

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

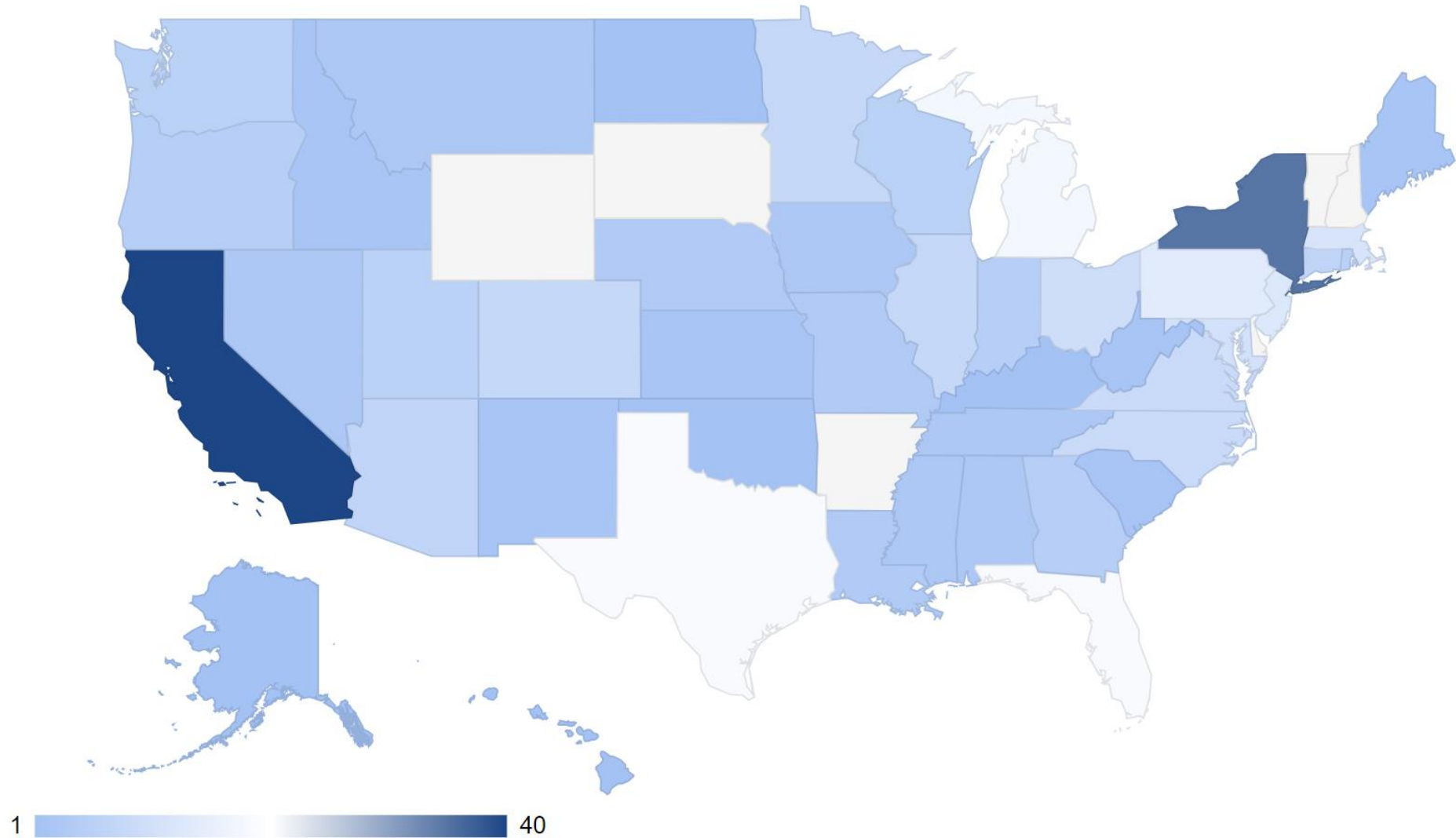
Welcome to the Webinar Series: Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma.....**1:00 p.m. EDT**

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

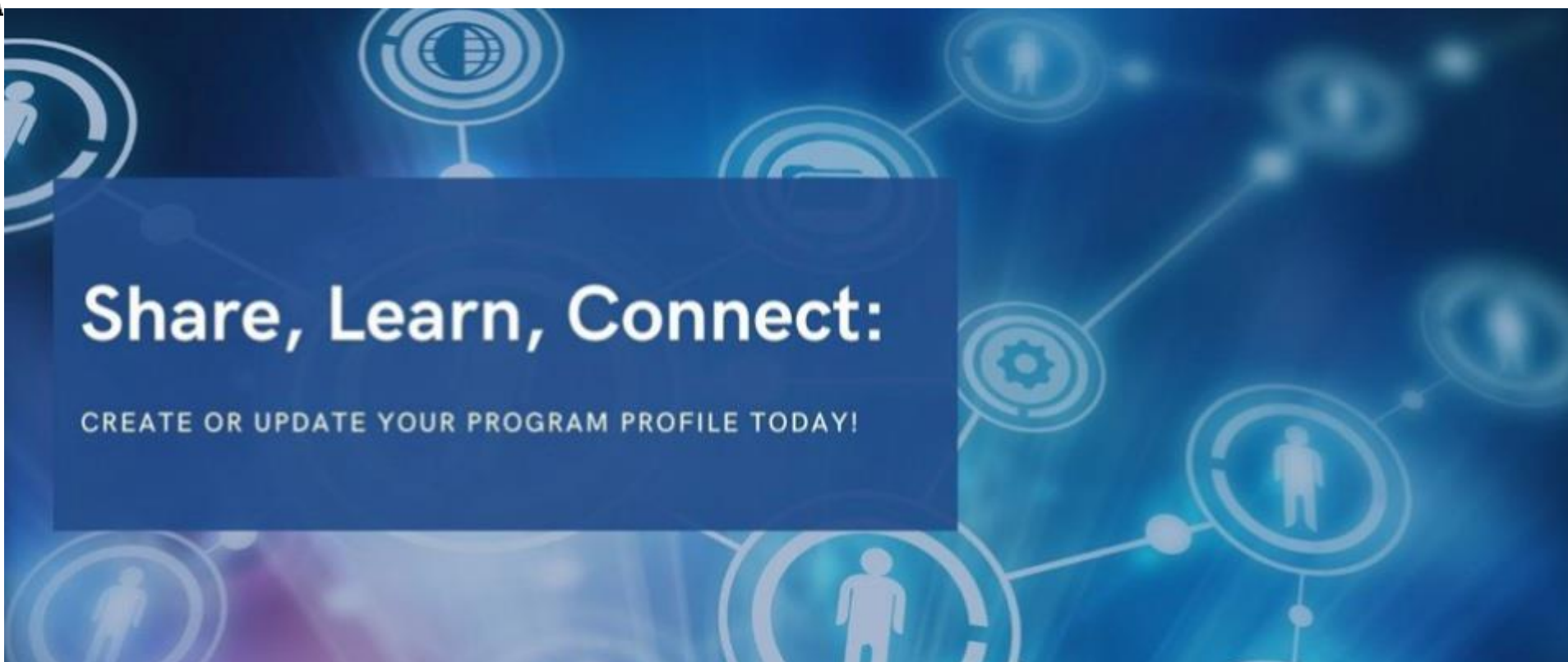


Using Data to Prioritize In-Home Environmental Interventions

- 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*

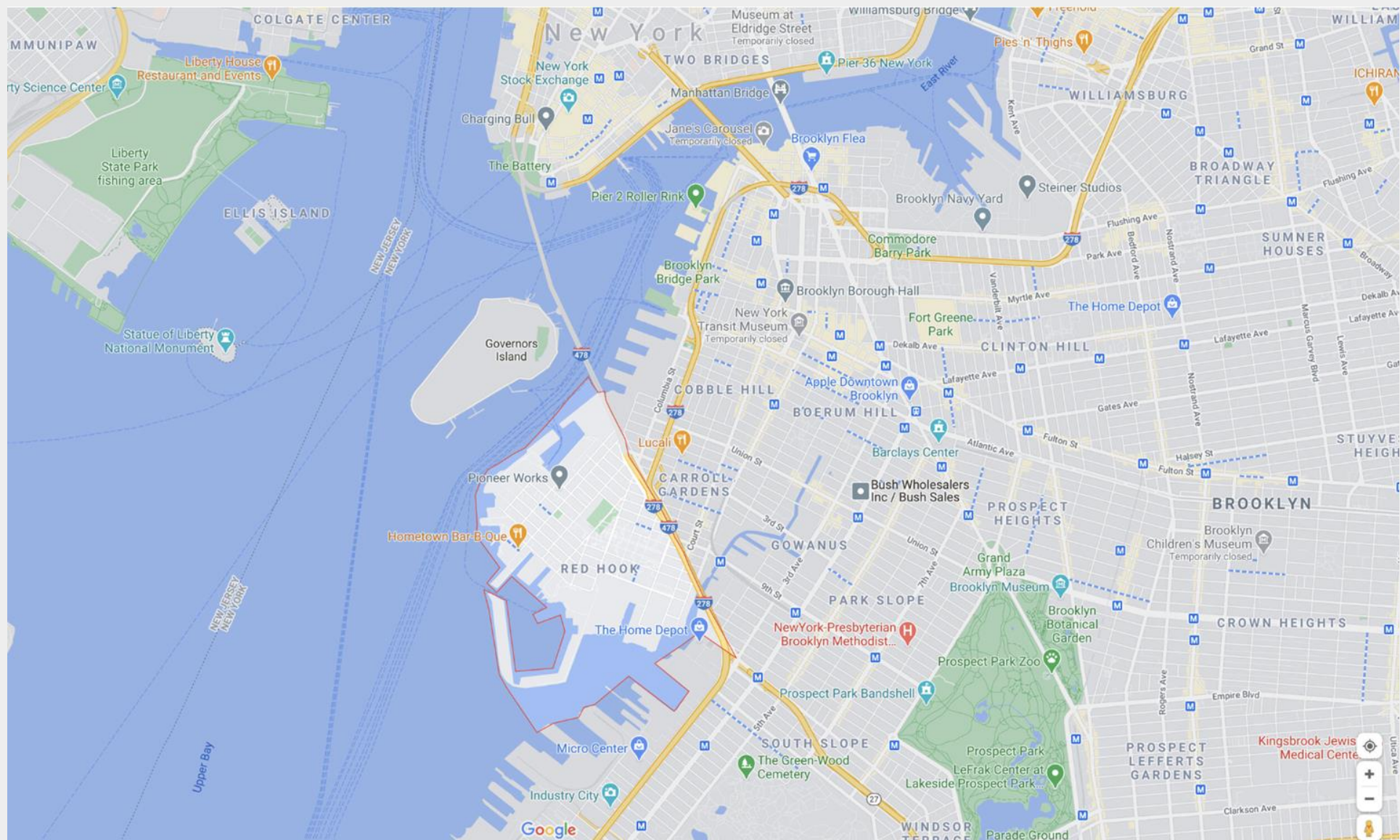
Kara Smith, *Red Hook Community Health Network Manager*



Red Hook Initiative

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







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 mold-related health problems since the 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 |
|-------|--------|--------------------|-----------------|-------------------|-------------------|-------------------|
| | 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 |

