

Studies of Health Impacts of Air Pollution in the San Joaquin Valley

June 23, 2005

Air Resources Board

California Environmental Protection Agency



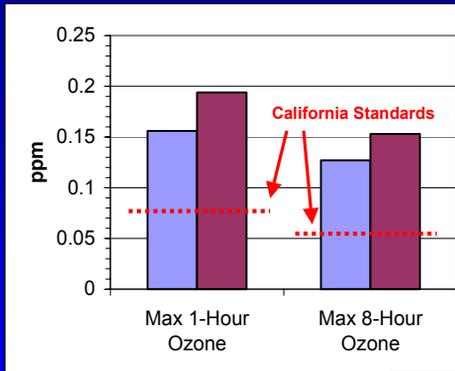
Thank you, Ms. Witherspoon. Good morning, Madame Chairman and members of the Board.

The San Joaquin Valley Air Basin is one of the fastest growing areas in the state. The air quality in the basin is impacted by several source types including motor vehicle emissions, oil production and refining, and agriculture.

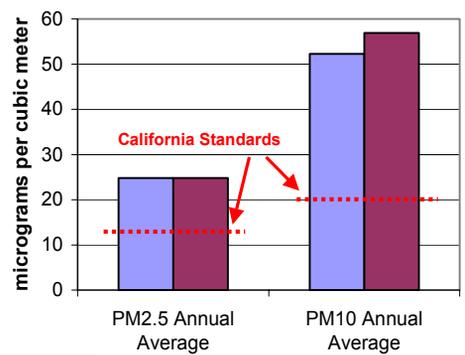
Today we want to discuss several studies that use a variety of methods to study the health impacts of air quality in the San Joaquin Valley Air Basin. Some of these studies have been completed and others in still being conducted.

San Joaquin Valley Air Quality

Ozone



Particulate Matter



Legend:
San Joaquin Valley (light blue)
South Coast AQMD (maroon)



2003 data from the ARB California Ambient Air Quality Data CD,
PTSD January 2005

2

As a result of the unique geography and meteorology of the valley and the many sources of air pollution, air quality in the valley routinely violates the state and federal standards.

For comparison, only the South Coast Air Basin had a higher maximum ozone concentration for both the 1-hour and 8-hour ozone averages than the San Joaquin Valley Air Basin.

The San Joaquin Valley also has some of the highest particulate matter concentrations in the state. As an example, the valley has long-term concentrations of both PM2.5 and PM10 similar to the South Coast Air Basin.

Health Benefits of Meeting the State Standards

	Combined PM and Ozone Health Effects	
	SJV	Statewide
Mortality	1100	6830
Hospital Admissions	1150	7700
Emergency Room Visits	280	1860
School Absences	700,000+	3,700,000+
Minor Restricted Activity Days	1,460,000	10,500,000



The air quality in the valley and the exceedances of the air quality standards can have significant health impacts. For example, if the state annual average PM_{2.5} standard were met, approximately 1000 pre-mature deaths would be avoided annually. Approximately 100 pre-mature deaths would be avoided by meeting the new California 8-hour ozone standard in the San Joaquin Valley.

Statewide figures are also presented in this table. When comparing the valley figures to the statewide figures it should be noted that the San Joaquin Valley has about 1/10th the statewide population.

Asthma Prevalence in SJV

County	Prevalence in Children (age 0 – 17)	Prevalence in Adults (age 18+)
Fresno	16.4	11.9
Kern	10.0	9.0
San Joaquin	10.1	8.9
Stanislaus	9.3	9.9
Tulare	10.5	8.8
Merced	11.8	11.7
Kings	14.7	10.0
Madera	11.1	11.2
SJV Average	11.9	10.1
California Average	9.6	8.5



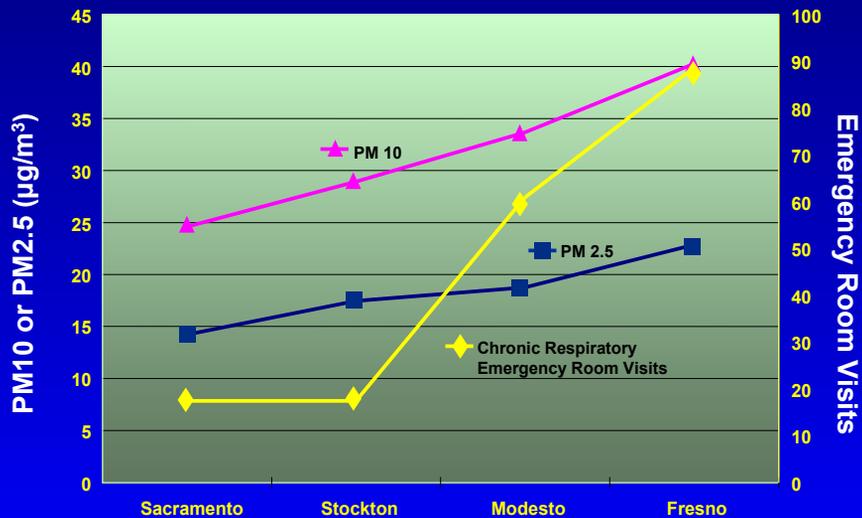
2001 data from the California Health Interview Survey, UCLA

4

Of special note are the high rates of asthma prevalence in the San Joaquin Valley.

