

CITY GOAL

results  
minneapolis

Meeting handout:  
Asthma hospitalization rate  
and  
Outdoor air quality

October 26, 2016

## What is this report?

- [City Goal Results Minneapolis](#) roundtables are focused on answering the question "Are we there yet?" by reporting progress on our community indicators. These reports are analytical in nature and focused on making connections with cross-sector data. Creating these reports requires input from multiple departments and, in many cases, external participants. The goal of this initiative is to reflect the realities being experienced in our communities. The objectives of the report and roundtable are to 1) have a new and different understanding of the indicator and 2) think differently about solutions.
- This report was created with participation from the Minneapolis Health Department.

## Why the asthma hospitalization rate?

- The City is concerned about asthma hospitalization rates because it represents a measure of serious health impact to Minneapolis residents. Asthma hospitalization rates are one of many examples of health disparities among Minneapolis residents.
- Asthma hospitalizations is not a measure of the total prevalence of asthma. It captures the most extreme asthma cases.

## Why outdoor air quality?

- The City is concerned about outdoor air quality because outdoor air pollution harms the health of Minneapolis residents. Outdoor air pollution is one of many causes of health disparities among Minneapolis residents.
- Outdoor air quality also impacts the Minneapolis economy because if air pollution exceeds federal standards, businesses are required to implement extra pollution control technologies which can be expensive.
- The Minneapolis Health Department recently completed the Air Quality: A Neighborhood Approach study, which measured the amount of volatile organic compounds (VOCs) at approximately 100 monitoring sites. This study found that at some monitoring sites, benzene and tetrachloroethylene and certain other VOCs exceeded health risk benchmarks.

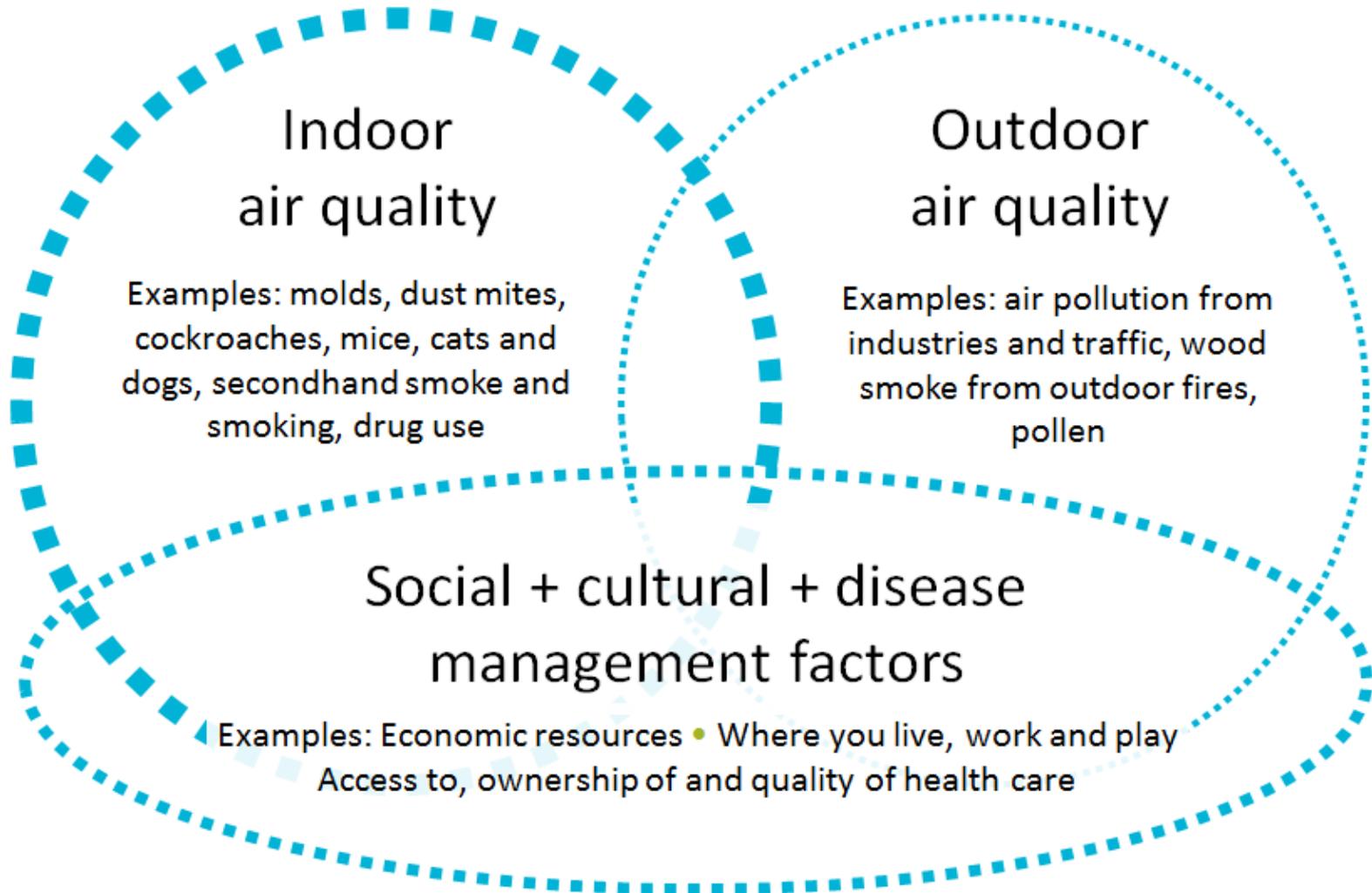
## asthma hospitalization rate

# UNDERSTANDING THE ISSUES

1. Disparities in asthma hospitalization rates exist within Minneapolis and within Minnesota. This health equity issue reflects social, cultural and racial inequities. Targeted solutions are needed in order to address these disparities.
2. We have a relatively good understanding of the major triggers of asthma symptoms. Environmental triggers inside the home are a major cause of asthma symptoms. If triggers can be removed or avoided, asthma symptoms can be reversed or prevented. Some fixes are easy and some are more difficult.
3. We also have a good understanding of the interventions that we know are successful. The issue is having the resources we need to pay for these interventions.

# Framework: Asthma hospitalization rate

Asthma is a disease with indoor air quality, outdoor air quality, and social, cultural and disease management causes. There is some interaction between these factors, but the degree and nature of this interaction is not well understood.



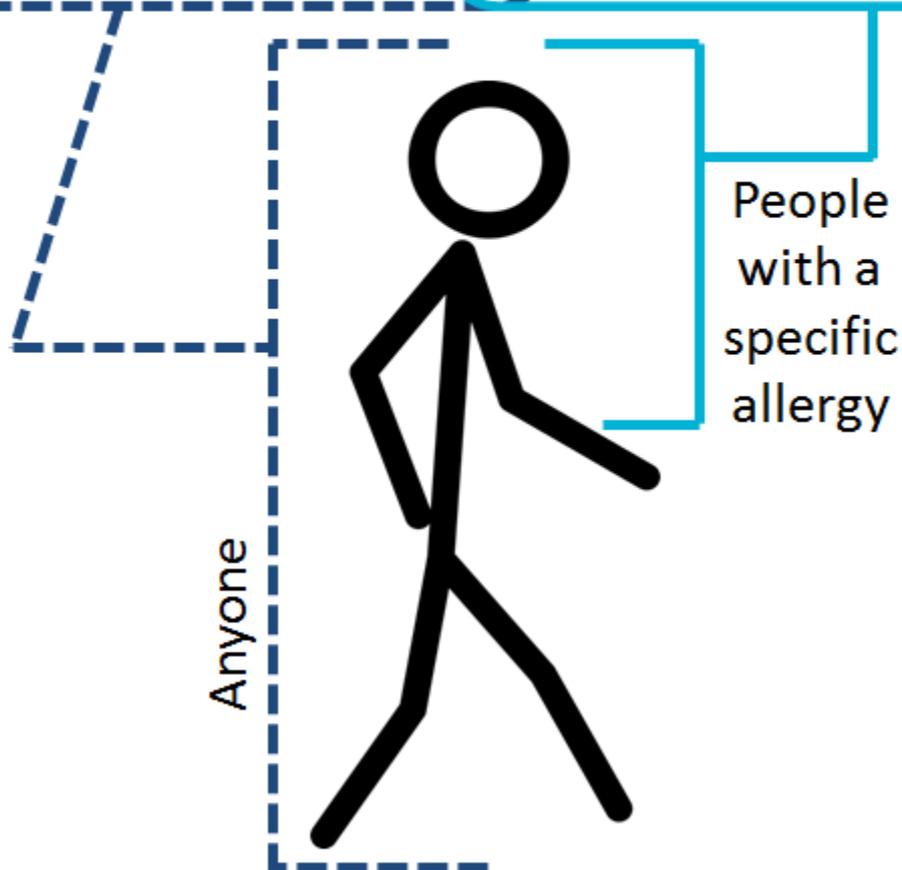
# Framework: Asthma hospitalization rate

## Irritant triggers

Examples: particle pollution (cigarette smoke, wood smoke, dirt), exercise, cold air, stress, ozone pollution

## Inflammatory triggers

Examples: mice, cockroaches, cats and dogs, dust and dust mites, mold, trees



There are two types of asthma triggers. **Irritant triggers** damage airway surface tissues, similar to a burn. Irritants can affect anyone. **Inflammatory triggers** cause an allergic reaction for people who are sensitive to those triggers.

A person with an inflamed system is more likely to be affected by irritants as well. Inflammation can be caused by inflammatory triggers and by many social determinants of health.

# 1. Disparities in asthma hospitalization rates exist within Minneapolis and within Minnesota. This health equity issue reflects social, cultural and racial inequities. Targeted solutions are needed in order to address these disparities.

