Union of Concerned Scientists

FACT SHEET

Inequitable Exposure to Air Pollution from Vehicles in New York State

Who Bears the Burden?

HIGHLIGHTS

Cars, trucks, and buses contribute significantly to particulate matter air pollution in New York State, with disproportionate effects on communities of color. Clean transportation policies—such as those that encourage vehicle electrification, cleaner fuels, and reduced driving—will help reduce these emissions. Additionally, New York policymakers should evaluate and place a high priority on investments in clean transportation and other clean transportation strategies for their ability to reduce inequities in exposure to vehicular air pollution. Quantitative evidence of such inequities in the state's air pollution helps to inform such evaluations.

Tailpipe emissions from cars, trucks, and buses are a leading source of harmful air pollution in New York State. This pollution has a significant impact on the health of the region's residents, and varies greatly geographically and across different types of communities in the Empire State. An analysis from the Union of Concerned Scientists (UCS) quantifies the formation of particulate matter air pollution from on-road vehicles in New York State. It also identifies the locations and populations burdened with the highest exposure to these transportation emissions.

Research links exposure to particulate matter smaller than 2.5 micrometers in diameter ($PM_{2.5}$)—20 times smaller than even fine human hair—to increased illness and death, primarily from heart and lung diseases. The UCS analysis finds that Asian American, Latino, and African American New Yorkers, as well as people of other races, are exposed to higher levels of $PM_{2.5}$ pollution from cars, trucks, and buses than are white New Yorkers. More specifically, the research finds that:

- More than 2.7 million Latino residents, more than 2 million African American residents, and more than 1.2 million Asian American residents in New York State live in areas where $PM_{2.5}$ concentrations from on-road transportation are higher than the state average. That represents 74 percent of the state's African American residents and Latino residents and almost 80 percent of Asian American residents.
- Asian American residents are exposed to twice as much $PM_{2.5}$ pollution as are white residents. Latino residents are exposed to 81 percent more vehicle pollution than are white residents, and African American residents to 72 percent more.

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Fine particulate pollution from cars, buses, and trucks on New York's roads have a disproportionate burden on communities near these roads; most of these residents are people of color. The 50 most polluted census tracts in the state are in the Bronx, Manhattan, and Queens, where vehicular air pollution is more than twice the state average.

- More than two-thirds of white residents live in areas that are below the state average for on-road transportation pollution.
- New York State has the census tracts with the highest exposure to vehicular fine particulate matter in the Northeast and Mid-Atlantic region. The region's most polluted census tract is in the West Bronx, New York City. Exposure in the tract, where 70 percent of the population are Latino residents and 29 percent are African American residents, is 270 percent higher than the state average.

The inequitable exposure of New York's communities of color to transportation pollution reflects decades of decisions about transportation, housing, and land use. Decisions about where to place highways, where to invest in public transportation, and where to build housing have all contributed to a transportation system that concentrates emissions on communities of color. In many cases, local, state, and federal transportation policies have left communities of color with inadequate access to public transportation, divided by highways, and breathing air polluted by congested highways serving suburban commuters.

New, clean transportation technologies, such as electric trucks, buses, and passenger vehicles, give us the opportunity to begin to rectify this injustice. They have the potential to reduce and ultimately eliminate the use of diesel fuel and gasoline in our on-road vehicle fleet. Improving public transportation, improving the infrastructure for walking and biking, and increasing the supply of affordable housing in communities close to transit can help New Yorkers drive less or even go car-free.

We must make these clean transportation technologies serve the communities that need them the most. At the same time, electric transit buses, school buses, and cars will save money in the long run. However, few low- and moderate-income consumers, school districts, or transit agencies can afford the up-front cost of these technologies without assistance. As we continue to invest in our public transportation system, new policies and new resources will help ensure that it provides the required high-quality services, in New York City and throughout the state. As New York and other states in the Northeast and Mid-Atlantic move to create clean, modern transportation systems, they should prioritize investments that will directly benefit communities that currently bear the greatest burden from transportation pollution.

