How is asthma related to the neighborhood you live in?

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Abstract

Do you have asthma? In the US, asthma is more common in communities of color. But why is that? People of color are more likely to live in neighborhoods with worse air quality and more poverty. But this is only the start of the answer. Why are those neighborhoods like that?

A discriminatory system from 85 years ago labeled Black and Hispanic neighborhoods as worse ("lower grade") than white neighborhoods. This meant these neighborhoods received less investment (money) than white neighborhoods. We wanted to find out if this grading system from the past might relate to asthma rates in these neighborhoods today.

We found that asthma emergencies are more common in those neighborhoods that were once labeled low grade. So was air pollution, the percentage of people living in poverty, and the percentage of people of color. A discriminatory plan from many years ago may be one of the underlying causes of asthma emergencies among people of color today.

To fight asthma, we need to uplift all communities, especially those harmed by the low grade label. We also need to ensure that outlawed and outdated policies are not still harming people living in these places.

Introduction

An asthma attack can be a terrifying experience. Your chest tightens and you can’t draw in a full breath. You start wheezing and coughing. Asthma is a lung condition that causes airways to swell and get narrow. Scientists think environmental and social factors such as air pollution, poverty, and lack of proper health care increase the risk of developing asthma. Many people have asthma, but in the United States, asthma is more common and more deadly among Black Americans and people who are Hispanic than White Americans.

During an asthma attack, the airways become swollen and inflamed. The muscles around the airways contract and the airways produce extra mucus, causing the breathing tubes to narrow.
We think this inequity in asthma between races is linked to the neighborhoods people live in.

We based our hypothesis on the home-loan program that was created in the 1930s. During the economic depression of the 1930s, the U.S. government created a program to help people better afford to stay in their homes or to buy a home. Before loaning the money, the government tried to determine who was likely to pay the money back (low risk) and who was not (high risk). They looked at neighborhoods and created “risk maps.” The decisions about risk were often made based on the race and social class of the people in the neighborhoods. Neighborhoods where mostly white people lived were graded as the lowest risk (best investment). Other neighborhoods, where mostly Black and immigrant populations lived, were graded as the highest risk (worst investment).

Although this discriminatory ranking system was banned in 1968, it had already shaped the neighborhoods in many cities across the US. Does this system play a role in the asthma inequity between races that we see today? To test our hypothesis, we analyzed the relationship between this historical home-loan strategy and present-day asthma attacks.

### Methods

We conducted an environmental and social study on about 1400 neighborhoods in eight cities across the state of California: Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, San Jose, and Stockton. We analyzed the relationship between the way neighborhoods had been graded in the 1930s and current asthma data for each neighborhood.

**Historical risk grade:** We used color-coded “security maps” that were created by the federal government in the 1930s. In the maps, neighborhoods were assigned a risk level: A (best), B (still desirable), C (declining), and D (worst or hazardous). See Figure 1a.

**Current data:** We used official surveys from 2011 to 2013 to determine the following for each neighborhood:

1. **Asthma-related emergency visits.** We calculated the rates of emergency room visits due to asthma per 10,000 residents (Fig. 1b).
2. **Air pollution:** Using air pollution data, we estimated the amount of diesel particulate matter (particles in exhausts from diesel engines, such as trucks, buses, and trains). These particles can make asthma and other lung diseases worse.
3. **Population:** We calculated the percentage of people of color (Black Americans, Hispanics, Asians and other non-white people) and the percentage of people living in poverty.

### Figure 1:

A) Left: Color-coded map of San Diego. It shows how each neighborhood was graded during the Great Depression.

B) Right: Emergency hospital visits for asthma in the same neighborhoods from 2011 - 2013. The rates of asthma emergencies increase as the color gets darker.
Our results show that the discriminatory housing practice from the 1930s could be an underlying cause of racial differences in asthma rates today. To explain why, we need to look closer at the environmental and social influence it had on neighborhoods.

**Environmental:** The worst-graded neighborhoods were undesirable for building homes. Instead they were used for constructing highways and factories - most of which still exist. This may explain why air pollution and asthma rates are higher in neighborhoods of color compared to white neighborhoods.

**Social:** For many years, banks used this ranking system to accept or deny home-loan applicants. People of color were commonly denied the opportunity to buy a home so they couldn’t build up wealth to pass on to their children. The results are higher poverty rates, fewer educational opportunities, and lower access to quality health care. These difficult living conditions place people at a higher risk of developing asthma.

Our study can help policymakers reduce asthma disparities in the U.S. While improving air quality in communities of color would help, it is not enough on its own. We need to focus on removing the barriers that continue to stop these communities from thriving. Quality housing, health care, and clean air are essential for a healthy life, no matter where we live.
Conclusion

Discrimination is unfair and its effects can be long-lasting. Race-based loan policies in the US that were put in place more than 80 years ago helped to create neighborhoods where people suffer from poverty and air pollution today. This is an environmental injustice for people living in those neighborhoods. As young scientists, you can help to restore environmental justice in your community. Here are some ideas:

- Research a local environmental justice issue and brainstorm solutions.
- Start or join a school environmental club. Organize within these groups to advocate for the needs of your community.
- Volunteer with an organization working on environmental justice such as the Sunrise Movement (sunrisemovement.org).
- Write your local lawmakers - mayors, city council, district representatives in Congress, and Senators to demand change.
- Vote when you turn 18!

Glossary of Key Terms

- **Asthma** – a long-term disease of the lungs. It causes your airways to get inflamed and narrow and makes breathing difficult. Coughing, wheezing, shortness of breath, and chest tightness are classic asthma symptoms.
- **Diesel particulate matter** – gases and solid particles in the exhaust from trucks, buses, trains, ships, and other equipment with diesel engines. They contain hundreds of different chemicals and are harmful to health, and worsen asthma and other diseases.
- **Discriminatory** – treating people and groups unfairly based on characteristics such as race, gender, age, or sexual orientation.
- **Environmental justice** – the fair treatment and meaningful involvement of all people in the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means no group of people should bear an unfair share of the environmental harms or benefits.
- **Great Depression** – a severe worldwide economic depression that took place mostly during the 1930s, beginning in the United States. Markets crashed (stocks lost value) and consequently, many people lost their jobs, industries collapsed or were halted, and poverty increased.
- **Hispanic** – a Spanish-speaking person, especially one of Latin American descent, living in the US.
- **Home-loan** – money borrowed by a person from a bank, mortgage company or other financial institution for the purchase of a house.
- **Inequity** – Unfairness. In this case, the differences in asthma rates between different communities is called an “inequity” because it is an avoidable situation that has come from inequality.
- **Poverty** – the state of being extremely poor; not having enough financial resources to meet basic personal needs such as food, clothing, clean water, or a place to live.
- **Security maps** – color-coded maps that showed the loan security grade (risk) of each neighborhood: A to D, lowest risk to highest risk. These maps were used by banks and other financial institutes to either accept or deny home-loan applications.

Acknowledgement

This scientific article was adapted with support from The Goggio Family Foundation.
If a health outcome is seen to a greater or lesser extent between populations, there is a health disparity. What is the evidence of the asthma disparity in the US?

How does the historical neighborhood grading system still affect air quality in communities of color? What evidence is given in this study?

What are some other ways that the historical neighborhood grading system affects communities of color today? What evidence is given in this study?

We used asthma-related emergency department visits to measure asthma rates in neighborhoods. What could be the limitations of this data?

REFERENCES

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Asthma Research and Resources

https://www.healthandenvironment.org/environmental-health/health-diseases-and-disabilities/asthma-research-and-resources