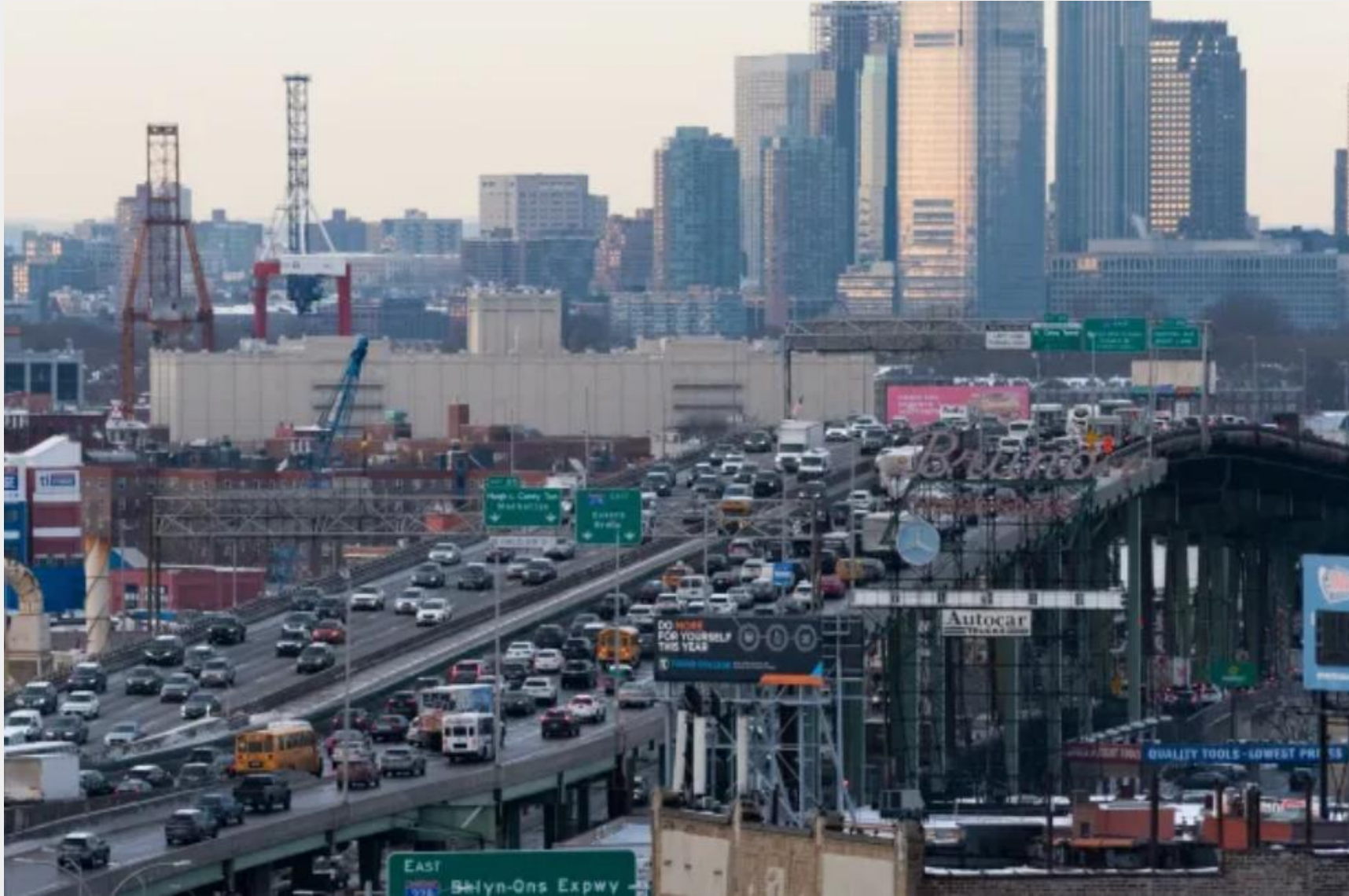
smelter-related

not smelter-related

400 ppm = EPA & NY standard;

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







#2: Environmental Impact

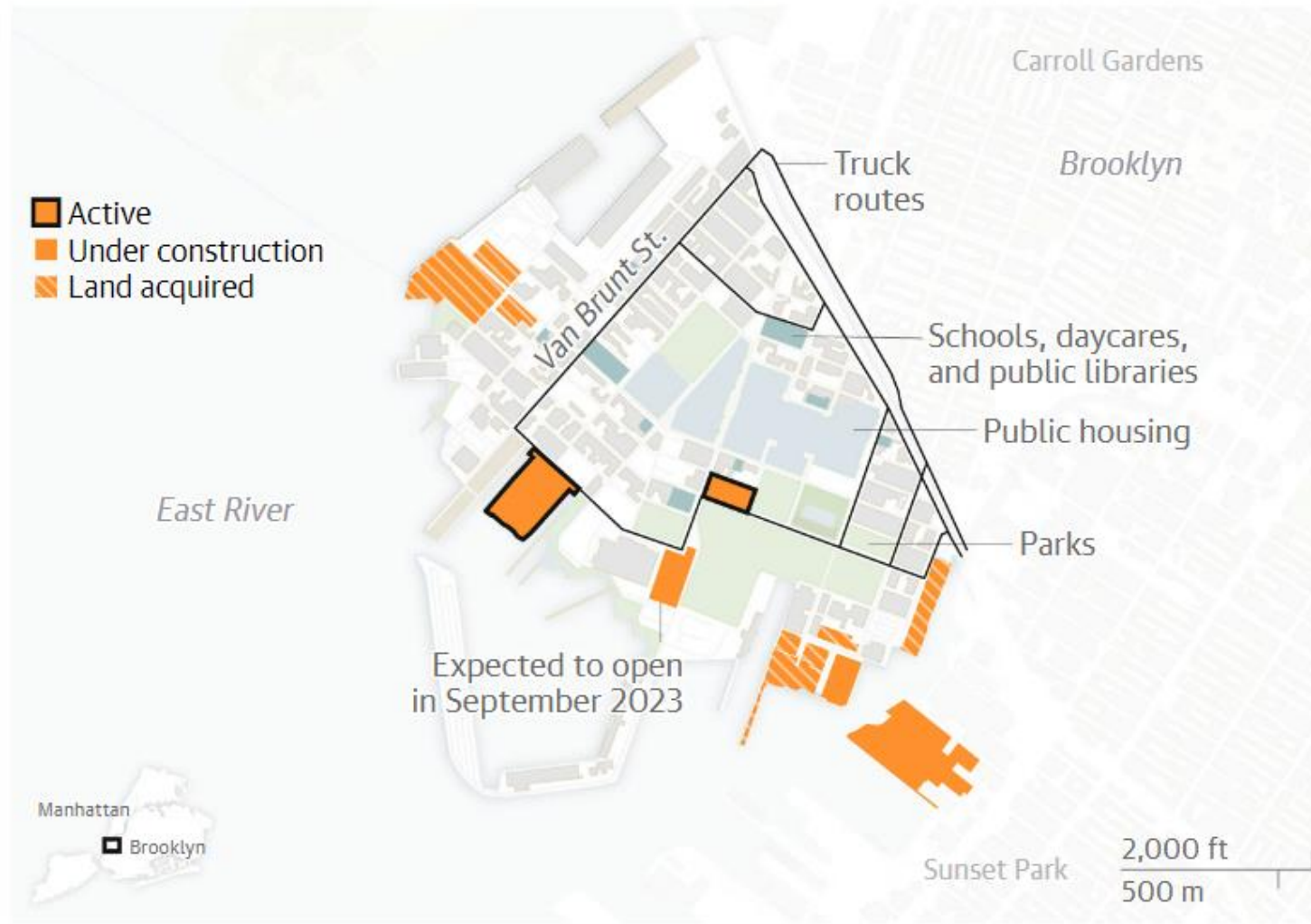
Red Hook has suffered decades of environmental racism and injustice, from geographic isolation resulting from the construction of the Brooklyn Queens Expressway, to long term environmental impact of the Columbia Smelting and Refining Works site, to disinvestment in the Red Hook Houses, New York City Housing Authority's (NYCHA) largest public housing complex in Brooklyn.

“ I feel like I can't breathe from the pollution. ”

- 40% of respondents called for “cleaner air to breathe” as a top community benefit they would like to see from the BQE redesign.
- 47% of the respondents reported that air quality/pollution was a top concern.



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



The Impact of Mold on Red Hook NYCHA Tenants

A Health Crisis in Public Housing

OCTOBER 2016



RED HOOK COMMUNITY HEALTH

OCTOBER 2018

A Red Hook Community Health Needs and Assets Assessment (CHNAA) was conducted with support from the NYU Langone Health Community Service Plan. The assessment was planned by a team of six organizations: The Alex House Project, Family Health Centers at NYU Langone, Good Shepherd Services, NYU Langone Health Department of Population Health, Red Hook Community Justice Center, and the Red Hook Initiative.

More than 20 Red Hook organizations and more than 600 people who live or work in Red Hook participated in this collaborative, community-based project to get more information about:

- > Important health issues for the Red Hook community
- > Strengths and existing programs in Red Hook
- > Needed programs and services in Red Hook
- > Opportunities to connect the community's strengths and needs to improve the health and wellbeing of Red Hook residents

During the assessment process, the CHNAA team:

- > Looked at data from hospitals, the New York City Department of Health and Mental Hygiene, Red Hook organizations, and other agencies, and identified missing data needing further exploration
- > Collected additional information from people who live and work in Red Hook through dot voting, surveying, and small-group conversations
- > Identified strengths and existing programs and resources
- > Identified potential future actions to address top health concerns

1

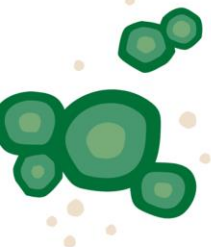
2023

Caring for Red Hook: What Healthcare Providers Should Know



Download these reports at: www.rhicenter.org

Air Purifier Pilot




GOT MOLD?

IF YOU LIVE IN NYCHA AND HAVE MOLD IN YOUR APARTMENT, YOU MIGHT BE ELIGIBLE FOR A FREE AIR PURIFIER.





People with asthma and other upper respiratory conditions are encouraged to apply!

SCAN THE QR CODE OR GO TO bit.ly/RedHookAir TO APPLY FOR A FREE AIR PURIFIER

Application link: bit.ly/RedHookAir



The Red Hook Community Health Network is a partnership of healthcare and community-based organizations working together to improve health and life outcomes in Red Hook.