Why Particulate Matter Air Pollution Is a Problem

$PM_{2.5}$ is the largest environmental health risk factor in the United States, responsible for 63 percent of deaths from environmental causes (Tessum et al. 2019; Tessum, Hill, and Marshall 2014). These particles are small enough to penetrate deeply into the lungs. The smallest can even enter the bloodstream (Donaldson et al. 2013).

Fine particulate air pollution is responsible for almost all of the 3 million to 4 million annual deaths attributed to air pollution worldwide.

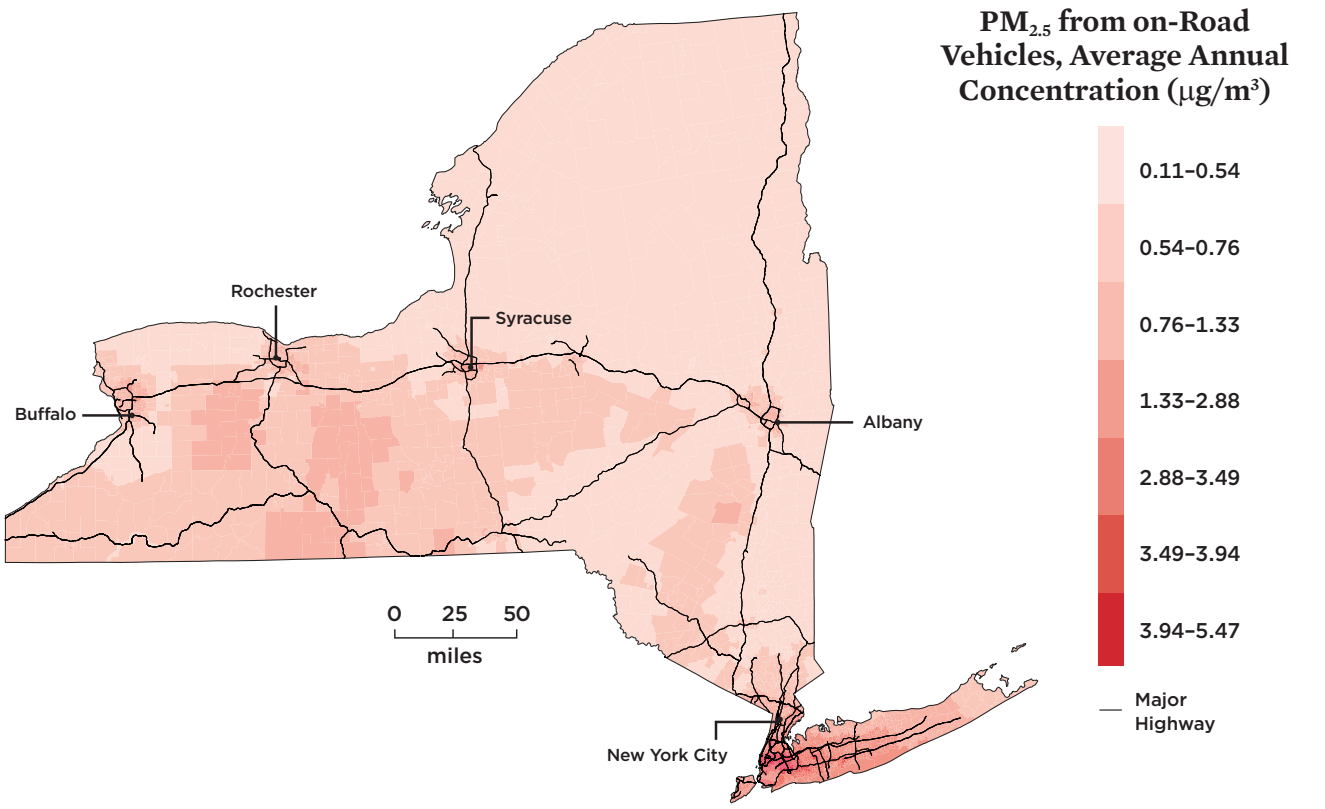
Exposure to $PM_{2.5}$ has significant negative health impacts. It has been estimated that fine particulate air pollution is responsible for almost all of the 3 million to 4 million annual deaths attributed to air pollution worldwide. $PM_{2.5}$ is estimated to be responsible for about 95 percent of the global public health impacts from air pollution, even if it is not the only air pollutant that affects health (Landrigan et al. 2018; Lelieveld et al. 2015).

