9/22/2025

BREATHE 2025 Summit Agenda

2:00- 2:10	**Welcome to MadTree with Rhiannon Hoeweler**
2:10-2:20	**Opening Remarks with Moshe Seid & Meriel Vigran**
2:20- 3:30	**Speaker Series**
2:20-2:30	*Green Cincinnati Plan - Air Quality with Amanda Testerman*
2:30-2:40	*Cincy Air Watch with Meriel Vigran*
2:40-2:50	*ALHS with Dr. Andrew Beck*
2:50-3:00	*Excessive Smoke from Neighborhood Restaurants with Dr. Nick Newman*
3:00-3:10	*Local Trees and Greenspace Initiatives with Rhiannon Hoeweler*
3:10-3:20	*Remote Monitoring Efforts with Dan Divelbiss and Dr. Kristy Hopfensperger*
3:20-3:30	*Lived Experience with Michael Pickston*
3:30-3:45	**15 Minute Speed Share with Meriel Vigran**
3:45-4:00	**Bridging Barriers Activity with Amanda Testerman**
4:00-4:15	**Moving Forward with Moshe Seid**
4:15-5:00	**Eat, Drink, Identify How it all Fits Together *(Networking Hall)***

WELCOME TO THE BREATHE SUMMIT

Bridging **R**esearch, **E**quity, and **A**sthma **T**hrough **H**ealthy **E**nvironments

Cincinnati Children's

city of CINCINNATI

MONDAY
SEPTEMBER 22
2-5 PM
MadTree Brewing Oakley
3301 Madison Rd, Cincinnati

MADTREE

ABOUT THE EVENT

A summit for clean air access changemakers to build a network of projects and resources for tackling challenges that are insurmountable alone.

Combining the focus of policymakers, community groups, public services, and other Cincinnatians, we can make tangible air quality improvements and reduce health burdens.

We've seen that through collaboration, generational goals have been accomplished. Please join us in being a part of this endeavor.

Agenda

- **2:00- Welcome to MadTree with Rhiannon Hoeweler**
- **2:10- Opening Remarks with Moshe Seid & Meriel Vigran**
- **2:20- Speaker Series**
  - *Green Cincinnati Plan - Air Quality with Amanda Testerman*
  - *Cincy Air Watch with Meriel Vigran*
  - *ALHS with Dr. Andrew Beck*
  - *Excessive Smoke from Neighborhood Restaurants with Dr. Nick Newman*
  - *Local Trees and Greenspace Initiatives with Rhiannon Hoeweler*
  - *Remote Monitoring Efforts with Dan Divelbiss and Dr. Kristy Hopfensperger*
  - *Lived Experience with Michael Pickston (presented by Moshe Seid)*
  - *15-miunte Speed Share Session*
- **3:45- Bridging Barriers Activity with Amanda Testerman**
- **4:00- Moving Forward with Moshe Seid**
- **4:15- Eat, Drink, Identify How it all Fits Together (Networking Hall)**

- I work in research
- I work in the environmental space
- I work in health care
- My project involves air quality monitoring
- My project involves planting trees
- I do community engagement work as part of my project
- My project involves fundraising
- I believe that local government is responsible for air quality
- I believe that businesses are responsible for air quality
- I believe that community drives change
- I believe policy drives change

Green Cincinnati Plan:
Air Quality

The City of Cincinnati's mission is to create the highest quality of life for the people of Cincinnati.

Amanda Testerman

City of Cincinnati Office of Environment and Sustainability

Green Cincinnati Plan 2023

city of CINCINNATI

2023 Green Cincinnati Plan

- Cincinnati's sustainability, equity and resilience plan.
- Originally passed by Council in 2008, it has been updated every 5 years, most recently in 2023.
- Over 3500 individuals engaged in their feedback through in-person and virtual meetings, and surveys.
- Establish Goals, Strategies, and Actions related to 8 focus areas.
- **What did we hear from residents about air quality?**

"We want better air"

"reduce emissions"

"I feel like I can't breathe outside"

"more tree canopy"

city of CINCINNATI

Air Quality: Goals, Strategies, Actions

Goal	Strategy	Actions
Improve air quality so that Air Quality Index "Healthy Days" are increased by 30% by 2028.	Increase air quality studies and education and reduce pollution from air emissions.	**Expand monitoring of air quality and nuisance odors, incorporating citizen science in priority neighborhoods**
		Provide services, resources, and education for residents in priority neighborhoods on air quality alert systems, sources of poor air quality, and air quality regulations
		Support and fund the development of natural corridors and tree barriers along streams and rivers, interstates and highways
		Strengthen air emissions regulations

The City of Cincinnati's mission is to create the highest quality of life for the people of Cincinnati

Meriel Vigran, MPH – Cincinnati Health Department, Environmental Epidemiologist

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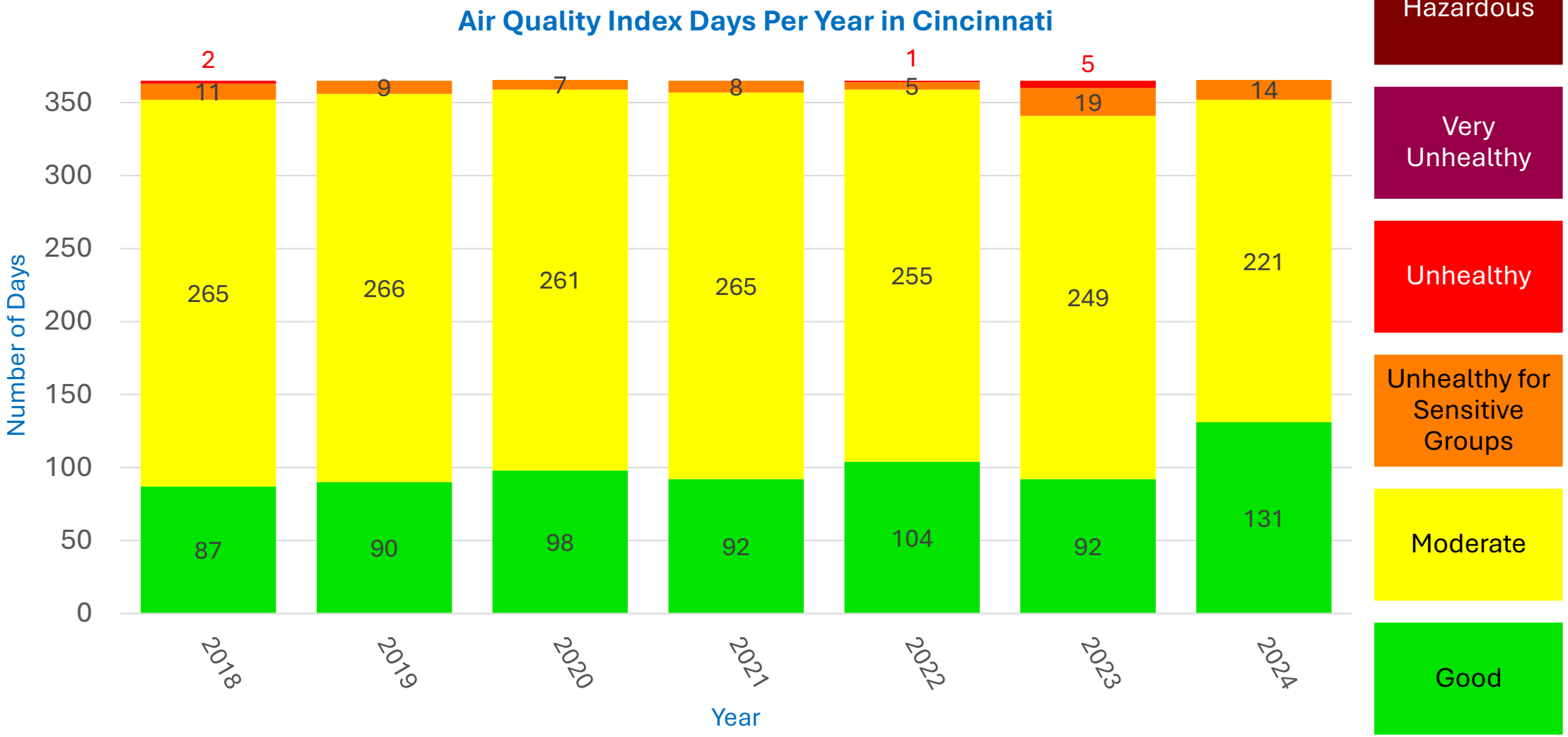
Air Quality Index (AQI)

	Category	AQI Color	Index	Level of Concern
	Good	Green	0-50	Air quality level indicates clean air with little to no health risks. A great day to be outside.
	Moderate	Yellow	51-100	Air quality is acceptable for most people, but there may be a slight risk for sensitive individuals. Sensitive individuals may consider limiting prolonged outdoor activites.
	Unhealthy for Sensitive Groups	Orange	101-150	Members of sensitive groups, such as people with pre-existing pulmonary or cardiovascular conditions, may experience negative health effects. Sensitive groups should limit prolonged outdoor activites or consider wearing a mask such as an N-95.
	Unhealthy	Red	151-200	Everyone may begin to experience negative health effects. Sensitive groups can expect to experience more serious outcomes. Everyone should limit prolonged outdoor activites or consider wearing a mask such as an N-95.
	Very Unhealthy	Purple	201-300	The air quality is a significant health risk for everyone. All individuals should take precautions such as masking outdoors. Sensitive groups should avoid outdoor activity, everyone should limit outdoor activites.
	Hazardous	Maroon	301-500	This is the most severe air quality level. It poses a serious health threat to everyone. All individuals should take precautions such as masking and avoid all physical activites outdoors.

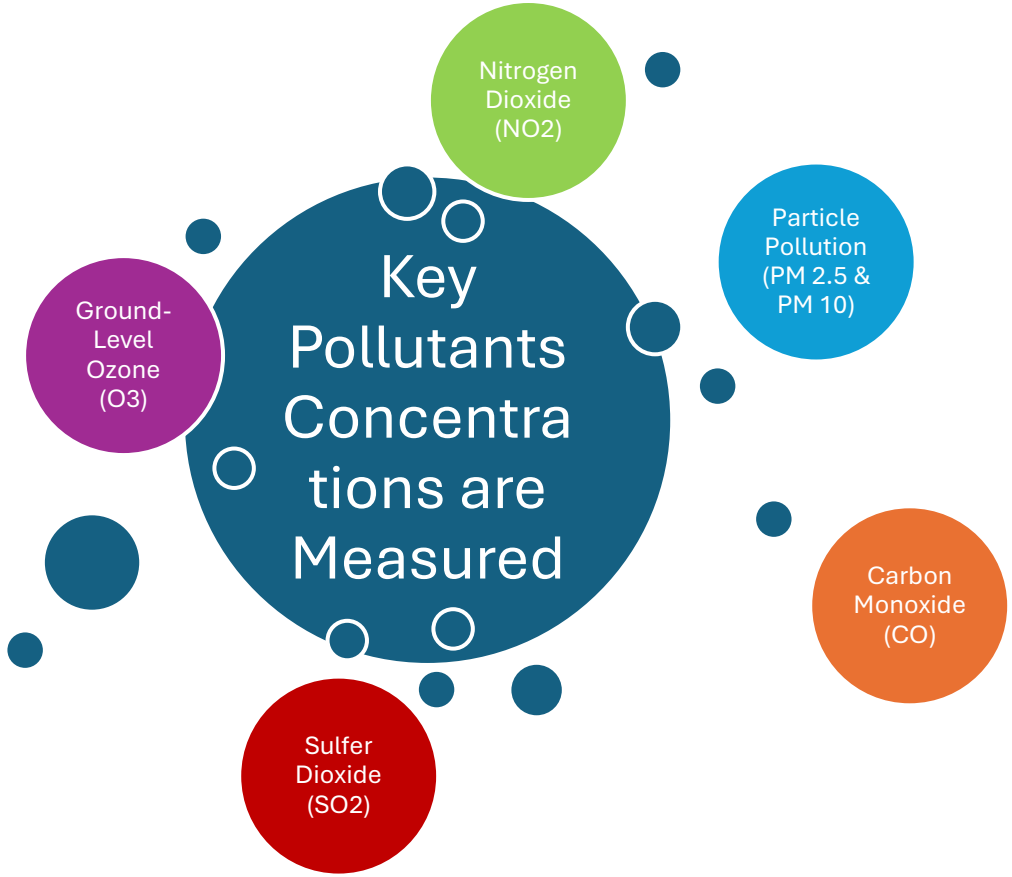
AQI in Cincinnati



Source: epa.gov/outdoor-air-quality-data/air-quality-index-report

How is AQI determined?

Step1: Measure



Step 2: Convert

Calculating the AQI from pollutant concentration data

The AQI is the highest value calculated for each pollutant as follows:

1. Identify the highest concentration among all of the monitors within each reporting area and truncate as follows:

   Ozone (ppm) – truncate to 3 decimal places

   $PM_{2.5}$ ($\mu g/m^3$) – truncate to 1 decimal place

   PM_{10} ($\mu g/m^3$) – truncate to integer

   CO (ppm) – truncate to 1 decimal place

   SO_2 (ppb) – truncate to integer

   NO_2 (ppb) – truncate to integer

2. Using Table 6 (next page), find the two breakpoints that contain the concentration.

3. Using Equation 1, calculate the index.

4. Round the index to the nearest integer.

Equation 1:

$$I_p = \frac{I_{Hi} - I_{Lo}}{BP_{HI} - BP_{Lo}}(C_p - BP_{Lo}) + I_{Lo}.$$

Where I_p = the index for pollutant p

C_p = the truncated concentration of pollutant p

BP_{Hi} = the concentration breakpoint that is greater than or equal to C_p

BP_{Lo} = the concentration breakpoint that is less than or equal to C_p

I_{Hi} = the AQI value corresponding to BP_{Hi}

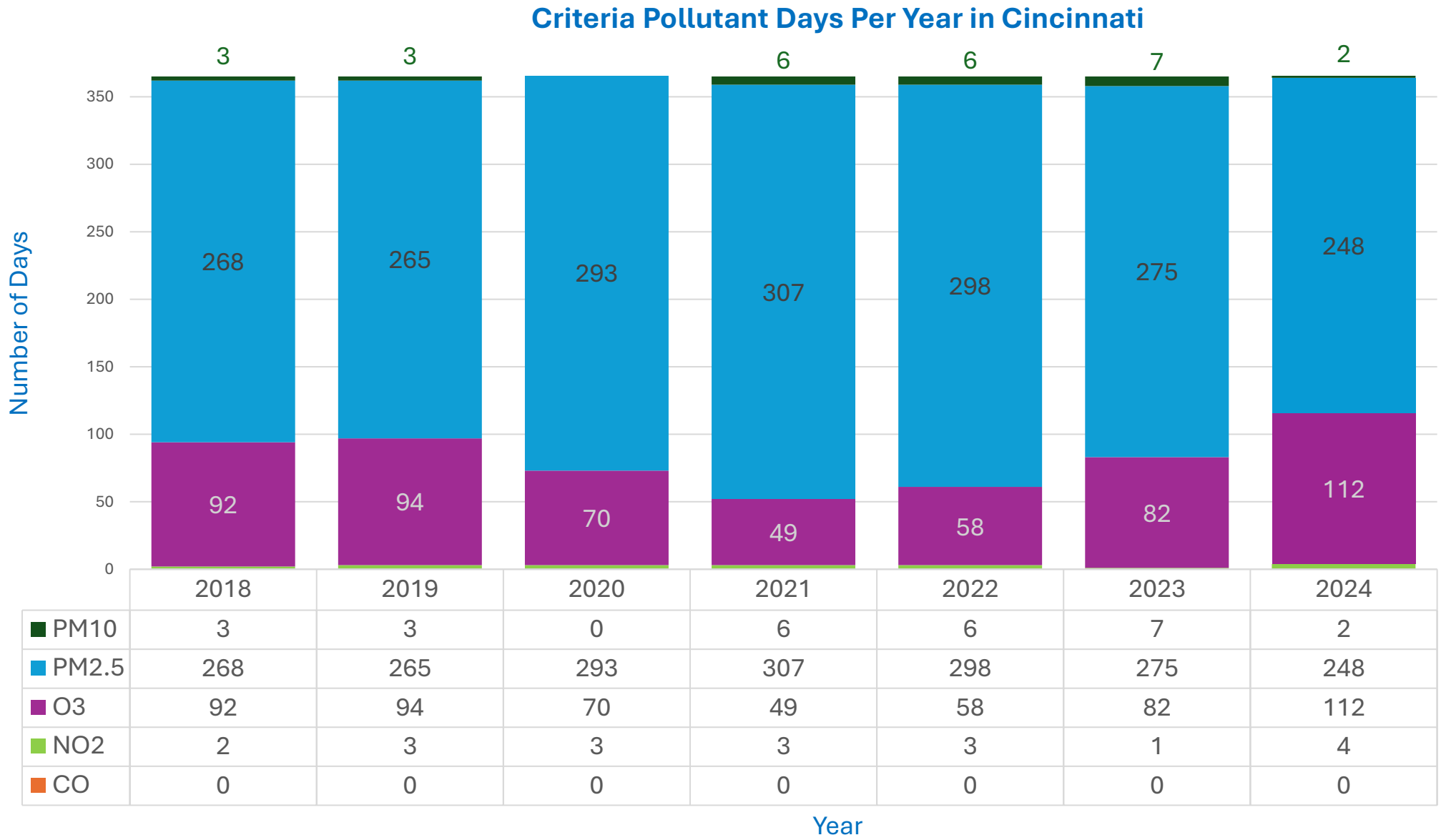
I_{Lo} = the AQI value corresponding to BP_{Lo}

Step 3: Determine Highest

The overall daily AQI for that location is the **highest** of these individual AQI values.

Source: https://document.airnow.gov/technical-assistance-document-for-the-reporting-of-daily-air-quailty.pdf

Criteria Pollutants in Cincinnati



	2018	2019	2020	2021	2022	2023	2024
PM10	3	3	0	6	6	7	2
PM2.5	268	265	293	307	298	275	248
O3	92	94	70	49	58	82	112
NO2	2	3	3	3	3	1	4
CO	0	0	0	0	0	0	0

Particulate Matter 10 (PM10)

Particulate Matter 2.5 (PM2.5)

Ozone (O3)

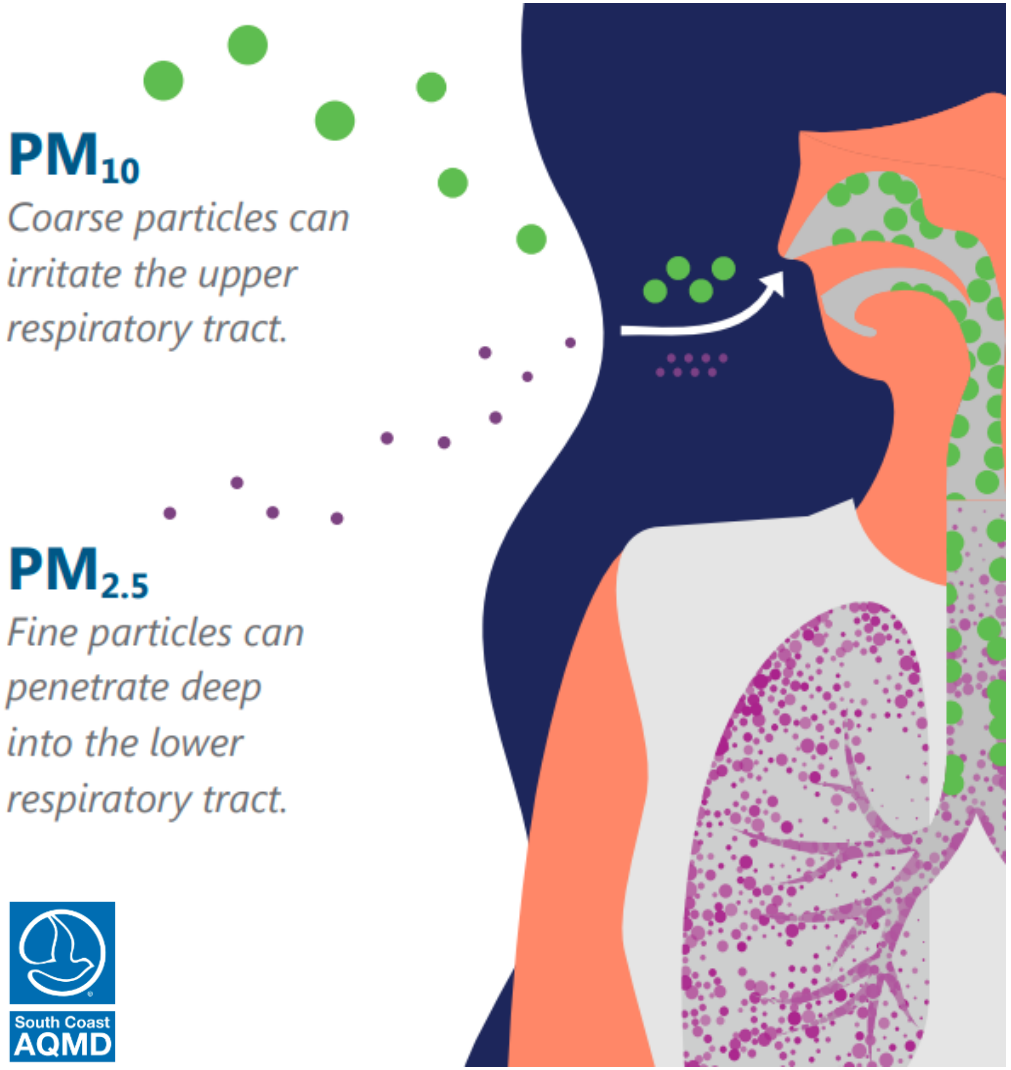
Nitrogen Dioxide (NO2)

Carbon Monoxide (CO)

Sulfur Dioxide (SO2)

Source: epa.gov/outdoor-air-quality-data/air-quality-index-report

Particulate Matter (PM)



Poor air quality is proven to negatively impact our health and environment.

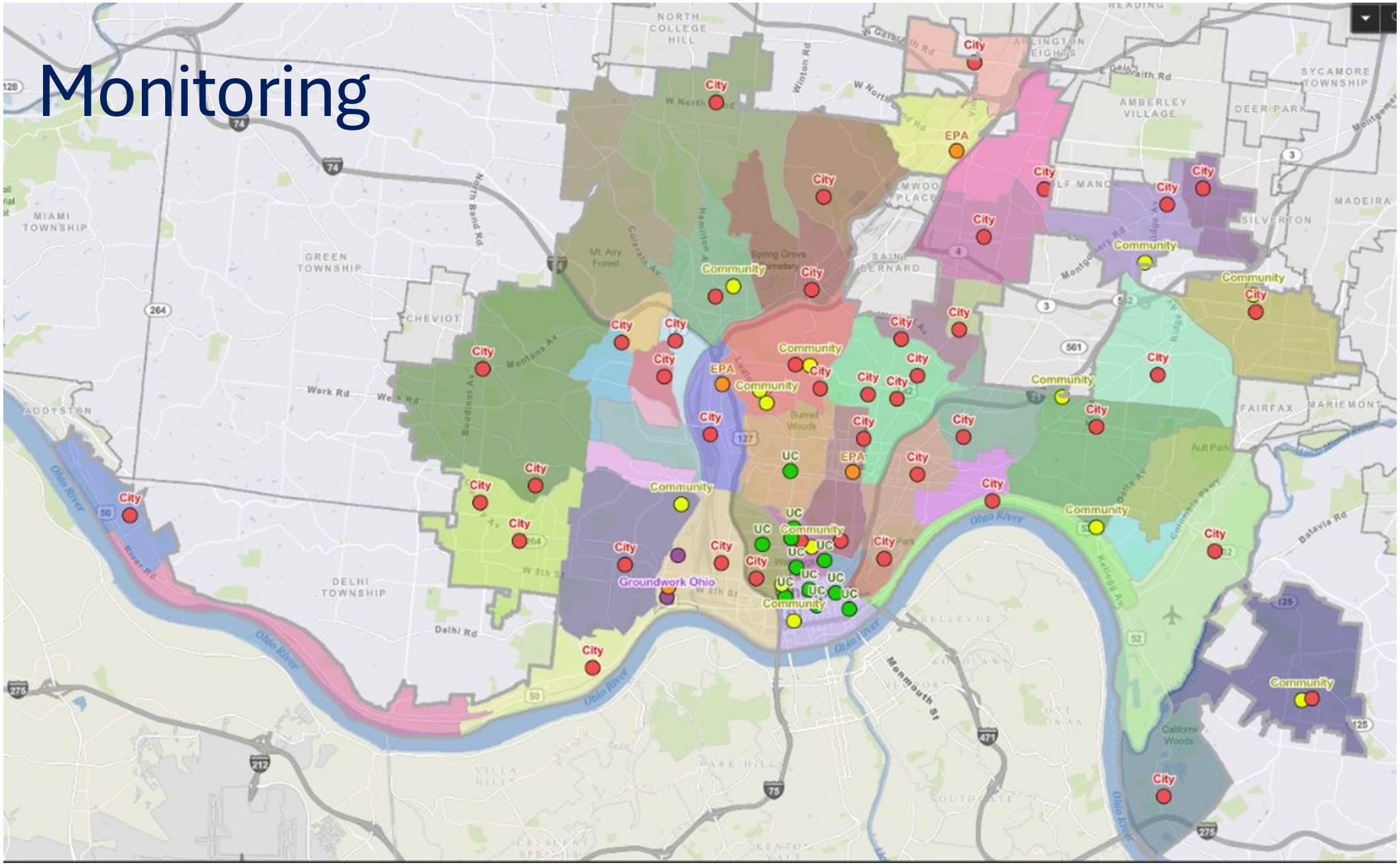
Particle size is directly related to the potential to cause adverse respiratory problems.

- Particles less than 10 microns or micrometers (µm) in diameter, PM_{10} (coarse particles).
  - Impact the upper respiratory tract and can sometimes be dislodged by coughing
- Particles less than 2.5 microns or micrometers (µm) in diameter, $PM_{2.5}$ (fine particles).
  - Can enter lower into the lungs, respiratory tract, and bloodstream becoming more dangerous and harder to expel from the body.

PM is known to cause aggravated asthma, decreased lung function, increased respiratory symptoms such as irritated airways, coughing, or difficulty breathing. It is also linked to nonfatal heart attacks, irregular heartbeat, and premature death in individuals with heart or lung disease.

The Cincy Air Watch Project has chosen to monitor $PM_{2.5}$ as our pollutant of investigation because of its known link to adverse health effects and its prevalence as the leading AQI indicator in Cincinnati.

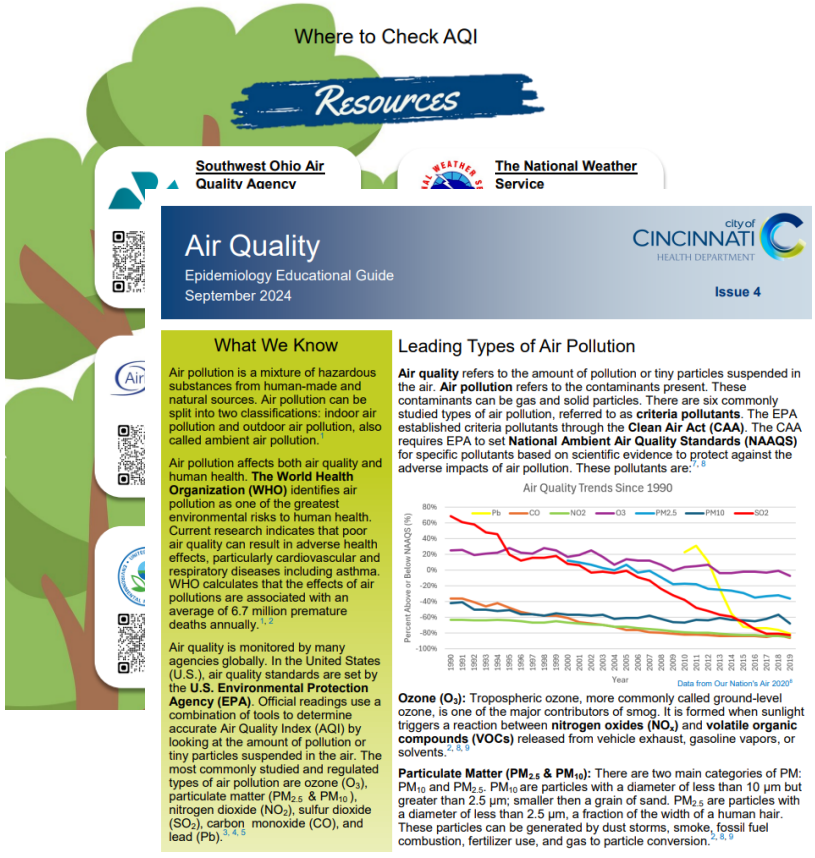
Monitoring

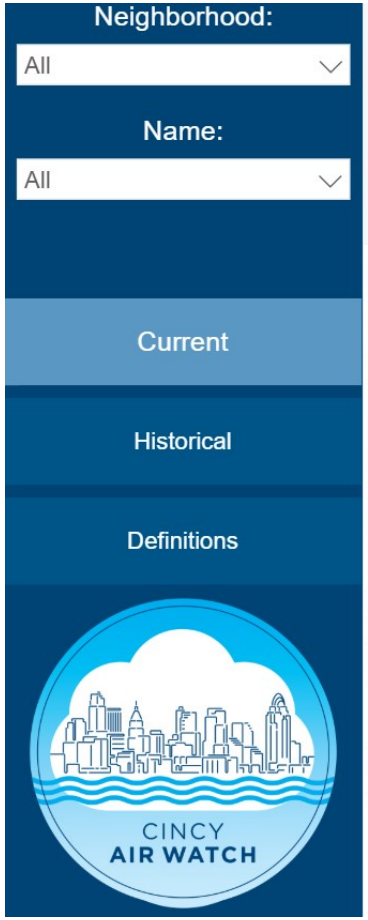

City
Community
EPA
UC
Groundwork Ohio
NORTH COLLEGE HILL
MIAMI TOWNSHIP
GREEN TOWNSHIP
CHEVIOT
ADDYSTON
DELHI TOWNSHIP
AMBERLEY VILLAGE
SYCAMORE TOWNSHIP
DEER PARK
MADEIRA
SILVERTON
FAIRFAX
MARIEMONT
BELLEVUE
Ohio River
Work Rd
Delhi Rd
Belvia Rd
Monmouth St
North Bend Rd
Montgomery Rd
Mt. Airy Forest
Spring Grove Cemetery
Burnet Woods
Ault Park
California Woods