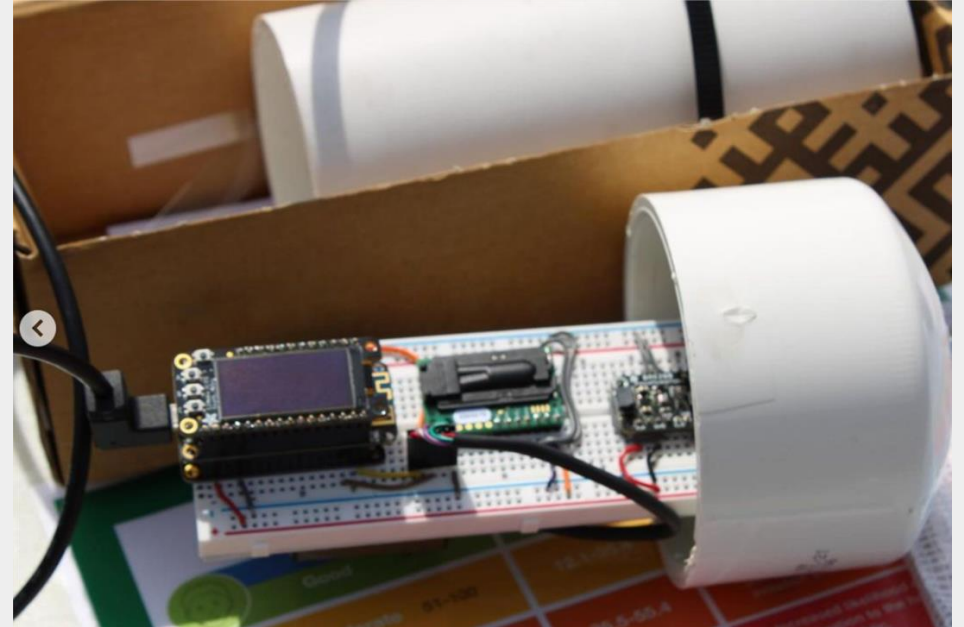


Community Air Monitoring



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_2 , 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*



Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma: Using Data to Prioritize In-Home IEDOH Interventions



ADAM HABER, Ph.D.
ASSISTANT PROFESSOR OF COMPUTATIONAL BIOLOGY AND
ENVIRONMENTAL HEALTH
HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH,
HARVARD UNIVERSITY



ELIZABETH A. SAMUELS, M.D., M.P.H., M.H.S.
ASSOCIATE PROFESSOR
UCLA EMERGENCY MEDICINE

MAPPING EMERGENCY DEPARTMENT ASTHMA VISITS TO IDENTIFY POOR QUALITY HOUSING

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

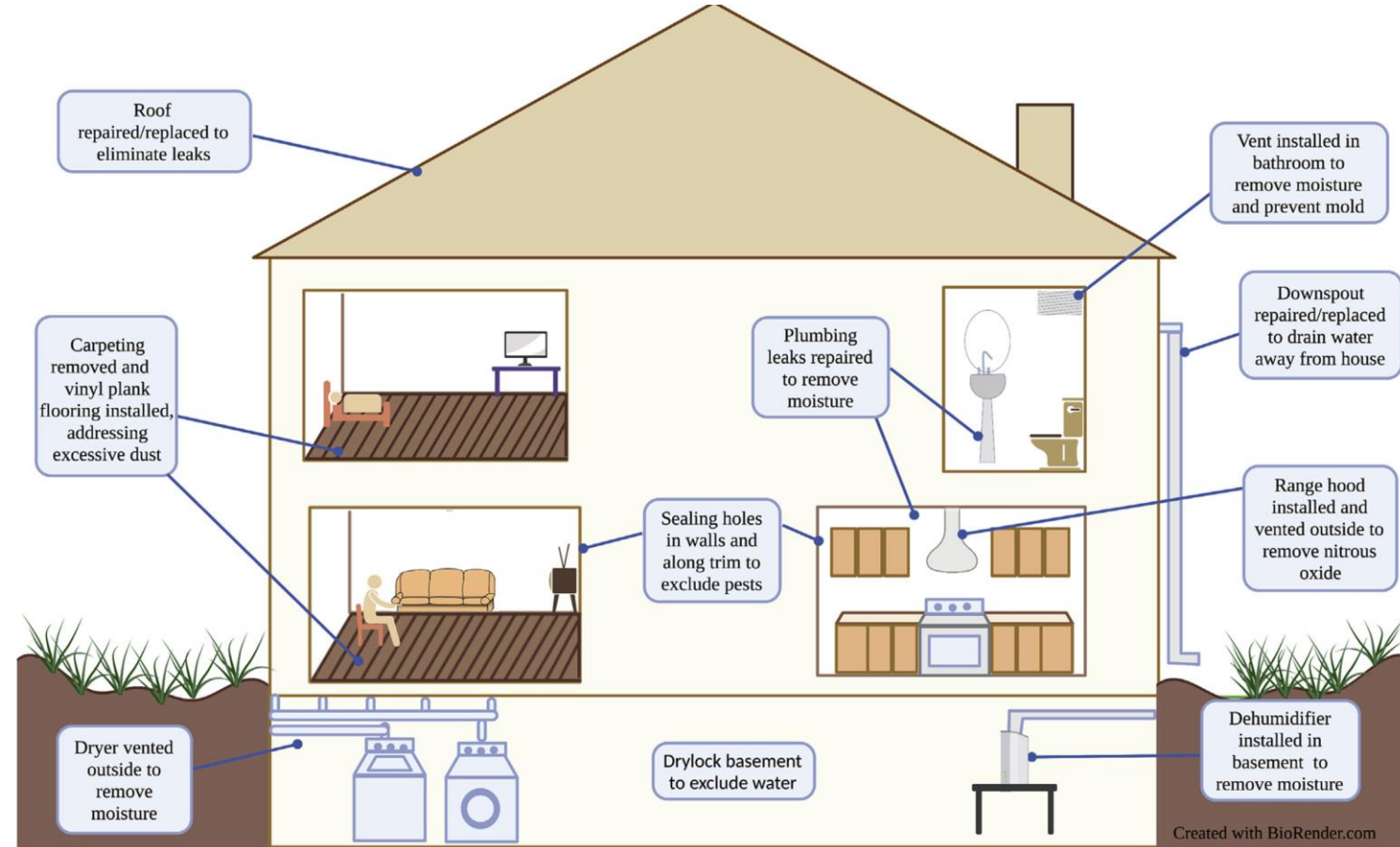
Elizabeth A. Samuels, M.D., M.P.H., M.H.S., UCLA

The UCLA logo consists of the letters "UCLA" in white, bold, sans-serif font, centered within a solid blue rectangular background.

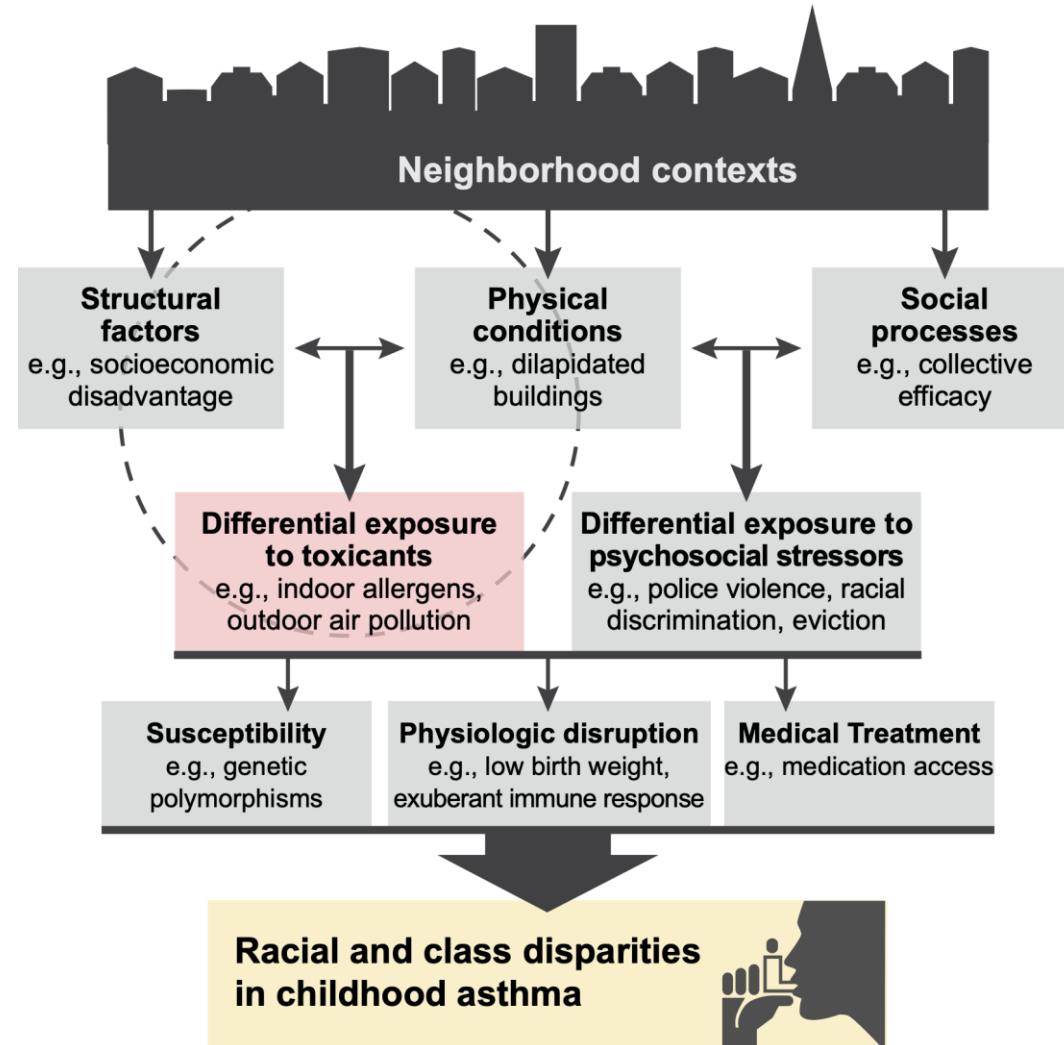
HARVARD
T.H. CHAN
SCHOOL OF PUBLIC HEALTH

HOUSING CONDITIONS DRIVE ASTHMA INCIDENCE AND EXACERBATIONS

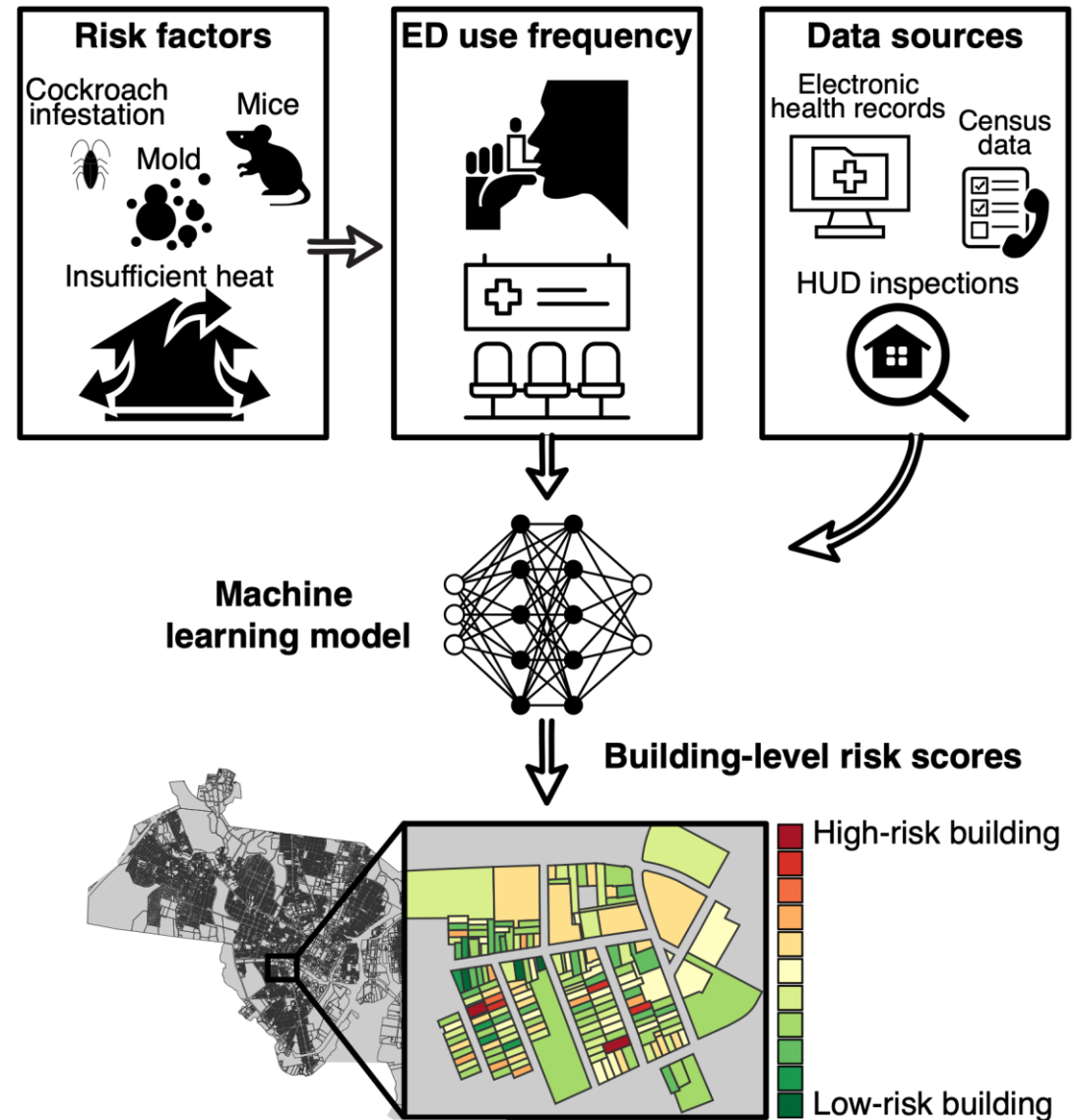
- Residents living in poor-quality housing have higher emergency department (ED) utilization for asthma.
- Interventions to improve housing conditions can reduce asthma ED visits.
- Identification and remediation of poor housing conditions is often delayed or does not occur.
- HUD inspections every ~760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