Both acute and chronic exposure to $PM_{2.5}$ have been linked to illness and death (Guo et al. 2018; Pagalan et al. 2018; Achilleos et al. 2017; Brook et al. 2010). Short-term exposure to elevated levels of $PM_{2.5}$ can exacerbate lung and heart ailments, cause asthma attacks, and lead to both increased hospitalizations and mortality from cardiovascular diseases (Orellano et al. 2017; Pope and Dockery 2006). Chronic exposure to $PM_{2.5}$ also causes increased death rates attributed to cardiovascular diseases, including heart attacks, and it has been linked to lung cancer and other adverse impacts (Fine, Sioutas, and Solomon 2008). Chronic exposure to $PM_{2.5}$ in children has been linked to slowed lung-function growth and the development of asthma, among other negative health impacts (ALA 2018; Gehring et al. 2015; Gauderman et al. 2004).

In New York City, exposure to $PM_{2.5}$ air pollution from vehicles contributes an estimated 320 premature deaths each year due to cardiovascular disease, heart attacks, and other illnesses (Kheirbek et al. 2016). Pollution from trucks and buses accounts for over half of these deaths. By way of comparison, 292 homicides and 222 traffic fatalities were reported in New York City in 2017 (NYC 2018; NYPD 2017).

In New York State, the combined health and climate costs in 2015 attributable to passenger vehicles were about $7.9 billion. Health cost estimates amount to about two-thirds of this total; these include costs from premature deaths, heart attacks, asthma attacks, emergency room visits, and

FIGURE 1. High Variation in Exposure to $PM_{2.5}$ Pollution from On-Road Vehicles in New York State



New York has many rural areas, so its average vehicle $PM_{2.5}$ concentration is not high. However, the state still has the region's second-highest level of pollution, after the District of Columbia. The 50 most polluted census tracts in New York State are in the Bronx, Manhattan, and Queens. Beyond the New York metropolitan area, car-dependent development in Albany, Buffalo, Rochester, Syracuse, and other cities has concentrated emissions in each of their urban cores.

SOURCES: US CENSUS BUREAU 2018; EPA 2014.

lost work days resulting from breathing pollution associated with passenger cars (Holmes-Gen and Barrett 2016).

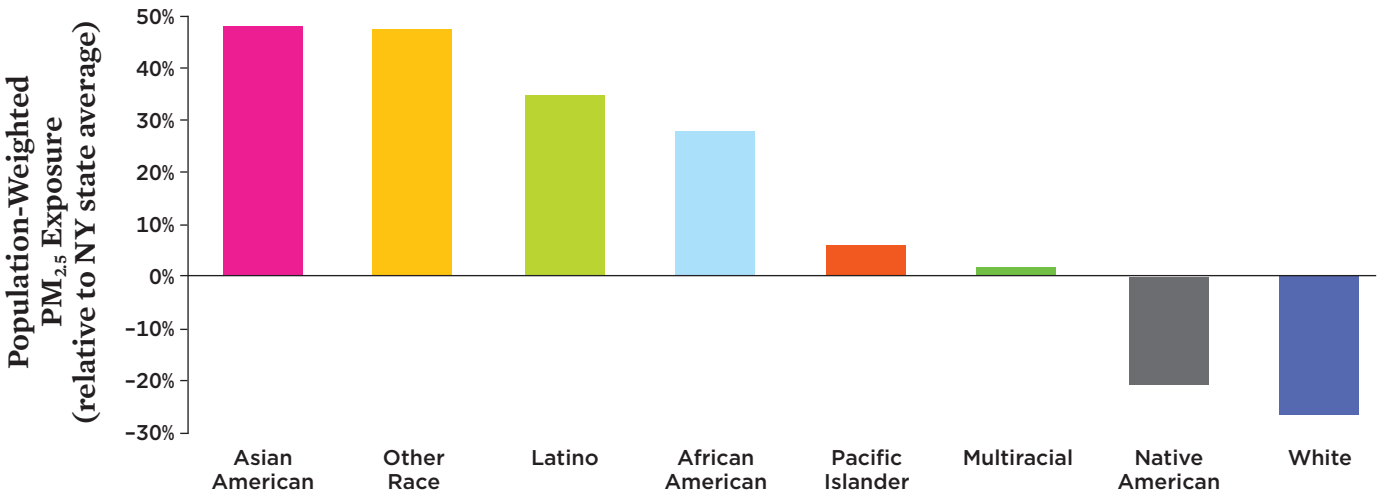
Analysis of $PM_{2.5}$ Pollution from On-Road Transportation