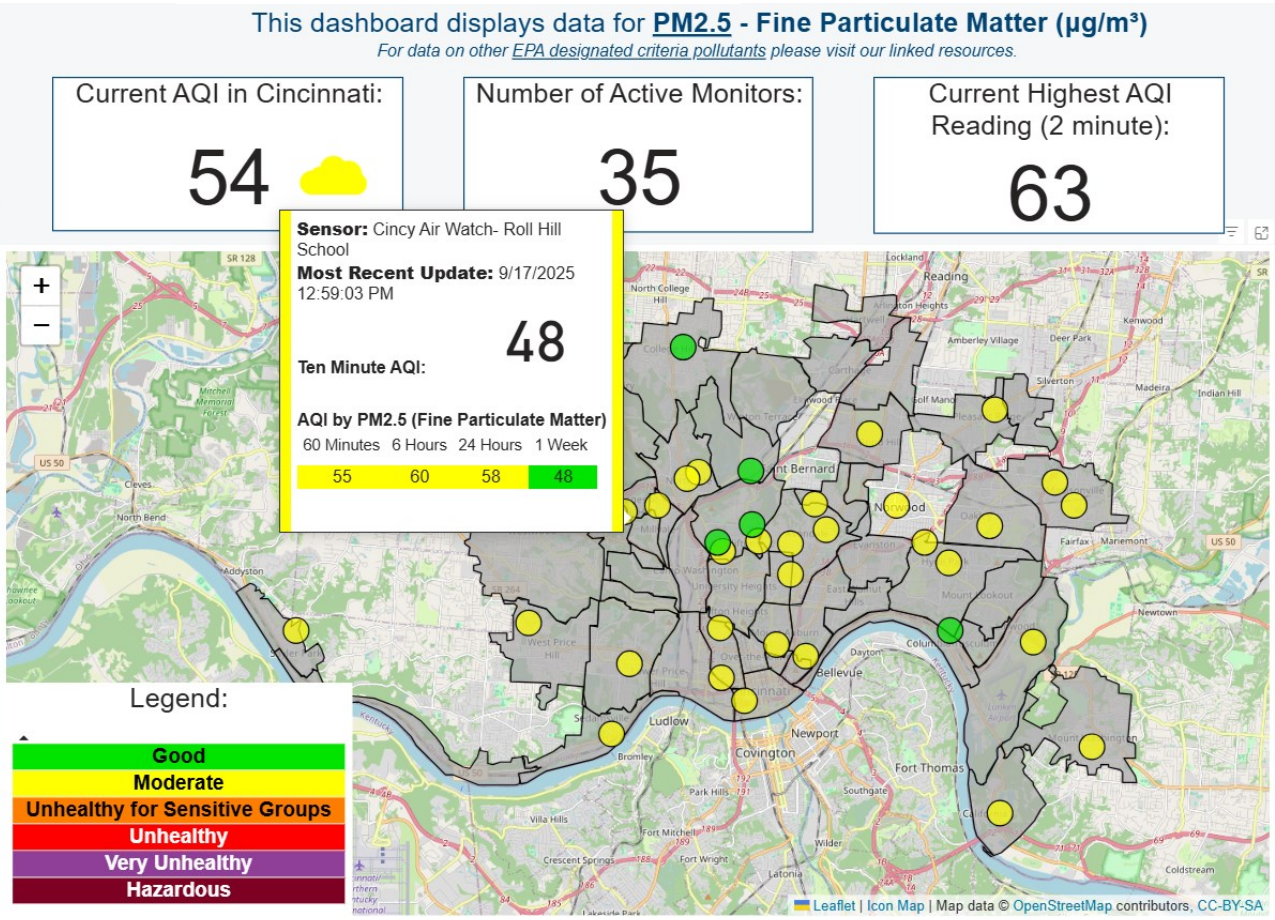
Education and Resources

Green Cincinnati Plan

Cincy Air Watch







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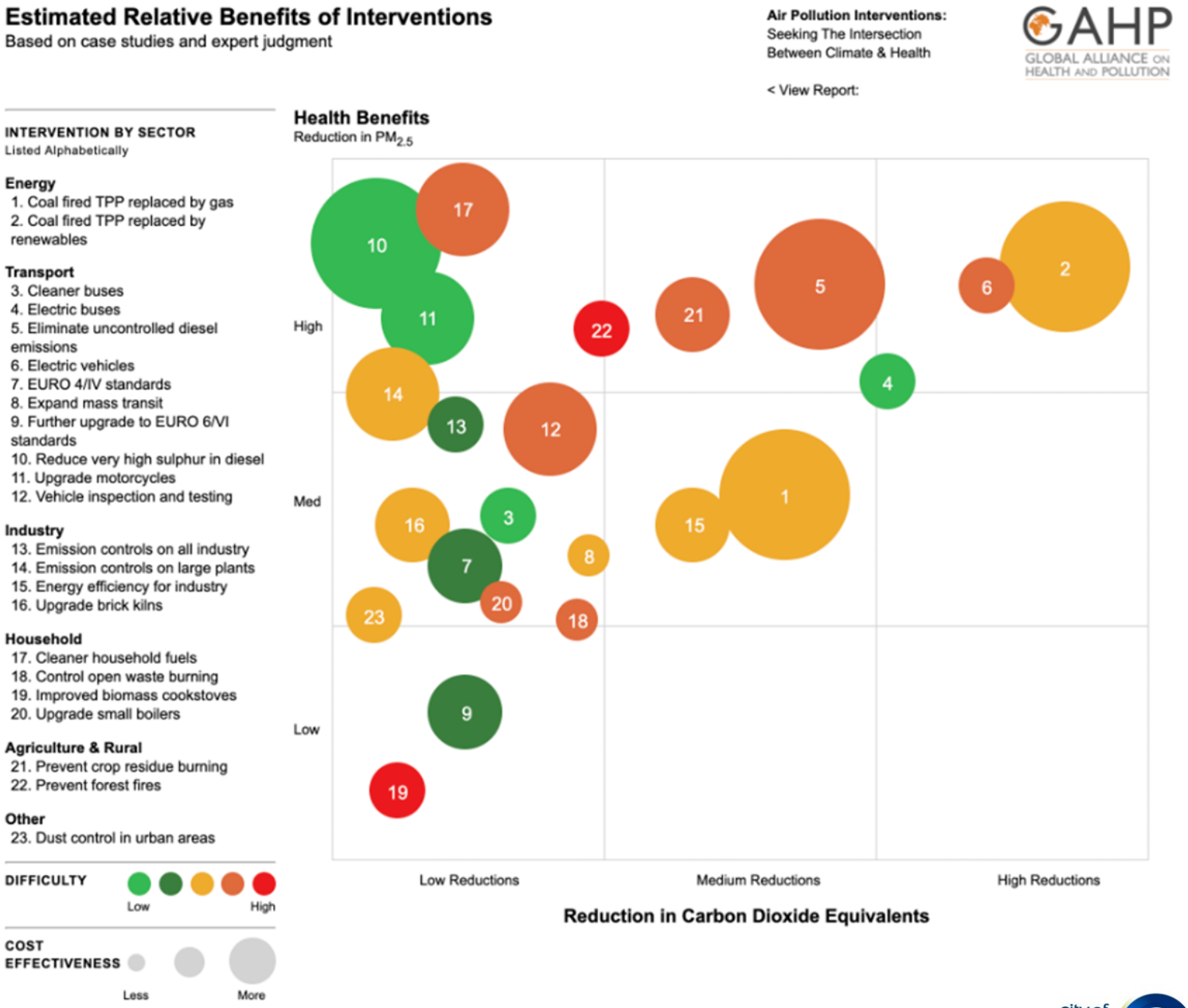
Next Steps

- Cincinnati aims to improve health benefits through air pollution interventions.
- To achieve these improvements the Cincinnati Green Workforce Landscape Analysis estimated that the total investment would need to be between $82 million and $163 million.
- The strategies included tree canopy expansion, improving air quality by investing in incentives for cleaner technology in the manufacturing and energy sectors, and utilizing vacant lots to develop small parks to link neighborhoods and more Cincinnati residents to greenspaces. These initiatives also include phasing out city fleet vehicles for electric ones with 400 vehicles being replaced as of 2025 and additional improvements to Cincinnati Metro moving to hybrid buses. The city also incentivizes electrification of previous gas powered equipment when available.



Questions

Meriel Vigran, MPH

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Amanda Testerman

Sr. Environmental Safety Specialist
Office of Environment & Sustainability
Amanda.Testerman@cincinnati-oh.gov

Partnering to Improve Child Asthma Outcomes in Cincinnati

Andy Beck
Cincinnati Children's
September 23, 2025

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changing the outcome together

Shared purpose: decrease asthma burden

COMMON

- 17% of children in Cincinnati have asthma compared with 5-10% across US
- Disproportionately affects children in urban, more disadvantaged areas

COSTLY

- One of top reasons for children to visit the ER and be hospitalized
- Cincinnati Children's: ~1,000 admissions/year
- Missed school / work, diminished quality-of-life

COMPLEX

- Significant inequities
- Highly sensitive to social and physical environment
- Multiple interest-holders
- Crosses divisions, sectors
- Numerous active projects (clinical, research, community)

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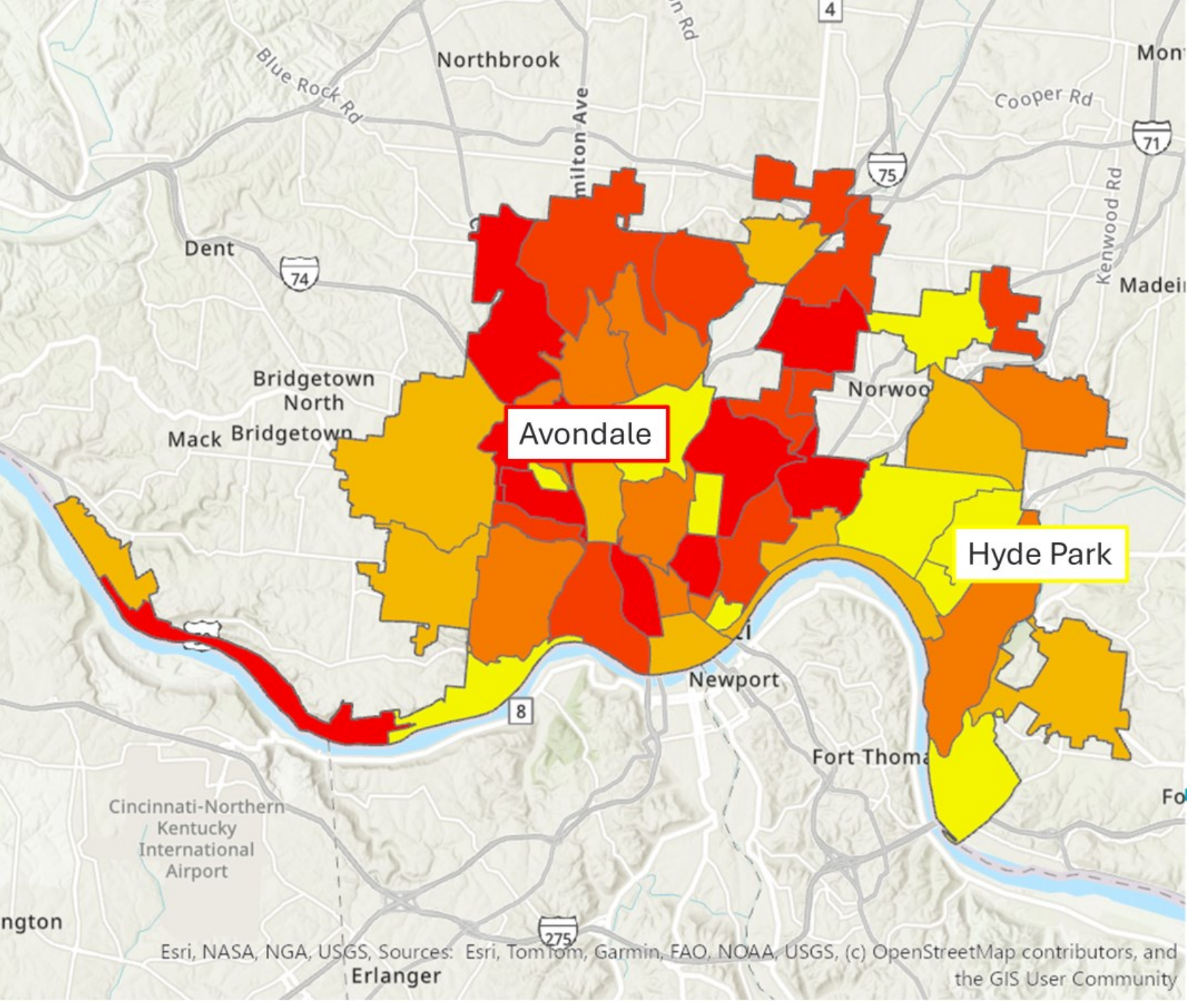
Admission rates for children across Cincinnati, by city neighborhoods