DIFFERENTIAL EXPOSURES ARE A CRITICAL CAUSE OF ASTHMA DISPARITIES

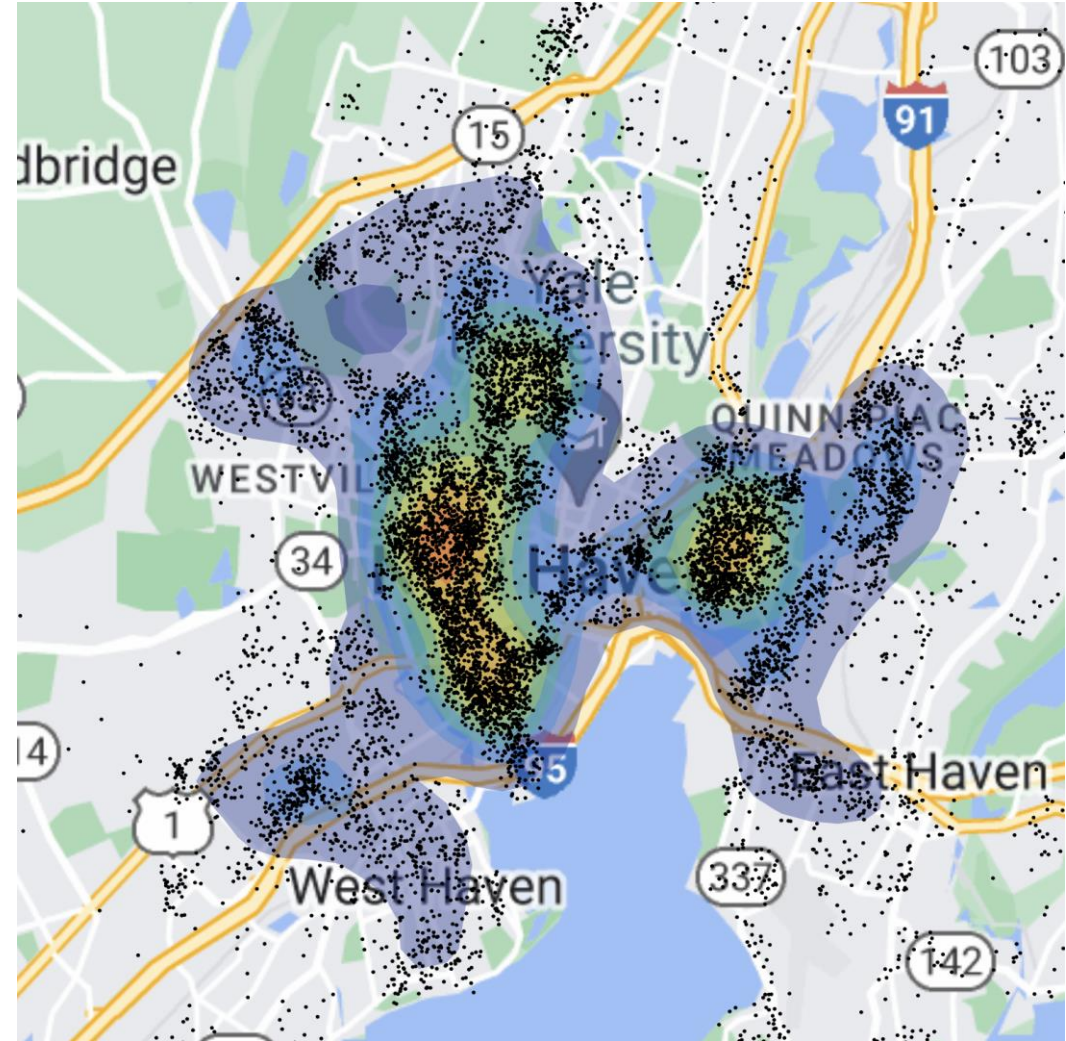


Are ED visits
for asthma an
accurate
indicator of
poor-quality
housing?



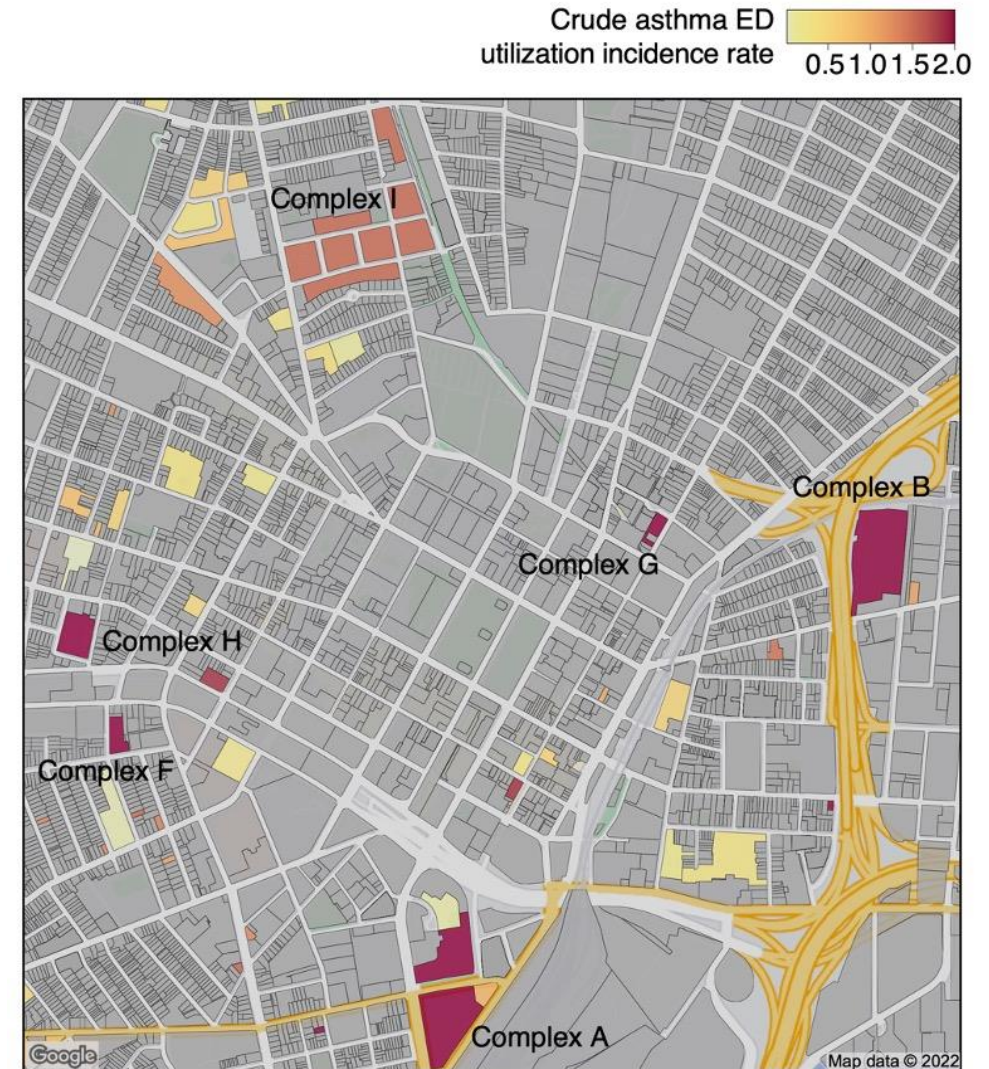
METHODS: RETROSPECTIVE COHORT STUDY IN NEW HAVEN, CT

- 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

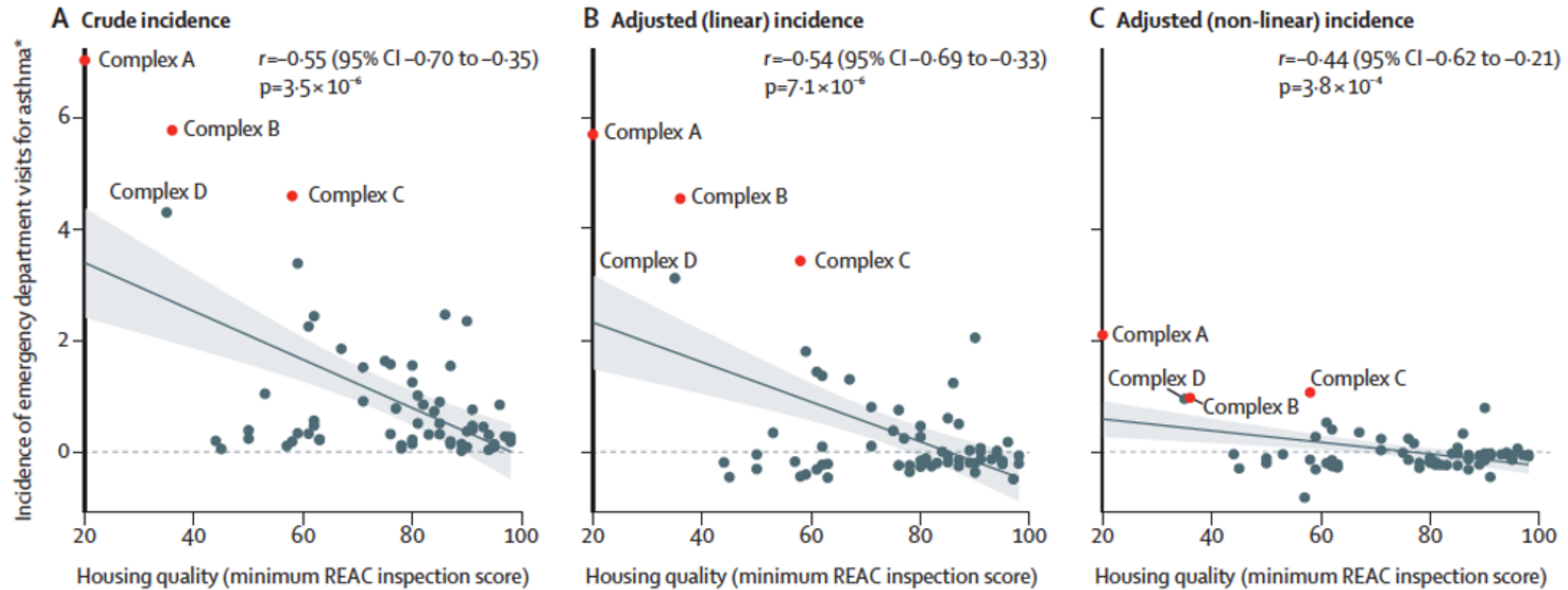


CALCULATING ASTHMA ED VISIT INCIDENCE AT EACH BUILDING (PARCEL) CITYWIDE

- 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 random 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

