

Final Group Proposal

INFOSCI 301

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## **Air Quality and Health Disparities: A Multidimensional Analysis**

### **DataSets**

1. Data descriptor or benchmark paper:
  - a. OpenAQ: <https://explore.openaq.org/?parameter=o3&active=false>
  - b. Papers: <https://ui.adsabs.harvard.edu/abs/2023AGUFMIN41C0602R/abstract>  
<https://ehp.niehs.nih.gov/doi/10.1289/isee.2016.3150?>
  - c. Open source platform that aggregates global air quality from governments and research grade monitors. Includes real time data and historical data. Fully compliant with Fair principles
2. United States Census:
  - a. <https://data.census.gov/table/ECNBASIC2017.EC1700BASIC?g=050XX00US24003.24001&tid=ECNBASIC2017.EC1700BASIC>
  - b. Shows indicators like income, race, education level, and poverty rates
  - c. gives context for understanding health outcomes
3. CDC Places:
  - a. <https://www.cdc.gov/places/tools/data-portal.html>
  - b. gives health information of areas around the US like asthma prevalence

The combination of these datasets allow us to create visualizations and analyze how air quality affects health and the addition of the US census data allows us to ensure that our data is not skewed by outside factors. It shows a more multidimensional and complete story about how air quality affects us.

All data and code will be made public on GitHub with documentation and steps for replicability.

### **Research Questions:**

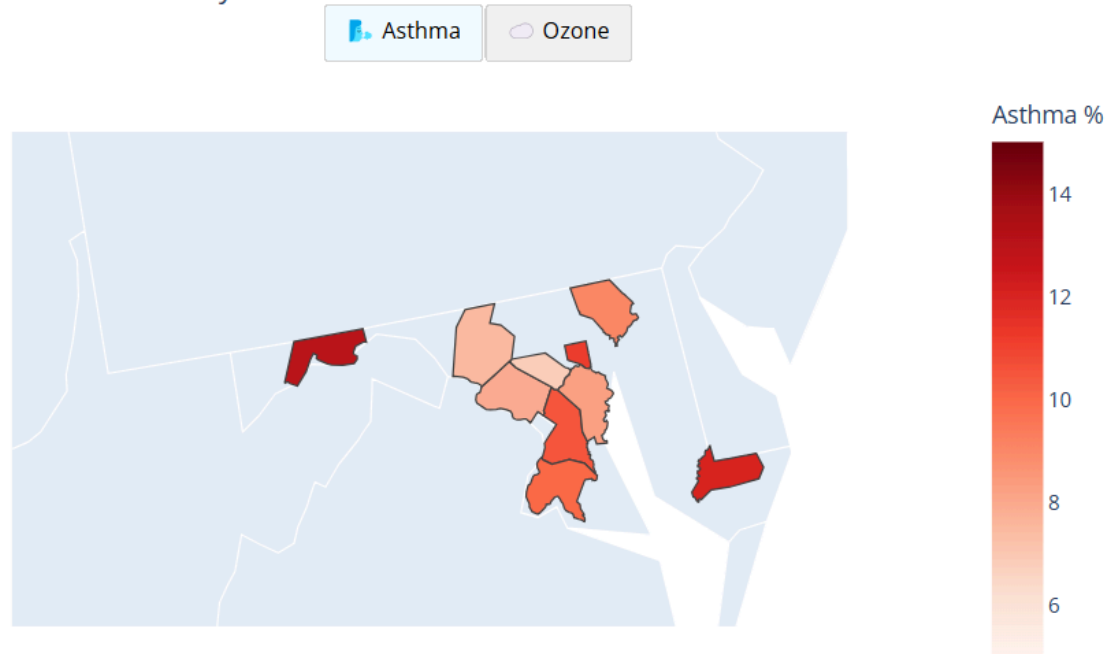
How do patterns of air pollution exposure align with reported respiratory illnesses and are these patterns influenced by socioeconomic status?

- Can visualizations uncover overlooked regions where lower air qualities and health overlap?
- Are there patterns between air quality and low income or minority neighborhoods?

Our primary audience would be public health researchers/environmental scientists and policy makers/local governments. The researchers might be interested in the correlation and the governments can make better informed decisions when it comes to urban health, planning, and environmental justice.

### Prototype:

#### Asthma Rates in Maryland Counties



**Figure 1.** *Interactive map showing environmental and health indicators across Maryland counties. Users can toggle between visualizing asthma prevalence (% of population affected) and ozone pollution levels (ppb). This view allows intuitive comparison between air quality and respiratory health risks at the local level, with contextual hover data showing both indicators.*

We drew inspiration from A Computational Design Process to Fabricate Sensing Network Physicalizations by S. Sandra Bae, Takanori Fujiwara, Anders Ynnerman, Ellen Yi-Luen Do, Michael L Rivera, Danielle Albers Szafir. The article discusses how physical sensors can be used

for meaningful visualizations and emphasizes integrating real-world sensor data. We took this and used real sensor data like OpenAQ's air monitors that track real time to make invisible problems like air quality understandable to allow future action



**Figure 2:** *Air Quality Data Analysis and Visualization Workflow*

**Github link:** <https://github.com/jiiean/301-Final-Project>

#### **Team Contribution Statement:**

- **Jiean:** Data sourcing, literature review, writing of proposal and methods sections.
- **NJ:** Prototype design, coding of data pipeline and interactive visualizations.

#### **References:**

Bae, S. S., Fujiwara, T., Ynnerman, A., Do, E. Y.-L., Rivera, M. L., & Szafir, D. A. (2023). A Computational Design Process to Fabricate Sensing Network Physicalizations. *IEEE VIS 2023*.

Centers for Disease Control and Prevention. (2023). *CDC PLACES: Local Data for Bette*

*Health*. Retrieved April 22, 2025, from <https://www.cdc.gov/places/tools/data-portal.html>

OpenAQ. (n.d.). *Explore OpenAQ*. Retrieved April 22, 2025, from <https://explore.openaq.org/?parameter=o3&active=false>

OpenAQ. (2016). *OpenAQ: Open Air Quality Data for Research and Action*. *Environmental Health Perspectives*, 124(7), A118–A119. <https://doi.org/10.1289/ehp.2016.3150>

Ramanathan, A., Wilkins, R., Murray, L., Kilaru, V., & Goshorn, M. (2023, December). *Crowdsourcing Air Quality: Supporting Community Science and Advocacy with OpenAQ* [Abstract]. AGU Fall Meeting 2023. <https://ui.adsabs.harvard.edu/abs/2023AGUFMIN41C0602R/abstract>

U.S. Census Bureau. (2017). *2017 Economic Census: EC1700BASIC*. Retrieved April 22, 2025, from <https://data.census.gov/table/ECNBASIC2017.EC1700BASIC?g=050XX00US24003,2001&tid=ECNBASIC2017.EC1700BASIC>