Bus Rapid Transit Systems and Air Pollution In the Urban World

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MOTIVATION

According to the World Health Organization, air pollution kills seven million people across the globe each year. These deaths and other illnesses caused by poor air quality are most commonly found in low and middle income countries. As a result, urban development and improved transportation within an environmental lens is more important than ever.

Mass urban transit systems, such as subway systems, are extremely expensive. For developing countries that have limited resources, the construction cost of a subway system might prove to be too great even if long-term it may benefit the air quality and the mobility of workers.

Thus, we need to find other cost-effective solutions, such as BRTs, that can help mobilize and protect city-dwellers. BRTs are also an alternative for smaller cities in developed countries who may have less riders to support a more costly transit system.

OBJECTIVE

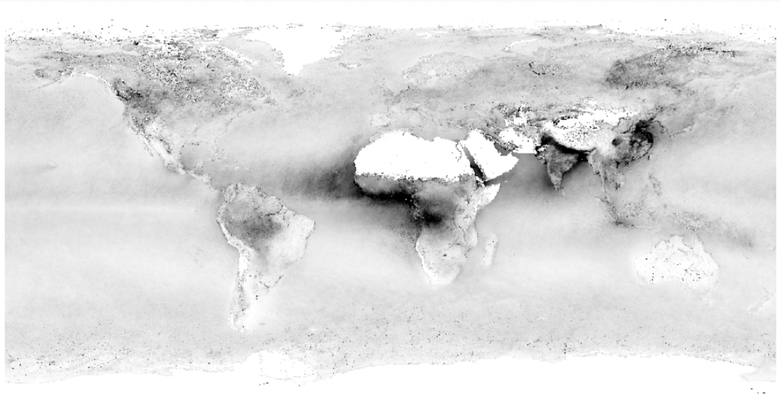
Does the implementation of a bus rapid transit system reduce air pollution over time within a given city?

DEPENDENT VARIABLE

The dependent variable for this project is aerosol optical depth (AOD), better known as air pollution, recorded by the Moderate Resolution Imaging Spectroradiometer (MODIS).

Annual average AOD - 2017

Image sourced from *Subways and Urban Air Pollution*



June

Literature Review

Understand the context of the subject by reviewing academic articles.

July

Cleaned Datasets

Prepare the dataset for the next step and conduct some preliminary tests.

August

Regression Analysis

Conduct various regressions in order to find an answer to our objective.

PRESENT

Interpreting the Results

Took the results and tried to apply context in order to understand them further.

DEALING WITH TIME

In order to find out whether or not the implementation of the Bus Rapid Transit system (BRT) was effective, I had to analyze the variation of air pollution over time.

In order to achieve this, I had to create mutually exclusive bins for each interval of time. In other words, I looked at the specific date of when the Bus Rapid Transit system opened and looked at the measured value of air pollution 18 months in the future. In this case, there were 4 mutually exclusive bins: 18 months before the BRT opening date, all time before the 18 months prior to the BRT opening date labelled as the "pre period", 18 months after the BRT opening date, and all time after the 18 months after the BRT opening date labelled as the "post period".

I repeated the creation of these mutually exclusive bins for 6 month intervals and 3 month intervals.

Example of Findings (18 month intervals -10km)

1. Basic Regression

- .0014628 (p = 0.814)

2. Regression with Climate Controls

-.0020452 (p=0.730)

3. City Fixed Effect Regression

- .0018927 (p=0.644)

4. City Fixed Effect with Controls

-.0007592 (p= 0.838)

FINDINGS & DISSCUSSION

The findings suggest that the implementation of the BRT has no significant impact on air quality within urban areas. Despite this, we cannot assume that public transportation systems have no positive effects on the environment and air quality. The reality remains that there exist many factors that are difficult to control for in our analysis and that vary immensely across cities.

An example of such an important yet elusive factor is the idea of path dependency and the overall public transit history of a given city. Research conducted by Leah Brooks and Genevieve Denoeux show that cities that historically had streetcars were better suited today to support the implementation of a BRT. This is because streets with streetcars were built wider and thus, as a result, the construction is easier today to recreate lanes for busses. To add, cities that had pre-existing infrastructure for public transit, such as stops or lanes, had an easier time integrating the BRT because they had a strong outline that they could build from. In cities that lacked such infrastructure, naturally there were more obstacles to overcome because public transit was a foreign commodity. Although, the history of city's previous urban transit system is an extremely important factor when we consider its success, it remains difficult to control for within large-scale research projects.

BIBLIOGRAPHY

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