To estimate the average annual exposure and health impacts of particulate matter air pollution from cars, trucks, and buses, UCS modeled $PM_{2.5}$ concentrations in the Northeast and Mid-Atlantic due to emissions from vehicle tailpipes and vehicle refueling (Tessum, Hill, and Marshall 2014).[1] We estimated ground-level pollution exposure for each census tract, then combined that information with population and demographic data to understand how exposure to $PM_{2.5}$ varies among groups and locations.[2]

These estimates do not include $PM_{2.5}$ exposure from other types of transportation, such as airplanes, marine vessels, or trains. The $PM_{2.5}$ concentration and exposure modeling also excludes operations at freight facilities and ports. Their emissions would add to the exposures shown in this analysis. These other transportation and freight emissions can cause significant health impacts, especially for people living closest to such facilities, leading to well-documented environmental justice concerns (Hricko 2008).

New York State has the second-highest average $PM_{2.5}$ concentration in the Northeast and Mid-Atlantic, after the District of Columbia. The state's average is 48 percent higher than the average for the region. Pollution from vehicles is concentrated in New York City, which has the highest $PM_{2.5}$ concentration of any city in the Northeast and Mid-Atlantic (Figure 1). The 50 most polluted census tracts in the state are in the Bronx, Manhattan, and Queens, where pollution is from 2.2 to 2.5 times the state average. More than a quarter-million people live in these highly polluted tracts.

FIGURE 2. Disproportionately High Exposure for Asian American, African American, and Latino residents, and People of Other Races, in New York State



Asian American residents and New Yorkers of other races have 47 percent higher exposure than the state average. Latino residents have 35 percent higher exposure and African American residents have 28 percent higher exposure. Meanwhile, white New Yorkers are exposed to 26 percent lower concentrations.

Note: This analysis uses the following US Census Bureau–defined racial groups: White; Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; Hispanic; Latino; and Some Other Race. In the chart above, Latino includes census respondents who select Hispanic, Latino, or both; Other Race includes respondents who select Some Other Race as their only race.

SOURCES: US CENSUS BUREAU 2018; EPA 2014.

Greater $PM_{2.5}$ Pollution for Latinos, Asian Americans, and African Americans

The $PM_{2.5}$ pollution burden from cars, trucks, and buses is inequitably distributed among the state's racial groups (Figures 2 and 3). On average, $PM_{2.5}$ exposures from transportation for Asian American, Latino, and African American New Yorkers, as well as residents who self-identify in the census as "other race," are higher than for white New Yorkers. The UCS analysis finds that exposure inequalities are more pronounced between racial and ethnic groups than between income groups.

