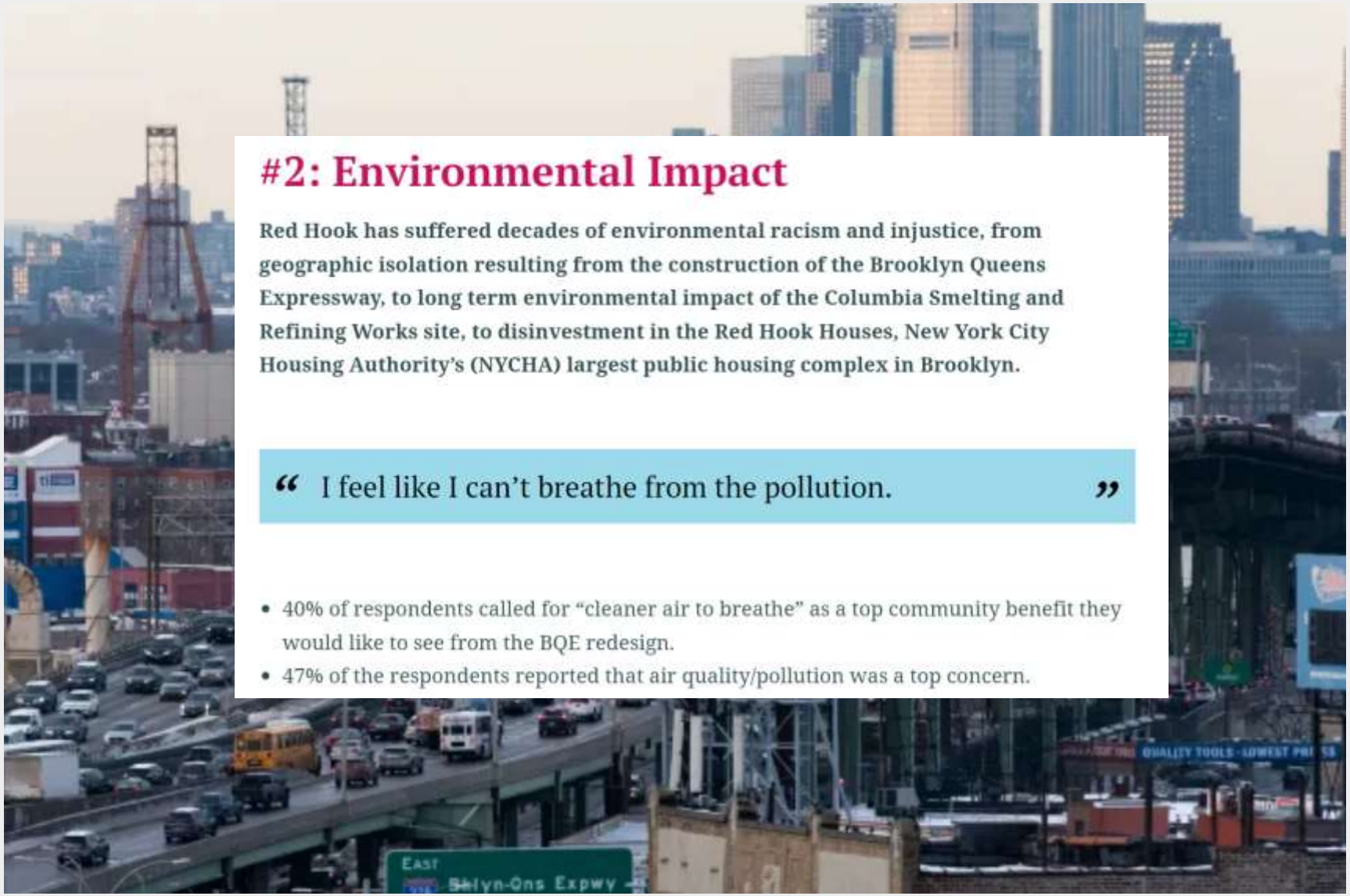
DEPTH		BALL FIELDS 5-8	BALL FIELD 9	SOCCER FIELD 2	SOCCER FIELD 1	SOCCER FIELD 6
SURFACE ↓ 2' DEEP	0-1"	1,580	140	285	**474**	254
	1-6"	2,240	179	**508**	**587**	367
	6-12"	2,590	**698**	**618**	**496**	**535**
	12-18"	2,847	1,209	**875**	389	387
	18-24"	3,795	1,222	1,431	**781**	**467**

smelter-related | *not* smelter-related

400 ppm = EPA & NY standard;

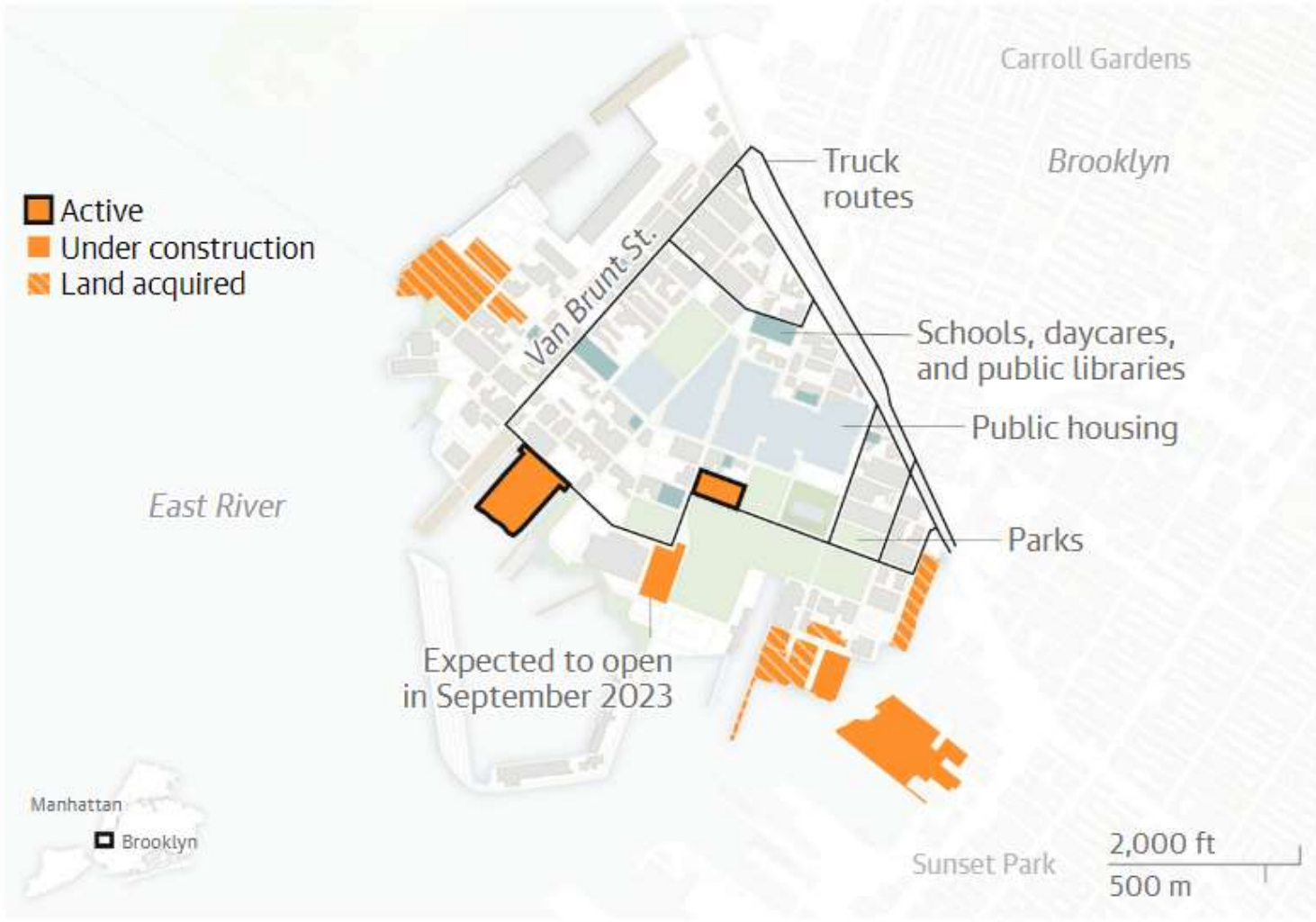
1,200 ppm = immediate action if in surface soil (0 to 6")


East
Autocar



Source: Ants Among Buffalo: https://storymaps.arcgis.com/stories/c09ddbde8c9c4329b2edf20c2d9b3d3b

Warehouses in Brooklyn's Red Hook neighborhood



Guardian graphic. Sources: Consumer Reports/Guardian research, NYC Open Data.

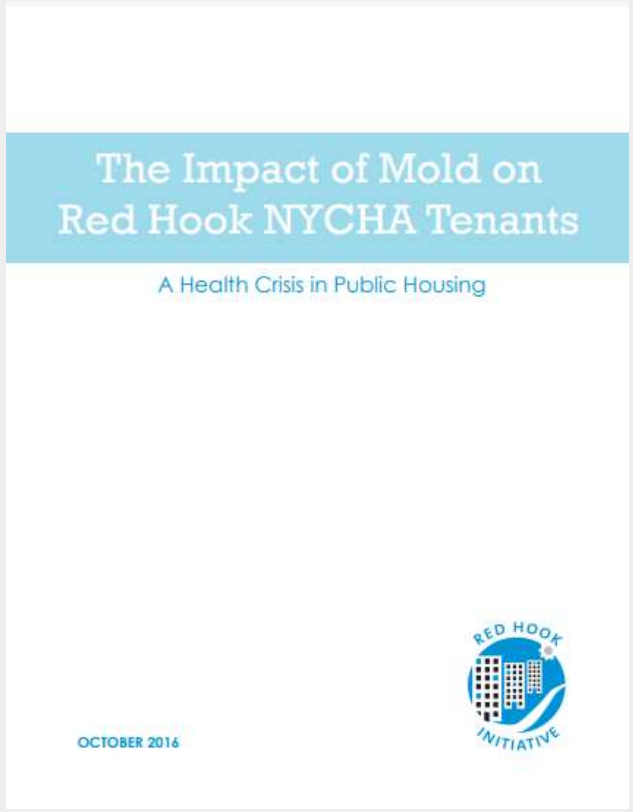
Red Hook Asthma Data

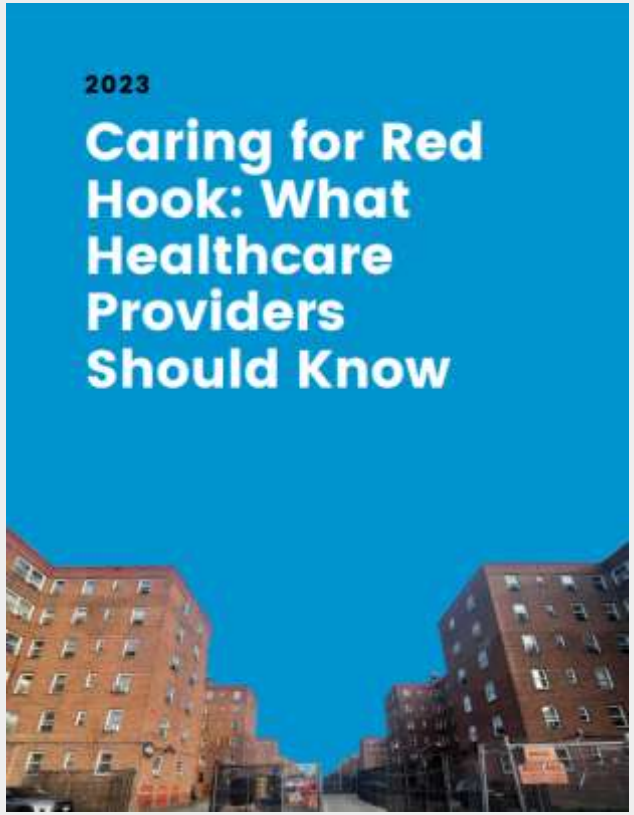
Challenges:

1. ZIP Code: Red Hook shares a ZIP code with wealthier neighborhoods that have greater access to resources that might alleviate health burdens/outcomes.
2. Community District: Shared with wealthier neighborhoods.
3. Neighborhood: Disparities between public housing and non-public housing residents in Red Hook.
4. Changing environment!