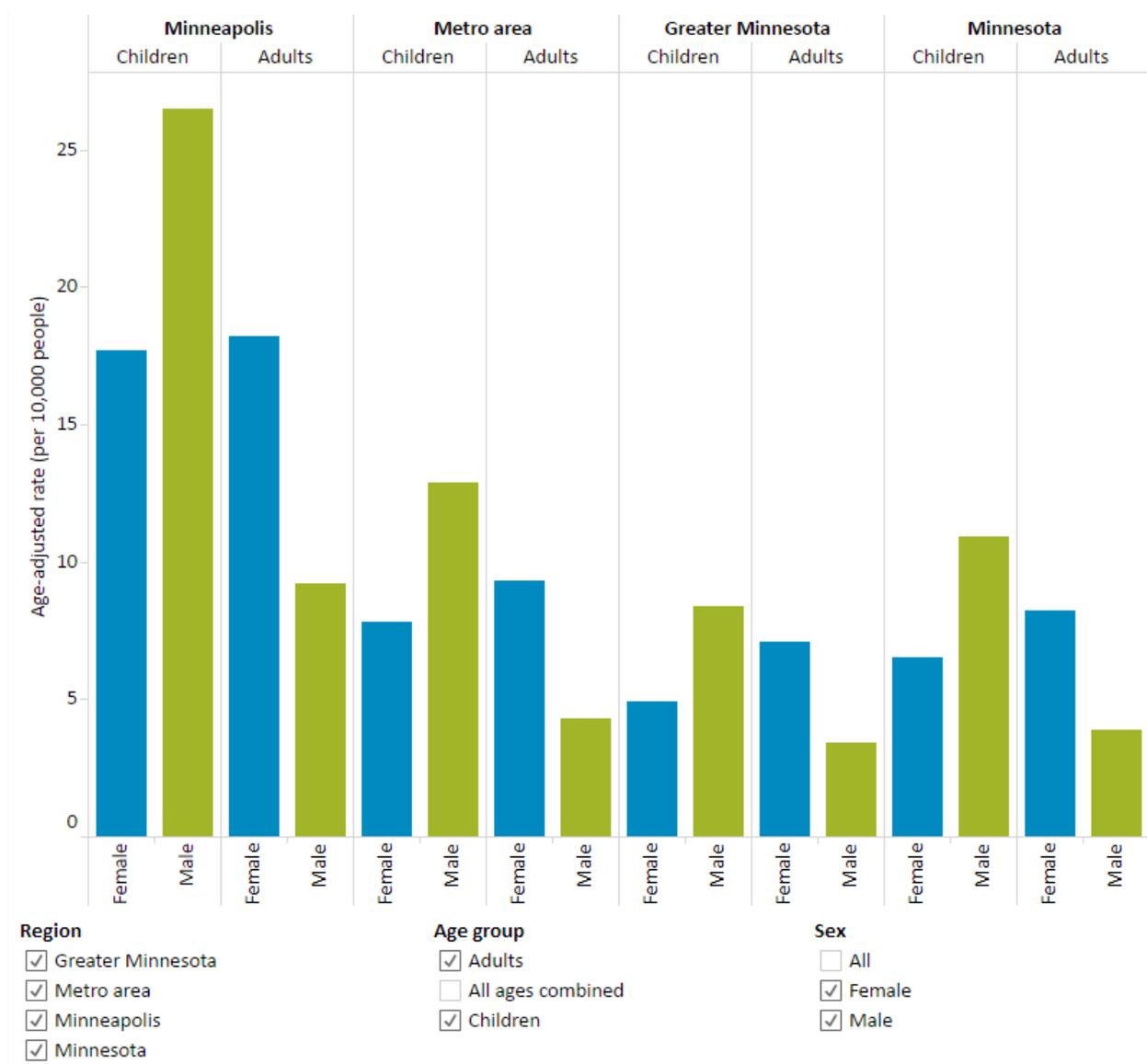
There are vast regional geographic disparities in asthma hospitalizations. While male children living in greater Minnesota have the lowest rates, the rate for adult males in Minneapolis is more than five times higher.

Disparities also exist by sex. Although female children have higher asthma hospitalization rates than male children in all regions, these disparities are flipped and magnified once they become adults.

Asthma hospitalization rates are highest and have the most fluctuation for children in Minneapolis.

Data is not available by race and ethnicity for asthma hospitalization rates. While we can't completely understand race disparities unless we have that information, disparities in underlying social determinants of health, including poverty and unemployment, also contribute to asthma. Areas with the highest poverty rates overlap with the areas with the highest asthma hospitalization rates.

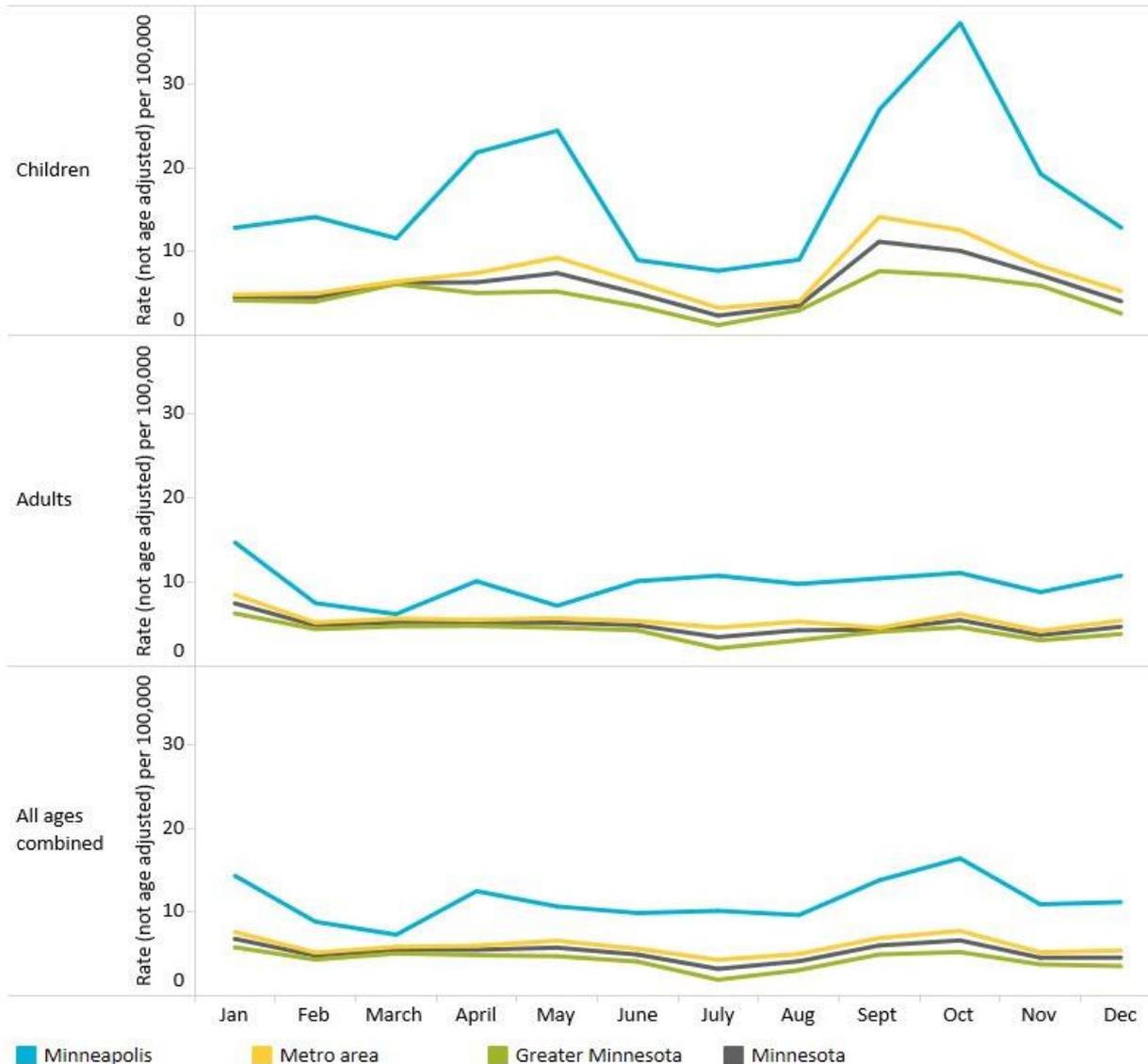
# 1a. Asthma hospitalization rates by region, age group and sex (2009-2013)



**How to read this chart:** The chart at left shows the age-adjusted rate of asthma hospitalizations per 10,000 people by region (Minneapolis, metro area, greater Minnesota, and Minnesota), by age group (children, adults, and all ages combined) and by sex for the years 2009-2013. *Data source: Minnesota Hospital Discharge Data, maintained by the Minnesota Hospital Association*

- Notes:**
- Age-adjusted rates are calculated by multiplying rates for each age group by their respective weights from the 2000 U.S. Census.
  - Minneapolis estimates include the zip codes 55401, 55402, 55403, 55404, 55405, 55406, 55407, 55408, 55409, 55410, 55411, 55412, 55413, 55414, 55415, 55417, 55418, 55419, 55454, and 55455.
  - The metro area includes Anoka, Carver, Dakota, Hennepin, Scott, Ramsey, and Washington Counties. All other counties are included in Greater Minnesota.
  - Children are defined as those under the age of 18. Adults are defined as those 18 years and older.
  - This data represents the place where the person lives, not where they had the asthma attack or where they were hospitalized.
  - The rate of asthma hospitalizations is not a measure of the total prevalence of asthma. It captures the most extreme asthma cases.

# 1b. Seasonal asthma hospitalization rates by region and age group (2013)

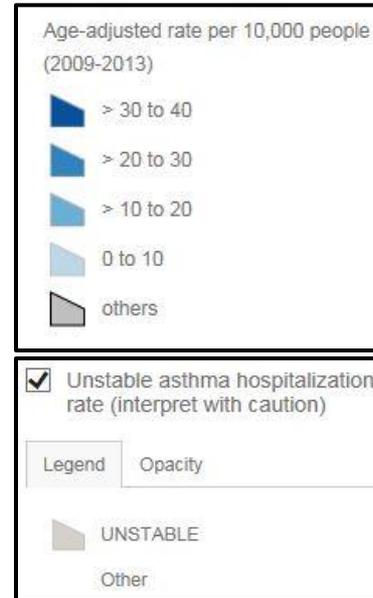
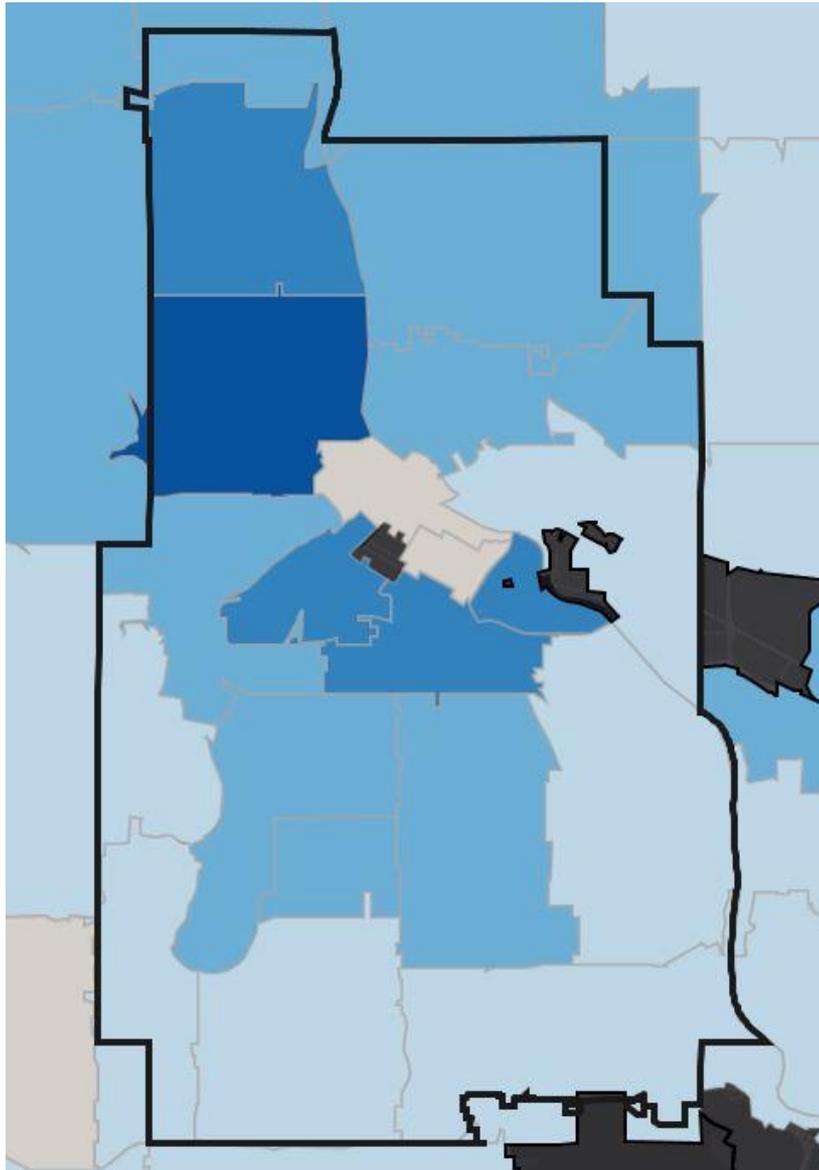


