

PROBLEM FORMULATION

BACKGROUND CONTEXT:

Urban air pollution is a critical environmental issue that poses significant risks to public health, especially in rapidly growing cities. Industrial emissions, vehicular traffic, and construction activities contribute to rising pollutant levels, making it essential to understand the relationship between air pollution and health outcomes. With urban populations continuing to expand, the need for data-driven solutions to mitigate air pollution's harmful effects is more urgent than ever.

PROBLEM STATEMENT:

Urban air pollution is directly linked to various adverse health effects, including respiratory diseases, cardiovascular conditions, and increased mortality rates. However, there is limited comprehensive analysis that quantifies the correlation between pollutant levels and health outcomes across different demographic groups. This project aims to fill this gap by analyzing air quality data and health records to identify patterns and provide actionable insights for policymakers and urban planners.

OBJECTIVES:

- Analyze the concentrations of key air pollutants (PM2.5, PM10, NO2, SO2, CO, and O3) in urban environments.
- Investigate the statistical correlation between air pollution levels and public health risks.
- Assess the impact of air pollution on different demographic groups based on age, gender, and socioeconomic status.
- Provide data-driven recommendations for policy interventions and sustainable urban planning.

RESEARCH QUESTIONS:

- What is the relationship between urban air pollution levels and the incidence of respiratory and cardiovascular diseases?
- How do pollution-related health risks vary across different demographic groups?

- What are the most critical pollutants contributing to public health risks?
- What policy interventions and urban planning strategies can effectively reduce the health impacts of air pollution?

SCOPE OF WORK:

- Collect air quality data from environmental agencies and health records from hospitals or government health departments.
- Perform statistical analyses to identify correlations between pollutant levels and health indicators.
- Focus on urban areas with varying pollution levels within the last five years.
- Limit the study to major pollutants (PM2.5, PM10, NO2, SO2, CO, and O3) and key health outcomes such as respiratory diseases, cardiovascular conditions, and mortality rates.
- Exclude rural areas and other indirect pollution effects (e.g., noise pollution).

CHALLENGES:

- Incomplete or inconsistent datasets.
- Confidentiality issues in accessing health records.
- Potential influence of confounding variables on the correlation between pollution and health outcomes.
- Difficulty in obtaining recent and localized data from different urban centers.

SIGNIFICANCE:

Understanding the relationship between air pollution and public health is crucial for developing effective policies and urban planning strategies. This project will provide evidence-based insights that can help policymakers prioritize interventions, improve air quality monitoring systems, and design sustainable urban environments. By addressing the health impacts of urban air pollution, this study will contribute to healthier and more resilient urban communities.