Health surveys reported in 2001 by the California Health Interview Survey show a 24% higher prevalence of asthma in children in the San Joaquin Valley than in the rest of the state and a 19% higher prevalence for adults. There are approximately 110,000 children and 240,000 adults with asthma in the San Joaquin Valley.

Particulate Matter Pollution Chronic Respiratory Emergency Room Visits



Van den Eeden, Stephen K, et. al. Particulate Air Pollution and Morbidity in the California Central Valley: A High Particulate Pollution Region, ARB Final Report, Contract 97-303, 2002

5

In 1999 the ARB funded a study with Kaiser Permanente to investigate the relationship between the exposure to particulate pollution selected respiratory and cardiovascular diseases in the Central Valley. This study examined the impact of air pollution on emergency room visits and hospitalizations in 1997 through 2001 in both the Sacramento and San Joaquin valleys.

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In this slide we compare the emergency room visits for chronic respiratory conditions in four different cities forming a transect down the valley.

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For PM10 we observe an increase in levels as we move down the Central Valley from Sacramento to Fresno.

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For PM2.5 we also observe an increase in concentration from Sacramento to Fresno.

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The rates of emergency room visits per 1,000 population increased in association with increasing pollution from city to city with the highest rates observed in Fresno. Although, the study did not separate specific admission diagnoses in each area, Fresno has a much higher rate of asthma in the pediatric population than the rest of California. This may play a part in these increased emergency room visits.

Respiratory Effects

- Respiratory effects of PM in animals¹
 - Concentrated ambient particles
 - Cytotoxic and inflammatory responses
- Airway changes in young Hispanic males²
 - Deaths due to non-respiratory causes
 - Bronchiole wall thickening and remodeling
 - Deposition of particles (PM_{2.5}) in lungs



¹ Smith, Kevin R, et.al, Airborne Particles of the California Central Valley Alter the Lungs of Health Adult Rats, Environ Health Perspectives, 111: 902-908 (2003)

² Pinkerton, Kent E., et. al, Distribution of Particulate Matter and Tissue Remodeling in the Human Lung, Environ Health Perspectives, 108: 1063-1069 (2000)

Investigators from UC Davis have conducted a number of studies in the Fresno area, two of which are presented here.

In the first study on this slide, researchers used an animal model to investigate the effect of fine and ultrafine particles on the respiratory system. Rats were exposed in Fresno to concentrated local ambient particles at varying concentrations. The study found consistent cytotoxic and inflammatory responses in the lungs with exposure to fine and ultrafine particles. The viability of cells recovered by bronchoalveolar lavage was significantly decreased during 4 to 6 weeks of exposure compared to rats exposed to filtered air.

In a second study conducted by UC Davis in Fresno, researchers studied changes in the airways of young Hispanic men during autopsies following death due to non-respiratory causes. Lung specimens of the the terminal bronchioles, which form the transitional zone between the conducting airways and the gas-exchange regions of the lungs showed marked thickening and physiological changes of the walls. The thickened regions contained moderate to heavy amounts of carbonaceous and mineral dusts. The importance of this site as a target for particle-induced injury is well established in occupational settings as the primary site of injury in coal workers pneumoconiosis (also know as black lung disease), asbestosis, and silica- and silicate-induced injury.

Fresno Asthmatic Children's Environment Study

- Study of air pollution effects on asthma symptoms and long-term asthma progression
- Draft Final Report due Fall 2005
- NIH application for 5-year study extension



The Air Resources Board is currently funding the Fresno Asthmatic Children's Environment Study or FACES. This five year study involves over 300 children in Fresno who are already diagnosed with asthma and recruited between the ages of 6 and 11. The study is designed to look at the effects of environmental factors including air pollution on the symptoms and the long term progression of asthma.

The investigators have applied to the NIH for additional funding to extend the study to the year 2010. They have also applied for funding support from the ARB until the NIH grant is reviewed.

Conclusions

- Reduction of particulate and ozone pollution is of great importance to the health of the Central Valley population
- Standards are set to protect the most sensitive populations
- Ongoing studies will further define pollution effects in the valley



The results of these studies confirm our belief that reduction of particulate matter and ozone pollution in the Central Valley is of great importance to the health and well being of the population. The Air Resources Board sets standards to protect the most sensitive populations. Ongoing studies, including the Teachers' Cohort Study funded by the ARB will help to evaluate the effects on elderly persons with cardiovascular disease.

Thank you for your attention. I would be happy to answer any questions.