

How does air pollution affect people differently?

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Abstract

Bad air quality is a problem all over the world. In the U.S., air quality is often worse in places where people of color live. There are many different sources of air pollution, like fireplaces, factories, cars, and power plants. We wanted

to know how much different pollution sources added to inequality. We found out that people of color are exposed to more air pollution from almost every type of pollution source.

Introduction

Have you ever seen a hazy sky over a city, or noticed a bad smell from a highway or factory? **Air pollution** is anything in the air that is harmful to the health of people or the environment. There are many kinds of air pollution, and it comes from a lot of different sources. That makes it hard to get rid of! Small amounts of pollution from many places can add up to a lot of pollution.

Air pollution doesn't affect everybody the same way. Young people, elderly people, and people who are already sick are hurt more by bad **air quality**. Air quality often is worse in some neighborhoods than others. Structures like highways and power plants are often next to minority neighborhoods. The noise, smoke, and exhaust get into people's homes and can make them sick.

Disparity in exposure to air pollution is an old problem. In most places, air quality is better than it used to be. But people of color still get exposed to more air pollution than white people do. That means the way the government has tried to improve air quality has not made things fairer. **We wanted to know if there are certain kinds of polluters that are especially unfair.** If we know that a specific pollution

source is causing disparity, working to fix that source could help make things fairer.



Factories emitting smoke are often built closer to poorer neighborhoods.

(Photo: Freepik)

Methods

We focused on a kind of pollution called PM2.5. PM2.5 describes very tiny particles – smaller than 2.5 millionths of a meter! Our bodies can filter out large particles like dust. But PM2.5 particles are so small that when you breathe them in, they can go deep into your lungs. Some can even cross into your bloodstream. Over time, this can make you sick! Because PM2.5 is dangerous to your health, governments keep track of how much of it is in the air.

We used an air quality **model** (computer program) to figure out how much pollution came from each source. The model includes 5,434 different pollution sources, which we grouped into 14 categories (Fig. 1). We only looked at human-caused emissions, so we didn't include wildfire smoke, for example.

We used data from the US Census American Community Survey to find out how many people live in each area. Census data also lets us know the race and ethnicity of people in each area.

Results

We found that for nearly all types of pollution and nearly all places, people of color had unfair extra exposure to pollution. Industry, small cars and trucks, construction, and heavy-duty diesel vehicles cause the largest total pollution

inequality. We also found two exceptions: white people on average have slightly more exposure to pollution from agriculture and coal power plants. Figure 2 shows all of these results.

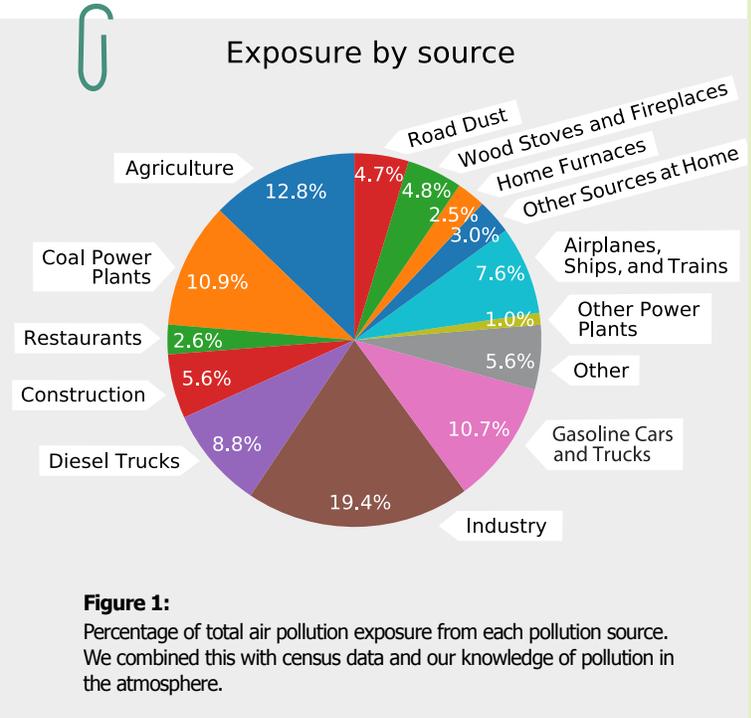
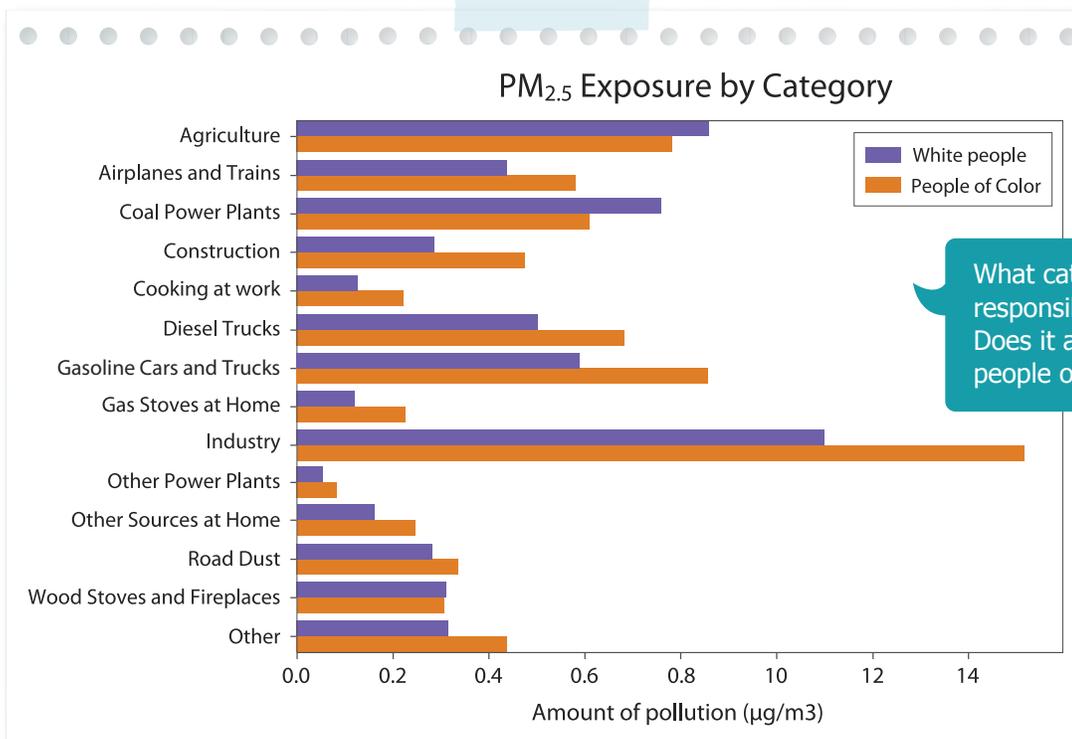