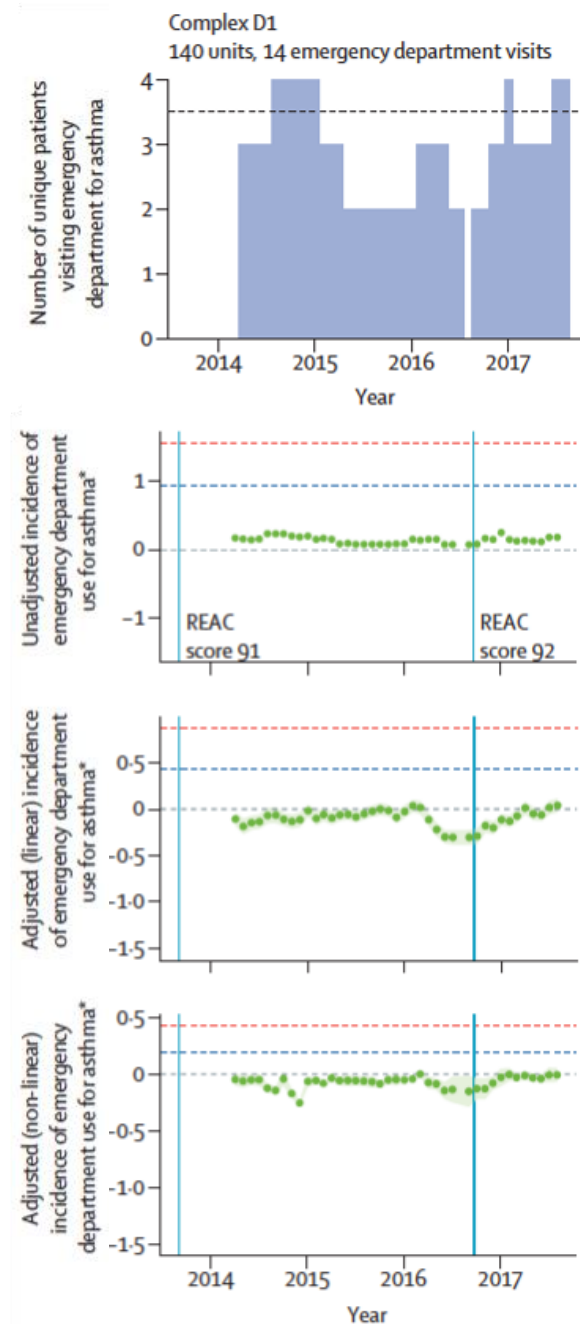


↑ Parcel-level
asthma visits

↓ HUD inspection
score

92.3% Specificity

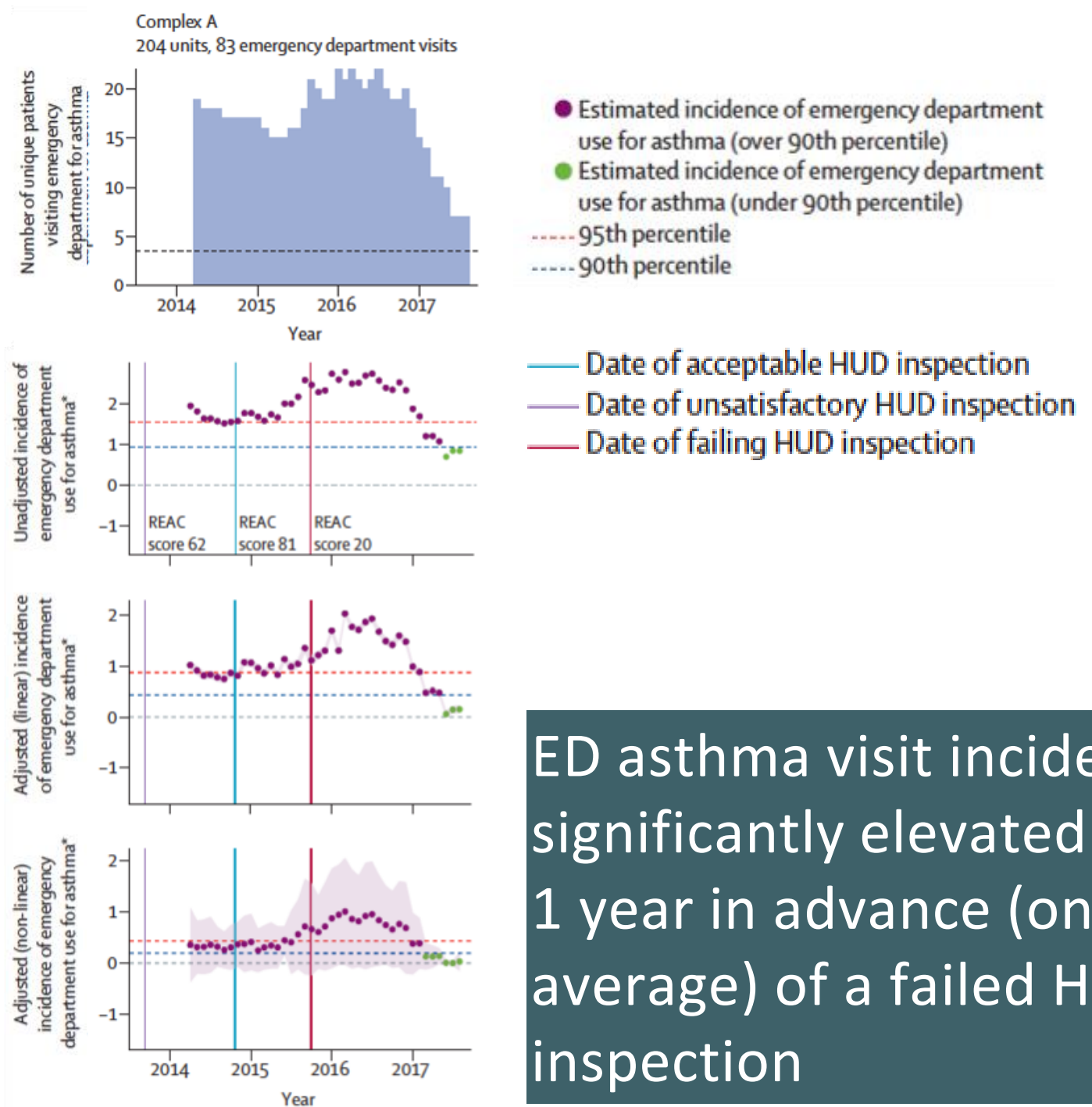
TEMPORAL RELATIONSHIP BETWEEN ED ASTHMA VISITS AND HOUSING INSPECTION SCORES



- Estimated incidence of emergency department use for asthma (over 90th percentile)
- Estimated incidence of emergency department use for asthma (under 90th percentile)
- 95th percentile
- 90th percentile
- Date of acceptable HUD inspection
- Date of unsatisfactory HUD inspection
- Date of failing HUD inspection