**How to read this graph:** The graph at left shows seasonal overall (non-age-adjusted) asthma hospitalizations rates per 100,000 people by region and age group for the year 2013. Data source: Minnesota Hospital Discharge Data, maintained by the Minnesota Hospital Association

**Notes:**

- Minneapolis estimates include the zip codes 55401, 55402, 55403, 55404, 55405, 55406, 55407, 55408, 55409, 55410, 55411, 55412, 55413, 55414, 55415, 55417, 55418, 55419, 55454, and 55455.
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- This data represents the place where the person lives, not where they had the asthma attack or where they were hospitalized.
- The rate of asthma hospitalizations is not a measure of the total prevalence of asthma. It captures the most extreme asthma cases.

## 1c. Asthma hospitalization rate by zip code (2009-2013)

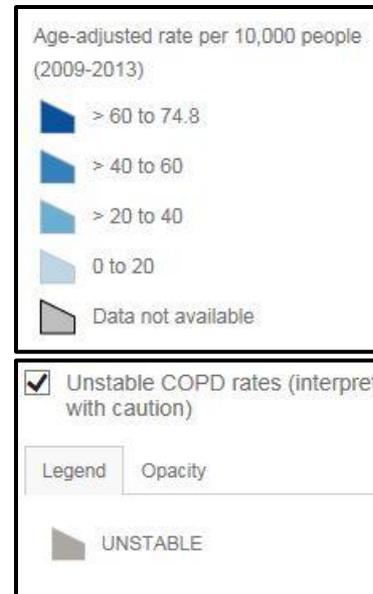
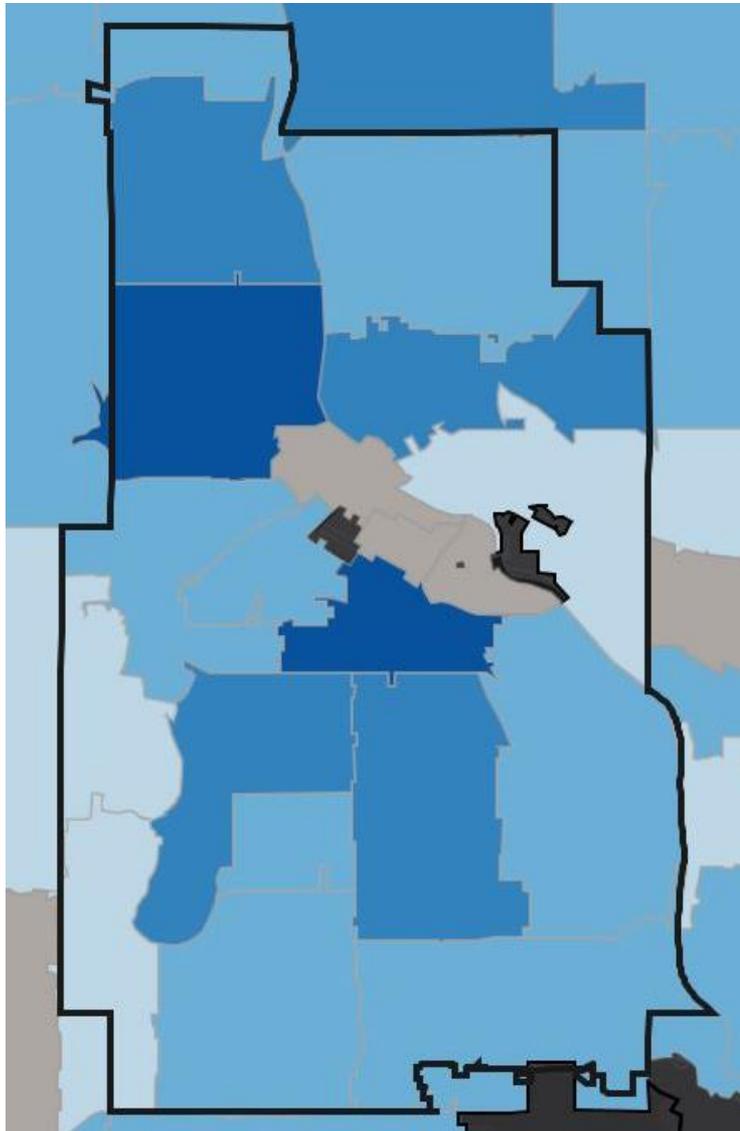


**How to read this map:** The map at left shows the age-adjusted rate of asthma hospitalizations per 10,000 people by zip code for the years 2009-2013. In some zip codes, asthma hospitalization rate data is either suppressed or unstable due to insufficient data. *Data source: Minnesota Hospital Discharge Data, maintained by the Minnesota Hospital Association*

**Notes:**

- Age-adjusted rates are calculated by multiplying rates for each age group by their respective weights from the 2000 U.S. Census.
- This data represents the place where the person lives, not where they had the asthma attack or where they were hospitalized.
- The rate of asthma hospitalizations is not a measure of the total prevalence of asthma. It captures the most extreme asthma cases.

# 1d. Chronic Obstructive Pulmonary Disorder (COPD) hospitalization rate by zip code (2009-2013)



**How to read this map:** The map at left shows the age-adjusted rate of chronic obstructive pulmonary disorder (COPD) hospitalizations per 10,000 people by zip code for the years 2009-2013. In some zip codes, COPD hospitalization data is unstable due to insufficient data. *Data source: Minnesota Hospital Discharge Data, maintained by the Minnesota Hospital Association*

### Notes:

- Age-adjusted rates are calculated by multiplying rates for each age group by their respective weights from the 2000 U.S. Census.
- This data represents the place where the person lives, not where they had the COPD attack or where they were hospitalized.
- The rate of COPD hospitalizations is not a measure of the total prevalence of COPD. It captures the most extreme COPD cases.

2. We have a relatively good understanding of the major triggers of asthma symptoms. Environmental triggers inside the home are a major cause of asthma symptoms. If triggers can be removed or avoided, asthma symptoms can be reversed or prevented. Some fixes are easy and some are more difficult.

The presence of environmental triggers in the home usually represents a rental housing violation code. The number of housing orders for indoor air quality violations mirrors the areas with highest asthma hospitalization rates.

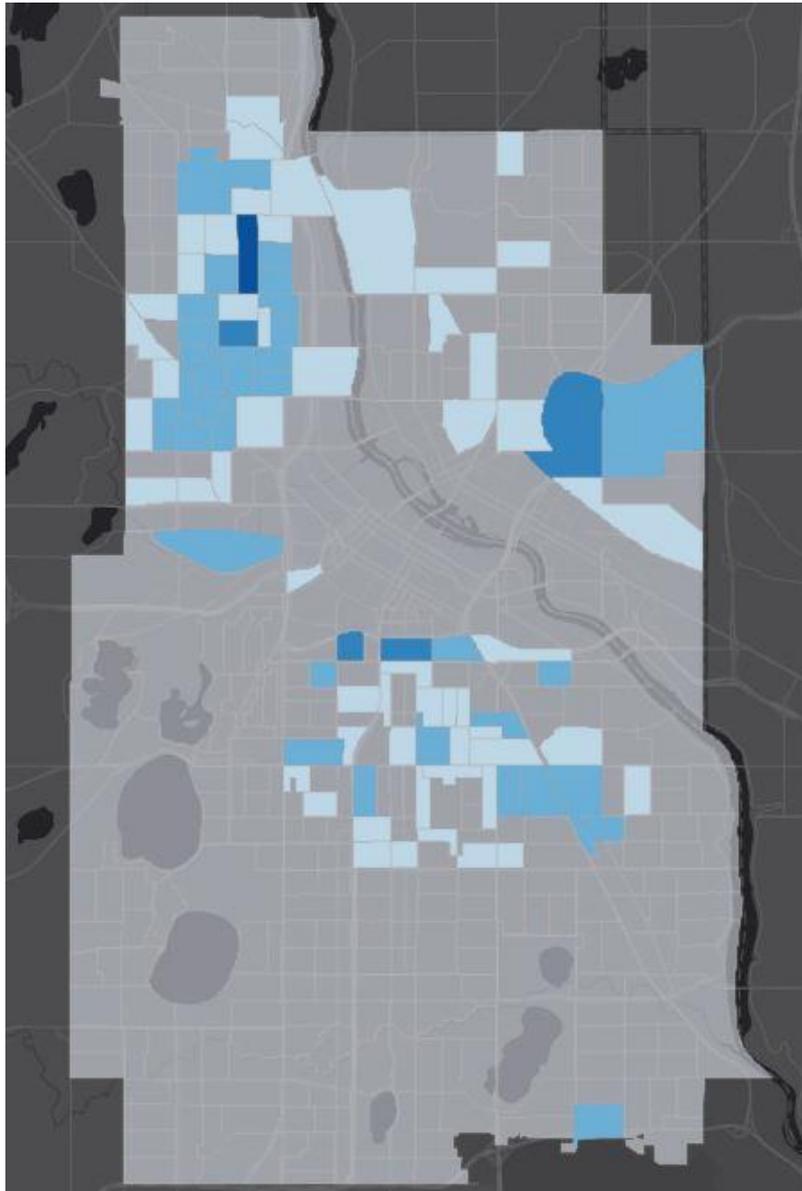
Pest problems can trigger asthma symptoms. In Minnesota, mice are a bigger problem than cockroaches or dust mites.

- Pest problems can be easier to see and sometimes to manage. However, renters of single family homes are responsible for managing pests even if the problem is due to improper maintenance of the home.