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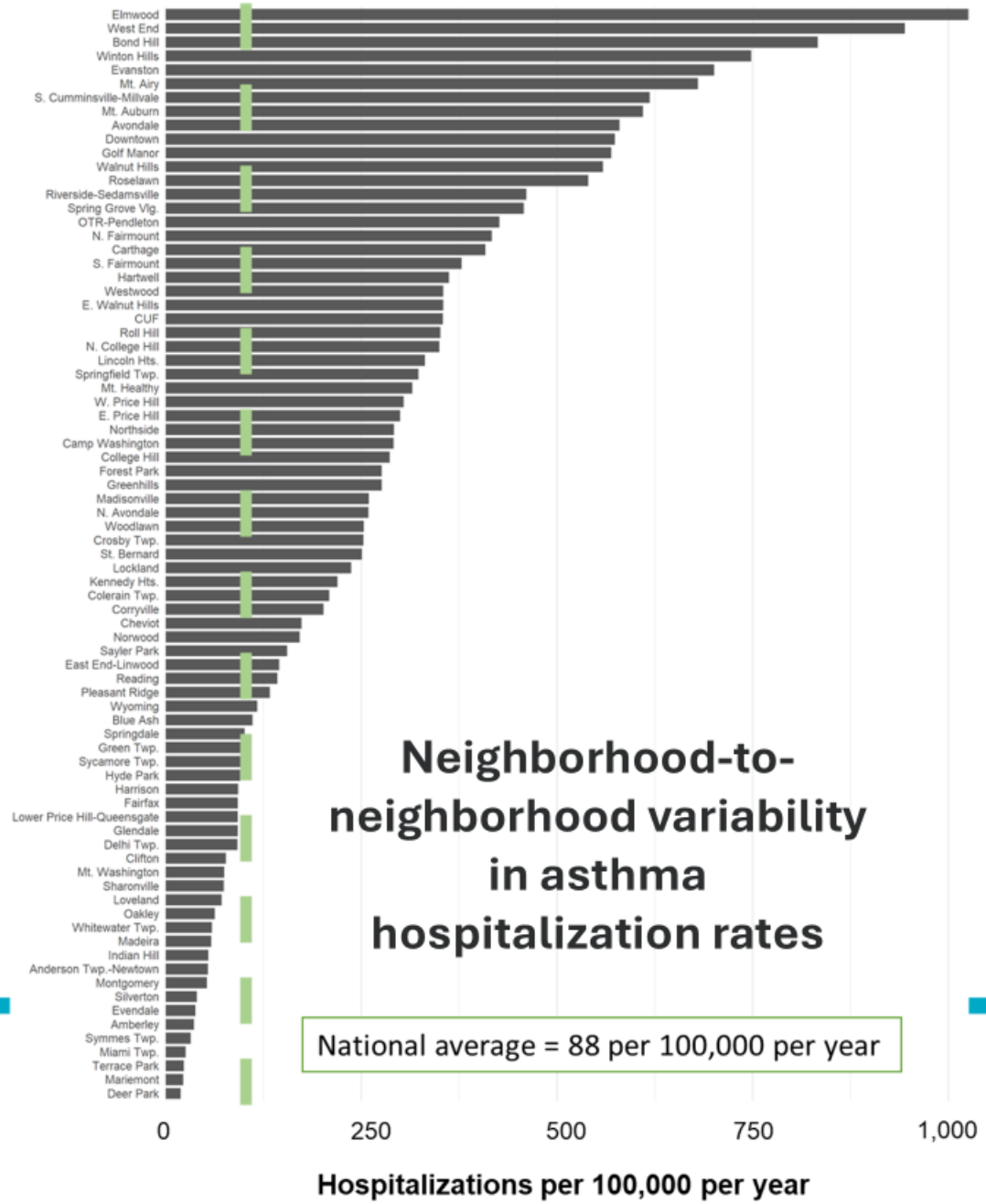

If admission rate was at the national average, we would prevent **~300** annual admissions across the county

Burden of asthma morbidity in Cincinnati disproportionately borne by:

- Black youth
- Those living in neighborhoods with higher rates of poverty
- Those living close to busy roadways
- Those living in population dense areas with limited greenspace

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https://onlinelibrary.wiley.com/doi/full/10.1002/lrh2.10403

Asthma Learning Health System (ALHS)

- *Aim: Excellent and equitable asthma outcomes for Greater Cincinnati's children*
  - Fewer ER visits, hospital admissions
  - More symptom-free days
  - Enhanced quality-of-life (school/work attendance, participation in play)
- *Theory: System capable of delivering the right care in the right way to the right person at the right time, enabled by …*
  - Shared situational awareness – what's happening on the ground
  - Child-centered, coordinated action by key actors across sectors (health, research, education, government, environment, community)

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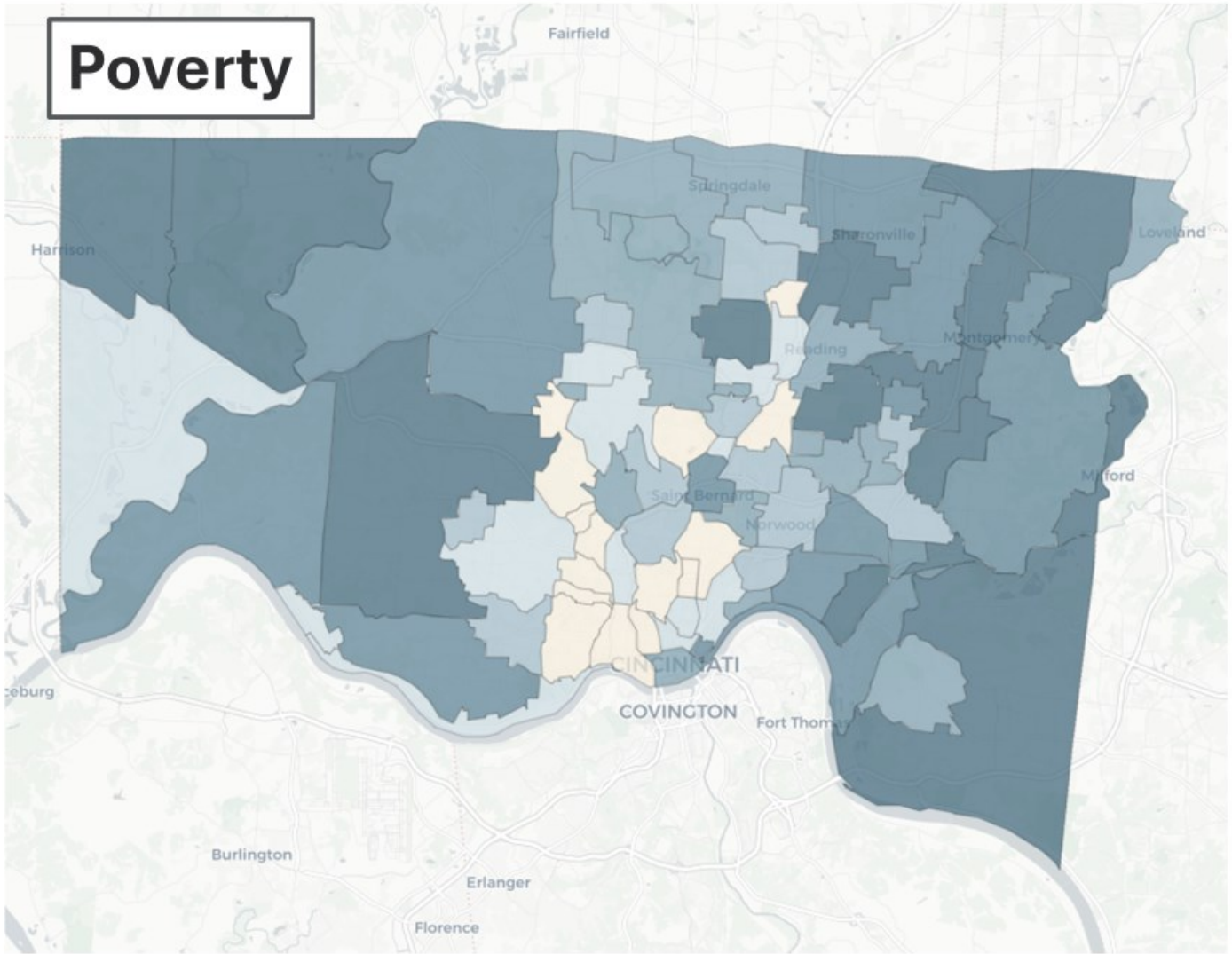

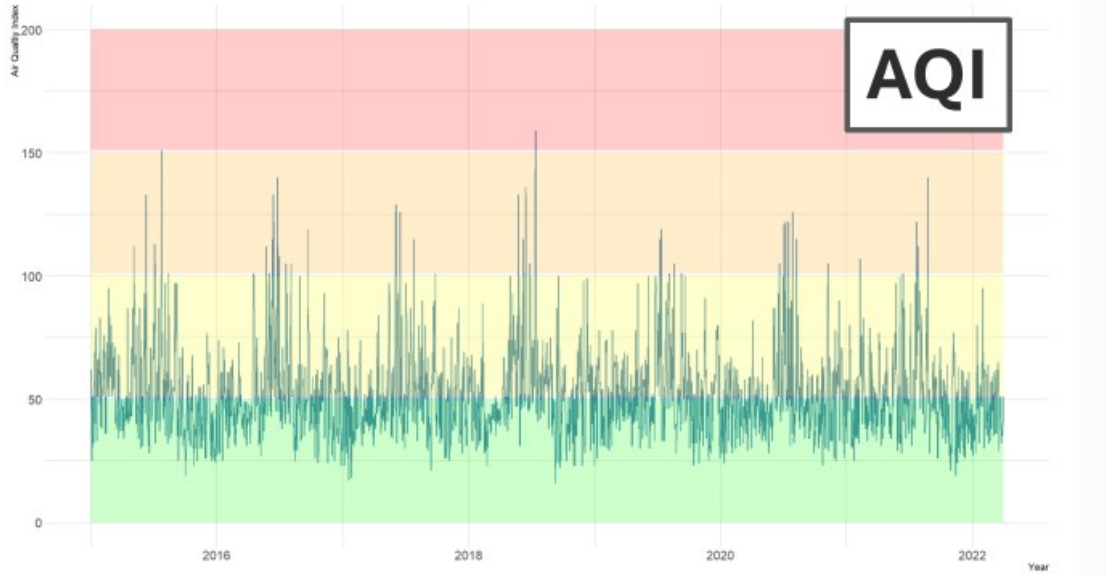

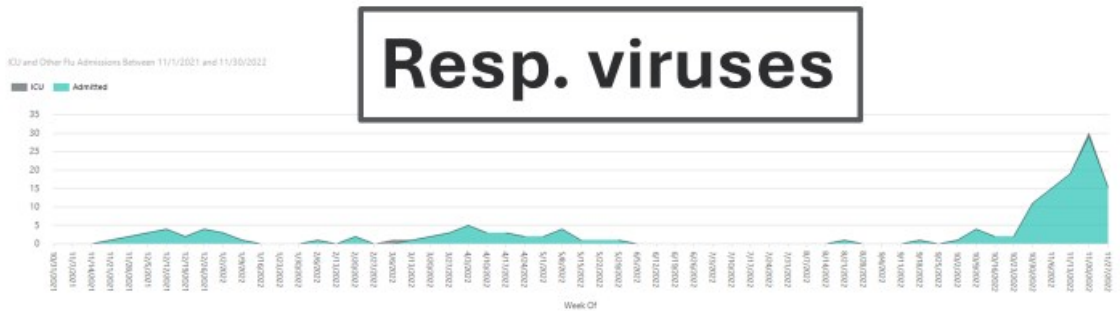

Contextual factors varying by space or time

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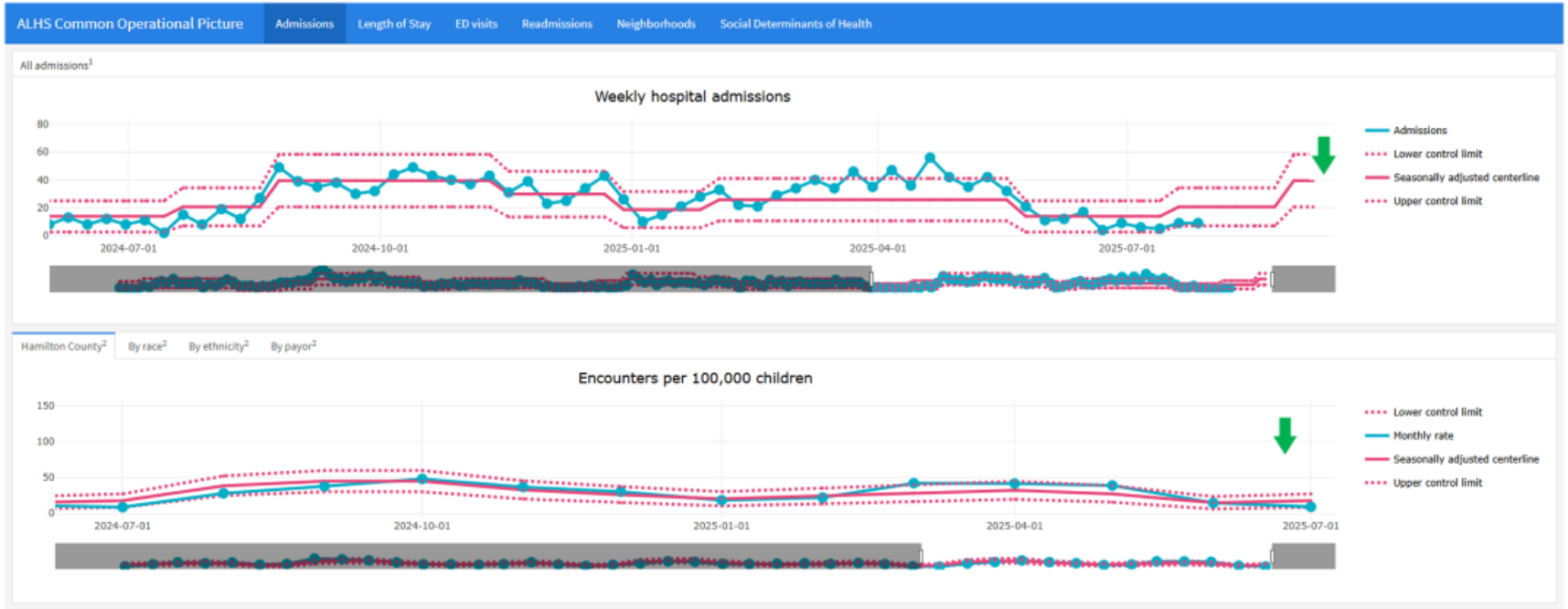
C/o A. Flicker, C. Brokamp, D. Hartley, J. Michael, S. Colegate