Asthma visits not elevated at housing units passing inspection

TEMPORAL RELATIONSHIP BETWEEN ED ASTHMA VISITS AND HOUSING INSPECTION SCORES



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

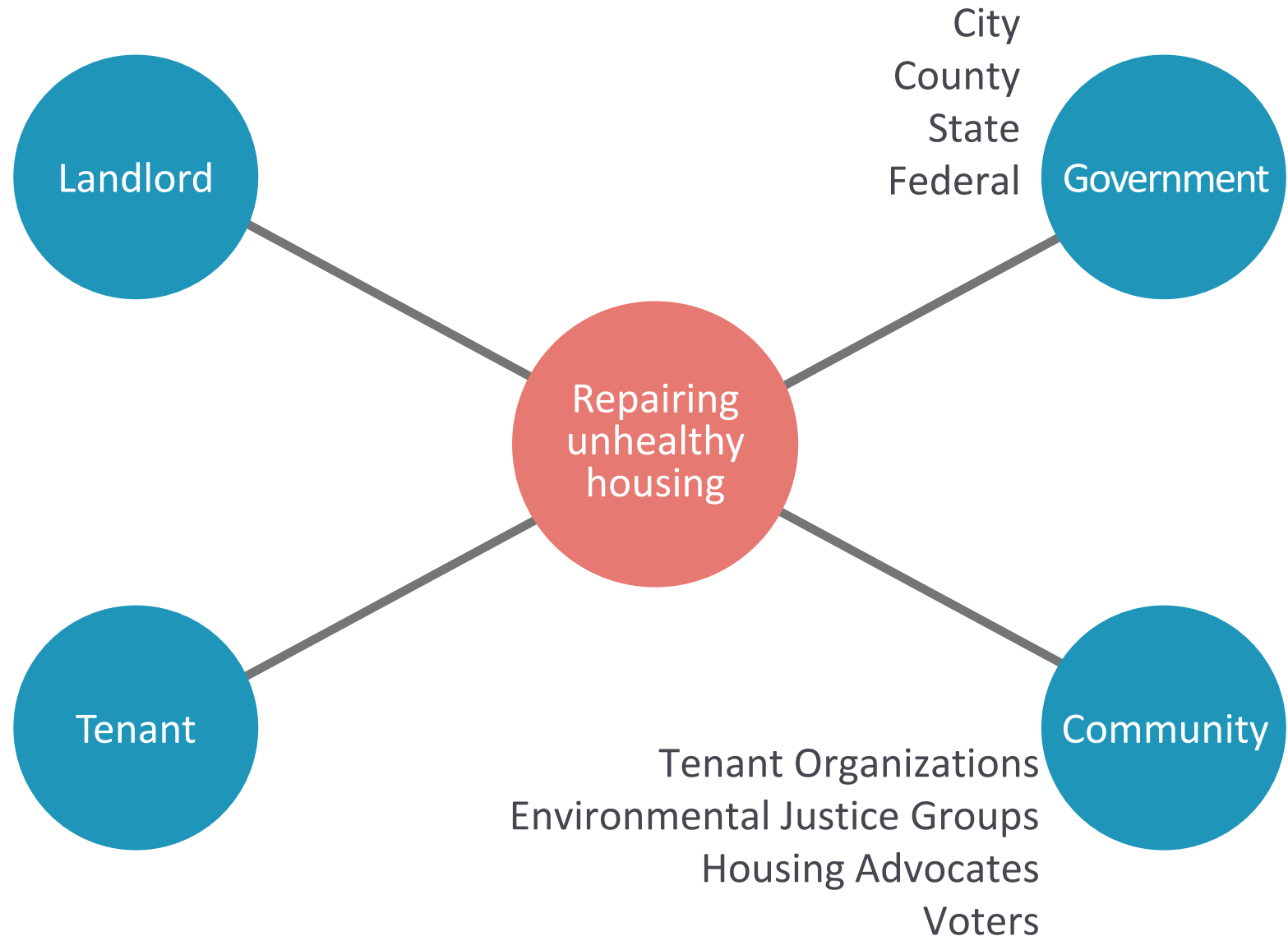


New Haven Independent, 2019

PROACTIVE INSPECTIONS CAN HELP REPAIR UNHEALTHY HOUSING

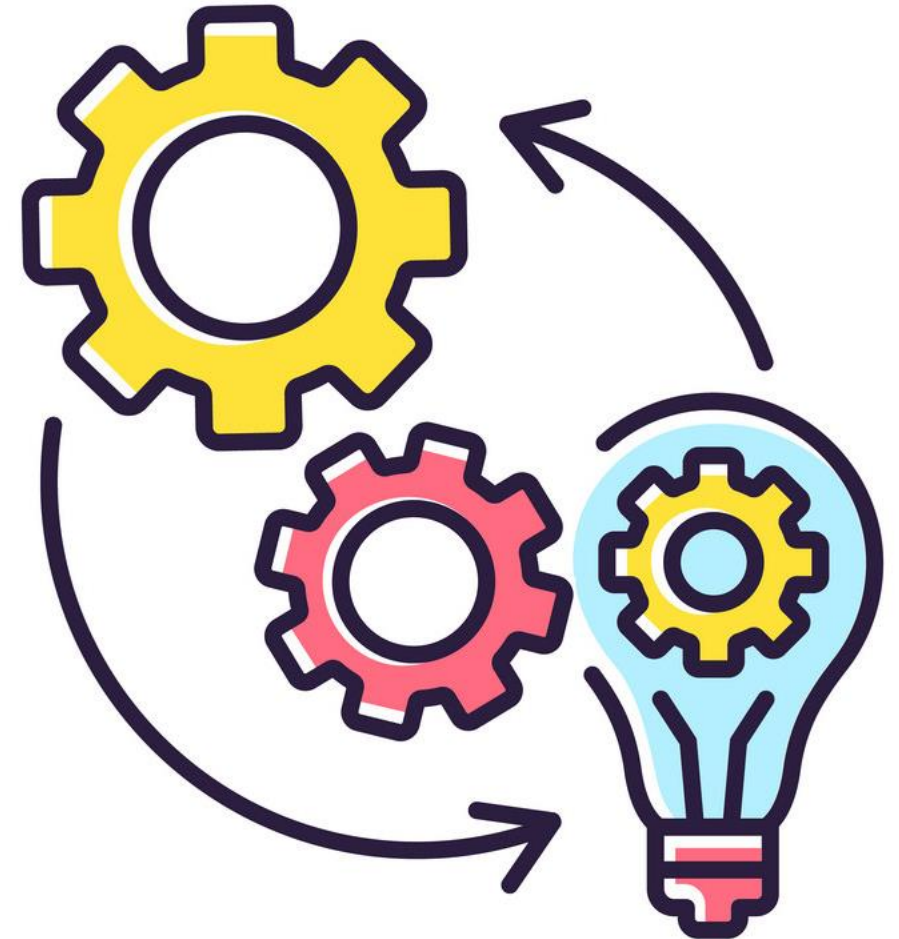
Leverage point that can be addressed by evidence-based, proactive housing inspections

- 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.
- 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.

HEALTH EQUITY

By Jamila Michener

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

HEALTH AFFAIRS OCTOBER 2023 42:10

Questions?

ahaber@hsph.harvard.edu

lizsamuels@ucla.edu

Solving for the Indoor Environmental Determinants of Health (IEDOH) in Asthma: Using Data to Prioritize In-Home IEDOH Interventions



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.

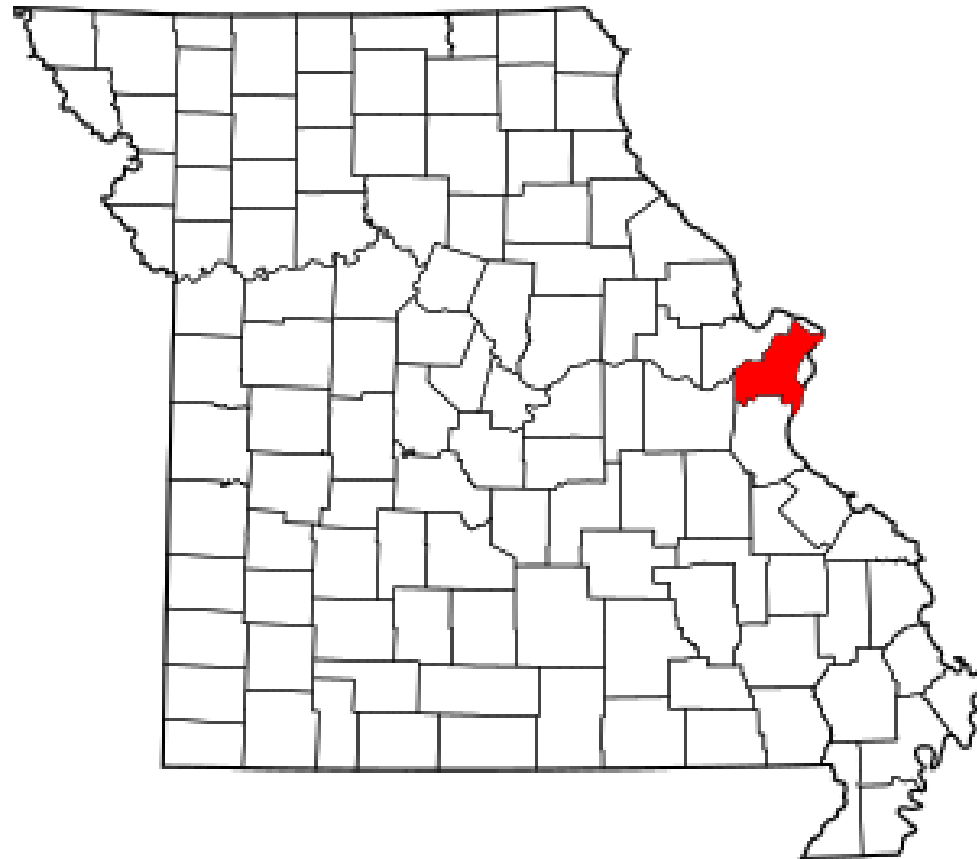
Epidemiologist, St. Louis County Department of Public Health

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

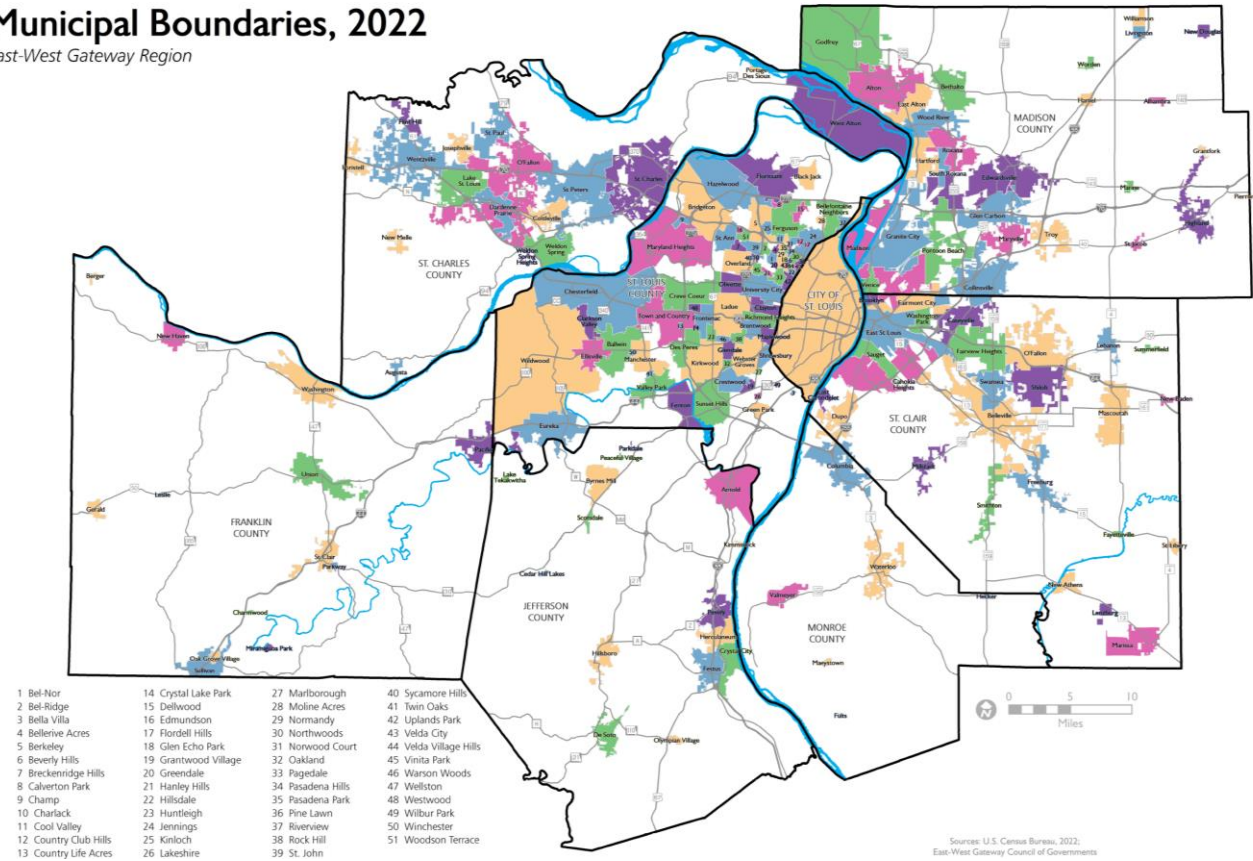


St. Louis County

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

Municipal Boundaries, 2022

East-West Gateway Region



Sources: U.S. Census Bureau, 2022;
East-West Gateway Council of Governments



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.

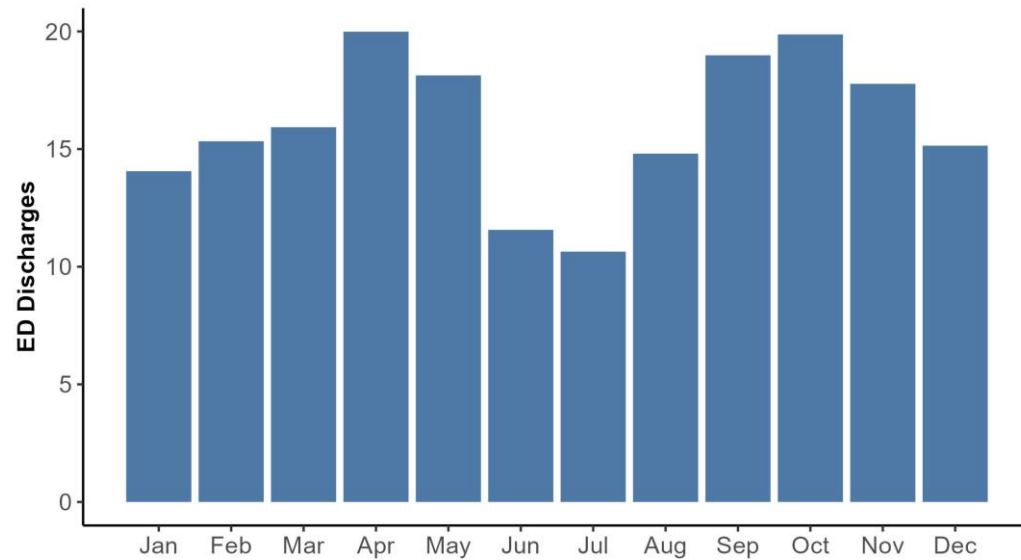
- Focused on environmental risk factors

Identified key partners within department for collaboration.