Mold has many different causes, which vary by each individual house. To address mold issues we have to work on a house-by-house basis. While the City can play a role in addressing some causes of mold, homeowners and renters can address others.

- Some aspects of the City's housing code could be more proactive to prevent indoor mold growth. This could be accomplished by installation of modern ventilation equipment and practices found in new homes.
- Some landlords contribute to moisture in their properties by not caring properly for their unit or building. For example, painting over mold between tenants hides the true extent of mold buildup, and can make it difficult for renters to find or prove mold issues that might be causing asthma symptoms.
- Homeowners and renters' lifestyle choices can also contribute to moisture in their homes. For example, placement of furniture (like beds or couches) along an outside wall can trap moisture and create an environment where mold can grow.

## 2a. Indoor health violations by block group (2013-2015)



**How to read this map:** The map at left shows the number of indoor health violations in Minneapolis from 2013 to 2015 by block group. This data includes violations that indicate presence of indoor asthma triggers. The data represents a variety of housing inspections (such as routine inspections and complaint-driven inspections), and represents primarily rental housing. *Data source: Minneapolis Regulatory Services Department*

3. We also have a good understanding of the interventions that we know are successful. The issue is having the resources we need to pay for these interventions.

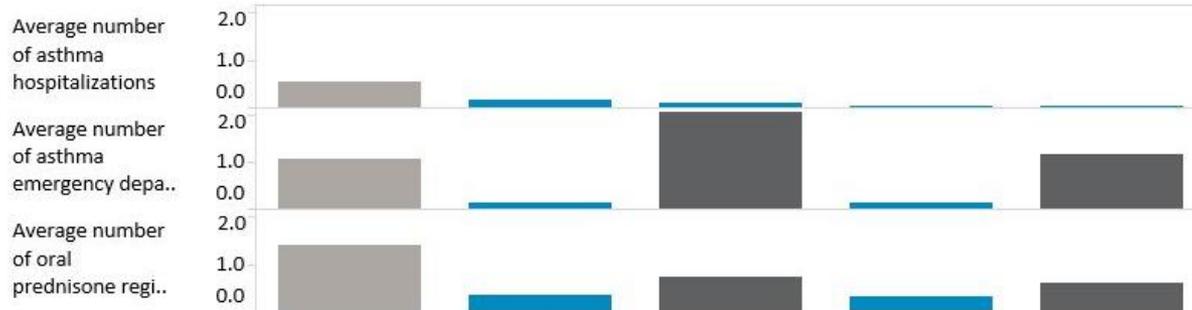
The City of Minneapolis implemented the Environmental Action for Children's Health (EACH) program between 2004-2009. Children with asthma symptoms were referred to this program, and upon referral a City inspector went into their homes to provide recommendations about improvements to their home environment and how to manage their symptoms. This intervention resulted in a number of statistically significant outcomes, reducing asthma disruptions for children.

Another intervention that is often successful is to get products that we know prevent or reduce asthma hospitalizations into the homes of families. Examples of these products include mattress covers, vacuums and HEPA air cleaners. A paradigm shift to consider this type of indoor air quality equipment as medical devices is needed in order to continue to provide community-based public health interventions and partnerships. A bill was in the legislature during the 2016 legislative session to consider indoor air quality equipment as medical devices.

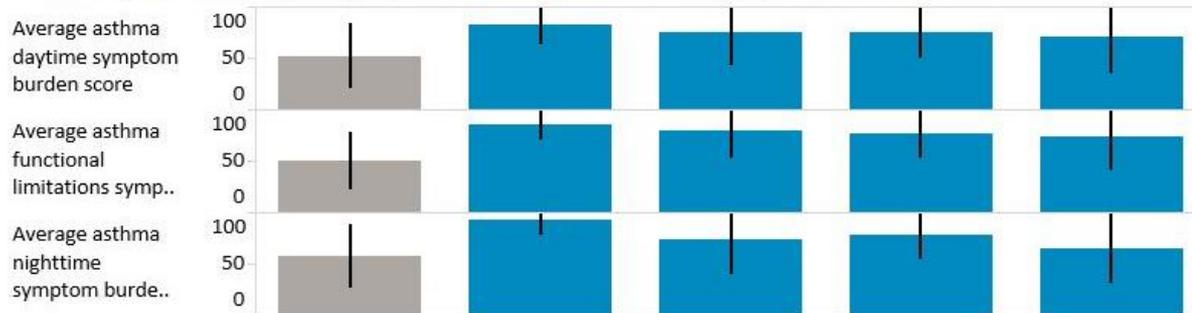
There is currently a successful model for lead control that we believe can and should be replicated for asthma. Implementing a similar model would mean that kids who are hospitalized for asthma problems would trigger a housing inspection. The City has done this kind of work periodically in the past, but with inconsistent funding, it can be difficult to build those relationships with care providers and families.

# 3a. Environmental Action for Children's Health (EACH) program outcomes

## Medical care



## Asthma symptom burden (higher scores indicate less symptom burden)



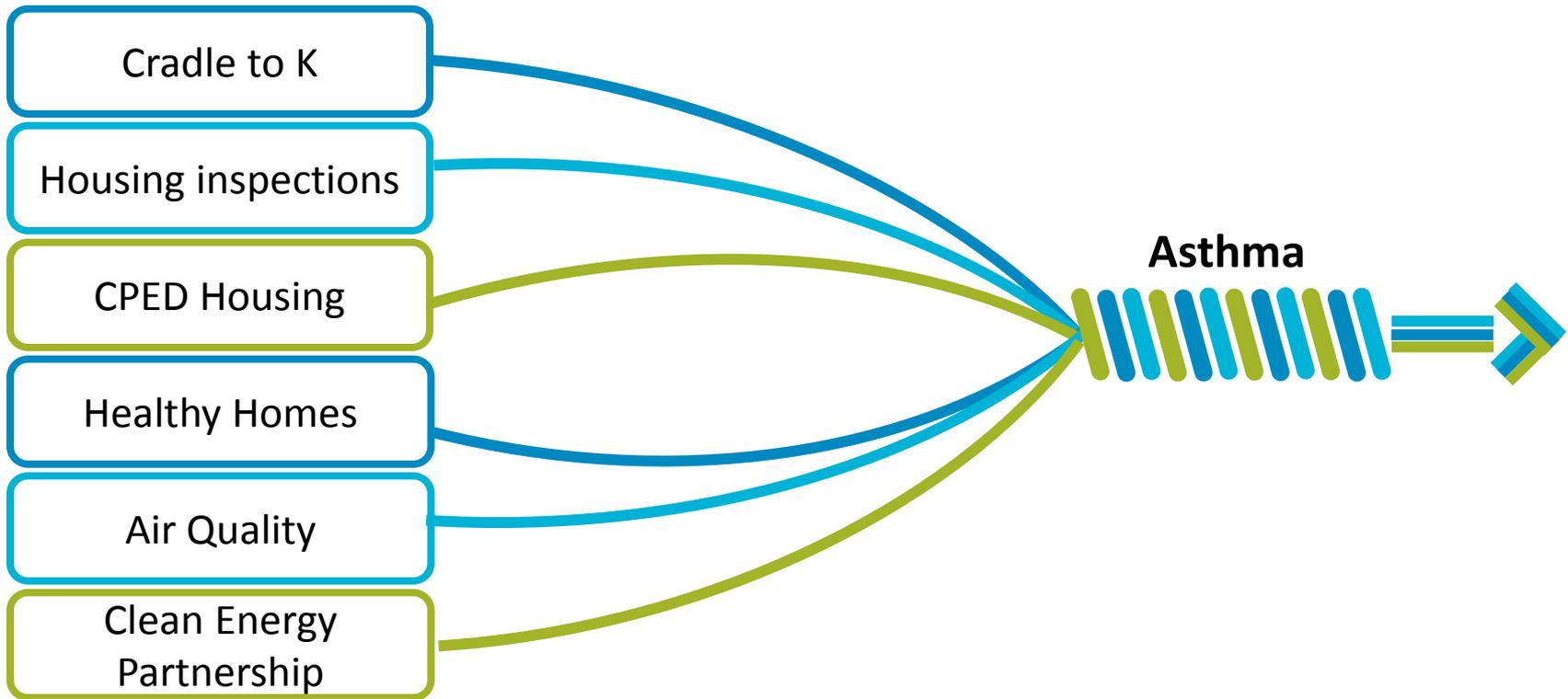
## School days missed due to asthma



**How to read this graph:** The graph at left illustrates changes in asthma burden after the City of Minneapolis implemented the Environmental Action for Children's Health (EACH) program to remediate allergens, lead, mold, and other home-based health hazards.

The estimates for each time period are color coded to reflect whether they are statistically significant or not.

Note: Higher asthma symptom burden scores indicate less symptom burden. *Data source: Minneapolis Health Department*



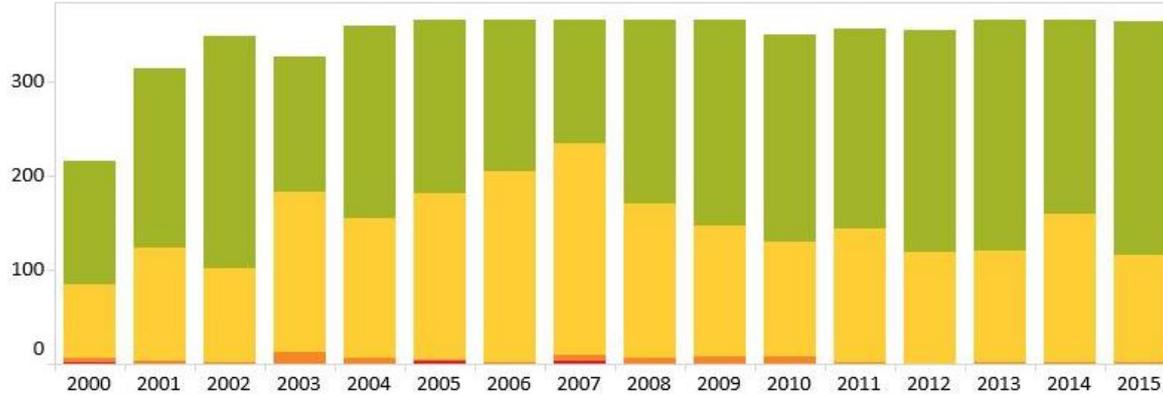
## UNDERSTANDING THE ISSUES

1. The City's role in influencing our broad indicators of PM2.5 and ozone is to be stewards of our local and regional air quality by taking the action we can to limit emissions and to avoid making air quality worse. We have a responsibility to protect people who are exposed to outdoor air pollution where they live, work and play.
2. Air pollution comes from many sources. While we generally know which of these sources contribute the most, misperceptions can distract us from focusing on what we know would have the biggest overall impact.
3. Some people are more susceptible to health impacts from air pollution because of the combined effects of underlying disparities in social determinants of health and proximity to pollution sources. The City should place a greater focus on area sources of air pollution than on regional air quality.
4. Determining the biggest opportunities for City action does not only involve focusing on the largest pollution sources. It also involves focusing on sources that are not already regulated by other entities such as the state and federal government, or going above and beyond regulatory standards to meet health standards. From a City perspective, the biggest areas for the City to improve air pollution are on and off-road mobile sources and area sources.
5. When we have the capacity to put interventions in place to improve air pollution, these interventions work. Their positive impact extends to other aspects of the City's work.