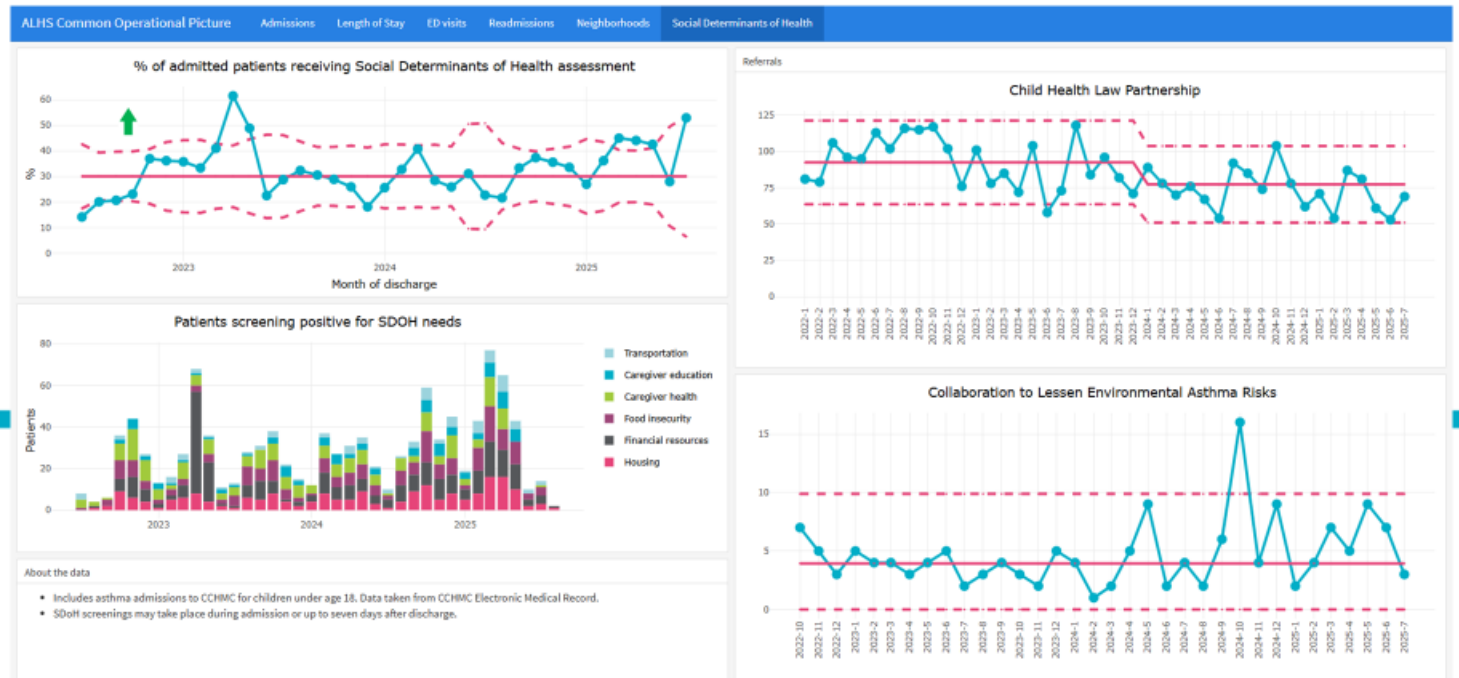
Shared outcomes (ER, admissions), **predictive models**

NORMAL

ELEVATED

HIGH

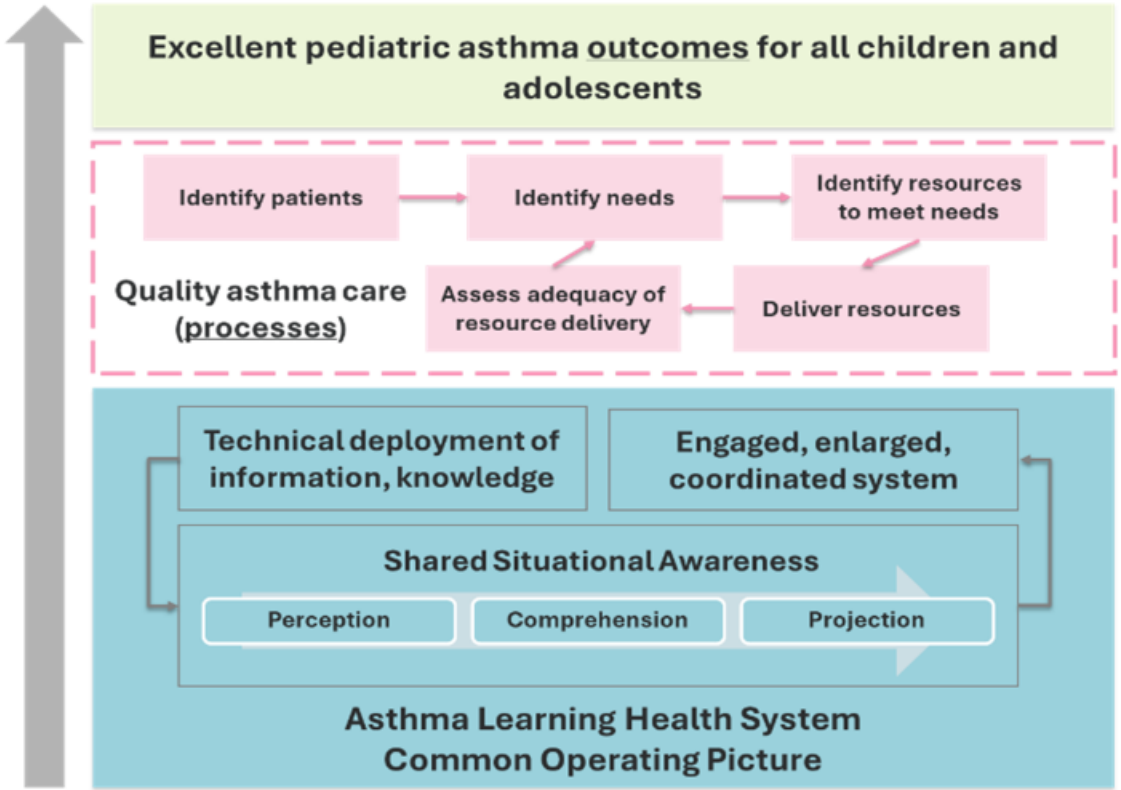
Actions (screenings, referrals)



C/o A. Flicker, C. Brokamp, D. Hartley, J. Michael, S. Colegate

ALHS' coordinating functions, across sectors

- Action teams
  - Clinical care
  - Housing
  - School
  - **Environment = BREATHE!!**
- Networking convenings, place for action teams to report out and discuss:
  - Successes, challenges
  - Plans for coming days/weeks/months
  - Gaps/needs



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Conclusions

- Dramatic inequities in child asthma outcomes, driven by racism, poverty, indoor/outdoor air quality, etc.
  - Asthma among conditions with most inequity
  - Growing threats to air quality
- Valued, deep, data-driven partnerships across region
  - Opportunities for pattern recognition and coordinated action
- Progress accelerated by cross-sector collaboration

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Questions? Comments?

Andrew.Beck1@cchmc.org

Road to Resolution for Excessive Smoke from a Neighborhood Restaurant

Nick Newman, DO, MS FAAP

City of Cincinnati BREATHE Summit

September 22, 2025

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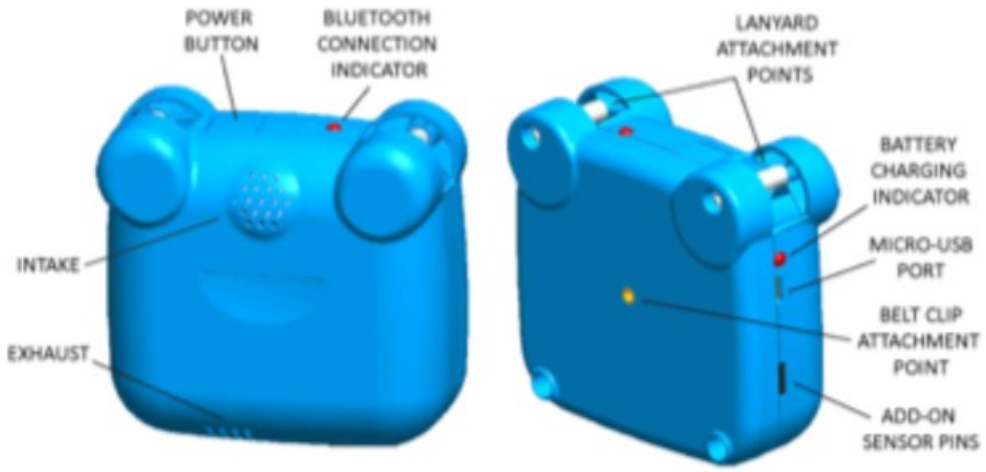
Introduction

- Smoke from a new restaurant
- Up to 20-70% of $PM_{2.5}$ in restaurant districts
- Bar-b-que cooking has higher emissions than other forms of cooking
- Emissions not related to typical commuting times

Song, et al., *Air Qual Atmos Health,* 2021
Coggon, et al., *Atmos Chem Phys*, 2024
Vert, et al., *J Expo Sci Environ Epi*, 2015

Community air pollution sampling 2016-2017



Courtesy Habitat Map
Newman, et al., *Air*, 2025

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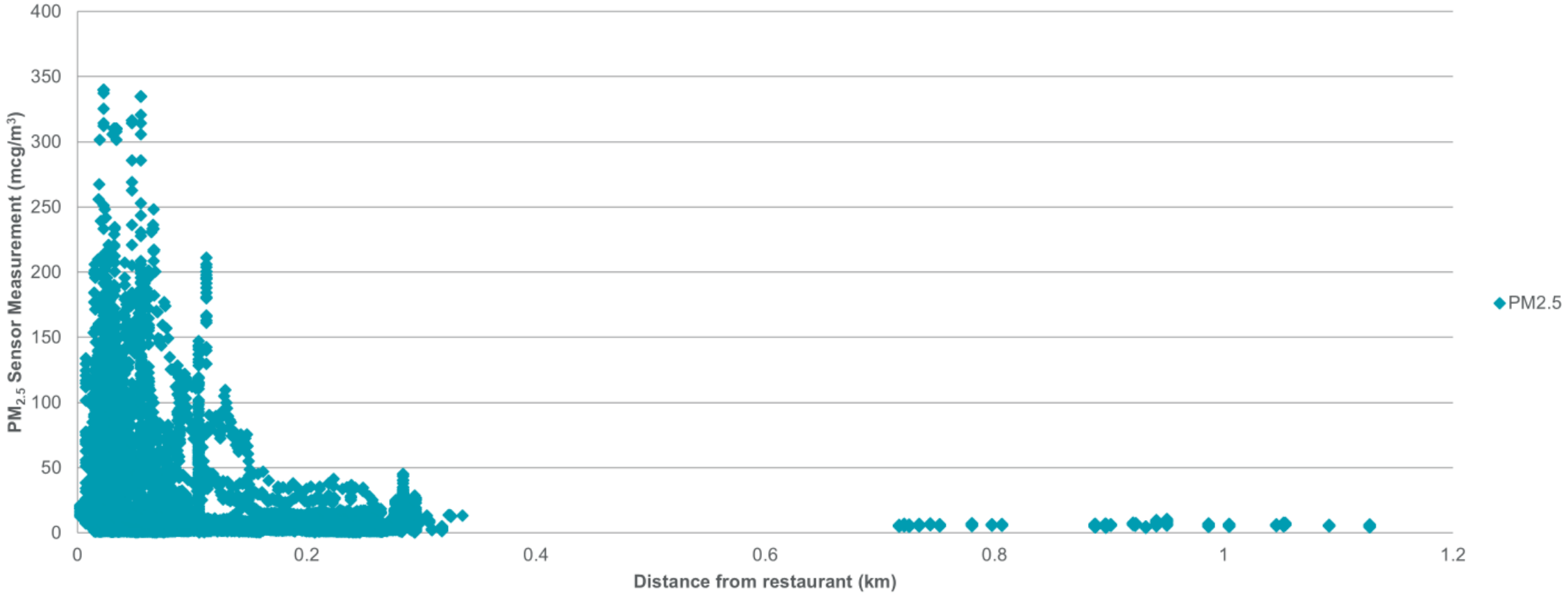
$PM_{2.5}$ Sensor Measurement by Distance from Restaurant



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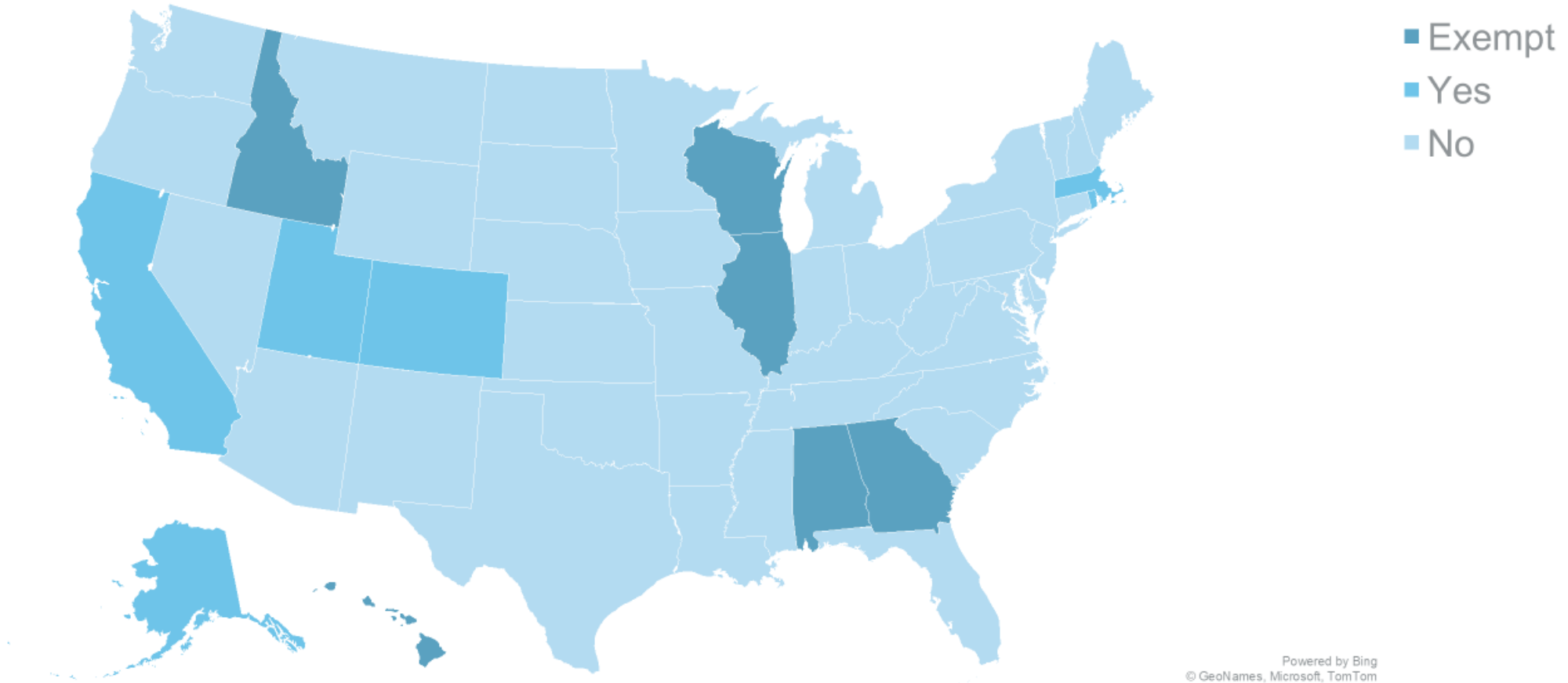
Cooker Emissions Rules and Regulations



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Community Air Pollution Sampling 2024

Courtesy Habitat Map
Newman, et al., *Air*, 2025

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What happened?