Figure 1: Percentage of total air pollution exposure from each pollution source. We combined this with census data and our knowledge of pollution in the atmosphere.



What category of pollution is responsible for the most exposure? Does it affect white people or people of color more?

Figure 2: The difference in air pollution experienced by each racial and ethnic group, shown by source of pollution.

Discussion

Our results show that it's not just one kind of pollution source that causes inequality. Almost every pollution source affects people of color more than white people. That means that fixing one or two pollution sources isn't enough to end inequality.

We checked whether the differences are due to differences in wealth. We also looked at whether it was different in small towns compared to big cities. Our results were basically the same for all states, cities, and rural areas, and for all income levels.

The total amount of pollution from each source depends on the part of the country.

Inequality in air pollution in the United States didn't happen randomly. The history of racism in the U.S. is an important part of the story. City planners put highways in the middle of Black and other minority neighborhoods. From the 1930s to the 1970s, the U.S. government told banks that lending money to people in minority neighborhoods was too risky. Without loans from banks, people couldn't get enough money to buy houses. This was part of a practice called **redlining**. It's illegal now, but people are still feeling the effects. **Our data showed that people who live in redlined neighborhoods are exposed to more air pollution than average.**

Conclusion

Air pollution is a big problem. Most people in the world live with air quality that's worse than World Health Organization guidelines recommend. Many things will need to change to make air quality better. In many places in the United States, air quality is much better now than it was even 20 years ago. But the disparity in air pollution exposure hasn't gone away. Individual choices can help, like choosing to ride a bike instead of driving a car. But not everyone is able to ride a bike to get to school or shopping or work, and in many places, it is unsafe.

The biggest changes come when people work together to make their communities better. This could mean:

- making public transport more convenient, cleaner, and safer.
- planning cities around bicycles and pedestrians instead of around cars.
- passing laws to stop the biggest polluters.
- closing coal power-plants and requiring solar, wind, and other renewable energy.
- requiring EVs or low-emission engines for cars, trucks, and off-road engines such as ships and construction equipment.

Look around at your community. What do you think would make it a better, safer, and fairer place to live?

Glossary of Key Terms

Air pollution - gases and particles in the air that harm the health of people and the environment.

Air quality - a measurement of the amount of air pollution.

Disparity - large differences between groups.

PM_{2.5} - particles in the air that are smaller than 2.5 microns (millionths of a meter) across. A lot of PM_{2.5} pollution comes from burning fuels like gasoline, diesel, natural gas, and coal.

Redlining - when banks refuse to give home loans to people just because of the neighborhood they live in. Redlining was common in the US from the 1930s to the 1970s.

Check your understanding

- 1 What makes PM_{2.5} dangerous?
- 2 Why might a minority neighborhood have worse air quality?
- 3 Is it easy to get around in your community without a car? If not, what would you change to make it easier?
- 4 Why is it important to work as a community to improve air quality instead of working alone?
- 5 In pairs or small groups, make a presentation about the transport options in your area. Explain the importance of public transportation, and make suggestions for increasing its use.

REFERENCES

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