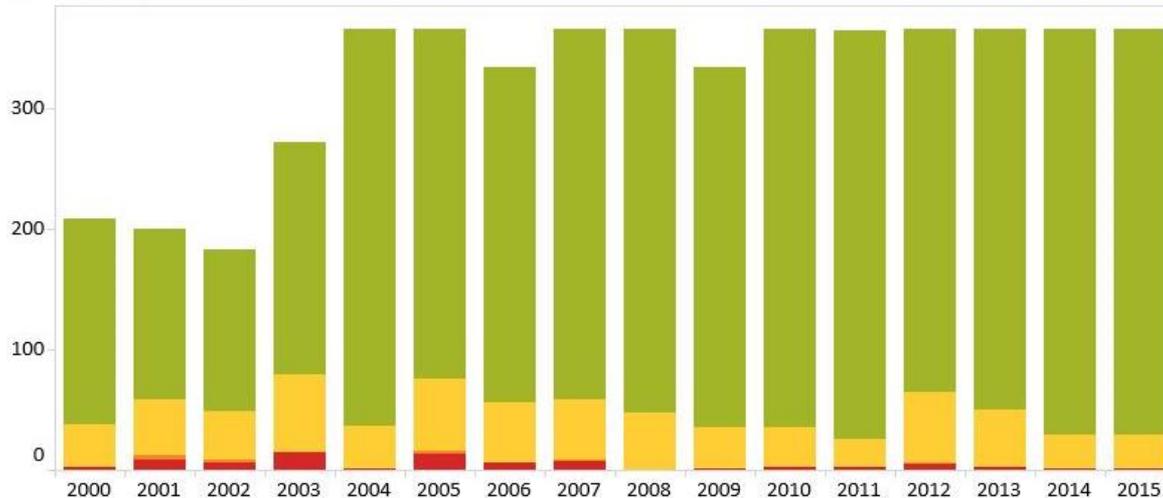
1. The City's role in influencing our broad indicators of PM2.5 and ozone is to be stewards of our local and regional air quality by taking the action we can to limit emissions and to avoid making air quality worse. We have a responsibility to protect people who are exposed to outdoor air pollution where they live, work and play.

# 1a. Number of days with air pollutant concentrations exceeding health benchmarks (2000-2015)

PM2.5



Ground-level ozone

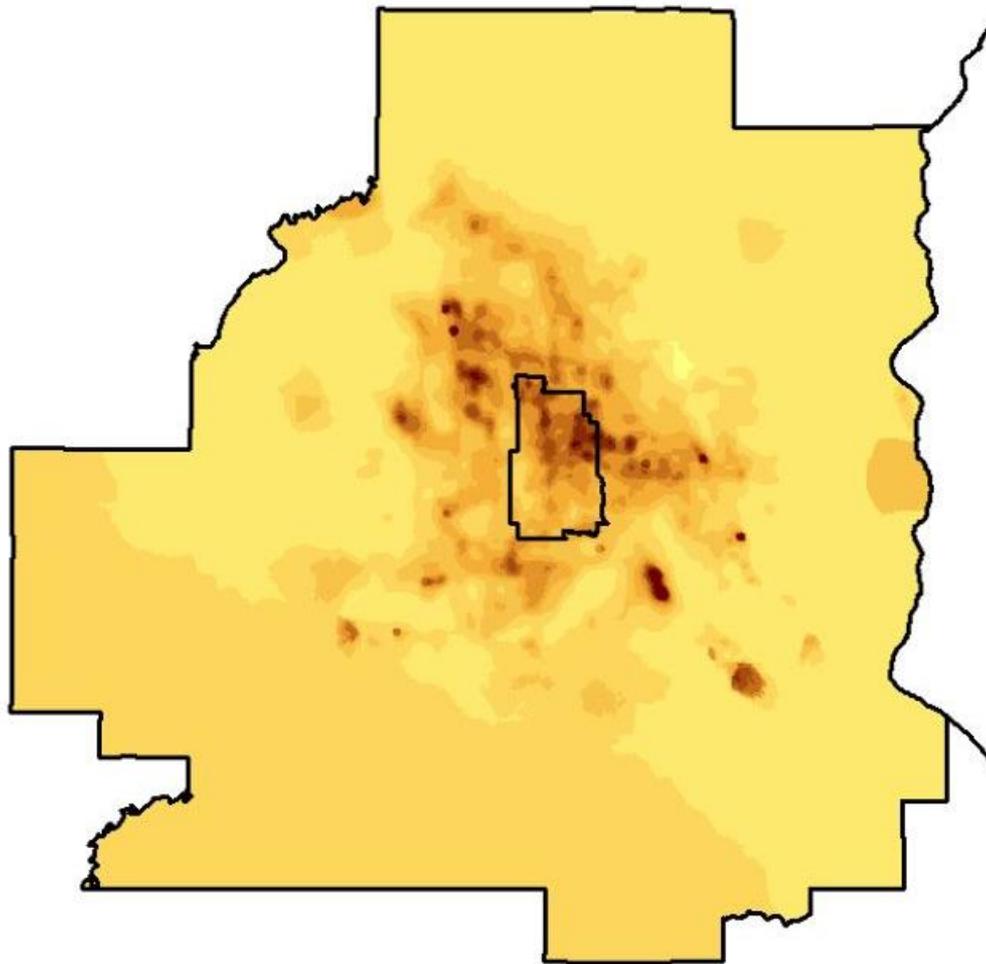


**How to read these charts:** The charts at left show the number of days with air pollutant concentrations exceeding health benchmarks by year from 2000-2015. The first chart shows PM2.5 and the second chart shows ground-level ozone.

Data marked as yellow, orange or red represents days above Clean Air Scientific Advisory Committee recommended values to be most protective of public health. Data marked as green represents days where the air quality is considered good. *Data source: Minnesota Pollution Control Agency*

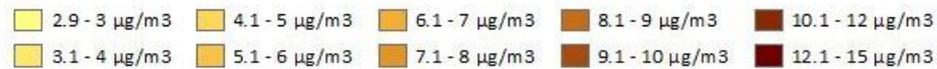
Note: Complete year-round data is not available for all years. The required ozone monitoring season is from April-October. Because the PM2.5 results are limited to Minneapolis monitors, missing data is due to site maintenance or outages.

## 1b. Modeled PM2.5 concentrations, metro area (2011)



**How to read this map:** The map at left shows modeled PM2.5 concentrations in 2011 for the metro area. *Data source:* Minnesota Pollution Control Agency

**Modeled annual adjusted PM2.5 concentration (micrograms per cubic meter), 2011**



2. Air pollution comes from many sources. While we generally know which of these sources contribute the most, misperceptions can distract us from focusing on what we know would have the biggest overall impact.

We generally know what types of pollution have the biggest impacts, but there are misperceptions about what those are. For example, when people think of air pollution, they often think of smoke stacks. While smoke stacks do contribute to air pollution, state and federal regulation has decreased the share of pollution coming from smokestacks over time.

## 2a. Minnesota point source emissions (2005-2014)

**How to read this chart:** This chart shows the reductions in Minnesota point source emissions from 2005-2014. The greatest statewide reductions have taken place for sulfur dioxide (SO<sub>2</sub>), lead, and nitrogen oxide (NO<sub>x</sub>). *Data source: Minnesota Pollution Control Agency*



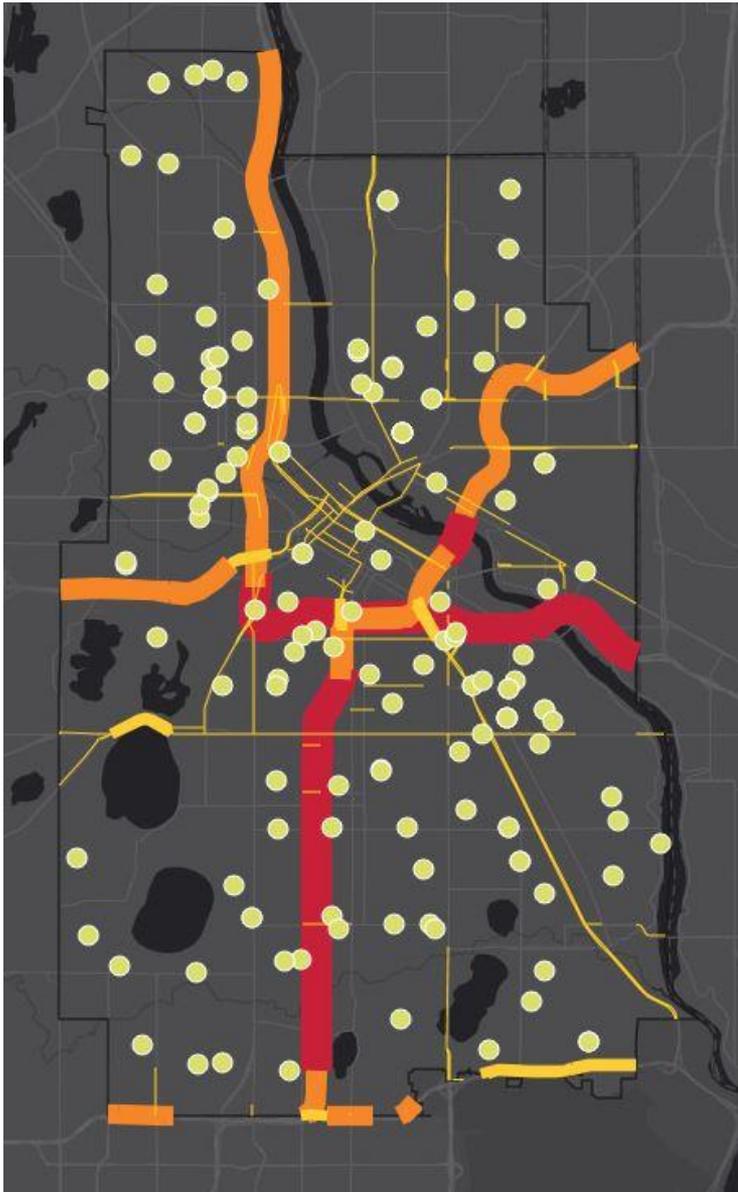
3. Some people are more susceptible to health impacts from air pollution because of the combined effects of underlying disparities in social determinants of health and proximity to pollution sources. The City should place a greater focus on area sources of air pollution than on regional air quality.