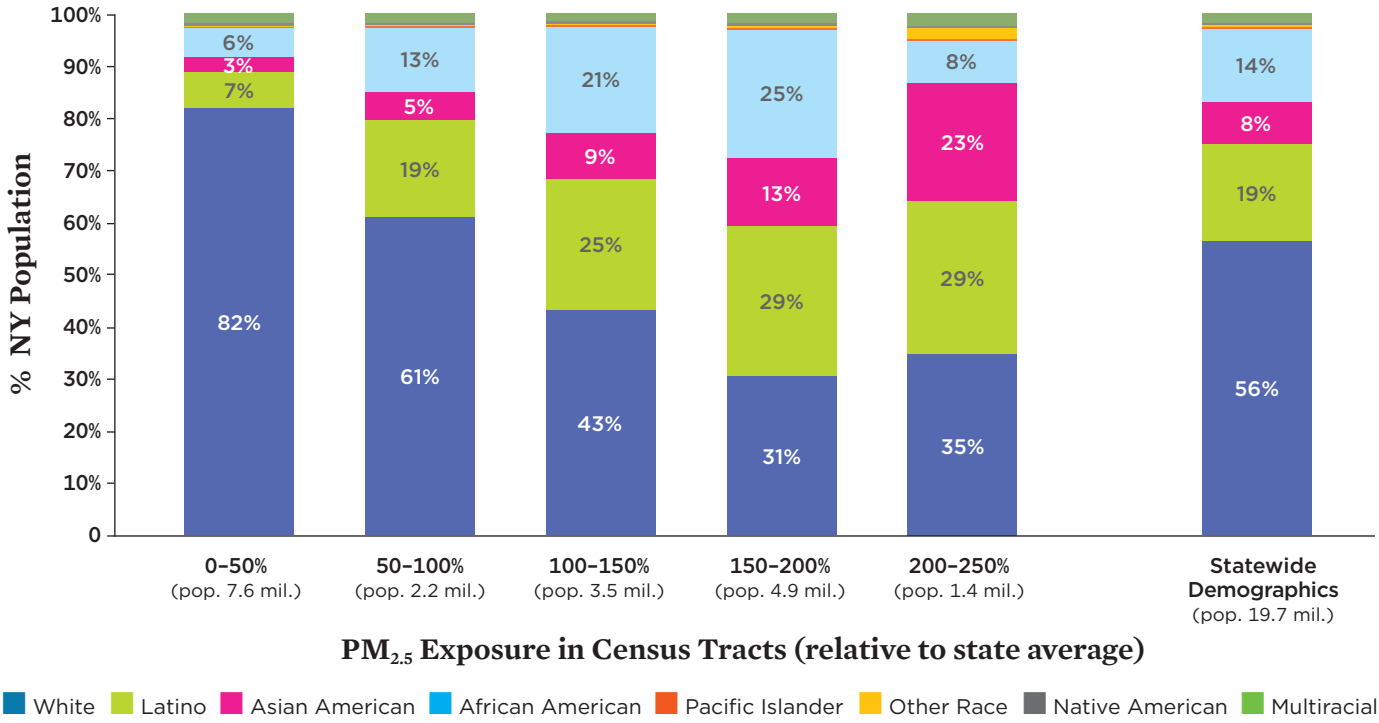
Inequity is most extreme precisely where the maximum pollution levels are highest. The Bronx ranks fourth in average pollution relative to the state average, but its maximum pollution is the highest of all the counties. The population in the Bronx consists of 55 percent Latino residents and 29 percent African American residents. The community with the highest exposure to vehicle pollution in New York State is in Morris Heights, in the West Bronx, where $PM_{2.5}$ levels are two-and-a-half times higher than the state average. Sitting at the intersection of I-95 and I-87, Morris Heights is a community where practically all residents are people of color: 70 percent of the population are Latino residents and 29 percent are African American residents. In 2013, 0.7 percent of children in the Bronx aged 5 to 14 were hospitalized for asthma; the figure was 1.2 percent in the Bronx neighborhoods of Mott Haven and Melrose compared with 0.3 percent in the city as a whole (CDC 2018).

The Bronx ranks fourth in average pollution relative to the state average, but its maximum pollution is the highest of all the counties.

What We Can Do

New Yorkers want to live in communities with a wide variety of transportation choices, including high-quality commuter rail, strong subway and bus systems, and good infrastructure for walking and biking. Proven technologies can help us transform New York State's transportation system, moving it away from diesel and gasoline and toward clean, modern

FIGURE 3. As $PM_{2.5}$ Exposure Increases in New York, the Fraction of White Residents Decreases



In areas where $PM_{2.5}$ exposure is lower than the state average, the fraction of white residents is higher than the state fraction of white residents. In areas in the state where $PM_{2.5}$ exposure is higher than the state average, the fraction of white residents is lower than the state fraction of white residents. In the highest pollution areas, which correspond to urban centers with heavy traffic, the fraction of white residents is high but still lower than the state fraction of white residents.