- Owner aware of neighbors' concerns
- To be a good neighbor, changed fuel from charcoal to wood
- Took about 10 years
  - Ohio budget rescinded the "Air Nuisance Rule" (2025)
- "Look for the helpers"

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Thank you

- Deborah Conradi, RN
- Alexander Mayer, MPH
- Cole Simons, BS
- Ravi Newman, BA
- Erin Haynes, DrPH
- Patrick Ryan, PhD
- Rachael Kiniyalocts, BS
- Funding: NIEHS P30ES006096, P30ES026529

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MADTREE

BREATHE Summit

1% FOR THE PLANET MEMBER

Certified B Corporation

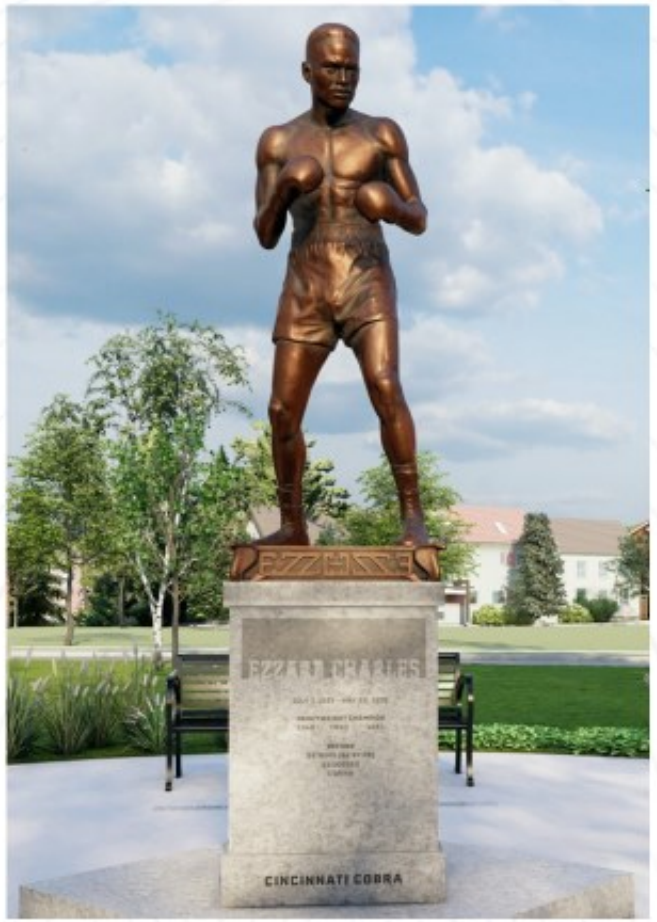
MadTree Belief System

2019 – Mt. Storm (Clifton)

- 60 Trees
- Arbor Day Foundation
- Cincinnati Parks
- Cincinnati Parks Foundation
- MadTree
- First tree planting & we kicked it off in a park

2020 – Ezzard Charles & ReLeaf (West End)

- 107 Trees in Laurel Park – Now Ezzard Charles Park
- 850 ReLeaf Trees
- Cincinnati Parks Foundation
- Cincinnati Parks
- Groundwork ORV
- MadTree
- Altafiber – provided free wifi for the neighborhood
- We moved into the urban landscape where heat islands occur.



2021 – Inwood Park (Mt. Auburn) & ReLeaf

- 37 Trees at Inwood
- 1700 ReLeaf
- Cincinnati Parks Foundation
- Cincinnati Parks
- Groundwork ORV
- MadTree
- Inwood is just up the street from Alcove our OTR location. Continued focus on the urban core.

2022 – Lower Price Hill, Avondale & ReLeaf

- 75 Trees LPH (& 54 Trees in Avondale)
- 1000 ReLeaf (Targeted <40% Neighborhoods)
- Cincinnati Parks
- Cincinnati Parks Foundation
- Groundwork ORV
- MadTree
- Our first Climate Safe Neighborhood!
- This picture says everything about what we are doing!
- Video compiled from the day - Video

2023 – Bond Hill & ReLeaf

- 140 Trees Bond Hill
- 1000 ReLeaf
- Cincinnati Parks
- Cincinnati Parks Foundation
- Groundwork ORV
- MadTree
- Mane (1st company to jump in and join us)
- Cincinnati Recreation Commission

2024 – Avondale & ReLeaf

- 200 Trees - Avondale
- 1000 Trees ReLeaf
- Cincinnati Parks
- Cincinnati Parks Foundation
- Groundwork ORV
- Cincinnati Recreation Commission Foundation
- Cincinnati Recreation Commission
- Avondale Community Council
- Ronald McDonald House
- Habitat for Humanity
- Mane
- Duke
- Upstream 360
- MadTree
- Payload
- Sysco
- Grote Enterprises
- Cincinnati Children's Hospital Medical Center
- Urban League
- City of Cincinnati

LET'S GROW LOCAL
WITH MADTREE BREWING CO.

2025 – West End & ReLeaf

- 110+ Trees - Avondale
- 1000 Trees ReLeaf
- Cincinnati Parks
- Cincinnati Parks Foundation
- Groundwork ORV
- Cincinnati Recreation Commission
- Mane
- Duke
- MadTree
- Payload
- Sysco
- Grote Enterprises
- Cincinnati Children's Hospital Medical Center
- City of Cincinnati
- Prus Construction
- Cincinnati Zoo & Botanical Garden
- Cincinnati Toolbank
- City Link
- FCC

What it is

The Mission
Let's Grow Local addresses the disparity in urban canopy coverage across Cincinnati. With 20 out of 52 neighborhoods having less than 40% urban canopy, this initiative focuses on planting trees to enhance community wellness through:

- Improved air quality
- Reduced risk of heat stress
- Decreased flooding

The Impact
Since 2019, this community-focused planting day has made significant strides:

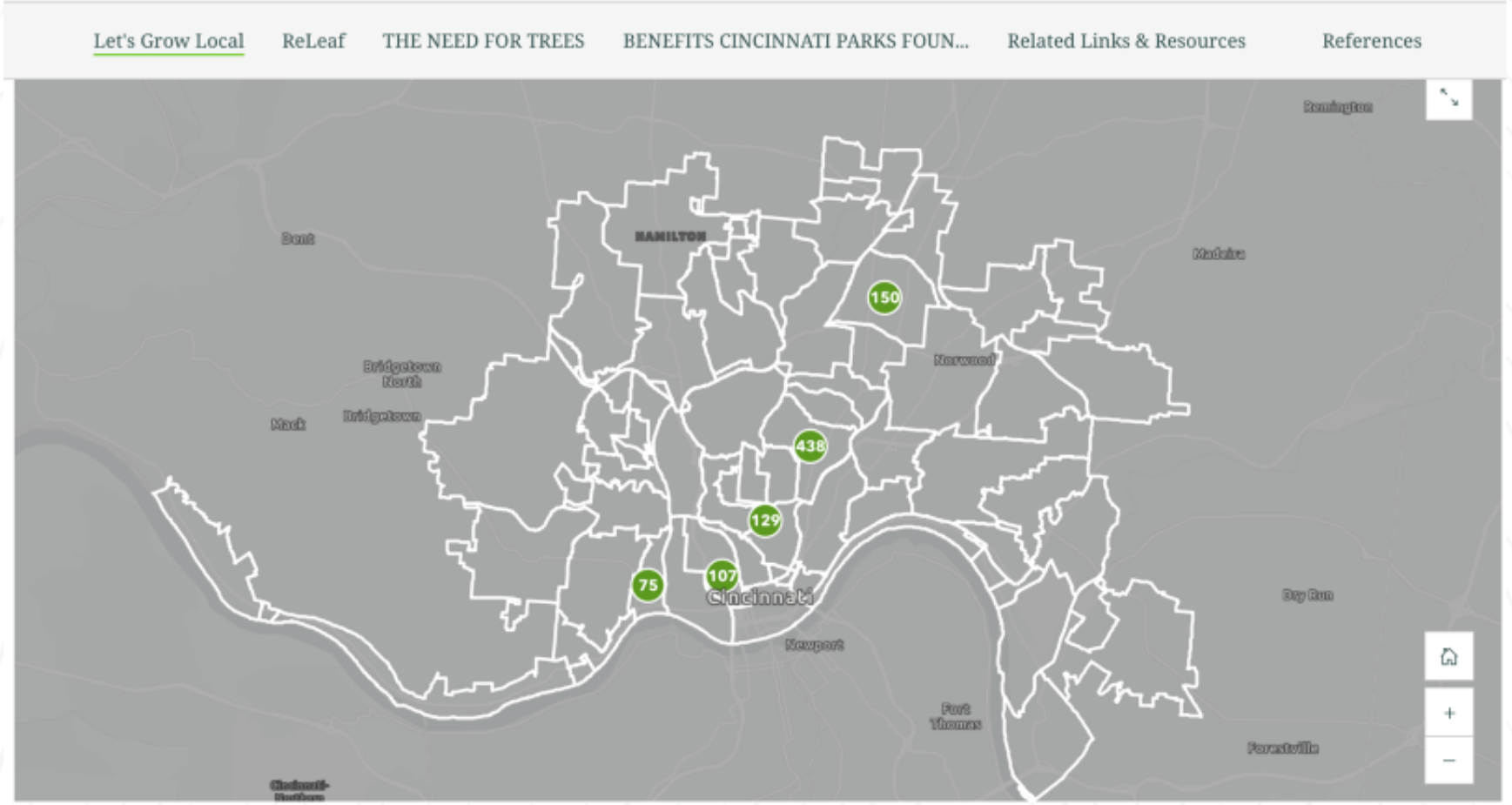
- 673 trees planted across six neighborhoods: Clifton, West End, Avondale, Bond Hill, Lower Price Hill, and Mt. Auburn
- Expanding green spaces and community engagement year after year

This Year's Event
On October 28, 2025, we're returning to the West End with an ambitious goal:

- Planting 110+ trees throughout the neighborhood
- Conducting maintenance and special projects at local community centers, schools, and institutions

Maps

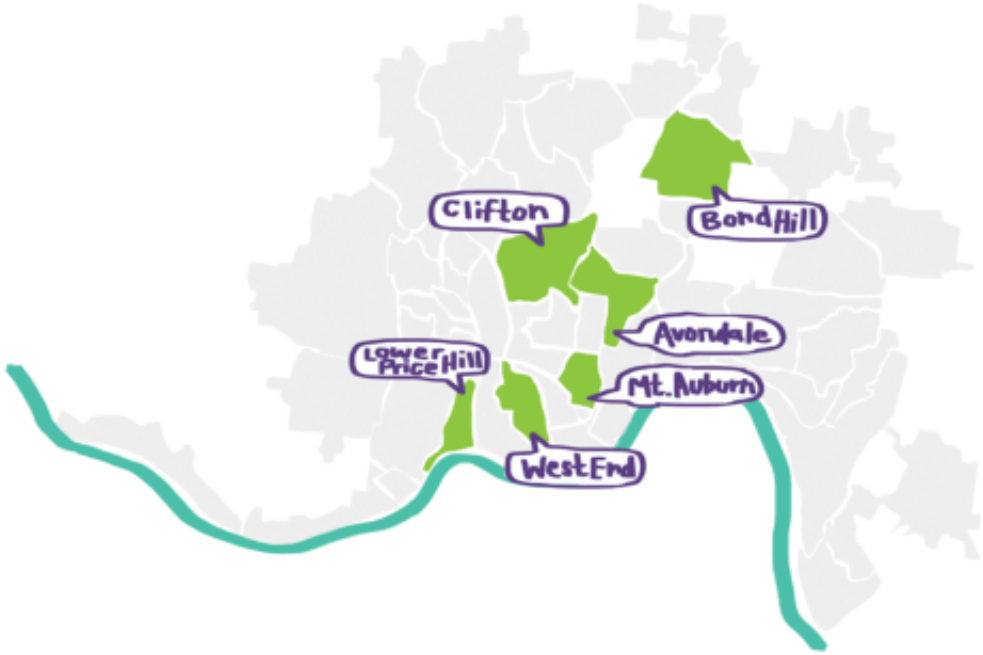
[LPH]
[Inwood]
[Ezzard Charles Park - West End]
[Bond Hill]
[Avondale]



Green Cincinnati Plan

How it Started

Cincinnati is home to 52 neighborhoods, but 20 of them have less than 40% urban canopy. Planting more trees in these neighborhoods improves air quality, reduces heat stress, mitigates flooding, and enhances overall community wellness. In 2019, **MadTree Brewing** expanded this initiative through their **1% for the Planet** commitment, funding tree-planting efforts and mobilizing hundreds of volunteers to make a lasting difference.



What's the Impact?

Over the past six years, through this partnership, we've planted **673 trees** in neighborhoods like **Clifton, West End, Avondale, Bond Hill, Lower Price Hill and Mt. Auburn**. In 2025, we're bringing that impact back to the **West End**.

On Tuesday, October 28, volunteers from **MadTree Brewing, Cincinnati Parks, Cincinnati Parks Foundation, Cincinnati Zoo & Botanical Garden, Groundwork Ohio River Valley, Keep Cincinnati Beautiful** and other local supporters will gather to plant **at least 100 more trees.** We'll also tackle additional projects to enhance green spaces and ensure long-term care for the new trees.

Effects of Urban Tree Planting on Neighborhood Temperature Trends: A Pilot Study of Microclimate Variability in Cincinnati

Jessea James[1], Patrick H. Ryan[1], Adair McWilliams[2], Grace Roudebush[3]
[1] The Center for Collaboration on Climate and Community for Health, [2] The Department of Environmental and Public Health Sciences, [3] University of Cincinnati College of Medicine

Abstract

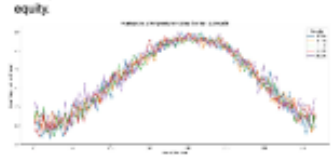
"Urban planners and other stakeholders often view trees as the ultimate panacea for mitigating urban heat stress; however, their cooling efficacy varies globally and is influenced by three primary factors: tree traits, urban morphology, and climate conditions" (Li et al., 2024). This research study examines temperature variations following targeted tree planting interventions in Cincinnati neighborhoods, contrasting them with pre-planting conditions and a control site at the University of Cincinnati where no planting occurred. Daily PRISM temperature data from 2014–2024, four planting sites—Clifton Mt. Storm, Ezzard Charles Park – West End, Lower Price Hill and Bond Hill were examined — to assess changes in maximum temperature, minimum temperature and mean temperature. Urban tree planting can help mitigate local warming, but its effectiveness depends on site-specific conditions. Preliminary Results show moderate temperature reductions in Clifton Mt. Storm, flattened maximum temperatures in Ezzard Charles Park, and early temperature containment in Bond Hill. However, Lower Price Hill and Avondale continue to experience rising temperatures, highlighting the need for adaptive, neighborhood-focused strategies in urban climate resilience planning.