What Has Worked?

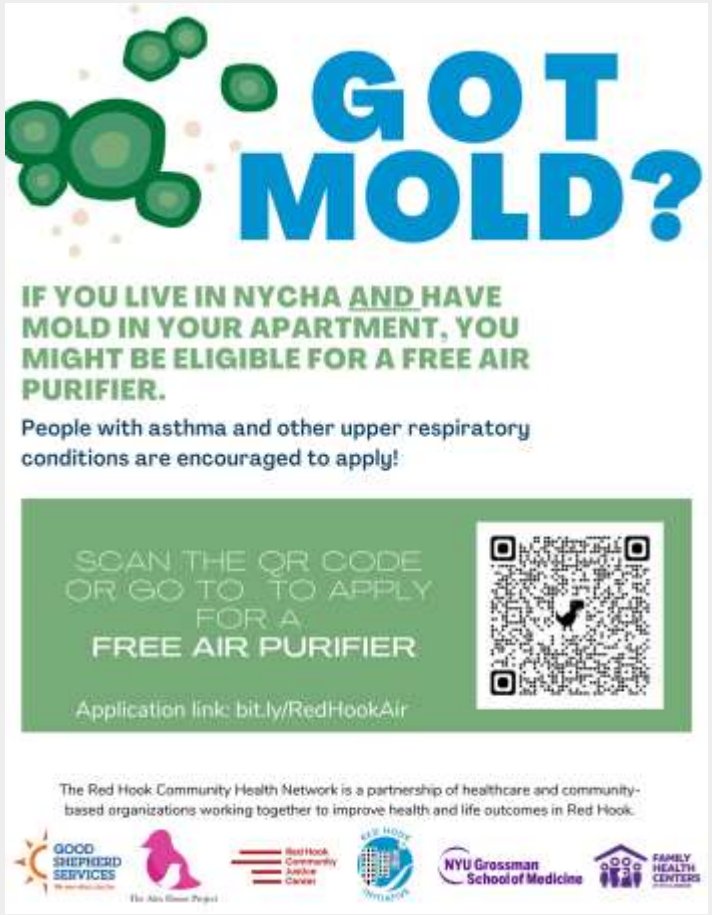
- Sources that include Census tract-level data
  - Limitation: Total population within Census tract 85 is underrepresented.
- Grassroots data collection





Download these reports at: www.rhicenter.org

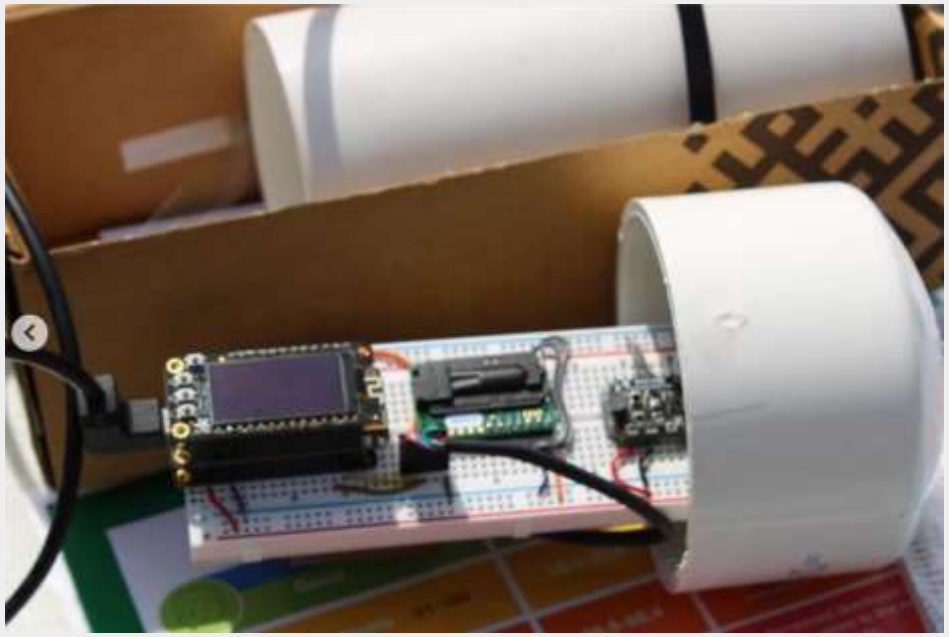
Air Purifier Pilot



Community Air Monitoring

Community Air Monitoring

- Community air monitoring is a network of strategically placed air sensors within a community or city to monitor the air quality for key pollution markers:
  - Particulate matter (PM_1, $PM_{2.5}$, PM_{10}), NO_2, O_3, SO,H_2S, NO, CO and other gases.
- Community input is the leading factor in building the air sensor network.



How We Do It

- Ask community members which locations, structures or situations that they believe are impacting the air quality.
- Verify that locations are potential hotspots to monitor.
- Identify current air monitoring initiatives in the community by other community-based organizations, private citizens or government agencies.

How We Do It

- Analyze the data that had been previously collected.
- Position the PurpleAir sensors in proximity to air quality stressors and where little or no air monitoring initiatives exist.
- Build a Community Advisory Group (CAG).

Carolyn Ferguson (carolyn@rhicenter.org), *Environmental Justice Manager*

Kara Smith (kara@rhicenter.org)**,** *Red Hook Community Health Network Manager*

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ADAM HABER, Ph.D.
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MAPPING EMERGENCY DEPARTMENT ASTHMA VISITS TO IDENTIFY POOR QUALITY HOUSING

Adam L. Haber, Ph.D., Harvard University

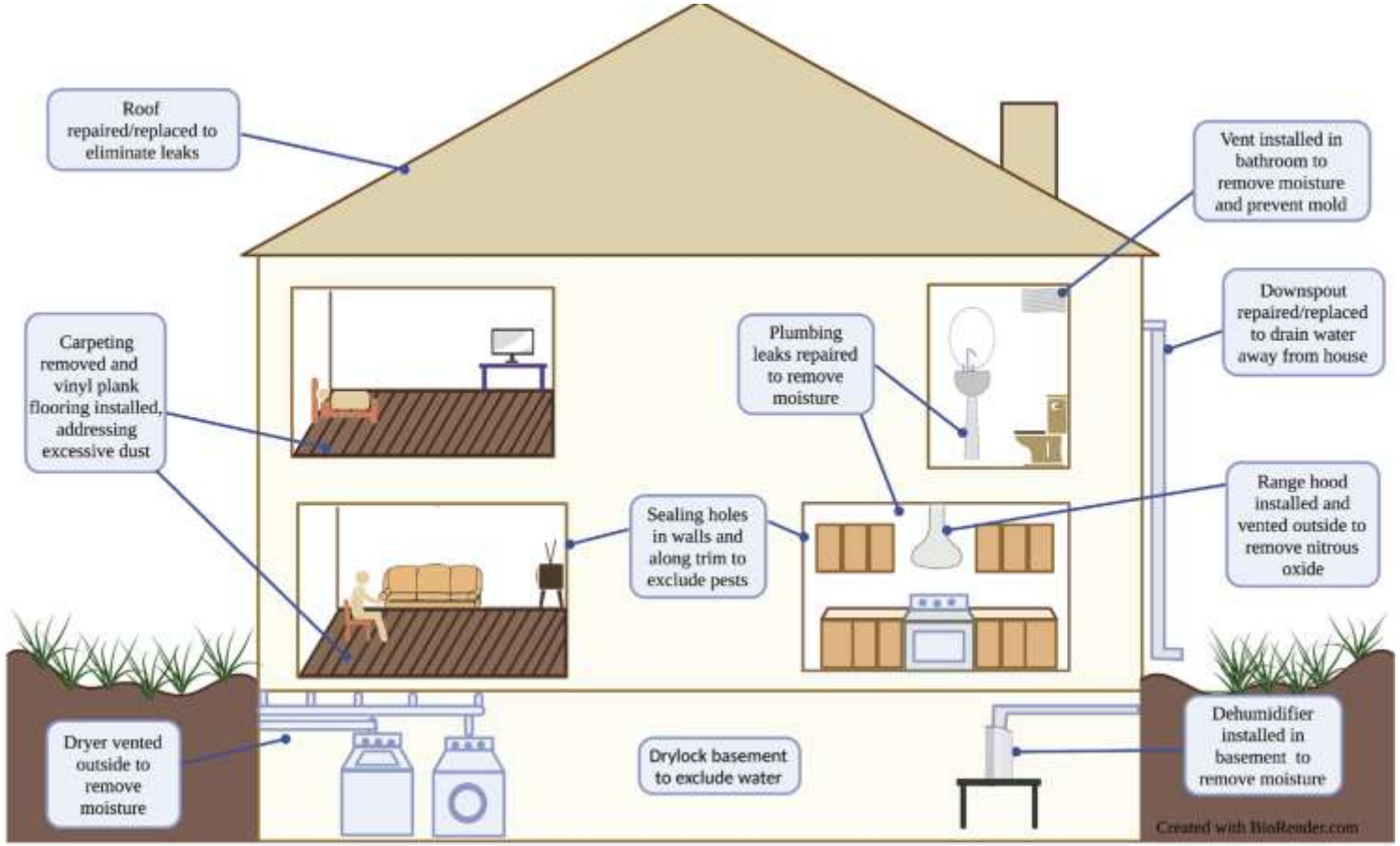
Elizabeth A. Samuels, M.D., M.P.H., M.H.S., UCLA