- Environmental Health Laboratory
- Healthy Homes Program

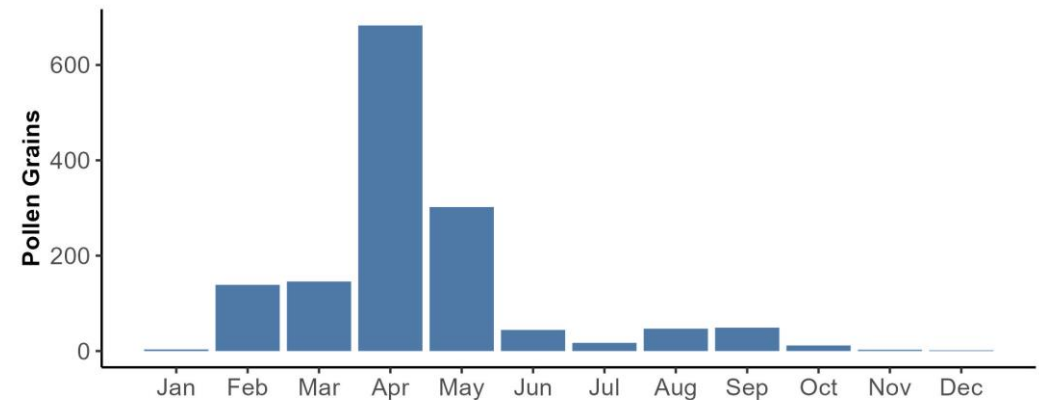
Compare Trends Over Time

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



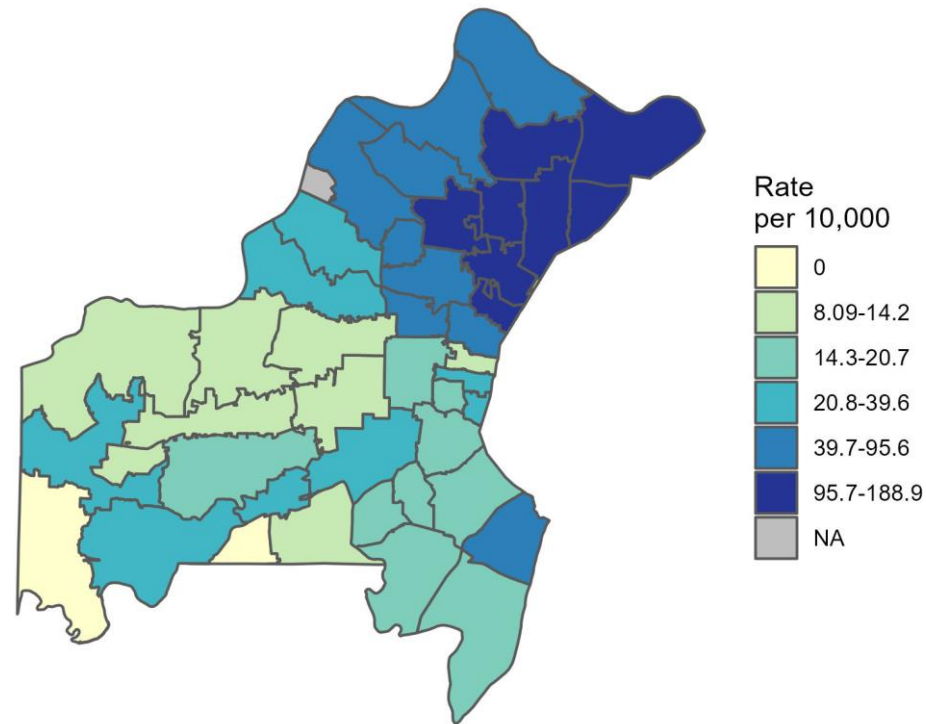
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

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



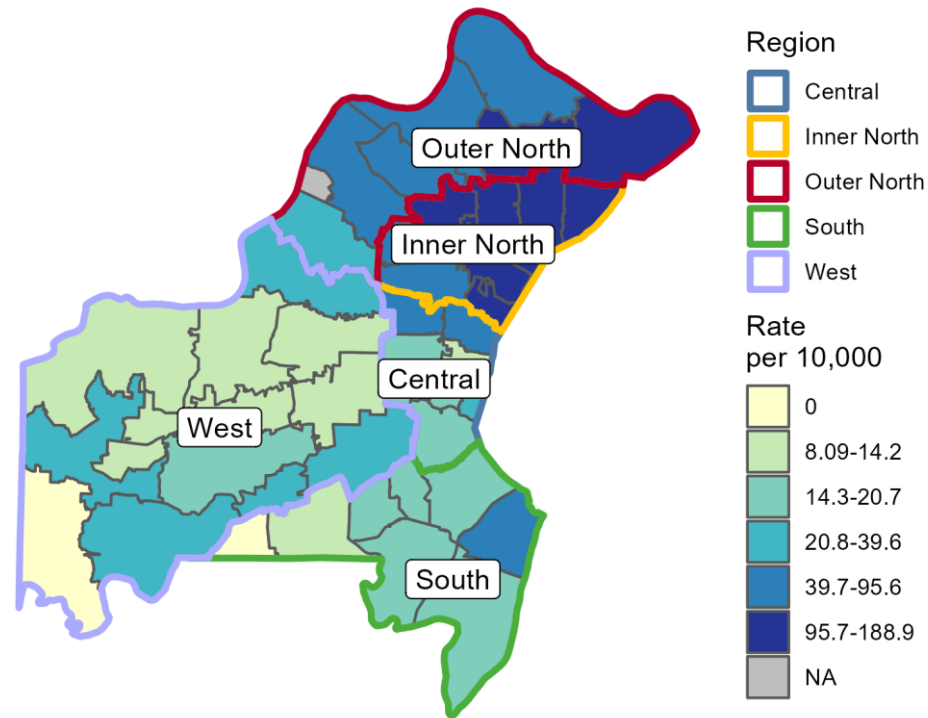
Source: Saint Louis County DPH Environmental Health Lab

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



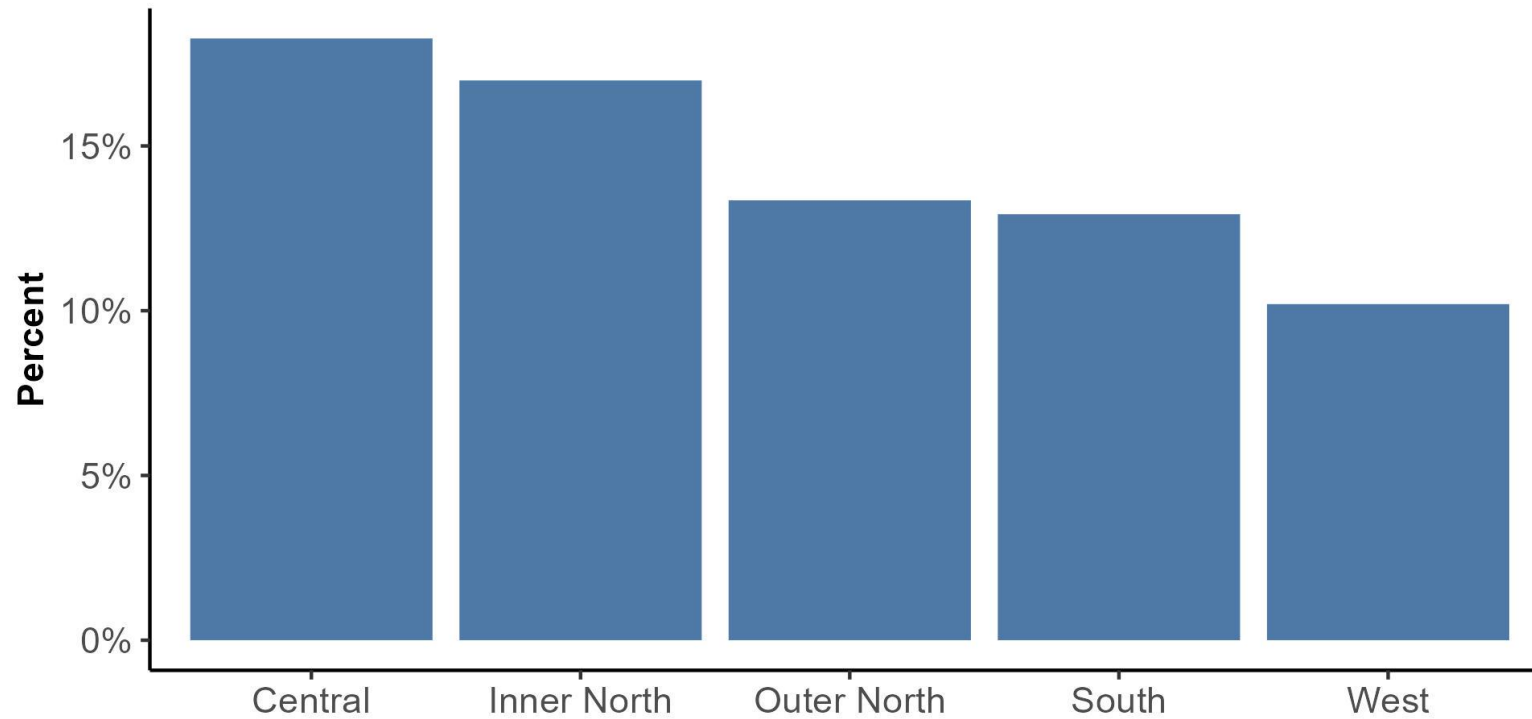
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

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



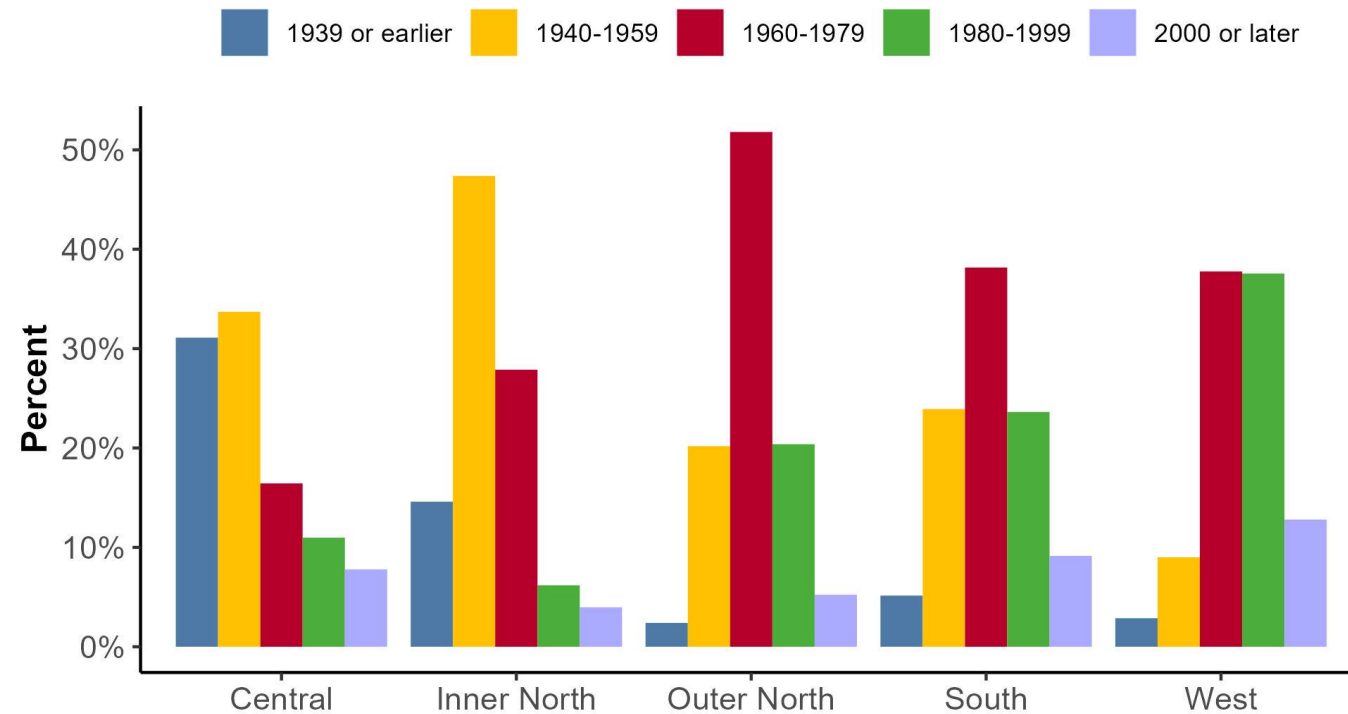
Source: Missouri DHSS, Bureau of Health Care Analysis and Data Dissemination

