



# Air Pollution and Oxidative Stress in Detroit

The M-LEEd Center's Community Engagement Core (CEC) increases awareness and understanding of environmental impacts on human health.

Stakeholder Advocacy Board members include:

- Community Health and Social Services
- Detroit Health Department
- Detroit Hispanic Development Corporation
- Detroiters Working for Environmental Justice
- Eastside Community Network
- Ecology Center
- Henry Ford Health System
- Michigan Environmental Justice Coalition
- We the People of Detroit

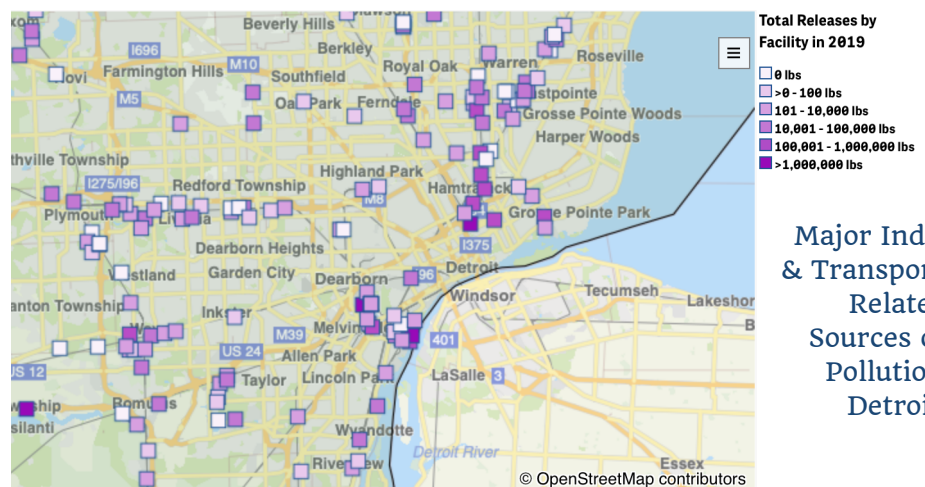
Alison Walding  
Project Manager  
Community Engagement Core  
walison@umich.edu

## What are the Major Sources of Air Pollution in Detroit?

Two major sources of air pollution in Detroit are:

**Industry:** The Michigan Department of Environment, Great Lakes, and Energy tracks air pollution from nearly 60 facilities in Detroit. These facilities include an oil refinery, steel mills, waste water treatment plants, and many manufacturing facilities.<sup>1</sup> Different types of facilities emit different types of air pollutants, such as sulfur dioxide, nitrogen oxides, heavy metals, and particulate matter (small particles of dust, soot, soil, or liquid made up of various chemicals).<sup>2</sup>

**Transportation:** Detroit is the busiest border crossing with Canada, with the Ambassador Bridge handling almost 25% of all trade between the US and Canada.<sup>5 12</sup> To handle this trade, Detroit has a network of border plazas, highways, railways, and intermodal facilities. Goods are often stored and moved in containers at intermodal facilities between ships, trucks, and trains before they are sent across the country.<sup>4 5</sup> These ships, trucks, and trains emit pollutants such as carbon dioxide, nitrogen oxides, and particulate matter. Overall, these pollution sources affect air quality in the outdoor and indoor places where we live, work, and play.<sup>6 7</sup>



Major Industrial & Transportation-Related Sources of Air Pollution in Detroit<sup>7</sup>

Source: Toxic Release Inventory, U.S. Environmental Protection Agency (2019)



## What Is Oxidative Stress?

Oxygen gives cells life by creating energy to support cell functions.

This process is called oxidation. The process of oxidation creates free radicals in our cells, which are atoms with a free electron. Free radicals can damage cells.<sup>8</sup>

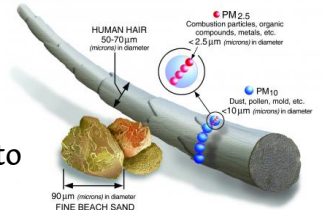
Oxidative stress occurs when there is an imbalance in our cells due to either an increase in free radicals and/or a decrease in antioxidants (substances that reduce the effects of oxidation). Over time, this imbalance can injure our tissues.<sup>8</sup>

By consuming foods rich in antioxidants, some researchers believe we can reduce oxidative stress levels. Many healthy foods contain antioxidants such as Vitamin C, D, and E, which may work to counter free radicals in the body.<sup>9 10</sup>

## How Does Air Pollution Affect Oxidative Stress?

Pollution from transportation and industrial sources, including particulate matter and gaseous ozone and nitrogen oxides, may increase the amount of free radicals in the body. This increases oxidative stress in the body. In particular, researchers hypothesize many ways that particulate matter may harm us:

- Particles are inhaled into our lungs, causing inflammation in respiratory and cardiovascular systems
- Particles pass through our airways into our bloodstream, harming blood cells
- Particles interact with nerve endings in our airways causing changes in our how our nervous system responds



Hundreds of studies link air pollution to cardiovascular and respiratory illnesses, cancer, and negative effects on brain functioning and the nervous system. Oxidative stress may be one of the many factors that help to explain the relationship between air pollution and these health outcomes. Much is still unknown about how this works and research is underway.<sup>6 8 11</sup>

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## What Does this Mean for Me and My Community?

Evidence shows that air pollution leads to oxidative stress, worsening health. Here are steps to reduce our exposures to air pollution:

- Support regulations for cleaner air, and those that prevent highways and industries from being located near homes and schools.
- Report air pollution complaints to the Michigan Department of Environment, Great Lakes, and Energy District Office at 313-456-4700 or 586-753-3700

Evidence also shows that antioxidants can reduce oxidative stress levels in the body. Here are steps to protect against oxidative stress:

- Eat foods rich in antioxidants, such as berries, nuts, beans, and veggies
- Support efforts to increase access to grocery stores and farmers markets selling healthy foods that are rich in antioxidants—especially for those neighborhoods near pollution sources

For additional information, please visit [ehsc.umich.edu](http://ehsc.umich.edu).

Please see [http://mleead.umich.edu/Coec\\_Fact\\_Sheets.php](http://mleead.umich.edu/Coec_Fact_Sheets.php) for the citations included in this factsheet.

The Michigan Lifestage Environmental Exposure and Disease (M-LEEaD) Center promotes collaboration among UM environmental health researchers and communities. Researchers work together to advance knowledge of environmental health issues that affect community members in Detroit and Southeast Michigan.

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