UCLA

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

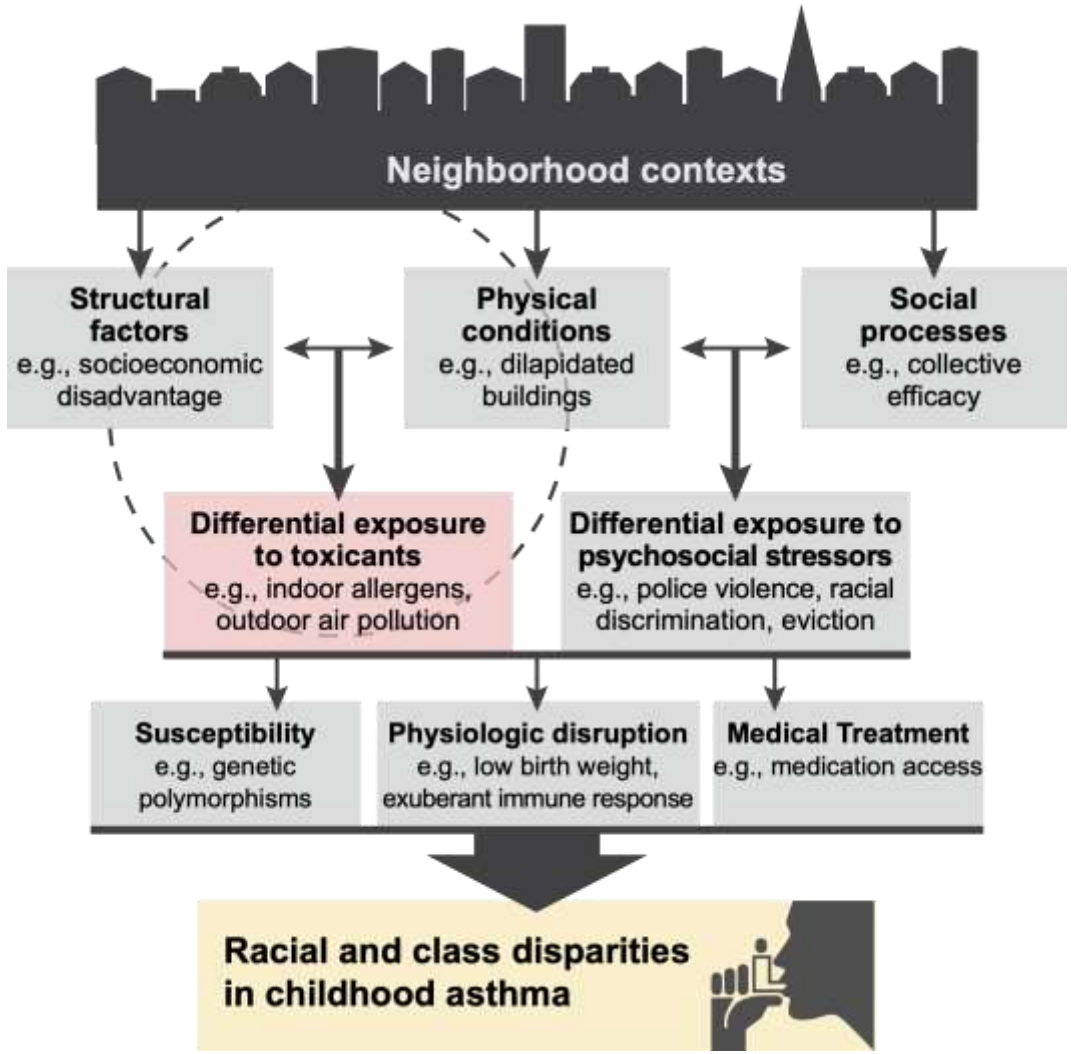
HOUSING CONDITIONS DRIVE ASTHMA INCIDENCE AND EXACERBATIONS

- Residents living in poor-quality housing have higher emergency department (ED) utilization for asthma.
- Interventions to improve housing conditions can reduce asthma ED visits.
- Identification and remediation of poor housing conditions is often delayed or does not occur.
  - HUD inspections every ~760 days for public housing and ~896 days for HUD-subsidized housing.



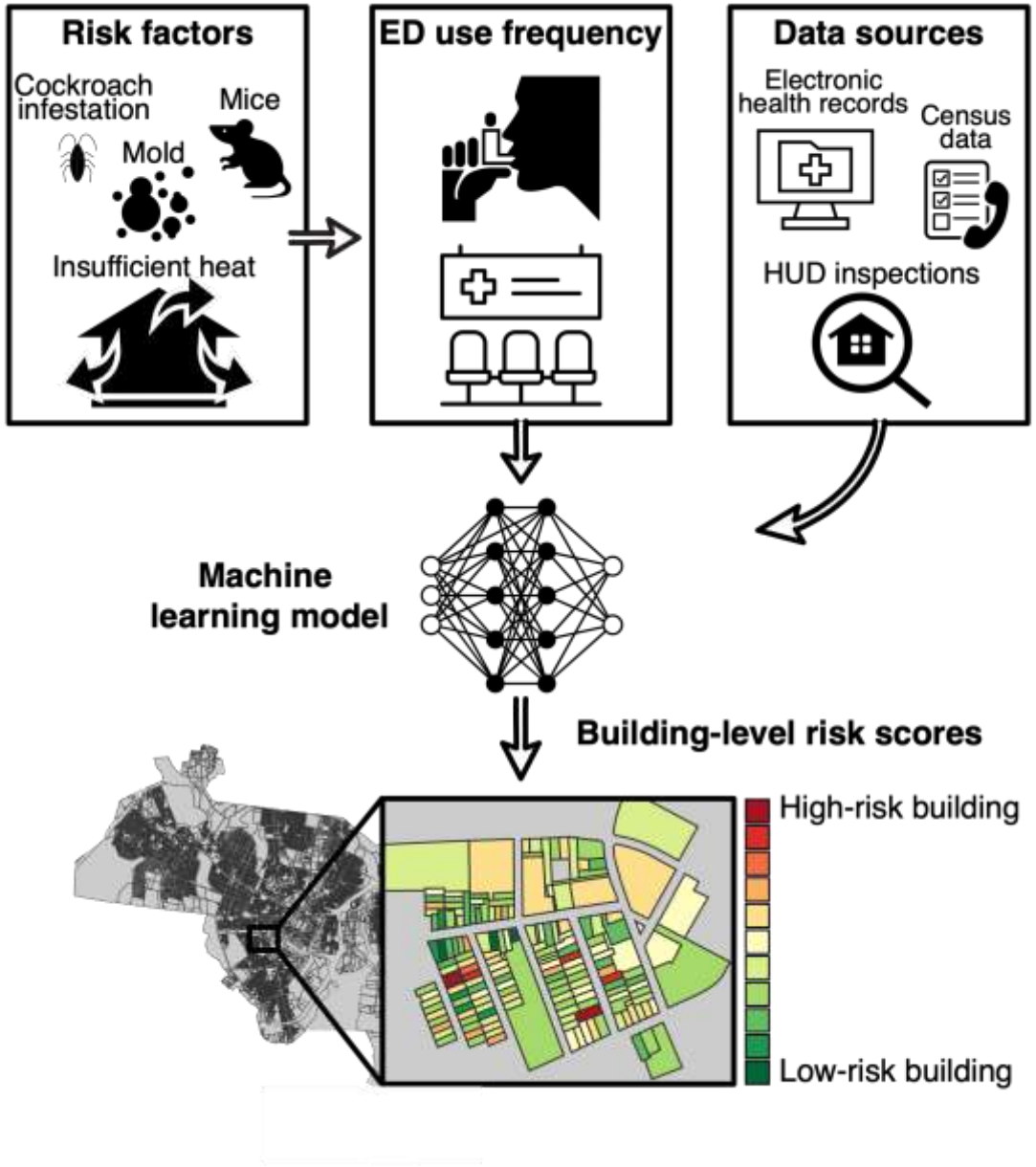
From Bryant-Stephens, et al. Housing and Asthma Disparities *J All Clin Imm*. 2021. The Philadelphia Community Asthma Prevention Program (CAPP)

DIFFERENTIAL EXPOSURES ARE A CRITICAL CAUSE OF ASTHMA DISPARITIES



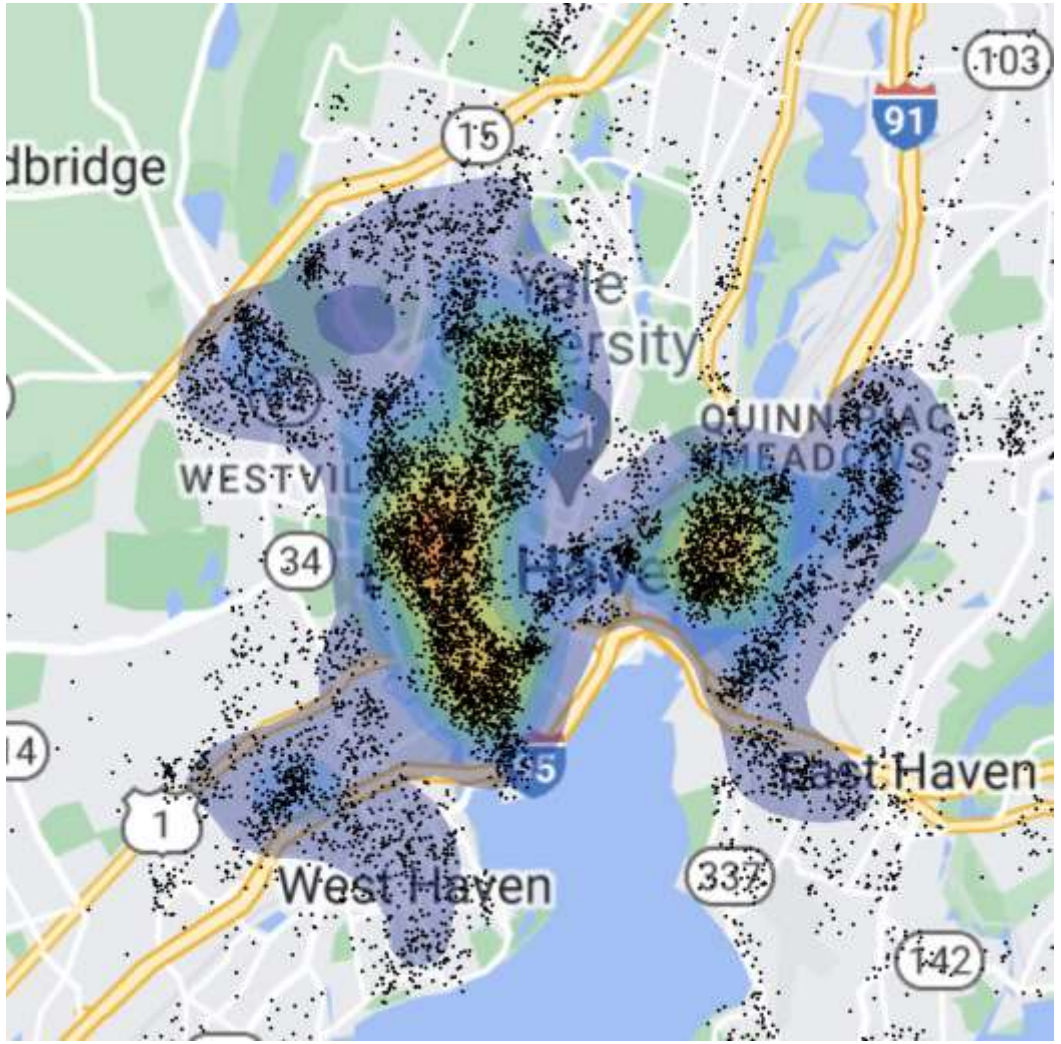
Adapted from: Subramanian et al, *Chest*, 2007.

Are ED visits for asthma an accurate indicator of poor-quality housing?