Even though we know what the biggest overall sources of air pollution are, these sources are often distributed unequally across the city.

People are not generally “next door” to point sources because of zoning, but can be next door to area sources such as roads, construction, and dry cleaners. There is often a separation between industrial and residential land uses (Minneapolis zoning map).

Regional air quality monitoring conducted by the State of Minnesota gives an overall picture of air pollution that everyone is exposed to. While air pollution has health effects on everyone, it is important to acknowledge that a pollutant that is small overall may impact some people in some areas more than others.

### 3a. Proximity to traffic



Schools (as of August 2016)

Legend    Opacity



Annual Average Daily Traffic 2013 (AADT)

-  > 134,000 to 210,000
-  > 71,000 to 134,000
-  > 37,000 to 71,000
-  14,000 to 37,000

Additional data such as child care facilities and demographic information are available in the online web map at <http://www.minneapolismn.gov/coordinator/rm/Monitoring/CityGoalResultsMinneapolis/outdoorairquality>.

**How to read this map:** The map at left illustrates the proximity of Minneapolis child care facilities, schools, and residents to roadways with high traffic volumes. *Data sources: Minnesota Department of Transportation, Minnesota Department of Education, Minnesota Department of Health, U.S. Census Bureau*

Note: [According to the U.S. Environmental Protection Agency](#), "there is no clear "bright line" to define "near" or "far" from a road. However, based on air quality measurements and modeling, in most cases, concentrations are generally highest on and/or nearest the roadway, while increasing distance from the road generally reduces concentrations to background levels within 500-600 feet though this distance will vary by pollutant in time and location."

# 3b. Air Quality in Minneapolis: A Neighborhood Approach



## Air Quality in Minneapolis: A Neighborhood Approach.

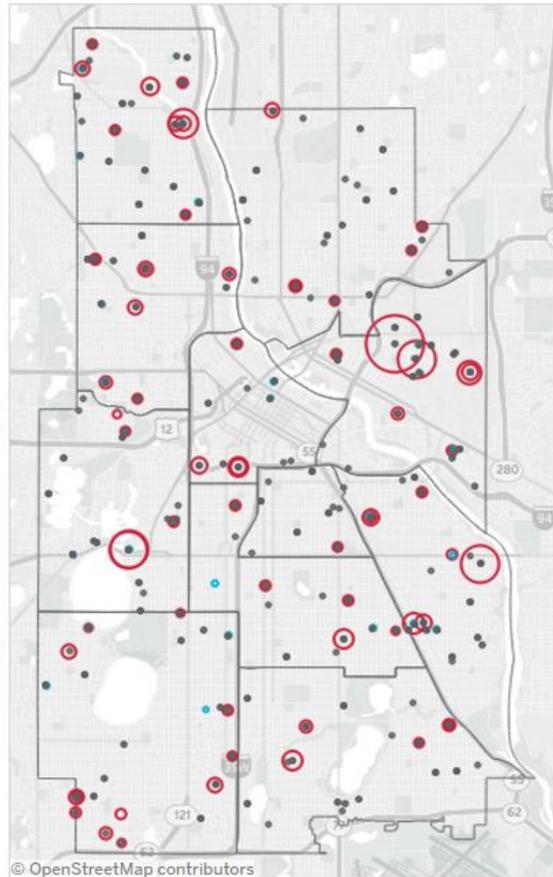
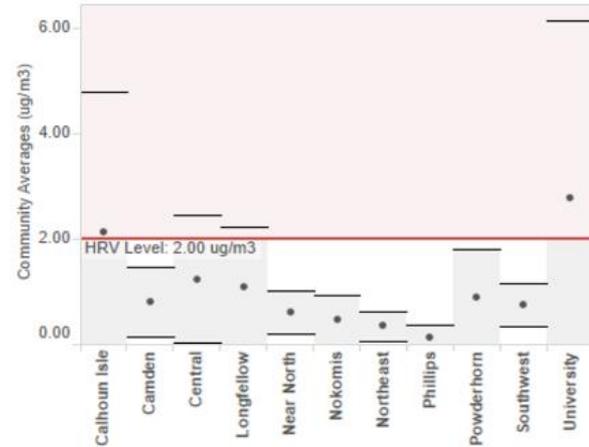
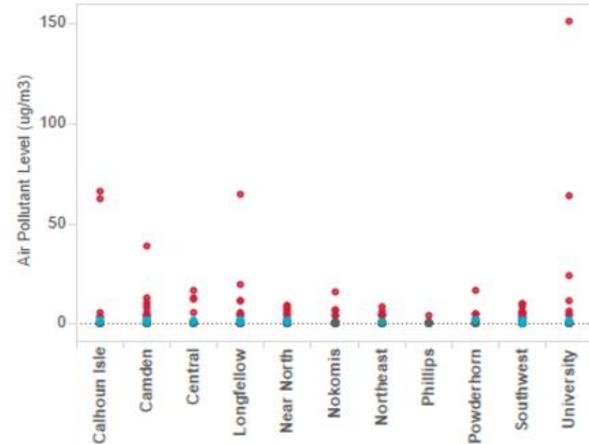
Choose a Study:

Air Quality Study

Choose Air Quality Study Air Pollutant:

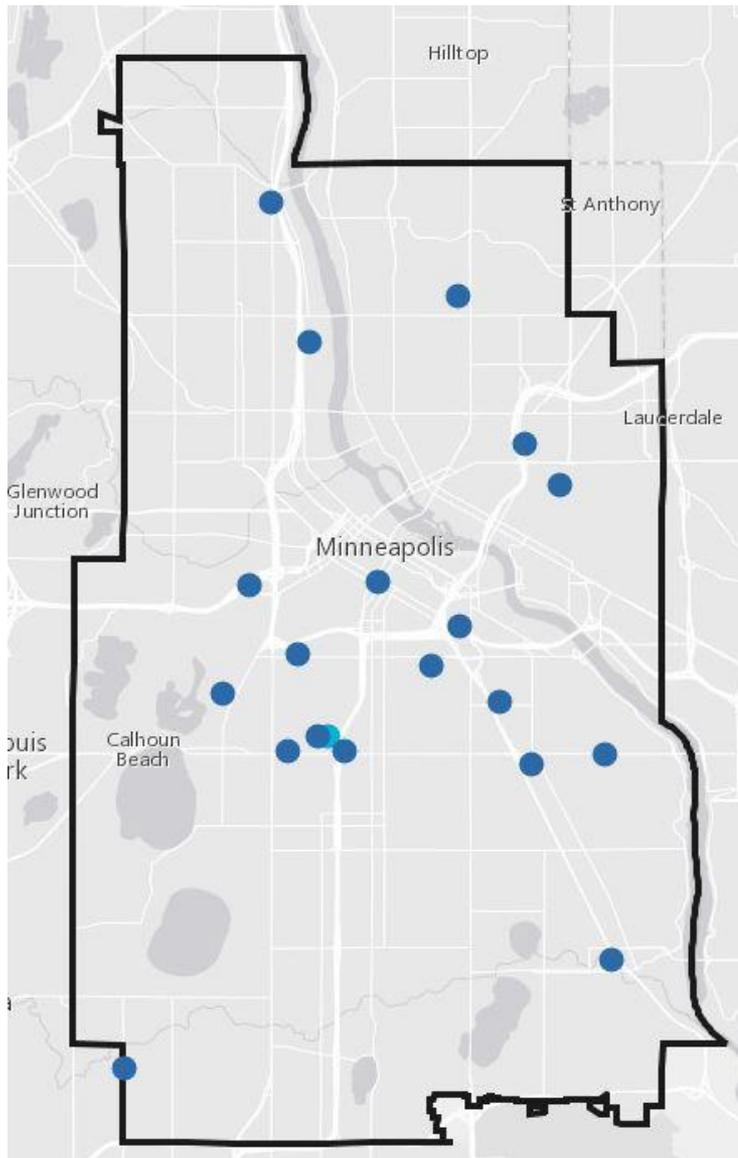
Tetrachloroethene

non-detectable
  less than HRV level
  over
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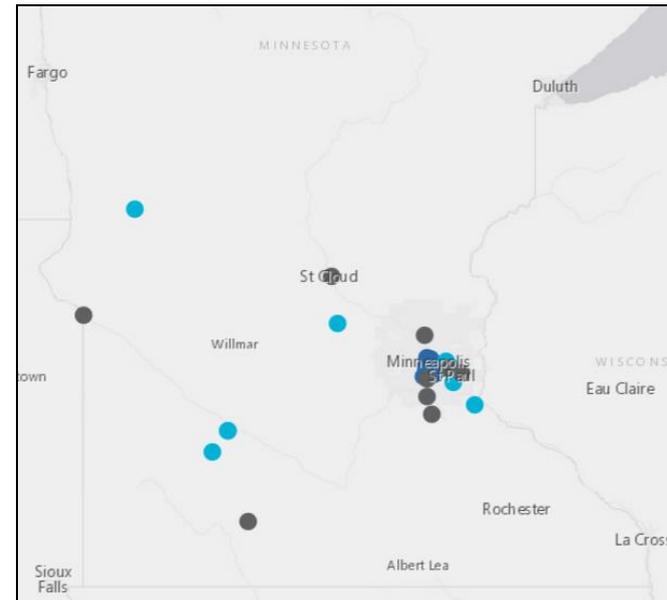


**How to read these charts:** The map and charts at left show the results of the [Minneapolis Air Quality: A Neighborhood Approach](#) study. *Data source: Minneapolis Health Department*

