

Project Pitch

There's an old myth that the Roman Empire fell, in part, due to lead poisoning caused by contamination in the tap water. Although not the main cause by far, some historians still argue that they cannot rule out the influence of lead contamination in the drinking water in speeding up Rome's demise. This fun fact evidences a fact that is both supported by evidence and assumed to be true by most: a person's environment is a major influence on their life and actions. Census data found that in Baltimore, lower-income areas where asbestos had not been removed from many homes were associated with higher crime rates. Across the United States, higher levels of depression, anxiety, and poor health conditions are seen in places where access to healthy foods is difficult. In 2014, there was massive national outrage about lead and bacteria contamination in Flint, Michigan. During this outrage, it was brought into the national spotlight how unsafe conditions can negatively affect people and communities.

In recent years, there has been a noticeable surge in environmental awareness and a heightened sense of urgency surrounding global warming within our national social consciousness. Widespread dissemination of information through social media, an increased focus on environmental issues by academic institutions, and a growing concern for the planet's future among teenagers and young adults are all contributing factors to this surge. As the impacts of climate change become more visible and tangible, we are recognizing the need for collective action to address these challenges. Sustainability initiatives, climate strikes, and environmental advocacy have become integral parts of campus life, reflecting our generation's commitment to making a positive impact on the environment and ensuring a more sustainable future for all. This growing environmental consciousness is not just a trend; it's a collective response to the pressing issues of our time, and it's reshaping the way we engage with and prioritize environmental concerns.

Analysis of changing environmental factors is done to understand, primarily, our relation to our environment. If the effects of the quality of our environment had no effect on us, such a

global increase in awareness would not have been possible. When doing analysis into environmental factors in a community, it is important to find correlations between environment and specific action seen in a community.

For our project, we will be analyzing potential links between air quality, respiratory health, and crime in New York City by year and location. We will find the prevalence of different chemicals and pollutants in the air in different boroughs and years in New York City, find the rates of respiratory illness and death in the areas during the same year, and connect it to crime statistics that happen at the same year and location. Through this analysis, we can find potential correlations between the level of air pollution in a specific area and the commonness of arrests for different crimes in that same area. With this data, hypotheses can be made about the impact of air pollution on cognitive factors, financial instability, and other factors closely connected to crime.

Data Sources

We will use two datasets as the basis of our analysis. These datasets are as follows:

NYPD Arrest Data (Year to Date) - *City of New York*

[NYPD Arrests Data \(Historic\) | NYC Open Data \(cityofnewyork.us\)](#)

- 5.5M observations of 19 features

Data is collected by the NYPD police department and consists of a list of arrest reports made across NYC boroughs from 2006 to 2022

Air Quality - *City of New York*

<https://catalog.data.gov/dataset/air-quality>

- 16,122 observations of 12 features

Data is collected by the NYCCAS real-time monitor network, a set of air quality monitors set up in various locations around New York City reporting the air quality of the NYC boroughs at different years

Background Research / Inspiration

<https://www.journals.uchicago.edu/doi/10.1086/707127#:~:text=The%20results%20suggest%20that%20exposure,leads%20to%203.7%25%20more%20crimes.>

Compare: Both our observations take place in densely populated cities and make connections between crime and factors outside of air pollution

Contrast: This study takes place in London, where different laws and police practices may affect arrest rates compared to New York City.

<https://www.ox.ac.uk/news/2023-07-06-poor-air-quality-found-affect-mental-health-many-ways>

Compare: Both our study and the article aim to provide insight into the impact of air pollution on mental health

Contrast: Our study, rather than making connections to mental health, makes an educated assumption of mental health impacts when considering the risk factors that lead to increased crime in an area.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8362969/#:~:text=Herrnstadt%20et%20al.,when%20the%20downside%20wind%20came.>

Compare: Both our analysis and the article hypothesize a correlation between worse air quality and increased frequency of crime in an urban setting.

Contrast: This study additionally focuses on victims of crime, which we will not be doing in the scope of this analysis. The study also looks into the statistics for the population of Australia who are not exposed to polluted air as frequently as those in New York.

<https://www.sph.umn.edu/news/air-pollution-linked-to-increases-in-violent-criminal-behavior/>

Compare: Both our analysis and this study connect crime statistics to mental health factors, and find connections between air quality and mental health.

Contrast: Our analysis focuses on a specific city, while the study focuses on national data from the Federal Bureau of Investigation, which may have different types of arrest records than a local police force.

https://www.erichmuehlegger.com/Working%20Papers/crime_LA_november_2019.pdf

Compare: Our analysis plans to focus on many similar trace chemicals in the air, most notably ozone levels. Both also put focus on densely-populated US cities.

Contrast: The study performed additional experimental study in a lab using mice, which we will not be doing for this project. Because of this, our response variables will likely be different.