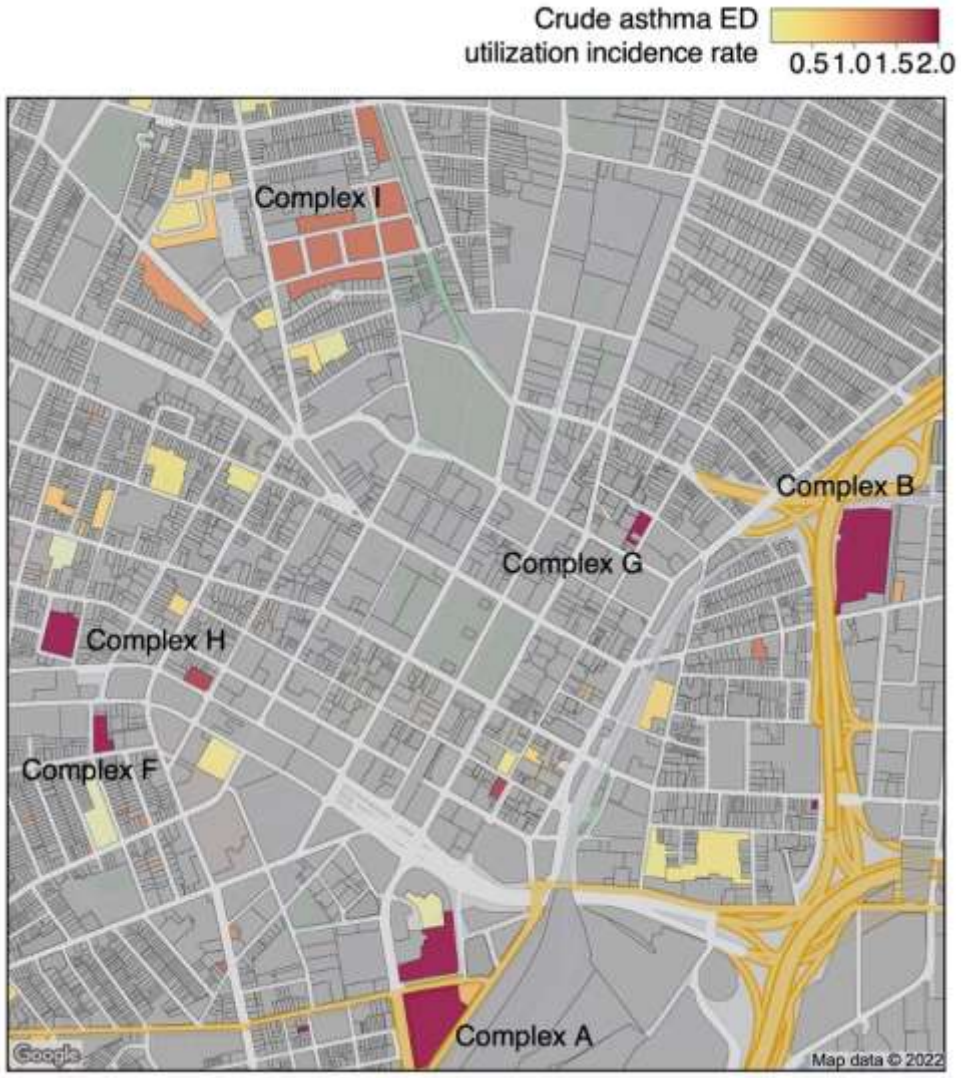
METHODS: RETROSPECTIVE COHORT STUDY IN NEW HAVEN, CT

- Data:
  - ED asthma visits March 1, 2013, to August 31, 2017, in a closed health system (ICD codes)
  - Real Estate Assessment Center (REAC) public housing inspection scores 2015–2019
  - American Community Survey
- Geocoded and mapped ED asthma visits and REAC inspection scores at parcel level

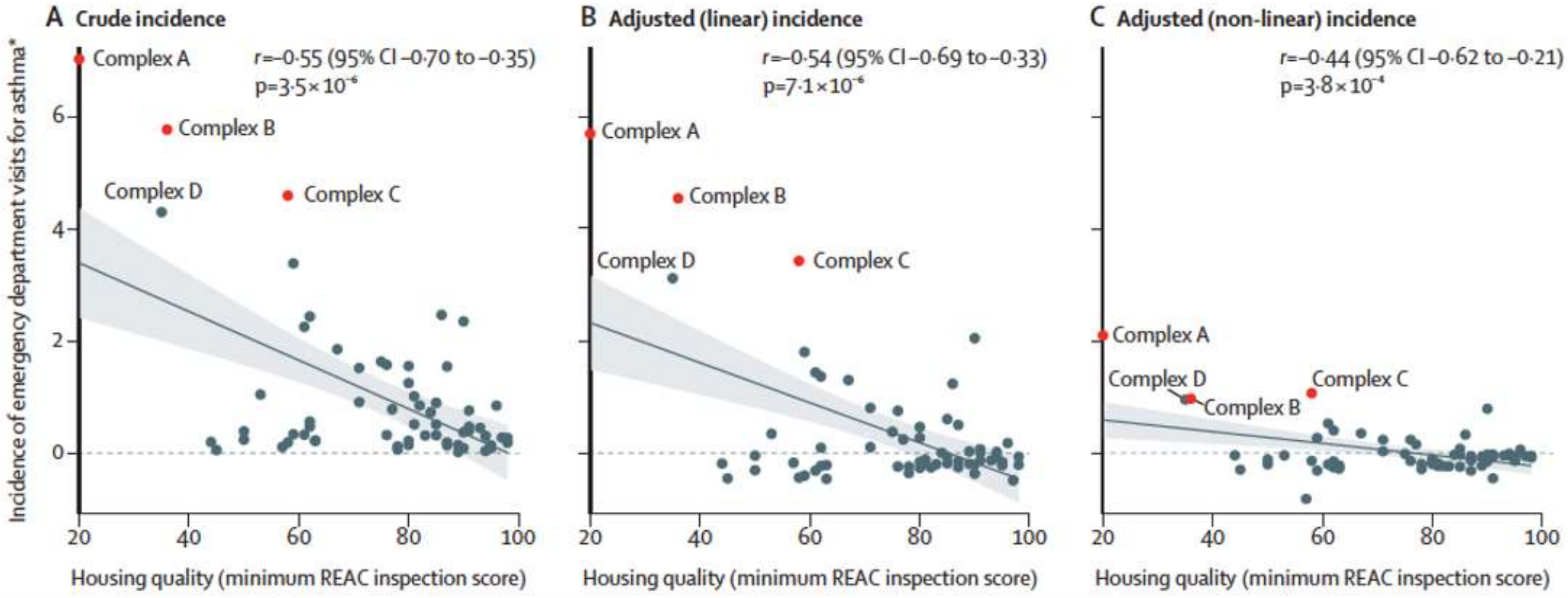


CALCULATING ASTHMA ED VISIT INCIDENCE AT EACH BUILDING (PARCEL) CITYWIDE

- Reflects number of patients and number of visits for the estimated population at that parcel.
- Pearson's correlation used to examine associations between ED asthma visits at parcel level and REAC scores.
- Linear and non-linear fandom forest regression models run, controlling for individual and neighborhood characteristics.
- Sliding window approach to identify number of days before an inspection asthma ED utilization rose above 90th percentile of all parcels.



