# Identifying "At-Risk Populations": Applying High-Resolution Air Quality, Demographic, and Baseline Health Data To Define and Locate At-Risk Populations

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**Background and Objectives:** The U.S. Environmental Protection Agency recently undertook a pilot project for Detroit that simulated two contrasting air quality management strategies: both met $PM_{2.5}$ and ozone air quality targets, while one minimized costs for each pollutant and the other aimed to maximize health benefits (i.e., reducing population-level air pollution risks). This supplemental analysis introduces a technique for identifying high-risk populations and investigates whether a multi-pollutant, risk-based strategy can more effectively reduce health impacts among these at-risk groups.

**Methods:** Applying fine-scale, multi-pollutant air quality modeling, we identified populations experiencing the highest concentrations of air pollution. Next, we utilized 1 km-level demographic data and ZIP code level hospitalization rates to detect those most likely to experience pollution-related health impacts: populations that frequently seek hospital care for respiratory or cardiovascular symptoms. Using Geographic Information Systems (GIS), we combined these data layers and assessed whether the least-cost or maximum risk reduction strategy achieves the larger exposure reduction specifically among these at-risk populations.

**Results:** The GIS-based technique identifies several clusters of populations of African American children. Among these populations, the multi-pollutant, risk-based strategy produces three times larger reductions in $PM_{2.5}$ exposure than the traditional "least-cost" strategy.

**Conclusion:** Considering spatially refined air quality, health, and demographic data jointly allows us to locate at-risk populations. Risk-based strategies can maximize air quality improvements among both general and high-risk populations.