### 3c. Minneapolis and MPCA green business program sites



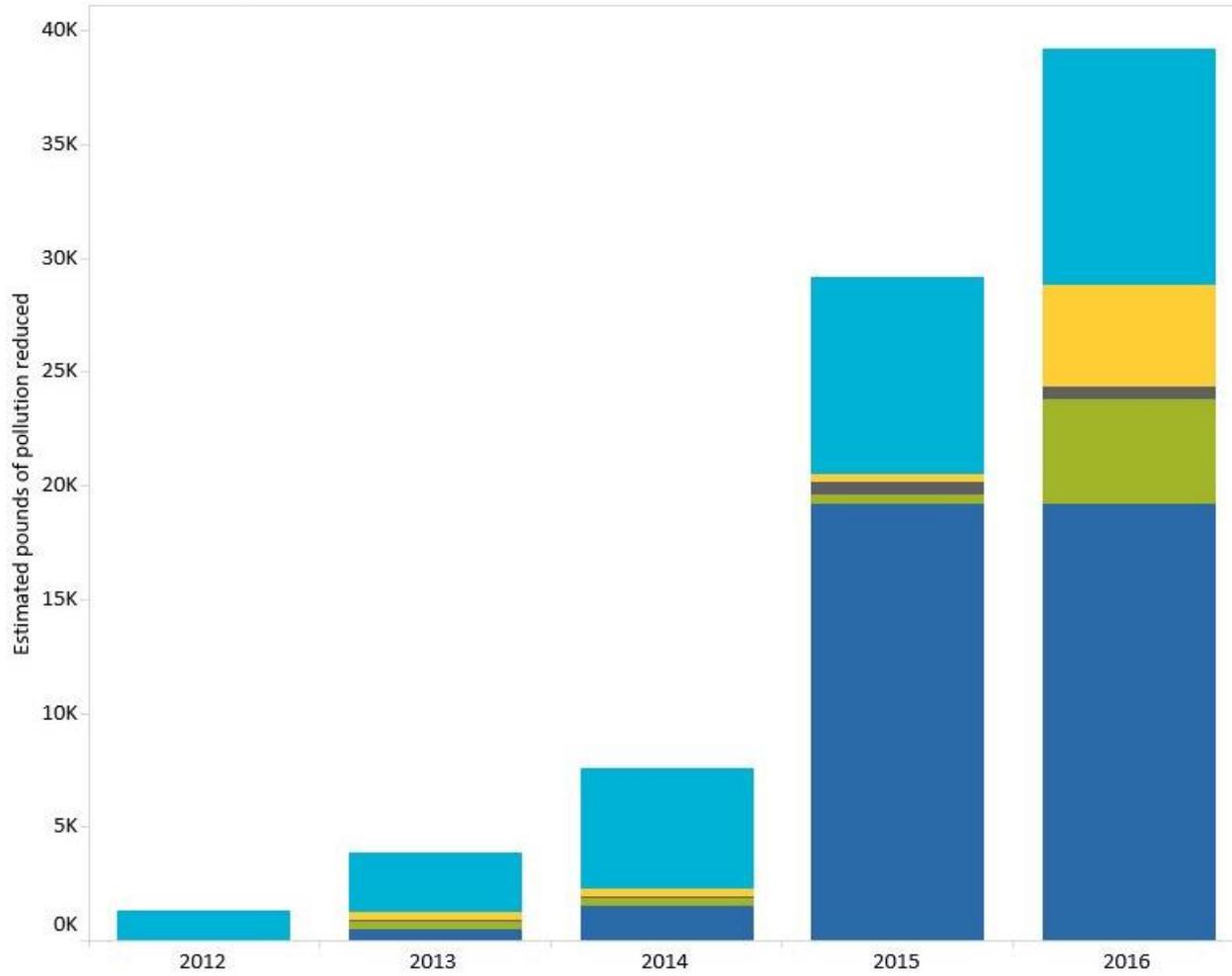
**Minnesota-wide**



**How to read this map:** The map at left shows the locations of businesses participating in the Minneapolis [Green Business Cost Share program](#) and current or potential future participants in a similar program run by the Minnesota Pollution Control Agency. *Data sources: Minneapolis Health Department, Minnesota Pollution Control Agency*

To learn more about these programs, short YouTube videos are available about the [Minneapolis Green Business Cost Share Program](#) and the [Minnesota Pollution Control Agency program](#).

### 3d. Estimated amount of pollution avoided through the Green Business Cost Share program (2012-2016)



**How to read this chart:** The chart at left shows the estimated amount of pollution avoided through the Minneapolis [Green Business Cost Share program](#). Data source: *Minneapolis Health Department*

**Pollutant**

- Hazardous air pollutants (HAPS)
- Nitrogen oxide (NOx)
- Particulate matter (PM)
- Sulfur oxide (SOx)
- Volatile organic compounds (VOCs)

4. Determining the biggest opportunities for City action does not only involve focusing on the largest pollution sources. It also involves focusing on sources that are not already regulated by other entities such as the state and federal government, or going above and beyond regulatory standards to meet health standards. From a City perspective, the biggest areas for the City to improve air pollution are on and off-road mobile sources and area sources.

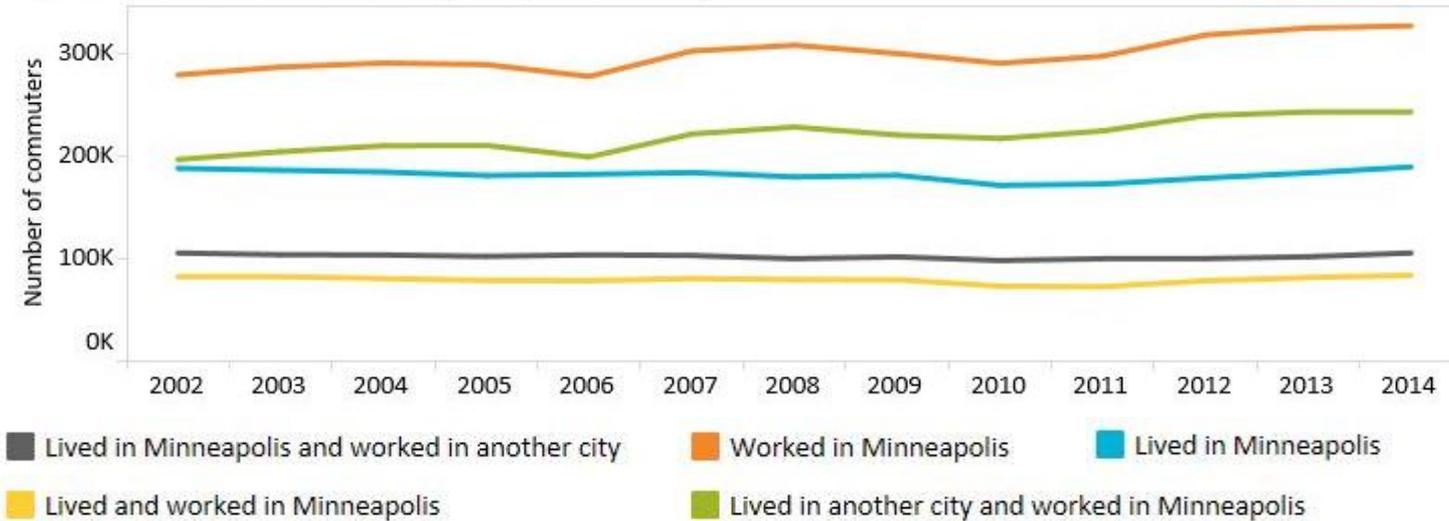
Filling this gap can be difficult because when levers to improve air pollution don't exist, we have to invent them. This involves working with businesses to overcome obstacles to go beyond regulatory standards.

On and off-road mobile sources and area sources are either not as heavily regulated or not regulated by us. The City doesn't currently have as many policy levers that influence these sources.

City action can also help the state by being a "lab" to test policies and other approaches.

# 4a. Commuter travel and commute mode share

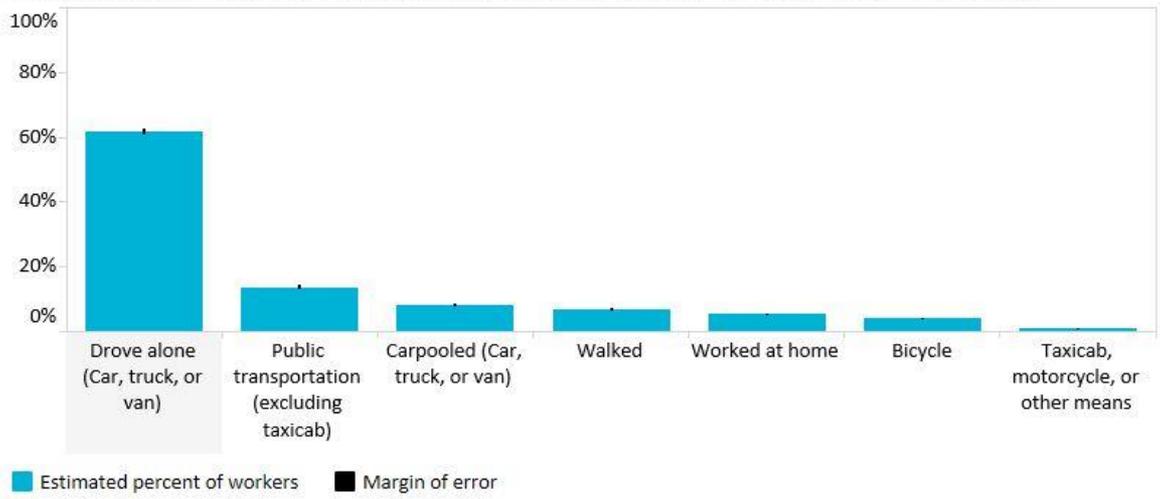
Commuter travel in Minneapolis (2002-2014)



**How to read this chart:** The first chart at left shows the number of total commuters that either lived in Minneapolis, worked in Minneapolis, or both over the years 2002 to 2014. *Data source: U.S. Census Bureau.*

The second chart at left shows the percent of Minneapolis workers age 16 and older who commute to work using various modes of transportation. *Data source: American Community Survey (Table S0801, 2010-2014 5-year estimates).*

Commute mode share among Minneapolis workers 16 years and older (2010-2014)