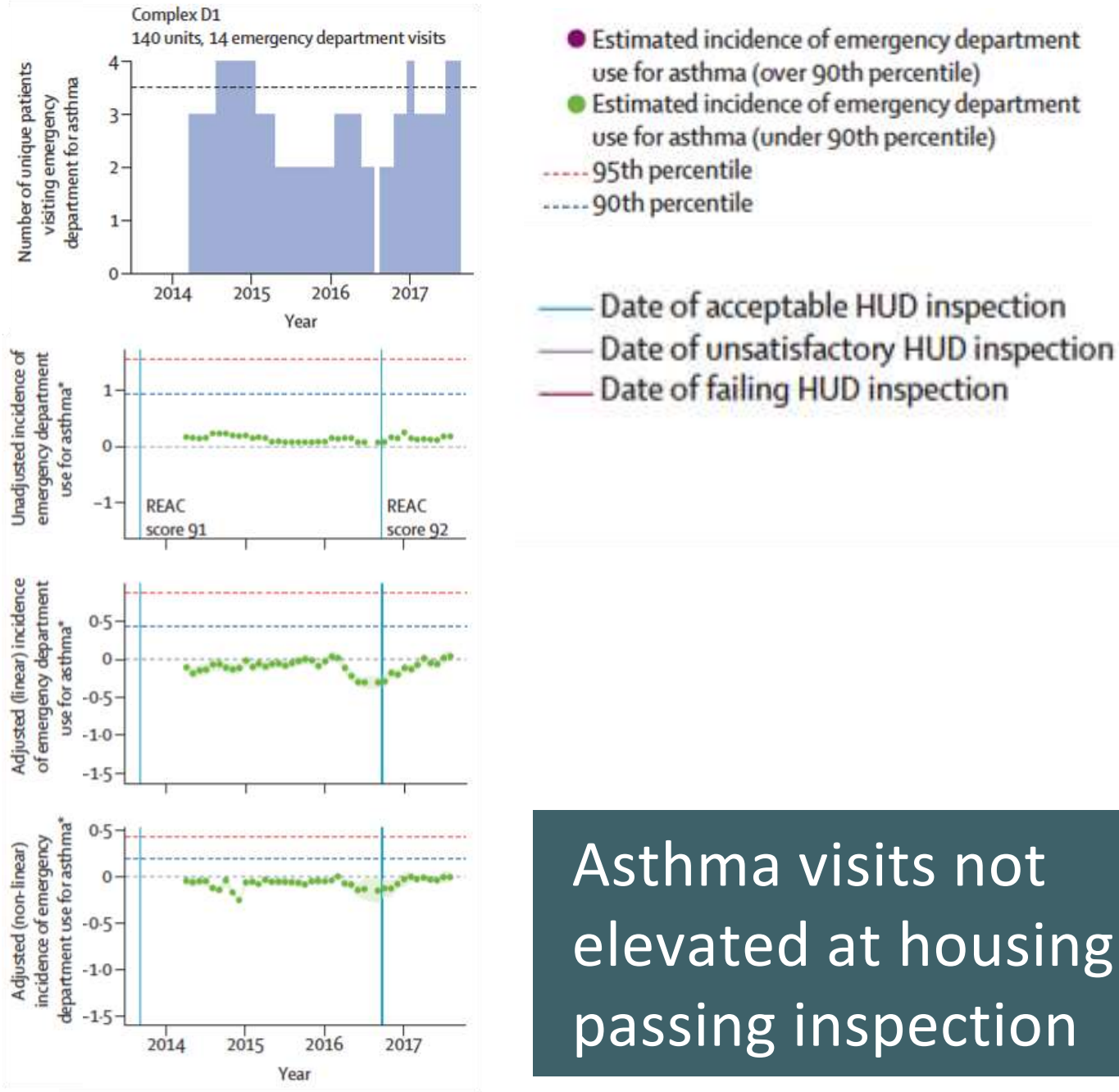
ASSOCIATION BETWEEN ED ASTHMA VISITS AND HUD INSPECTION SCORES



Parcel-level asthma visits ↑ ↓ **HUD inspection score**

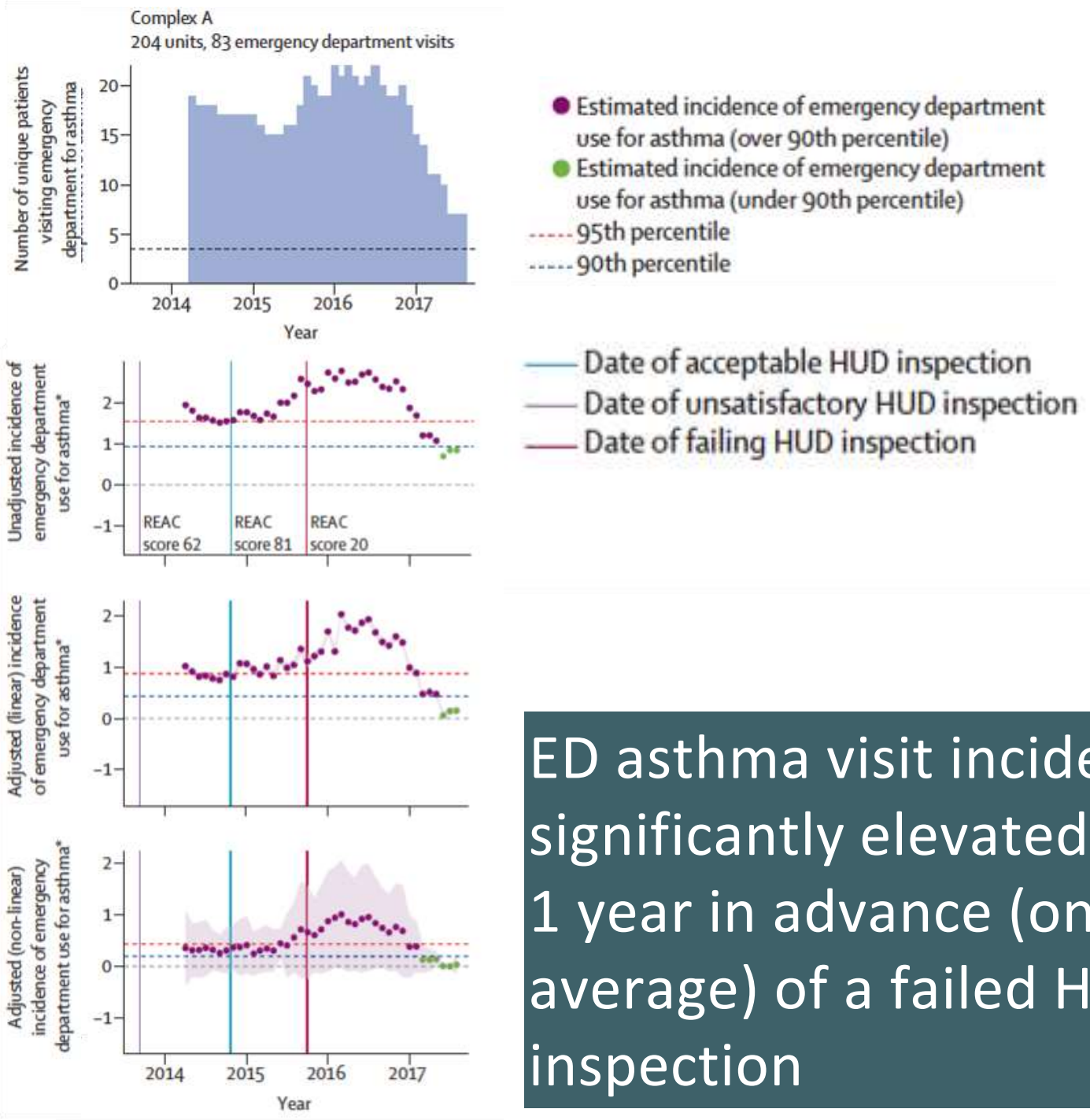
92.3% Specificity

TEMPORAL RELATIONSHIP BETWEEN ED ASTHMA VISITS AND HOUSING INSPECTION SCORES



Asthma visits not elevated at housing units passing inspection

TEMPORAL RELATIONSHIP BETWEEN ED ASTHMA VISITS AND HOUSING INSPECTION SCORES



ED asthma visit incidence significantly elevated over 1 year in advance (on average) of a failed HUD inspection

TRANSLATING THESE RESEARCH FINDINGS INTO PRACTICE

- Our findings offer a proof of concept.
- Electronic health record data feasible source of objective data to identify unhealthy housing.
- Applications:
  - Direct home inspections at sites of greatest need.
  - Hold landlords accountable.
  - Reduce onus on tenants to report.
  - Improve conditions in public and renter-occupied housing.
    - Improve individual and population health outcomes.

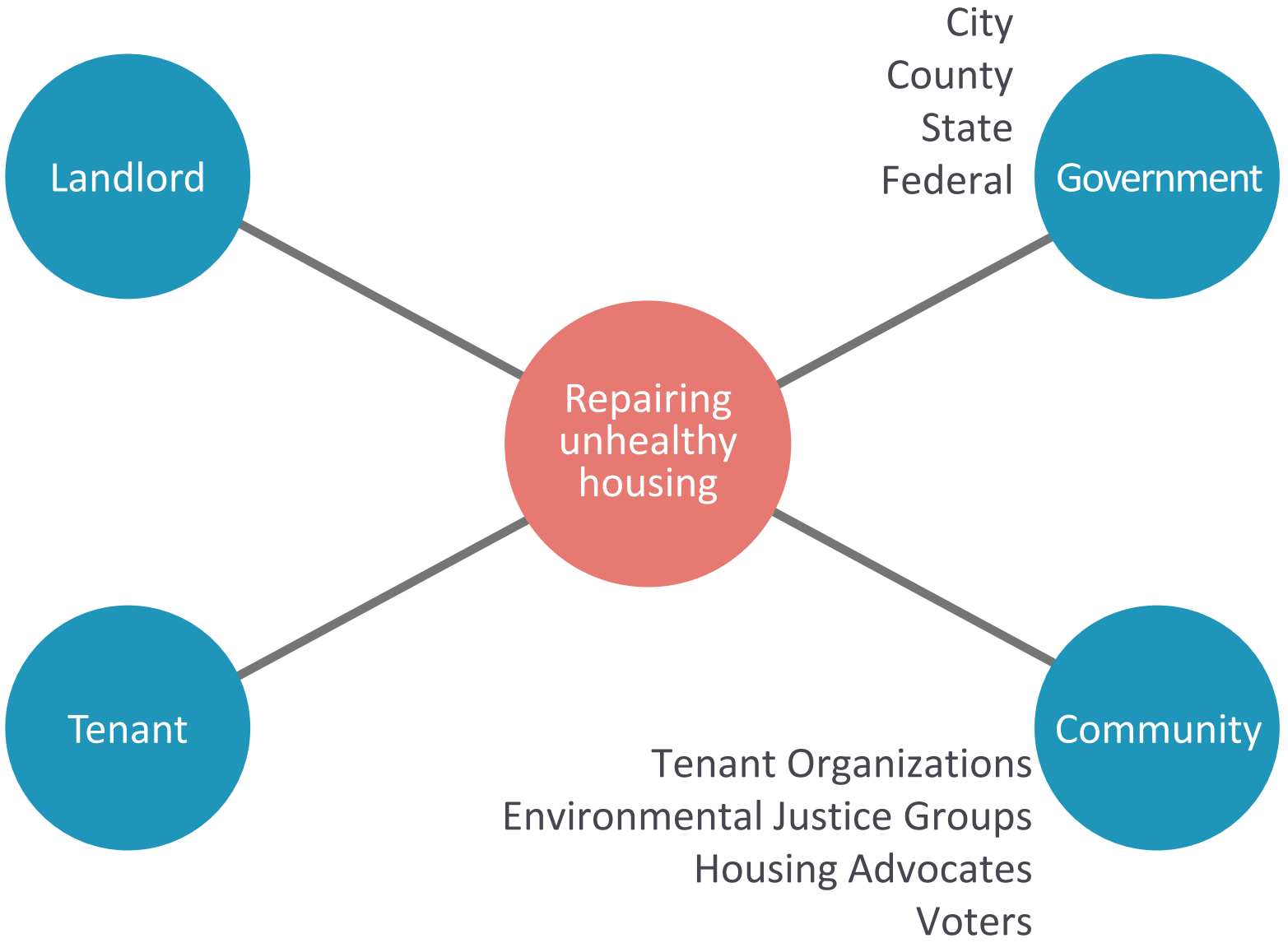
Complex A

New Haven Independent, 2019

PROACTIVE INSPECTIONS CAN HELP REPAIR UNHEALTHY HOUSING

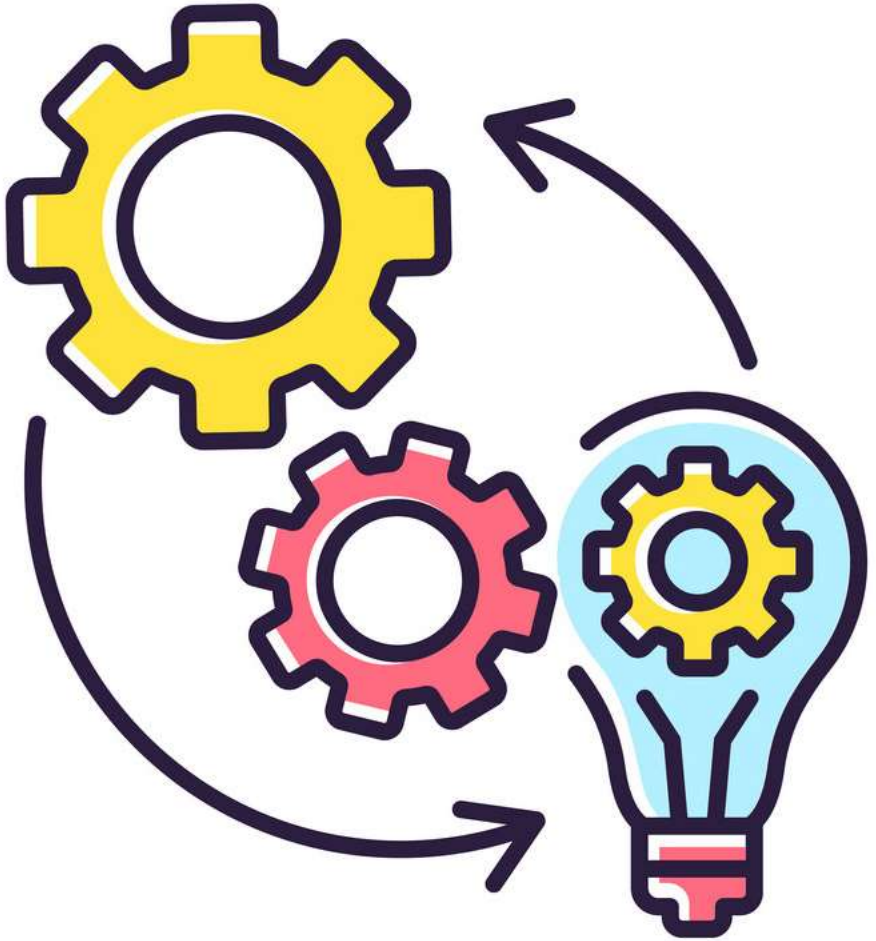
Leverage point that can be addressed by evidence-based, proactive housing inspections

- Marginalized tenants are disproportionately likely to live in dilapidated housing
- Less likely to report poor conditions due to threat of retaliation
- Face unequal housing code enforcement when they do report
- Have less social power to have repairs made



IMPLEMENTATION CONSIDERATIONS

- Model is good for large buildings, less useful for smaller buildings.
- Further validation required—especially in settings with multiple hospitals.
- Privacy—current models do not estimate incidence for buildings with less than five patients.
- Proactive inspections must put tenant needs first to avoid risk of further stigmatization and surveillance in poor communities and communities of color.



TAKE HOME POINTS AND FUTURE DIRECTIONS

- Electronic health records (EHR) are a feasible data source to identify unhealthy housing.
- EHR data may be used to direct community interventions to improve housing quality and individual and population health.


HEALTH EQUITY

By Jamila Michener

Racism, Power, And Health Equity: The Case Of Tenant Organizing

HEALTH AFFAIRS OCTOBER 2023 42:10

- Tenants facing bad conditions need supporting data.
- Integrating distinct data sources can improve identification accuracy.
- Need to engage community for implementation to reduce stigmatization, ensure maintenance of individual privacy.

Questions?

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ELLEN HUTTI, M.P.H.
EPIDEMIOLOGIST
ST. LOUIS COUNTY DEPARTMENT OF PUBLIC HEALTH

Applying Surveillance Data to Asthma Interventions: An Example of Interdivision Collaboration Within a Local Public Health Department

October 25, 2023

Ellen Hutti, M.P.H.