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



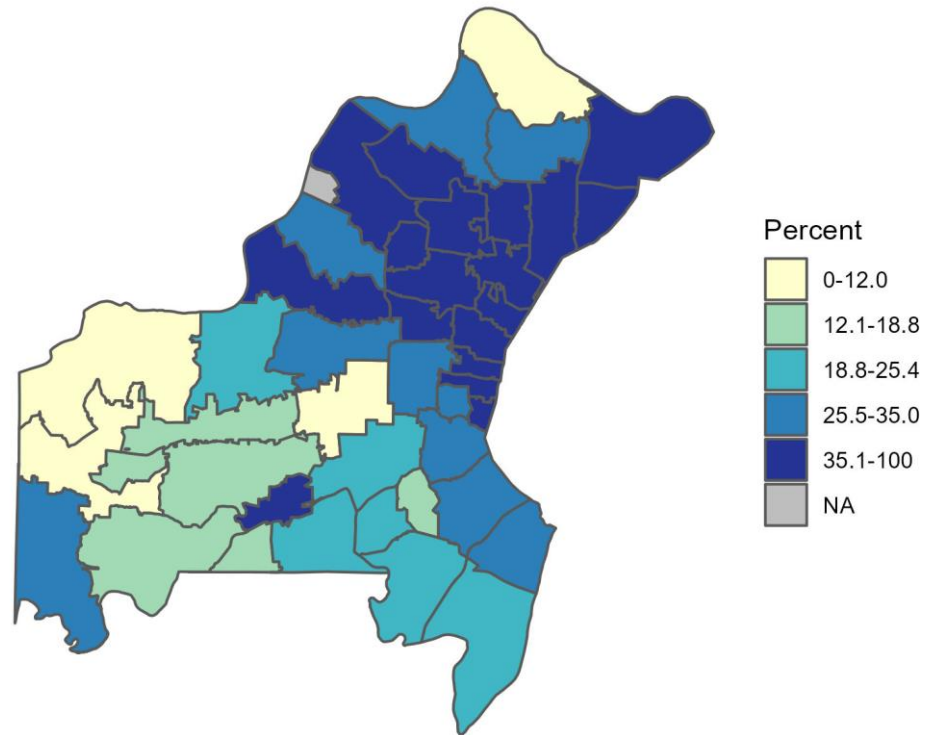
Source: Missouri Department of Transportation, 2021

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



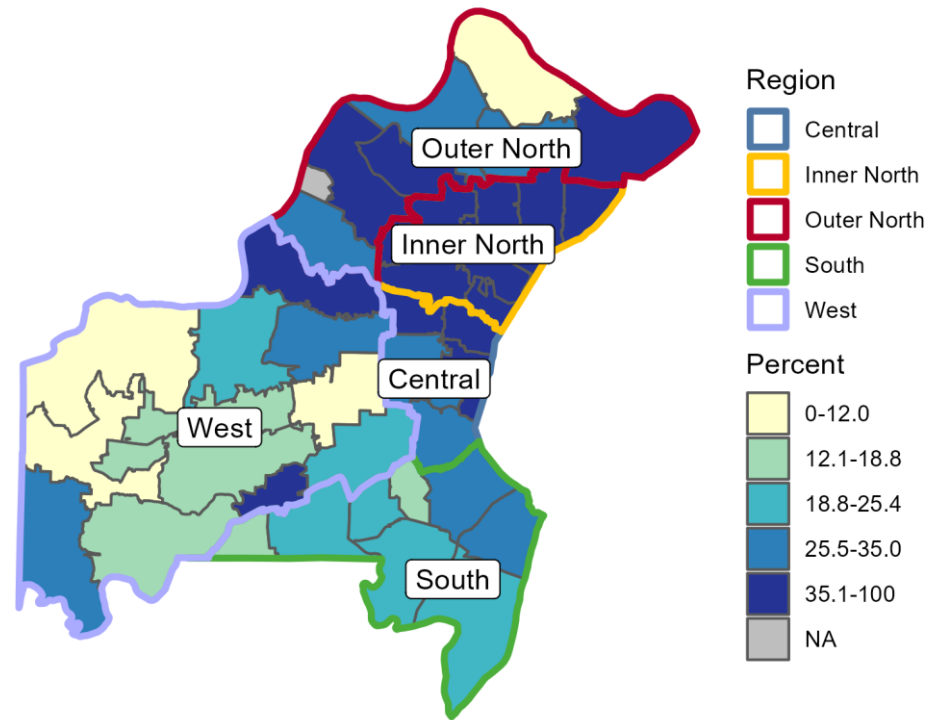
Source: U.S. Census Bureau, American Community Survey (ACS), 2020

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

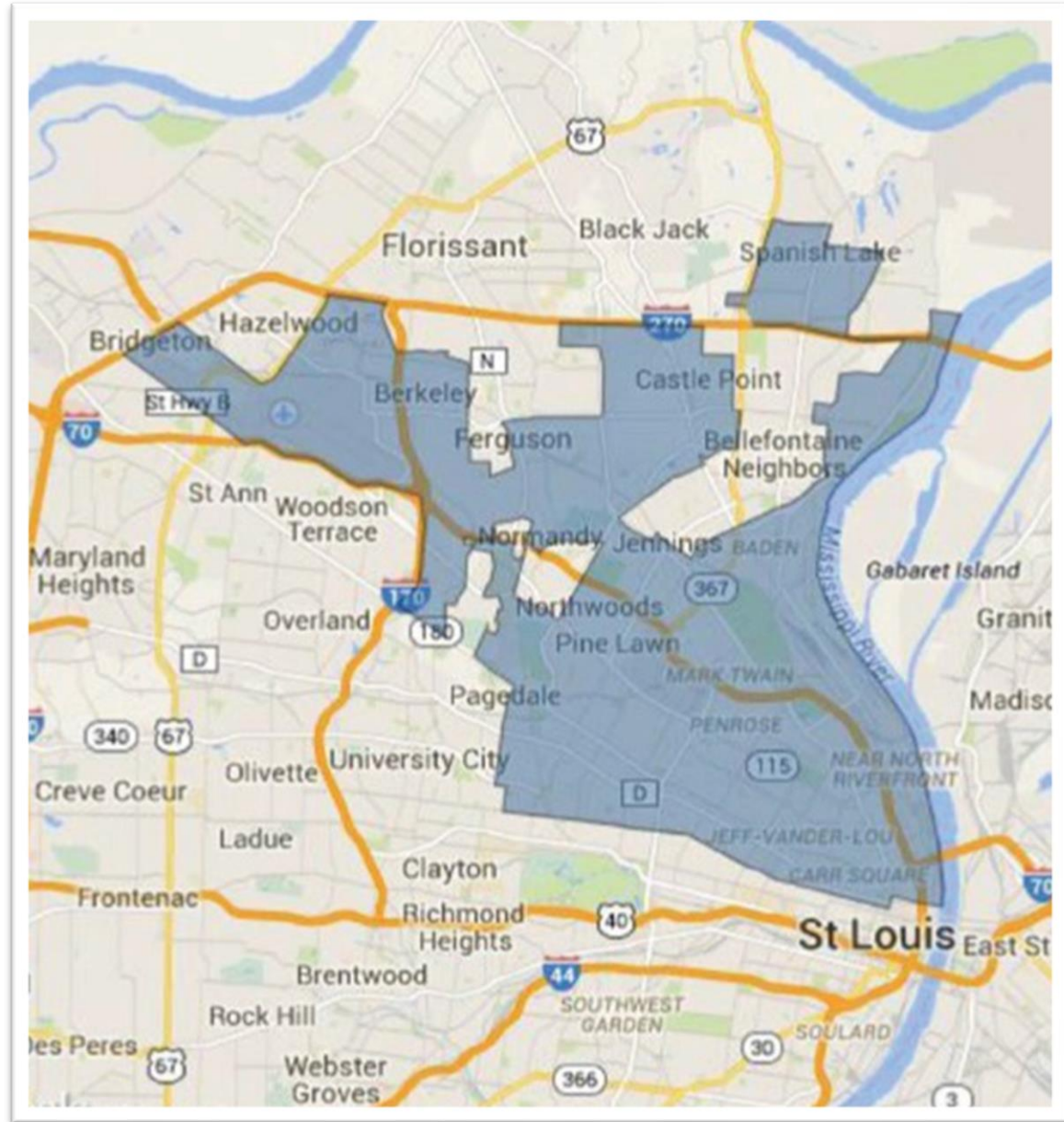
Show-Me Missouri Healthy Homes Program

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

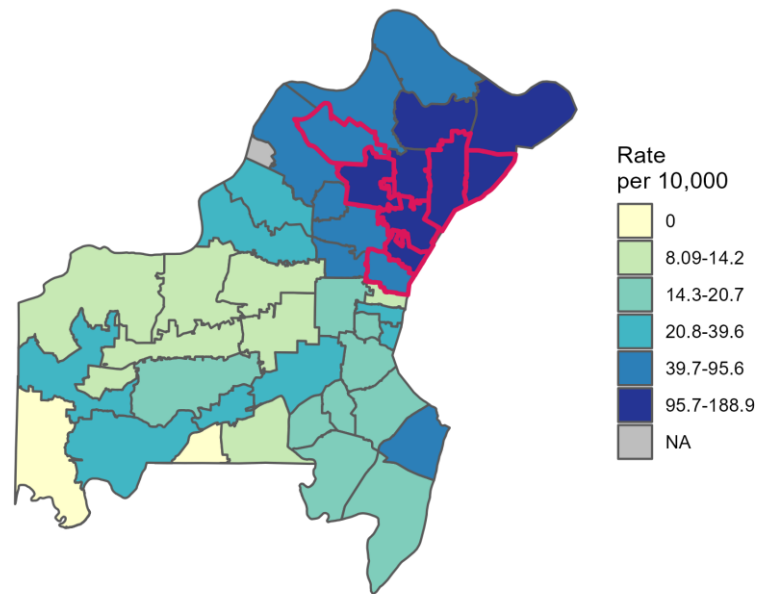
\$1.8 million in funding to
support community
trainings, healthy homes
assessments and
interventions

St. Louis Promise Zone



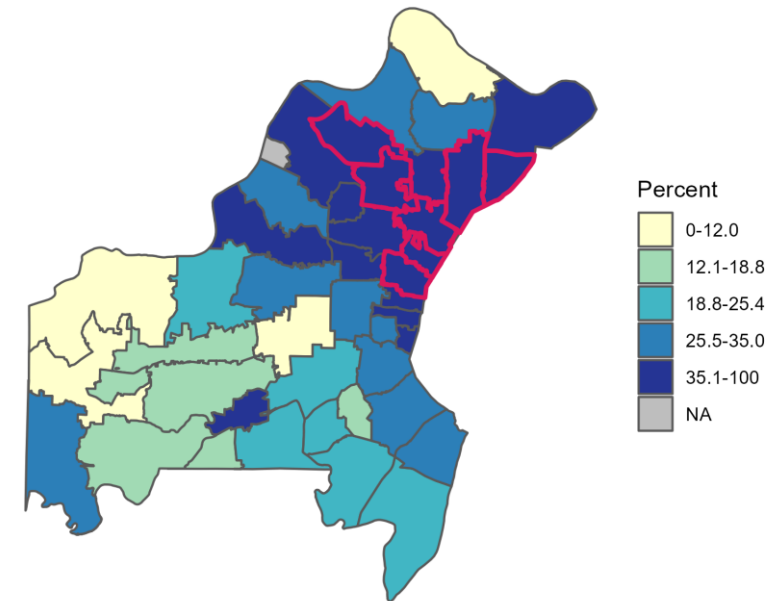
Target Area

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



Thank you!

Ellen Hutti, MPH

ehutti@stlouiscountymo.gov

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.

Archived Webinar!

2023 Asthma Award Winner
Wisconsin Asthma Program:
Using Asthma Surveillance to Drive
Improvement and Sustainability



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

