

## **Particulate Matter Pollution in Philadelphia and its Association with Asthma Exacerbations**

### **Abstract**

Asthma, a chronic lung disease characterized by variable airflow limitation, affects 18.7 million US adults. Exacerbations, which are episodes of worsening asthma requiring the use of systemic corticosteroids to prevent serious outcomes, are a major cause of morbidity and health care costs. Despite the availability of treatment options that are efficacious in clinical trials, asthma exacerbation rates in real-life populations remain high with persisting and marked disparities by race/ethnicity and socioeconomic status. Air pollution exposure is a prominent modifiable risk factor that exacerbates respiratory diseases and is associated with increased morbidity and death. Reducing exposure to pollution is recommended to patients on the basis of values obtained via regulated measures that cover large geographical areas. While such pollution measures are helpful, they are inherently limited in that they are unable to provide neighborhood or personal exposure data. Portable pollution sensors are becoming increasingly accurate and affordable devices that allow for personalized measures of the environment. In this proposal, we seek to (1) identify geographic areas in Philadelphia where asthma patients are more prone to have exacerbations, (2) use portable pollution sensors to characterize neighborhood air pollution differences in Philadelphia and relate these to asthma exacerbation rates, and (3) measure individual differences in air pollution exposure among asthma patients residing in a single neighborhood. This project will determine the geospatial distribution of asthma exacerbations in Philadelphia and measure whether air pollution is associated with such differences. Further, it will establish the feasibility and utility of using individual-level pollution sensor data to measure associations with disease outcomes. Characterizing the geographic distribution of asthma events and establishing the utility of portable sensor data will enable more comprehensive studies of asthma exacerbation risk factors and gene-by environment interactions, as well as the design of personalized interventions to decrease asthma exacerbations.