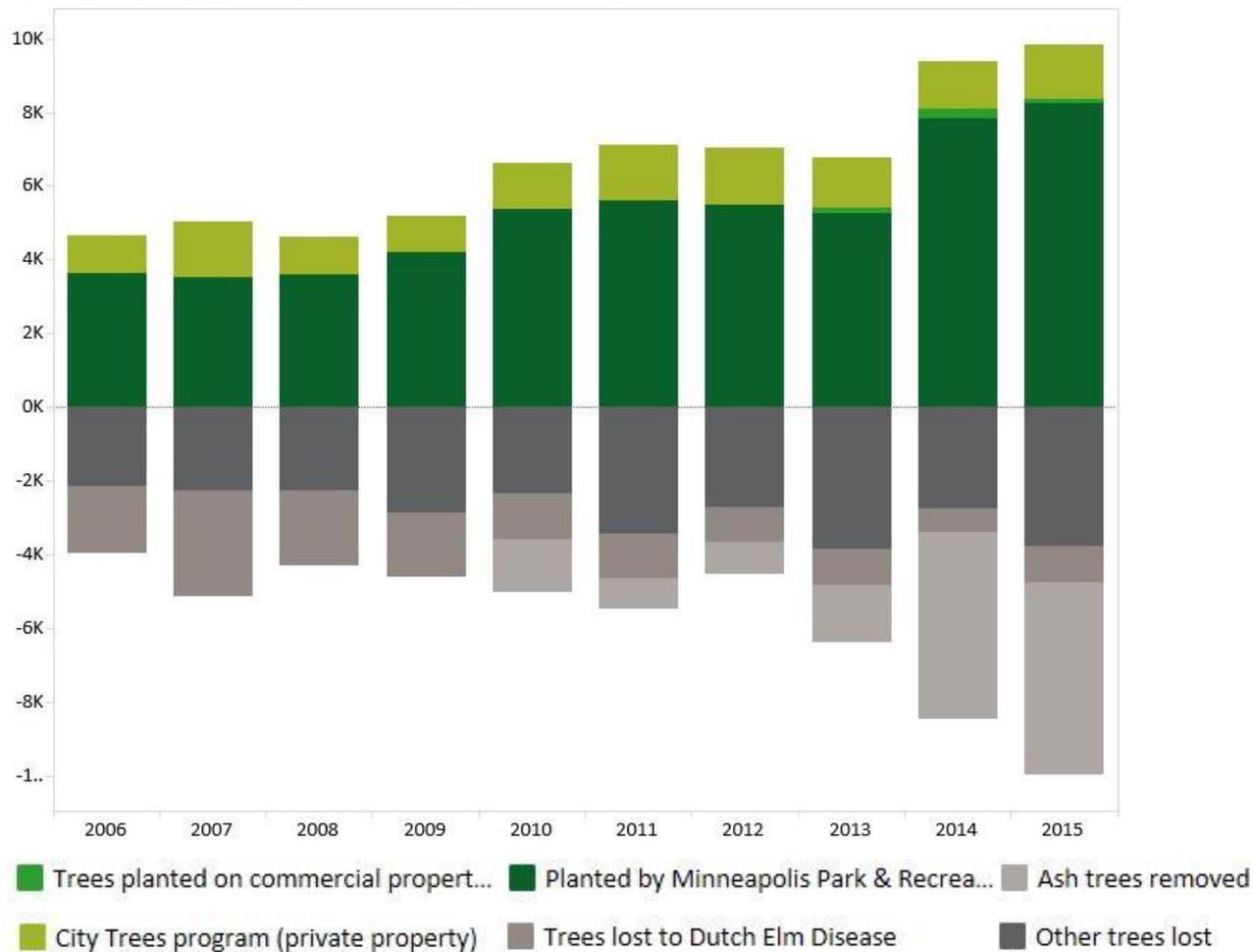


5. When we have the capacity to put interventions in place to improve air pollution, these interventions work. Their positive impact extends to other aspects of the City's work.

Trees can reduce air pollution. While the number of trees planted on public land by the Minneapolis Park and Recreation Board has increased over time, diseases and pests such as Dutch Elm Disease and Emerald Ash Borer continue to pose threats. Increased planting on private land is also necessary to protect our tree canopy.

Climate change may exacerbate the effects of outdoor air pollution. Action to mitigate or adapt to climate change often improves outdoor air quality as well. The City of Minneapolis Climate Action Plan provides a roadmap toward reducing greenhouse gas emissions in Minneapolis.

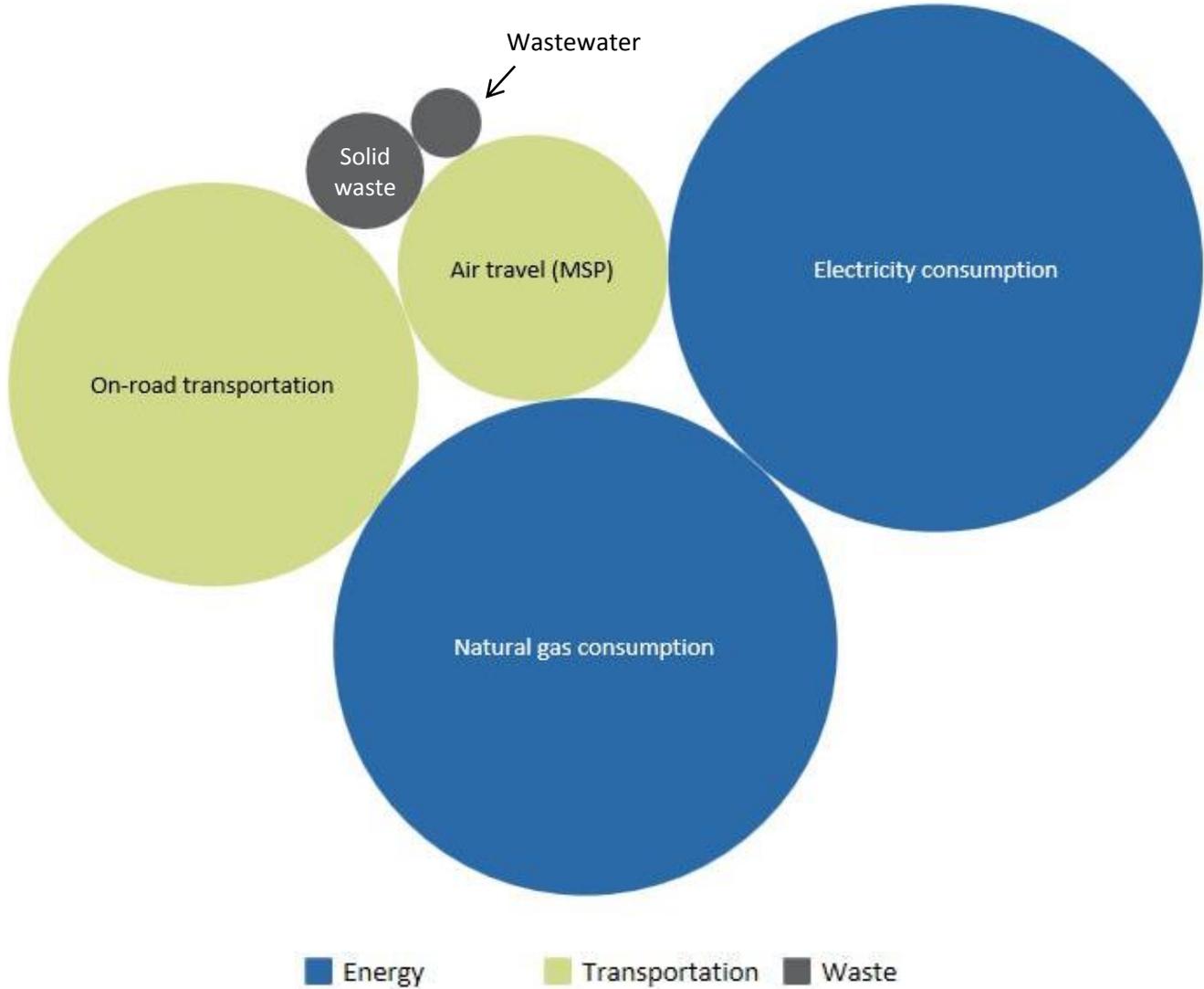
## 5a. Trees lost, planted and sold (2006-2015)\*



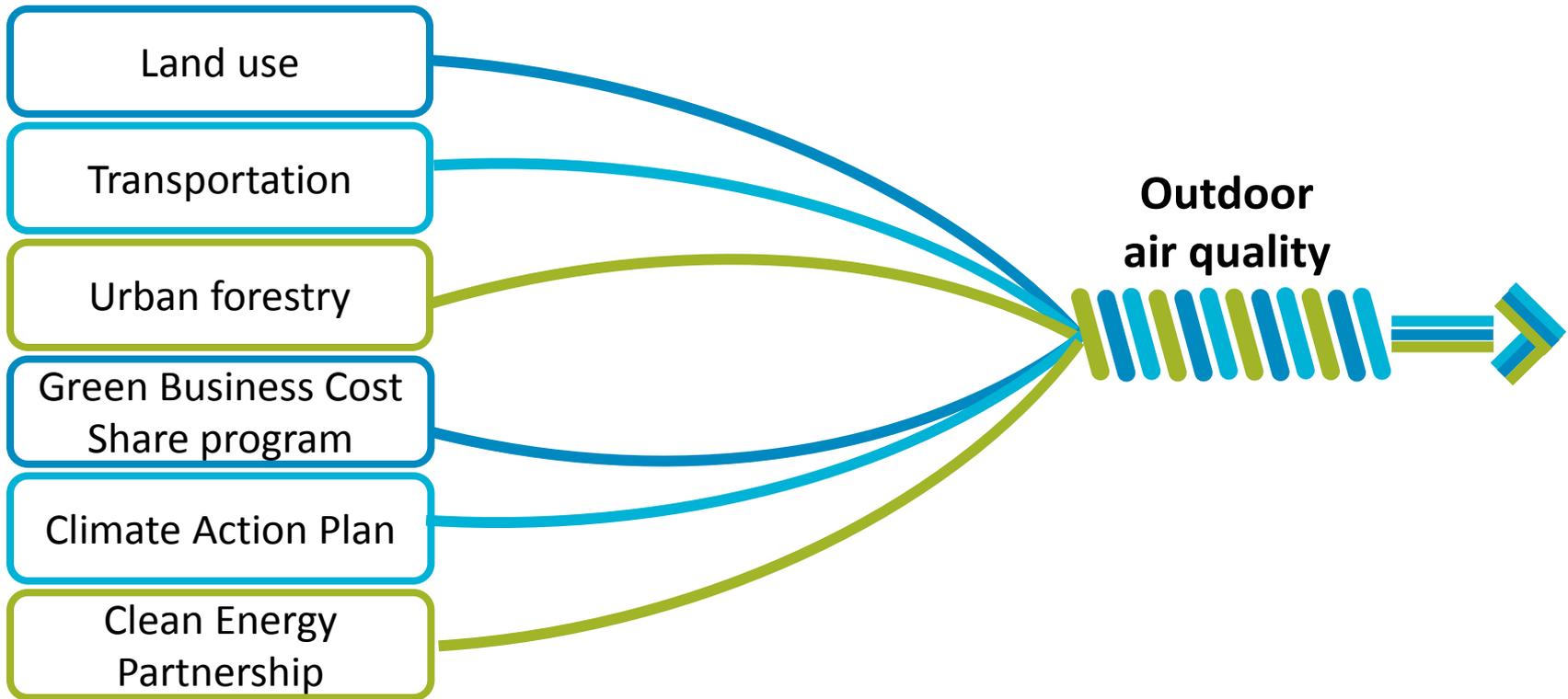
**How to read this chart:** The graph at left illustrates the number of trees lost and planted on public land, the number of trees planted on commercial property through the Minneapolis Urban Forestry Project, and the number of trees sold by the Tree Trust between 2006 and 2014. *Data sources: Minneapolis Park and Recreation Board, Minneapolis Health Department, Tree Trust*

\*This data represents trees lost and planted by the Minneapolis Park and Recreation Board, trees planted on commercial property through the Minneapolis Urban Forestry Project, and trees sold through the City Trees program. This data does not represent trees lost, planted or sold through other means and therefore is not comprehensive.

# 5b. Minneapolis greenhouse gas emissions by community-wide activity (2014)



**How to read this chart:** The image at left illustrates estimated 2014 greenhouse gas (CO<sub>2</sub>e) emissions by community-wide activity. *Data source: Minneapolis Sustainability Office*



If you have questions or comments, please contact Andrea Larson ([Andrea.Larson@minneapolismn.gov](mailto:Andrea.Larson@minneapolismn.gov)) or Laurelyn Sandkamp ([Laurelyn.Sandkamp@minneapolismn.gov](mailto:Laurelyn.Sandkamp@minneapolismn.gov)).