Epidemiologist, St. Louis County Department of Public Health

Outline

- Program overview
- Asthma surveillance in St. Louis County
- Show-Me Missouri Healthy Homes Program
- Next steps

St. Louis County

- Population: 990,414
  - 67.1% White
  - 25.2% Black/African American
  - 5.0% Asian
- Median Household Income: $72,562

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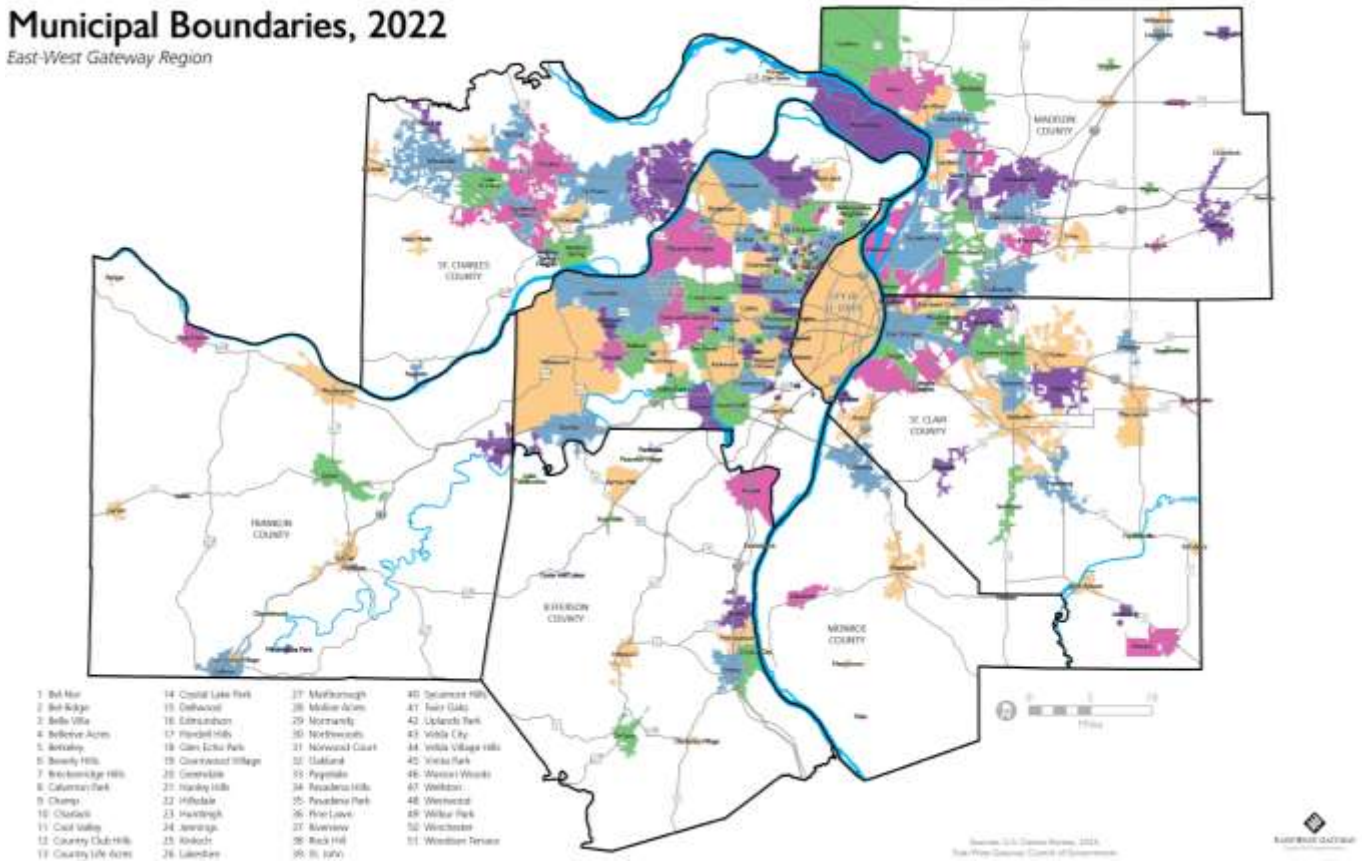
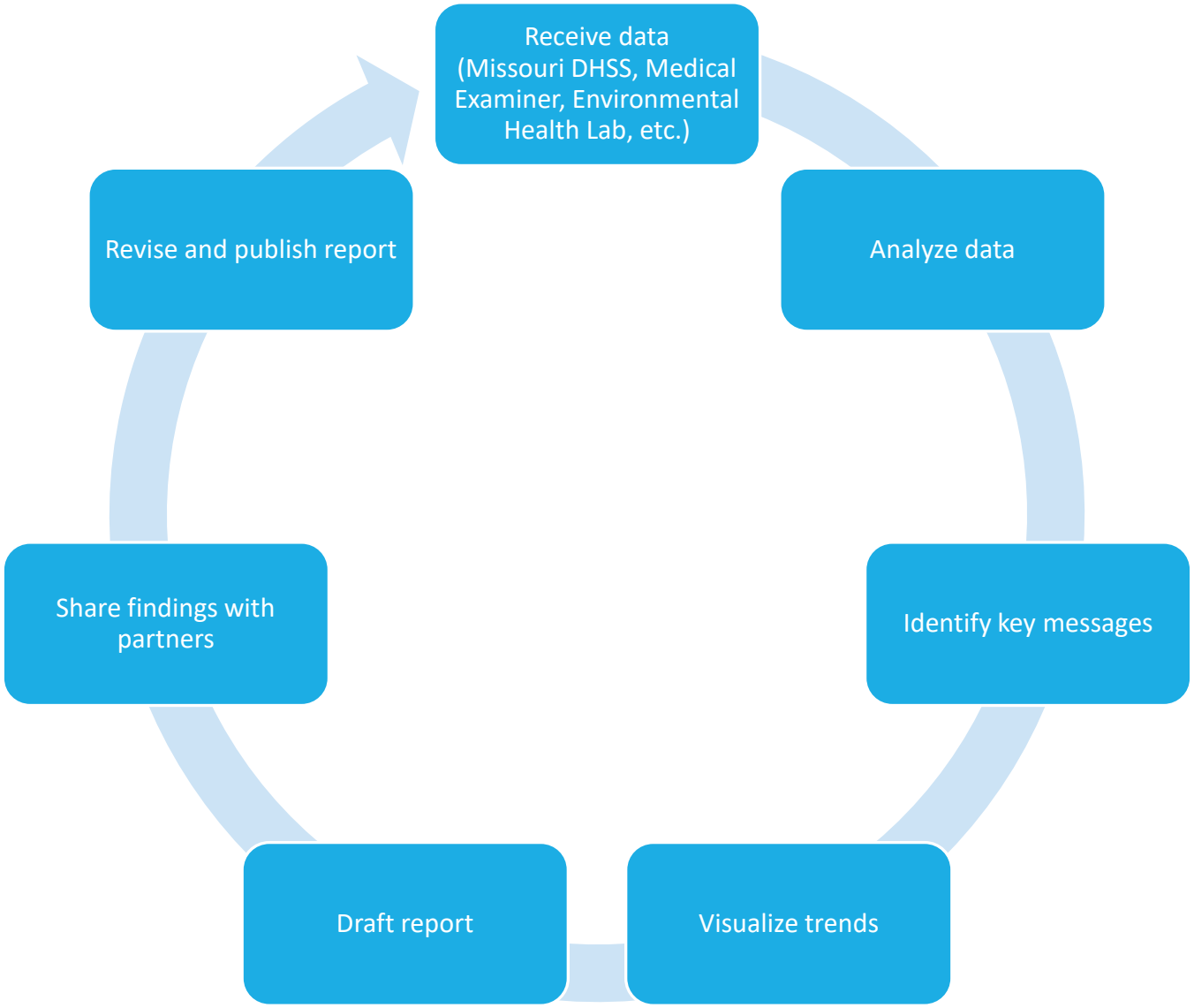



Receive data (Missouri DHSS, Medical Examiner, Environmental Health Lab, etc.)
Analyze data
Identify key messages
Visualize trends
Draft report
Share findings with partners
Revise and publish report

COUNTY PUBLIC HEALTH

Asthma and Environmental Health
St. Louis County, Missouri, 2016 – 2020

March 2023

Asthma is a chronic lung disease that is caused by inflammation and narrowing of the airways, which carry air into and out of the lungs.[1] It affects people of all ages, but usually begins in childhood. People with asthma experience recurrent wheezing, chest tightness, shortness of breath, and nighttime or early morning coughing. Symptoms can occur when the airways react to certain exposures, also called triggers. Common triggers of asthma symptoms include tobacco smoke, air pollution, chemicals or dust in the workplace, allergens from dust, animal fur, cockroaches, mold, or pollen, viral respiratory infections like cold or the flu, fragrances, and physical activity.[2] An asthma exacerbation, or asthma "attack," happens when symptoms become more intense, or many occur at the same time. Severe asthma attacks can require emergency care or even be life-threatening.

From 2016 to 2020, chronic lower respiratory diseases (CLRD) were the sixth leading cause of death in St. Louis County.[3] In 2021, there were 22.6 CLRD deaths per 100,000 population with deaths due to asthma accounting for fewer than four percent of all CLRD deaths. Asthma does not account for a large proportion of deaths due to CLRD; rather, the burden of asthma in St. Louis County is most apparent when looking at emergency department (ED) discharges. Overall, there were 63.5 ED discharges due to asthma per 10,000 population in 2019, accounting for nearly two-thirds of all CLRD ED visits that year.

Key findings:

- From 2016 to 2020, there were a total of 25,864 ED discharges for asthma. Annual totals ranged from 5,839 to 5,185 until 2020 when asthma ED discharges decreased to 3,320.
- The age-adjusted rate of asthma ED discharges decreased by 44.6 percent from 64.8 per 10,000 in 2016 to 35.9 per 10,000 in 2020. A similar trend in ED discharges for all causes occurred in 2020, reflecting a large decrease in usage of ED services most likely due to the COVID-19 pandemic.
- Since 2016, annual pollen counts have decreased by 62.6 percent, driven by declines among all species of pollen detected in the county.
- On average, ED utilization to treat asthma was highest during April and May in the spring, and during September and October in the fall. Springtime increases in asthma ED discharges corresponded with elevated pollen levels and tree pollen season.
- Air quality improved since 2016, with the annual number of "Good" AQI days increased and ozone exceedances decreased.
- Geographically, age-adjusted asthma ED discharge rates were highest in the inner north county sub-region, followed by the outer north. The two sub-regions had a greater proportion of houses built before 1960 and a higher percentage of renter-occupied housing units. The inner north, along with the central sub-region, had a higher percent of the population living near busy roads.

Since 2016, ED discharges for asthma demonstrated a downward trend. Age-adjusted ED discharge rates decreased by nearly 45 percent from 2016 to 2020 (**See Figure 1**). The largest single-year decrease occurred in 2020, with rates dropping 38 percent compared to 2019. Prior to 2020, asthma ED discharge rates decreased ten percent since 2016. In this same five-year period, female county residents had a higher average rate of asthma ED discharges compared to males. Males had higher ED visit rates until 2018, however, when the rate for females surpassed males. Rates for both males and females remained similar and followed the same year-over-year patterns, except for in 2017 when the rate for males increased while the rate for females decreased.

Asthma Surveillance

Report updates often confirm what is already known about disease distribution and disparities.

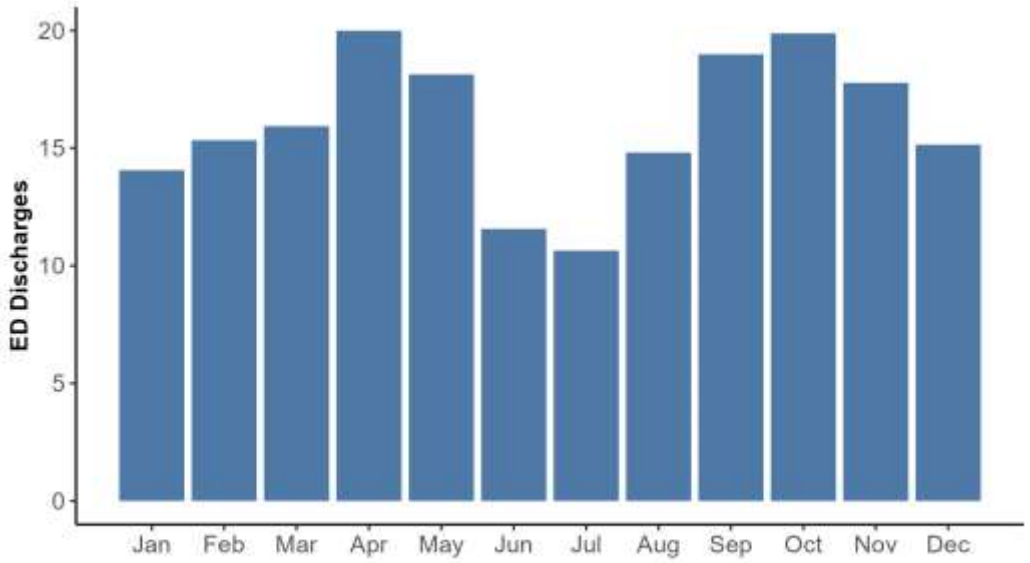
- Focused on environmental risk factors

Identified key partners within department for collaboration.

