

The Impacts of Short-Term Changes in Air Quality on Emergency Room and Hospital Use in California's San Joaquin Valley

Report Snapshot

ON THE DAYS WITH THE WORST AIR POLLUTION, MORE VALLEY RESIDENTS USE EMERGENCY ROOMS AND HOSPITALS

The findings of a recent CVhPI study for the San Joaquin Valley Air Pollution Control District provide important new regional evidence for the public health consequences of air pollution. This study offers the first local evidence of short-term population-level health effects associated with elevations in PM_{2.5} and ozone for the San Joaquin Valley, demonstrating linear increases in rates of asthma ER and hospital admissions with increasing levels of air pollution, with effects more pronounced for children.

The San Joaquin Valley is arguably the most polluted air basin in the United States. In particular, Bakersfield and Fresno are consistently ranked by the American Lung Association as the #1 and #2 cities in the nation, respectively, for the highest concentrations of short-term ambient fine particulate matter (PM_{2.5}). This study combined air quality and health care utilization data for Fresno/Clovis, Bakersfield and Modesto to address the following question: Are short-term increases in air pollution (PM_{2.5} or ozone) associated with respiratory and cardiovascular emergency department and hospital admissions in the San Joaquin Valley?

We studied emergency room and hospital admissions on a daily basis for selected conditions, such as asthma and acute myocardial infarction (MI), that have been previously linked to air pollution in other studies from around the world. We studied how variations in the daily number of admissions were correlated with PM_{2.5} and ozone levels over several years. We focused on zip codes near air quality monitors in Bakersfield, Fresno and Modesto. Our analyses also took into account co-pollutants, weather, seasonality and other time dependent factors.

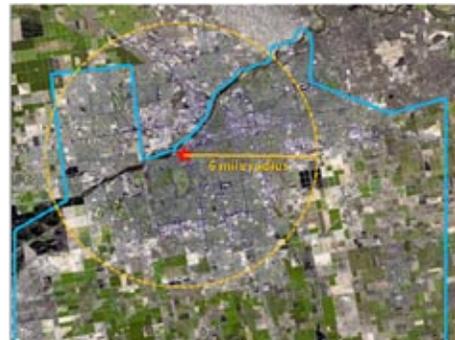
Geographic study area



MODESTO



FRESNO

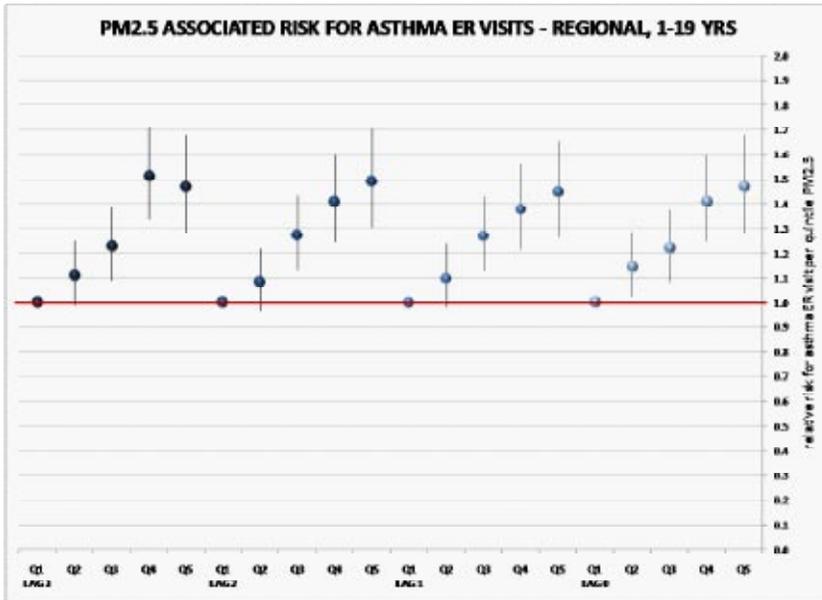


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We found that asthma ER admissions are strongly linked to increasing PM2.5 across the Valley, with a higher risk in children. Risk for asthma hospitalizations also increased dramatically with PM2.5 in children and adults across the region.

In the figure below, we show what happens on the same day, and one, two and three days after at varying PM2.5 exposure levels (quintiles). The figure shows that children experience a linear increase in risk of asthma ER admission as the level of PM 2.5 increases.

Relative risk for PM2.5-associated asthma ER a visit for 1-19 yrs old for the region



A moderate increase in risk of acute MI (heart attack) was also linked to PM2.5 levels regionally, as were pneumonia ER visits in children and acute bronchitis ER visits in adults. Individual city analyses showed a similarly strong correlation between children's asthma ER visits and PM2.5 in all three cities, while correlations between PM2.5 and other diseases or age groups varied by city. Ozone was also found to be strongly linked to increased risk for asthma ER visits in children during the hottest summer months.

Relative risk for PM2.5-associated acute MI hospitalization for 20+ yrs old for the region