Background

- Extreme heat is a serious and unevenly distributed issue in Cincinnati, with those with the lowest incomes being the most vulnerable. According to a Cincinnati Enquirer analysis of U.S. Census data, areas such as Lower Price Hill, Avondale, Winton Hills, and South Cumminsville face significantly higher risks during heat waves due to a combination of factors including a lack of tree canopy, extensive heat-retaining surfaces such as concrete and glass, and limited access to air conditioning or other cooling resources. These factors create localized "heat islands," where temperatures can be 5 to 10 degrees Fahrenheit higher than in less populated areas, posing increased health and safety risks.The Census Community Resilience Estimates for Heat reveal that about 25% of Cincinnati's residents are at high risk during extreme heat events, with that proportion more than doubling in certain neighborhoods. This disparity highlights an urgent need for targeted climate adaptation strategies that address both environmental and social vulnerabilities.
- In response, MadTree Brewing and the Cincinnati Parks Foundation have been leading targeted tree planting programs since 2019, providing a unique chance to measure real-world cooling impacts at precise spatial and temporal resolutions. Using high-resolution PRISM temperature data from 2014 to 2024, this study compares year-over-year temperature trends at multiple planting sites—including Clifton Mt. Storm, Ezzard Charles Park – West End, Lower Price Hill and Bond Hill —to a control site at the University of Cincinnati where no trees were planted. This study aims to address the following question: What quantifiable temperature variations occurred following tree planting in urban environments, and how do these variations contrast with pre-planting conditions?

Methods

- Initial Consultation: An initial consultation was held to define the project's objectives and scope, focusing on the temperature impacts of urban tree planting in Cincinnati.
- Background Research: Background research was conducted on MadTree Brewing tree planting initiatives across Ohio, including their collaboration with the Cincinnati Parks Foundation.
- Case Study Highlight: A key planting project involved 40 trees planted in Inwood Park as part of Cincinnati's Neighborhood Parks Campaign (Cincinnati Parks Foundation, 2021).
- Site Selection: Dates and locations of tree planting were compiled for Cincinnati neighborhoods: Clifton Mt. Storm, Ezzard Charles Park, Inwood Park, Lower Price Hill, Bond Hill, and Avondale.
- Data Acquisition: High-resolution daily temperature data (2014–2024) were obtained from the PRISM Climate Group database to support longitudinal analysis.
- Control Site Designation: The University of Cincinnati was designated as the control site, as no tree planting occurred there during the study period.
- Data Processing: Data were cleaned and analyzed in Google Colab using Python, including the calculation of summer daily mean, maximum, and minimum temperatures averaged to assess long-term patterns.
- Visualization: Graphs and charts were generated in Google Colab to visualize temperature trends before and after planting at each site, compared to the control.
- Analysis: The study focused on identifying temperature changes linked to tree planting across different sites.
- Interpretation: Results were summarized to explain the cooling effects within the broader context of urban heat and equity.



Seasonal Temperature Trends by Decade (1981–2024) Using PRISM Data

This graph displays the average daily mean temperatures across the year by decade using PRISM climate data from 1981 to 2024. Each line represents a decade, showing the typical seasonal temperature pattern—cooler in winter and warmer in summer. The lines gradually shift upward over the decades, with the 2020s showing the highest temperatures, indicating a clear warming trend over the past four decades.

Figure 2.

Phenological Shifts in Seasonal Temperature Thresholds (1966–2025)

The graph shows a clear shift in seasonal temperatures, with the first day over 77°F occurring earlier in the year. In the 1990s, this happened before Day 150 only twice, but since 2015, it has occurred early in 7 of the last 10 years.

Temperature Variability from Memorial Day to Labor Day (2014–2024) at the University of Cincinnati Control Site

- This plot shows the distribution of daily minimum (Tmin), mean (Tmean), and maximum (Tmax) temperatures based on PRISM data. Medians are labeled: 64.2°F (Tmin), 74.0°F (Tmean), and 83.7°F (Tmax). The plot illustrates temperature variability and seasonal extremes over time.

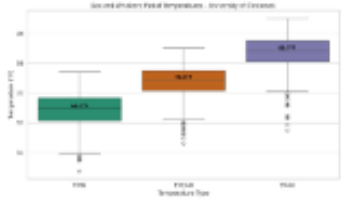


Figure 3. Box and Whiskers Plot of Daily Temperatures – University of Cincinnati (1981–2024)

Temperature Distributions Before and After Tree Planting

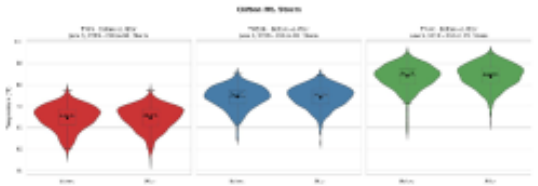


Figure 4. Violin Plots of Summer Temperatures Before and After Tree Planting in Clifton Mt. Storm

At Clifton – Mt. Storm, minimum temperature (Tmin) rose slightly from 64.5°F to 64.6°F, while mean temperature (Tmean) dropped from 74.3°F to 74.1°F. Maximum temperature (Tmax) also declined from 84.1°F to 83.6°F.

Figure 5. Violin Plots of Summer Temperatures Before and After Tree Planting in Ezzard Charles Park

At Ezzard Charles Park, Tmin increased from 63.9°F to 64.6°F. Tmean showed a small rise from 74.4°F to 74.5°F, and Tmax decreased from 85.0°F to 84.3°F.

Figure 6. Violin Plots of Summer Temperatures Before and After Tree Planting in Bond Hill

At Bond Hill, Tmin decreased marginally from 64.2°F to 64.1°F. Both Tmean and Tmax showed more notable declines, dropping from 75.3°F to 74.0°F and from 86.3°F to 84.0°F, respectively.

Temperature Distributions Before and After Tree Planting (cont'd)

Figure 7. Violin Plots of Summer Temperatures Before and After Tree Planting in Clifton Mt. Storm

Lower Price Hill experienced an increase in Tmin from 63.0°F to 64.4°F and a slight rise in Tmean from 74.2°F to 74.4°F. Tmax fell from 85.4°F to 84.3°F.

Conclusions/Summary

- Tree planting density varied across study areas, influencing temperature changes observed over time.
- Ezzard Charles Park and Lower Price Hill showed the most notable cooling, reflecting the impact of increased canopy in densely built environments.
- Expanded tree canopy in these urban areas effectively reduced both mean and peak temperatures through shading and evapotranspiration.
- Clifton Mt. Storm, which had earlier tree plantings, demonstrated a reduction in peak summer temperatures, indicating long-term cooling benefits.
- Bond Hill exhibited less cooling, likely due to its open landscape and lower canopy growth, which limited the trees' ability to reduce surface heat.
- Site-specific characteristics, such as urban density, existing land cover, and canopy growth, played a key role in determining the success of each site's tree planting.
- Urban forestry efforts are most effective in the warmest and most vulnerable neighborhoods, where tree planting leads to significant heat reduction.
- These findings support the need for targeted, long-term urban forestry programs focused on high-priority areas to maximize environmental and public health outcomes.

Future Directions

Urban tree planting has a considerable impact on local temperatures, but long-term monitoring is critical. A Quality Improvement (QI) and statistical testing framework can help track temperature trends over time. More research is needed to evaluate site-specific variables such as land use, impervious surfaces, and green space. Comparing planned and unplanned (initial planting vs randomized planting) communities can help us grasp the genuine microclimate benefits of urban trees. Integrating high-resolution geographic temperature data can improve analyses and guide future strategic measures. Incorporating community feedback into program planning can help greening projects succeed by improving design, placement, and public participation.

Acknowledgements

Grateful for the opportunity to conduct research through the UC SURF Climate Program this summer. Thank you to Dr. Ryan and MadTree Brewing for their collaboration and support. Deep appreciation goes to Adair McWilliams and Grace Roudebush for their advice, mentorship, and encouragement along this journey.

Findings

- Tree planting density varied across study areas, influencing temperature changes.
- Expanded tree canopy in these urban areas effectively reduced both mean and peak temperatures through **shading and evapotranspiration**.
- **Site-specific characteristics**, such as urban density, existing land cover, and canopy growth, played a key role in determining the **success of each site's tree planting.**
- **Urban forestry efforts are most effective in the warmest and most vulnerable neighborhoods, where tree planting leads to significant heat reduction**
- These findings support the need for **targeted, long-term urban heat forestry programs** focused on high-priority areas to **maximize environmental and public health outcomes.**

Off Grid Air Quality Monitoring for Ecological Studies

Dan Divelbiss

Kristy Hopfensperger

NKU Study Overview

- Purpose: Conduct *community-driven*, collaborative climate research
- Air quality is a great concern of residents in the neighborhood. They came to the CRI seeking collaboration. (Green Umbrella's *Climate Research Incubator*)
- Project ecologists are interested in comparing the environment between green and gray spaces
- Data: Continuous air quality and environmental variables + biodiversity data
- Acquired funding is for one year; however, a community-driven project takes much time building relationships *and* it is important to continue the relationships well beyond one year of funding

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NKU Challenges to Data Gathering

- Access to property
- Power and wifi access
  - Locations deep in vegetated areas, parking lots, and along streets
- Time involved to go to sites to download data

*Remote monitoring becomes a solution

Mander Edge Solutions, LLC

A platform

- Solar-powered
- Cloud connected
- Real-time monitoring and control
- Web-based management system

Demonstration Project with MSD

- Autonomous stormwater discharge control
- Connected with existing sensor network
- Reductions overflows at CSO 472

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Device

Air Quality Monitoring

- Parameters
  - Temperature
  - Relative Humidity
  - Particulate Matter (PM1, 2.5, 10)
  - CO2
  - VOC
  - NOX
- Data resolution
  - Every 15 minutes

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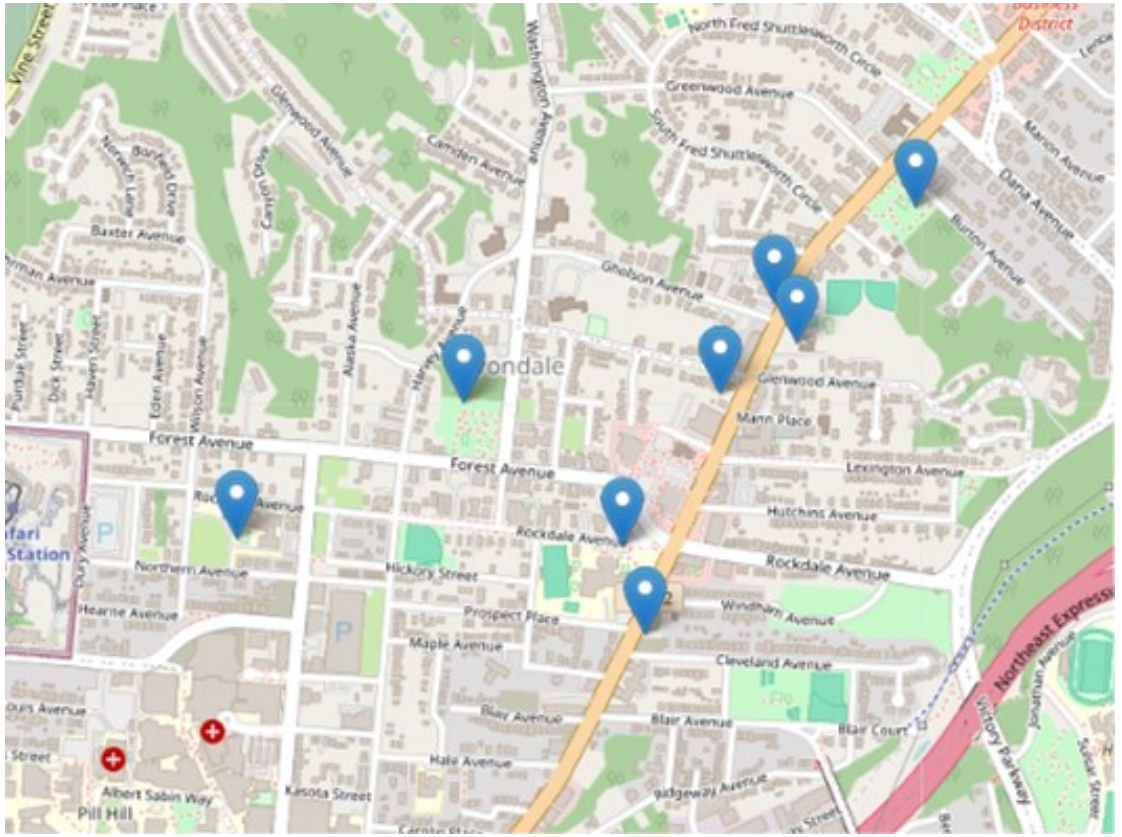
Device and Deployment