- Environmental Health Laboratory
- Healthy Homes Program

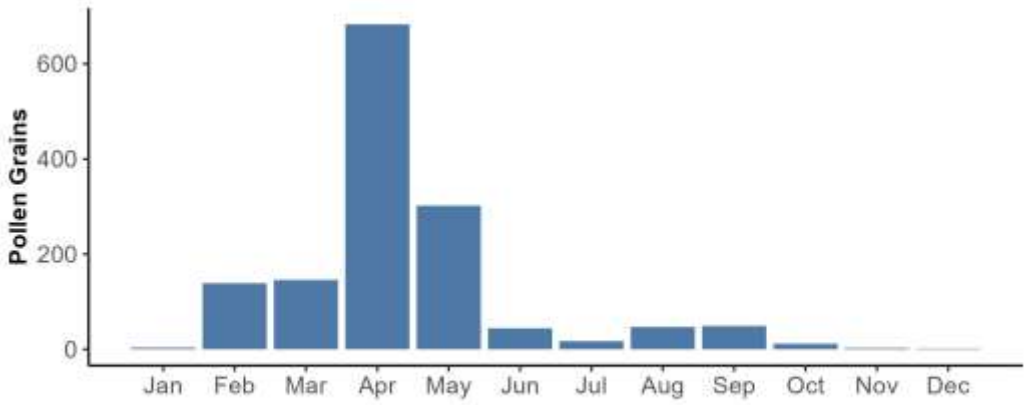
Compare Trends Over Time

Average number of asthma ED visits per day by month, 2016–2020



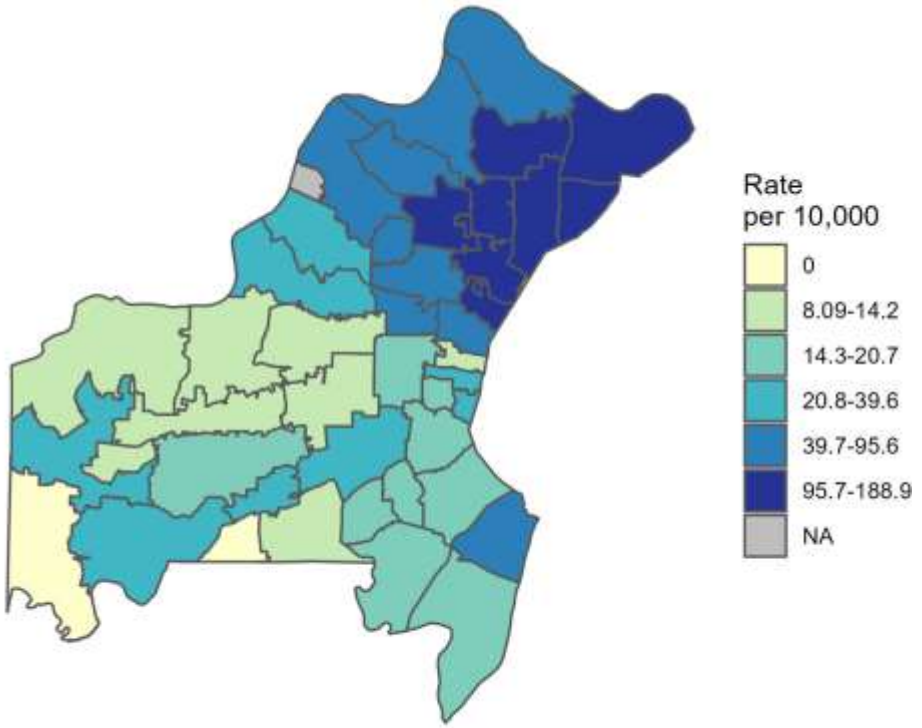
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

Average pollen grain count per day by month, 2016–2020



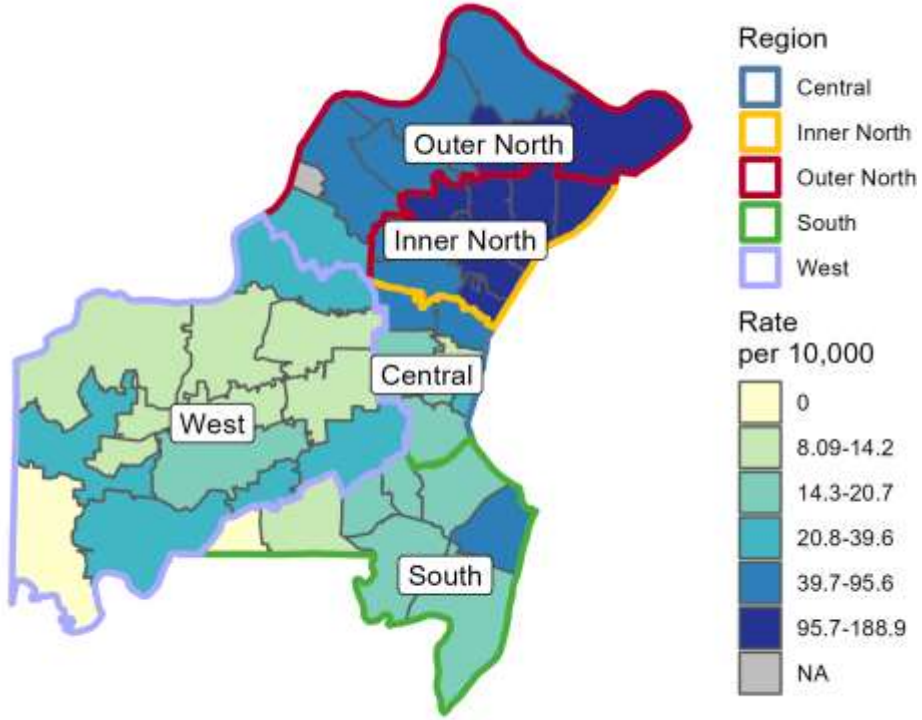
Source: Saint Louis County DPH Environmental Health Lab

Age-Adjusted Asthma ED Discharge Rate by ZIP Code, 2016–2020



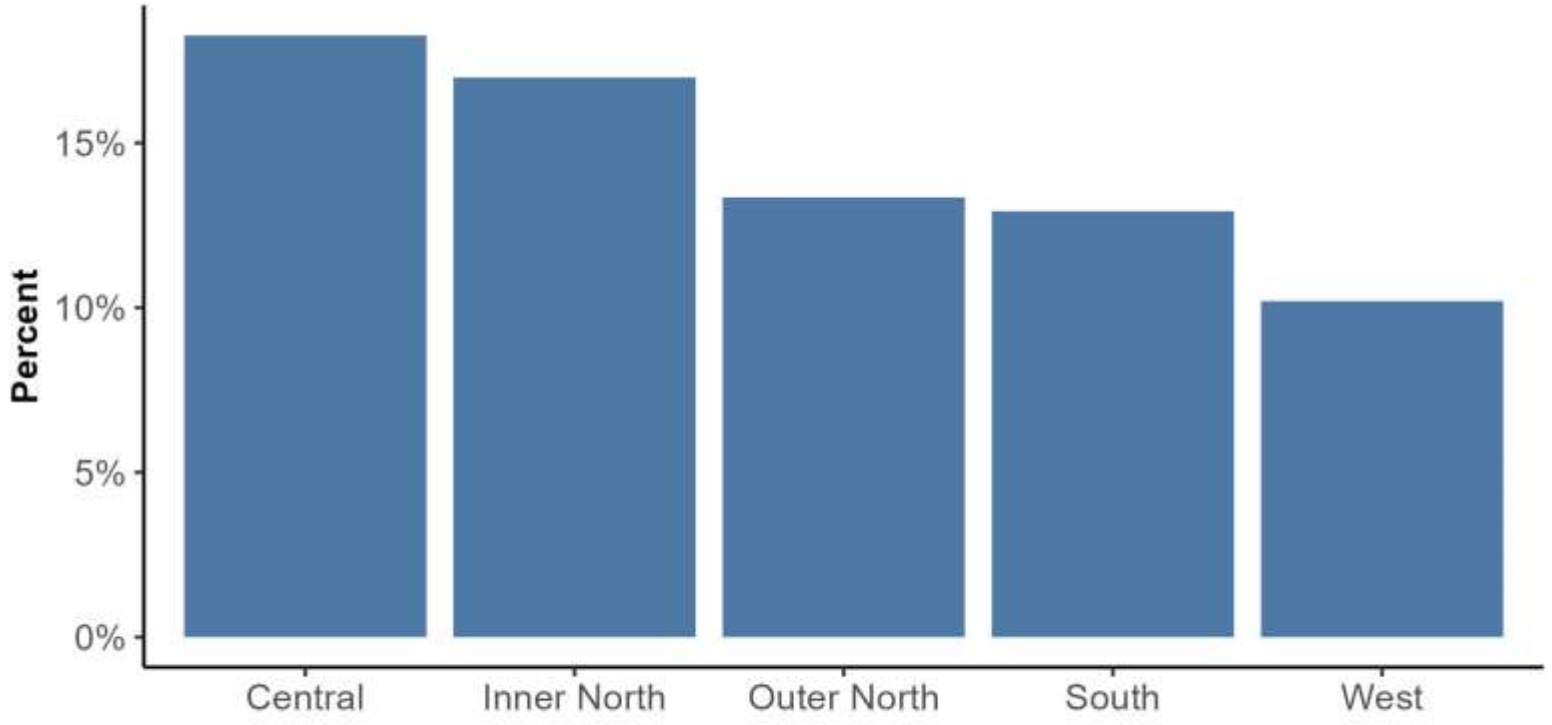
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