Notes: Each column refers to census tracts in areas with similar $PM_{2.5}$ pollution concentrations. Columns show the fraction of people belonging to each of eight racial groups living in those areas. The least polluted areas are on the left and the most polluted on the right. The 0–50% area refers to census tracts where $PM_{2.5}$ pollution is below half the regional average; the 50–100% area refers to census tracts where pollution is from half the regional average to the regional average. The column at the far right shows the racial composition of the entire state.

This analysis uses the definitions of racial groups according to US Census Bureau: White; Black or African American; American Indian or Alaska Native; Asian American; Native Hawaiian or Other Pacific Islander; Hispanic; Latino; and Some Other Race. In the chart, Latino includes census respondents who select Hispanic, Latino, or both; Other Race includes census respondents who select Some Other Race as their only race.

SOURCES: US CENSUS BUREAU 2018; EPA 2014.

solutions. Battery-electric buses are operating right now in the state; with the right investments, they could eventually power our entire fleet of public transportation buses. Electric vehicles have no tailpipe emissions,[3] and they are improving with every passing year even as they become more affordable and increasingly available in a wide range of vehicle classes. The generation of the electricity used to charge the vehicle can produce some emissions, but these emissions are lower than those of an average gasoline car and vary depending on where the vehicle is charged (Reichmuth 2017). In the Northeast and Mid-Atlantic, the Regional Greenhouse Gas Initiative (RGGI), along with investments in solar, wind, and other renewable electricity sources, has greatly reduced emissions from electricity generation (RGGI 2019).[4]

Making these clean transportation technologies available to all will require significant up-front investments, yet the communities most affected by transportation pollution often have the fewest available resources. Significant new funding is necessary to expand access to clean transportation in these communities, as are strong regulations that limit transportation emissions and put a price on carbon pollution. New York State should adopt a variety of policy approaches to supporting clean transportation in communities that are disproportionately affected by tailpipe pollution, such as the Climate and Community Protection Act. Multiple approaches at the local, state, and regional levels can, and should, work together to ensure that the Empire State is a leader in reducing one of the most harmful sources of pollution.

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Public transit (such as this city bus in Albany), vehicle electrification, cleaner fuels, and building housing near transit are all critical to helping to reduce vehicle pollution and its associated health risks. Policymakers in New York should prioritize clean transportation investments in the communities most burdened by vehicle pollution.

In December 2018, nine states in the Northeast and Mid-Atlantic and the District of Columbia agreed to create a regional program that would limit transportation emissions and invest in clean transportation. This effort could bring in more than $1 billion per year for clean transportation investments in New York (Gatti 2017). A portion of these investments should bededicated to programs that improve air quality in communities with the highest exposures to transportation pollution.

In addition, New York should ensure that all state investments in clean transportation consider equity. The state should seek input from communities disproportionately burdened by transportation pollution and ensure that equity is a key consideration in both design processes and future investment decisions. As evidenced by the ElectrifyNY campaign, investments in electric buses should focus first on serving communities with the highest concentrations of diesel emissions. The Drive Clean Rebate, the state's electric vehicle rebate program, should expand to provide financing assistance and larger rebates to low- and moderate-income residents. Utility investments in the infrastructure for charging electric vehicles should ensure that these programs serve renters and people without access to off-street parking. State programs to provide municipalities with aid to support clean transportation, such as Complete Streets and Cleaner, Greener Communities, should target heavily affected communities.

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ENDNOTES

1 *Details on the modeling approach can be found at* www.ucsusa.org/air-quality-methodology.
2 *The average population of a census tract is 4,000.*
3 *There are minor amounts of $PM_{2.5}$ emissions from tire and brake wear.*
4 *Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont participate in RGGI. Virginia is preparing to join in 2020, and Pennsylvania is considering joining. New Jersey left RGGI in 2012 but is on track to rejoin in 2020. Partially because of RGGI, the region has reduced its emissions by about 40 percent relative to 2005 levels.*

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