- 8 Devices
  - Four “green” areas
  - Four “gray” areas



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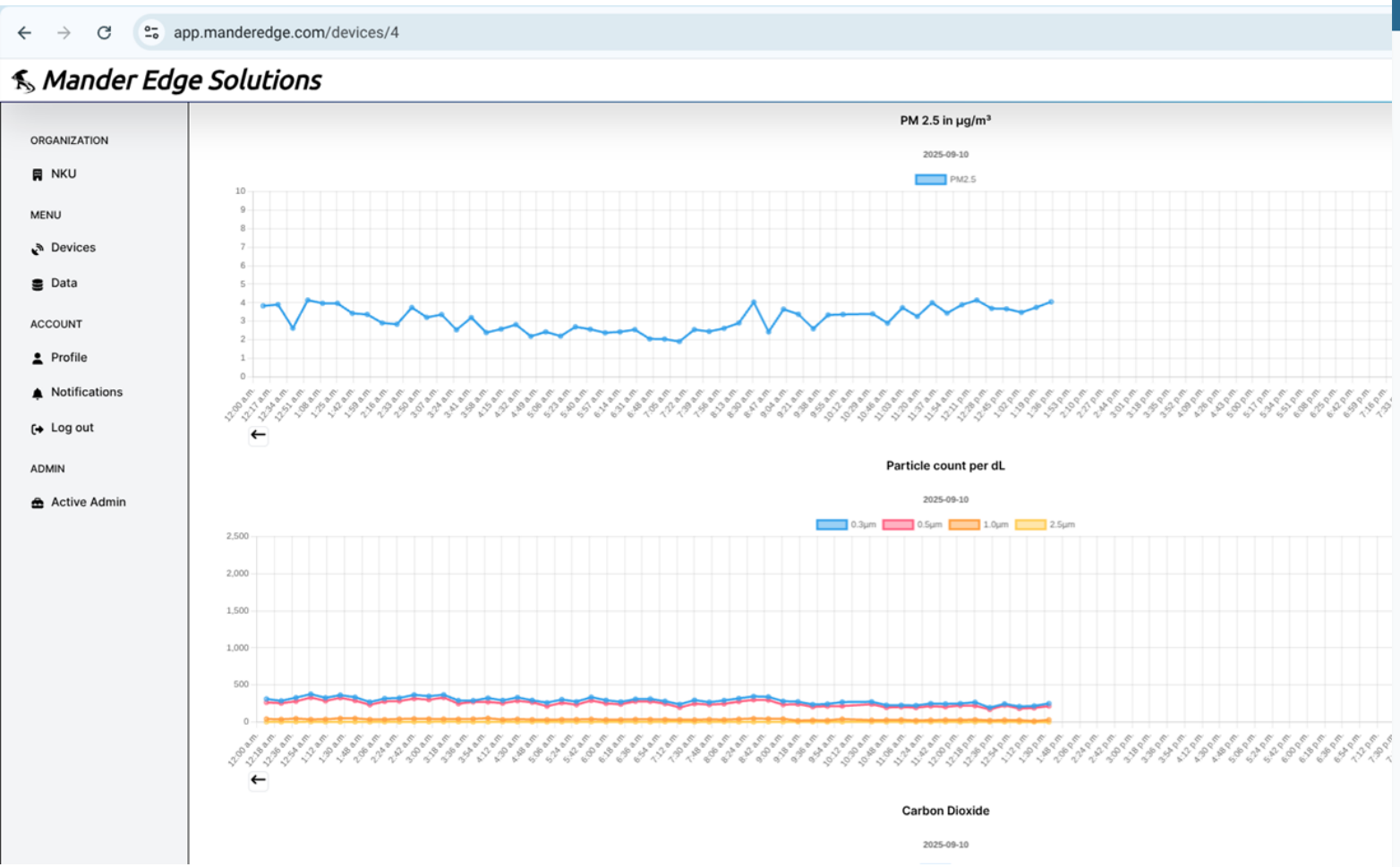
Data Platform



Mander Edge – home / nku

joined_data_view (view)

643,819 rows sorted by created_at descending

- column - | = | Apply

View and edit SQL

This data as json, CSV (advanced)

Suggested facets: created_at (date)

id	device_id	device_identifier	sensor_id	sensor_type	created_at
775547	7	Urban League	102	atmp	2025-09-0
775548	7	Urban League	103	atmpCompensated	2025-09-0
775549	7	Urban League	104	noxIndex	2025-09-0
775550	7	Urban League	105	noxRaw	2025-09-0
775551	7	Urban League	106	pm003Count	2025-09-0
775552	7	Urban League	107	pm005Count	2025-09-0
775553	7	Urban League	108	pm01	2025-09-0
775554	7	Urban League	109	pm01Count	2025-09-0
775555	7	Urban League	110	pm01Standard	2025-09-0
775556	7	Urban League	111	pm02	2025-09-0
775557	7	Urban League	112	pm02Compensated	2025-09-0

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Study Results…

- COMING SOON.. about 12 months from now

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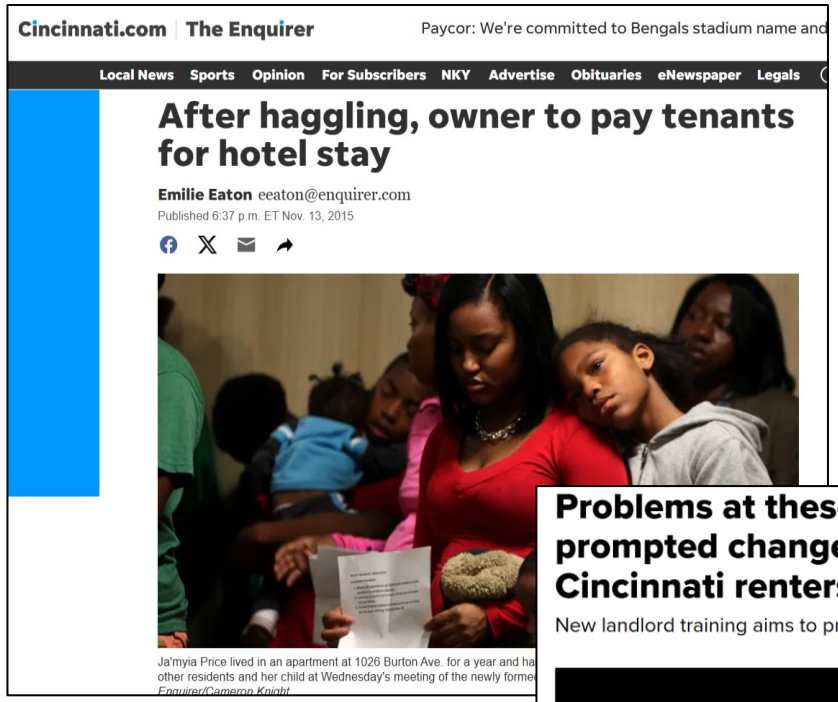
Harmon Tenants Union

How our tenant union is working on asthma and air quality

History


Cincinnati.com | The Enquirer

Paycor: We're committed to Bengals stadium name and

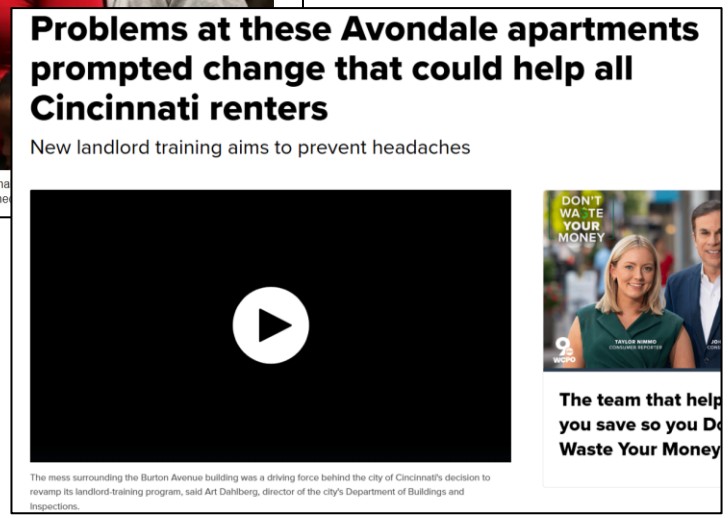
Local News Sports Opinion For Subscribers NKY Advertise Obituaries eNewspaper Legals

After haggling, owner to pay tenants for hotel stay

Emilie Eaton eeaton@enquirer.com

Published 6:37 p.m. ET Nov. 13, 2015

Ja'myia Price lived in an apartment at 1026 Burton Ave. for a year and ha
other residents and her child at Wednesday's meeting of the newly forme
Enquirer/Cameron Knight


Problems at these Avondale apartments prompted change that could help all Cincinnati renters

New landlord training aims to prevent headaches

The mess surrounding the Burton Avenue building was a driving force behind the city of Cincinnati's decision to revamp its landlord-training program, said Art Dahlberg, director of the city's Department of Buildings and Inspections.

DON'T WASTE YOUR MONEY

The team that help
you save so you D
Waste Your Money

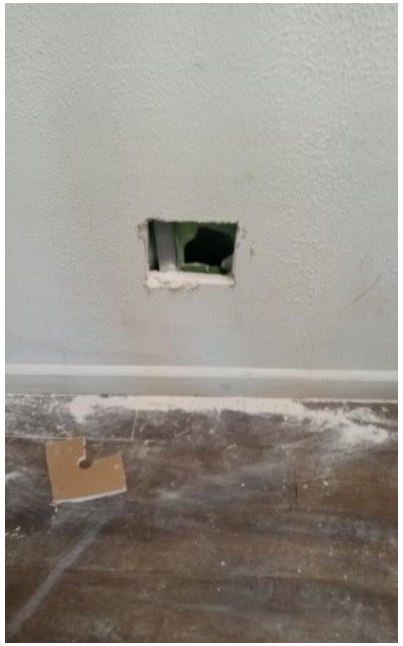
- In 2015-16, the Harmon Manor building roof collapsed, displacing many families
- Unresponsive management had neglected crucial building maintenance
- First tenant union in the buildings was mobilized, and tenants won some major victories


Judge declares low income properties public nuisances

Published: Dec. 17, 2015 at 10:17 PM EST | Updated: Dec. 17, 2015 at 10:51 PM EST

AVONDALE, OH (FOX19) - A Hamilton County judge has declared several low-income apartment buildings public nuisances.

2024-2025



Wall opening that exposed gas line valve to residents and children

Multiple ceiling leaks that have gone unaddressed

Black mold growth resulting from unrepaired leaks

Urination & Fecal Matter across hallways and stairwell

Other problems

- Fast forward to 2025, and residents are starting to experience new problems within their building/units with poor response from management.
- Harmon Tenants Union residents were able to survey buildings to highlight some of the issues that have been recurrent and unaddressed by management.
- These unaddressed issues have led to a dangerous environment that have impacted the social determinants of living for many families.
  - Safety
  - Education Access
  - Economic Stability
  - Health care
  - Environmental Health and Housing

Asthma

- Many people (adults and children) in these buildings have asthma
- Poor housing conditions (mold/pests/filth) make asthma worse
- Poor housing conditions are a result of landlord decisions
- If we advocate for better living conditions, we can improve our children’s health

Harmon Tenants Union part 2

- Weekly meetings
- Seasonal neighborhood gatherings (Easter Egg Hunt, Cookout)
- Tuesday night dinner series
- Monthly newsletter
- Between 10-15 people attending every week, elders and children

Our partners

- Legal Aid
  - Attending meetings, providing advice, helping with initial letter of action draft
- Homeless Coalition
  - Support connecting with other tenant unions across the city
- Cincinnati Building Inspectors and Health Department
  - Inspections conducted for each building and select units
- Cincinnati Children's asthma team and family referral
  - Support provided for identifying families who have experienced asthma related conditions living at home
- People Working Cooperatively
  - Providing asthma cleaning kits and education

Next Steps

- We’ve attempted to meet with management three times, and they have bailed each time
- Avondale Tenants Union first meeting, September 23rd
- Harmon Tenants Union press conference, September 30th
- Indoor air quality monitors deploying first week of October

Questions?

BREATHE Summit Exercise 9/22/25			
Who are you? What groups are represented?	**Health (CHD, Dr. Newman)**	**OKI, KCB, Cardinal Land Conservancy, Zoo, MadTree**	**Indoor/outdoor air monitoring and research - UC CEAS, UC DAAP, UC DPHS, ManderEdge, CCHMC, DGC, DataBloom, CHD, OES**
What is your project/work? (Does it involve research, data management, tree planting, fundraising, community outreach, infrastructure design ect. ?)	Future: educate civilians on air quality. Healthy Homes, CLEAR referrals, Meriel's work	Tree planting, greenspace, land acquisition and protection, volunteer & community engagement, community outreach, beautification and dignification	research and data management, data transparency, watch dog, interest in infrastructure design
What tools or resources do you use?	311, data, PowerBI (complaints, life expectancy, other health conditions), human resources, enforcement rules, in home air monitors, HEPA filtration, education,	research (ish), purple air monitors (MadTree)	Mass spectrometer for air quality research, DPHS has many monitors, purple air monitors, airbeam, AQ mesh, tem tops, omni aware, uHoo, Parks has LIDAR, air gradient, looker studio, PowerBI, R and Rshiny, Microcontroller firmware
What expertise or resources do you bring to the table?	Data analysis, connection to other resources, clinicians, research	Trees, land, plants, workforce development, youth and adult volunteers, pollinator watch, funders (P&G, Dater, private donors)	Community engagement, data visualization, data analysis, GIS mapping, health data (UC, Children's, CHD)
Who are your allies?	Children's, building dept, legal aid, PWC, CHD	Civic Garden Center, Zoo, Parks, Groundwork, City of Cincinnati, Adventure Crew, Reds Community Fund, Green Umbrella, Taking Root	Groundwork, GU and 2030 district, OAQDA? SWOQA, Language assistance, CUFA? GCWW?
What are your barriers?	Translating science to action, data sharing, unknown resources? Can't easily find	Centralized place for info, ego, isolation, lack of leadership, money, **maintenance**	Access to funding, community engagement, story telling and communications, source apportionment and studies, specificity of particle breakdown. (Maybe Simone at UC is a resource or Bob Hyland for communication)

Can we map this information?	Yes, complaints, other city data	Yes, they are all separate - central place to have this	Yes, monitor locations, LIDAR interest, infrastructure/industry sites, mobile measurements - hoping to map this, Satellite imaging, NDVI for heat/temperature, story maps, urban heat island data, movies of air monitoring 'fly' the route, mapping engagement
Can we identify Silos?	Healthcare & public health (data)		Funding by jurisdiction, single types of monitors, research to action are different players, communities & enforcers are not well connected
Can we bridge gaps?	Getting into EPIC for CHD communication	Margaret from OKI	Yes, some funding by jurisdiction can be bridged
Can we build a web? Figure out how all our work ties together?		Centrally located resources and databases	

BREATHE Summit 2025 Feedback Form Summary

Total number of responses: 24

How often should this group meet each year?

- Monthly: 0
- Quarterly: 9
- Semi-Annually: 9
- Selected both quarterly or semi-annually: 6
- Annually: 0

How should this learning group meet?

- At least 1 in-person meeting a year: 23
- 1 person wanted virtual sessions only
- 2 people were adamant against any virtual sessions at all
- 18 people liked the idea of doing a mix.
- 4 people wanted all in-person sessions.

Locations to meet (free response):

- One of the research sites- walking tour experience
- Zoo
- Madtree
- Cincinnati Library
- Mercantile LIbrary
- Cardinal- Offered to host
- CHD Auditorium
- Centrally located- like avondale?
- Green Umbrella
- Centennial II (downtown)

How should we share the work each team is doing?

- Email updates: 6
- newsletter: 8
- document or information repository: 13
- Other suggestions: Discord, OKI,

Suggestions:

- Break into smaller committee groups virtually, whole group in person
- Recorded sessions
- Could be pitched to the media?
- funding opportunities in the future
- The best way to engage with BREATHE as a vendor

Who wasn't present that should be?

Cincinnati Parks, EPA, CPS, Policy makers, environmental law enforcers, libraries, city planners, transportation people, industry leaders, NKU departments, Port, Merto Housing Authority, more zoo, School health, DOTE, homeless coalition, PWC, Groundwork, legal aid, more tenants and children in the room, communications people, 3CDC, Cynthia Walters, St. Elizabeth, Hamilton County, Northern Kentucky, Pulmonaolgists

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