Age-Adjusted Asthma ED Discharge Rate by ZIP Code, 2016–2020



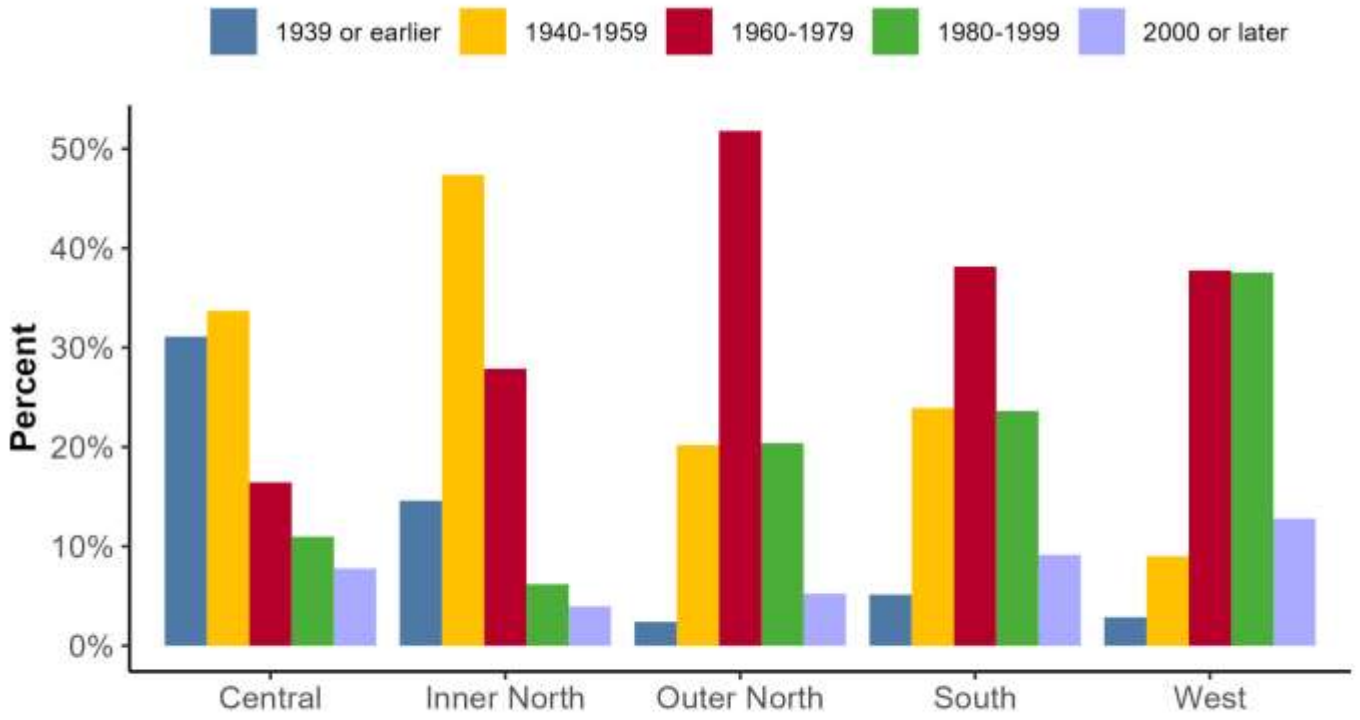
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

Percent of Population Living Within 300 Meters of Busy Roads by Region, 2021



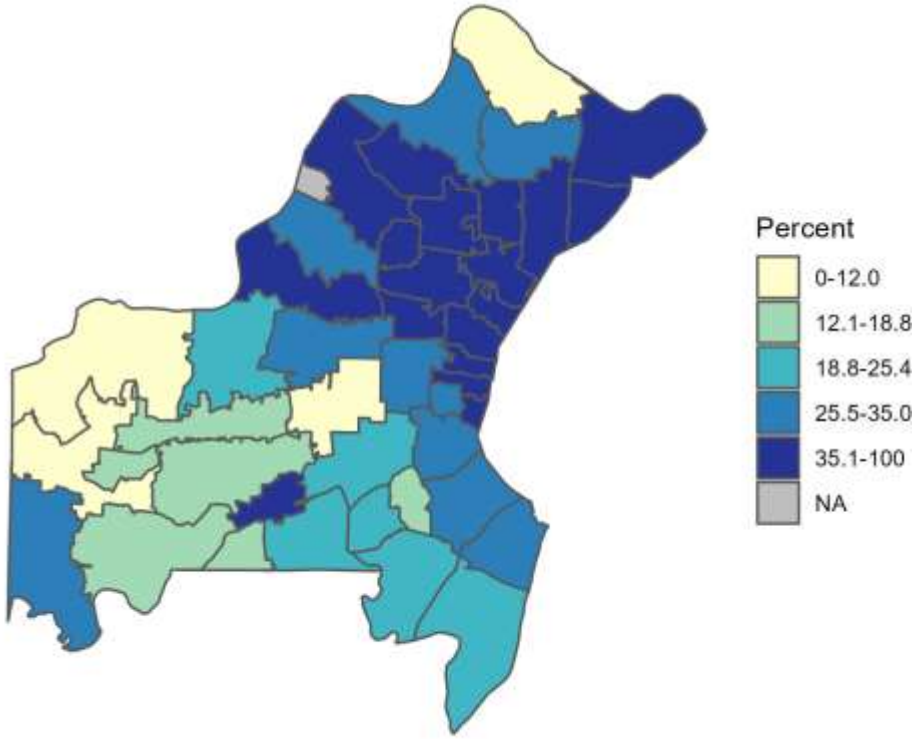
Source: Missouri Department of Transportation, 2021

Percent of Occupied Housing Units by Year Built and Region, 2020



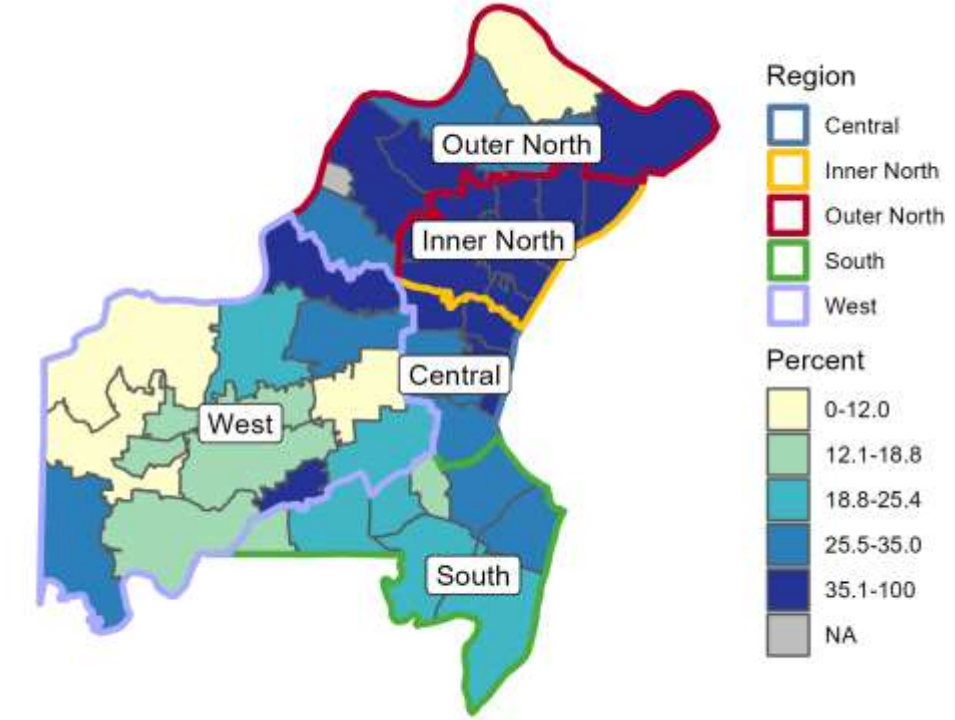
Source: U.S. Census Bureau, American Community Survey (ACS), 2020

Percent of Housing Units Occupied by Renter, 2020



Source: U.S. Census Bureau, ACS, 2020

Percent of Housing Units Occupied by Renter, 2020



Source: U.S. Census Bureau, ACS, 2020

Show-Me Missouri Healthy Homes Program

Funded through U.S. Department of Housing and Urban Development's Healthy Homes Production Grant

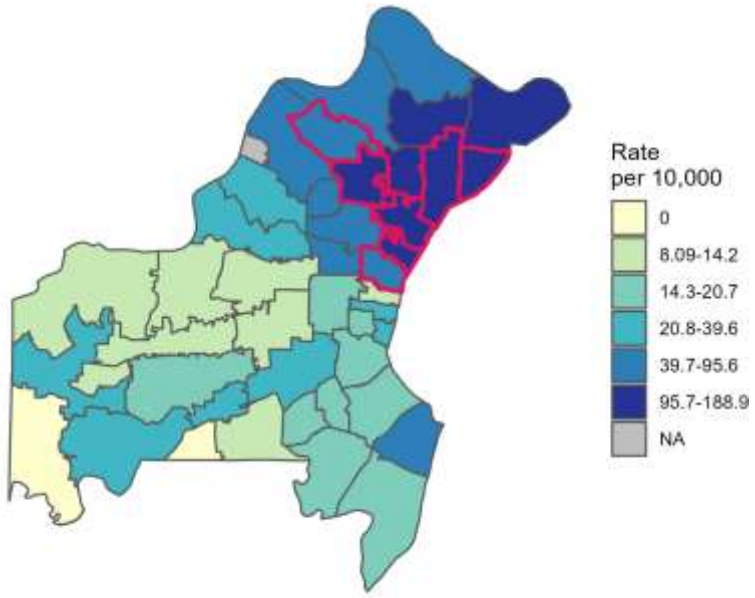
Multi-year partnership between St. Louis County Department of Public Health and Children's Mercy Kansas City

$1.8 million in funding to support community trainings, healthy homes assessments and interventions

St. Louis Promise Zone

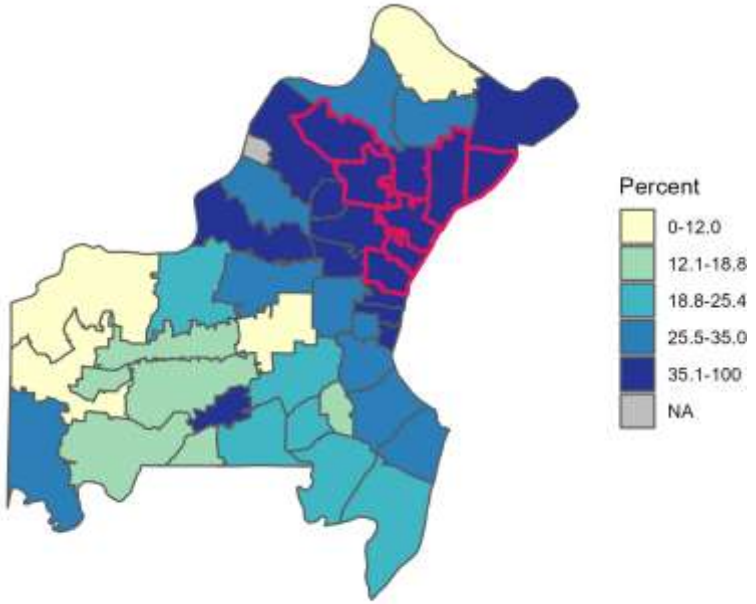
Target Area

Age-adjusted asthma ED discharge rate by ZIP code, 2016–2020



Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

Percent of housing units occupied by renter, 2020



Source: U.S. Census Bureau, ACS, 2020

Next Steps

Expand asthma surveillance

- New data sources
- Interactive dashboard

Implement asthma risk prediction and warning system

- Received project support from Council of State and Territorial Epidemiologists (or CSTE) Data Science Team Training program

Collaborate with local public-school nurses

Saint Louis COUNTY PUBLIC HEALTH

Thank you!

Ellen Hutti, MPH

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Chronic Disease Epidemiology Program

Division of Health Promotion & Public Health Research

St. Louis County Department of Public Health

Panel Discussion and Question-and-Answer Session

Polling Question 2

How familiar are you with using data and analytics to prioritize indoor environmental interventions for asthma health outcomes?

1. Very familiar. I use data and analytics to characterize our asthma burden and prioritize interventions.
2. Somewhat familiar. I plan to use data and analytics to support asthma program planning.
3. A little. I can imagine using data and analytics to prioritize in-home asthma services.
4. Not familiar. What do you mean by “use data and analytics”?

Where Can I Learn More?

- Join the Asthma Community Network at www.asthmacommunitynetwork.org.

National Environmental Leadership Award in Asthma Management

The nation's highest honor for exceptional asthma management programs.

- Recognizes programs addressing the environmental components of asthma.
- Showcases and promotes best practices in comprehensive asthma care via a national webinar during Asthma Awareness Month.
- Follows national guidelines and published criteria for achieving improved health outcomes.
- Employs a two-tiered review process with reviewers from federal agencies and national nongovernmental organizations.

The application process opens in December of each year.

In Closing: Creating Systems to Address IEDOH