

Team 12: Air Pollution and its Health Impacts in Fresno, CA

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Introduction

Causes

1. Geography and Meteorology
 - a. Surrounding mountain ranges create a pool of emissions in the San Joaquin Valley
 - b. Thermal inversions
2. Agribusiness
 - a. Account for 21% of the emissions that form ozone gases
3. Dense Population and Human Activity
 - a. 5th most populous city in California
 - b. High rates of traffic and congestion
 - c. Increased ozone emissions through the release and dissemination of nitrogen oxides and volatile organic compounds

Proposed Solutions

1. Consult lower-income households and populations most vulnerable when creating public policy
2. Promote public transportation instead of automobile use
3. Investing in clean boilers & green building materials
4. Implement bio-organic fertilizers in place of inorganic chemical-based fertilizers to improve soil fertility and crop productivity

Findings

Impact of Air Pollution on the Environment

1. Carbon dioxide and GHGs are the primary contributors to climate change
2. Increases instances of wildfires and desertification

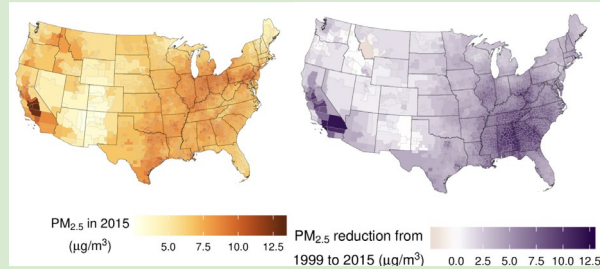


Figure 1. Population-weighted average PM_{2.5} concentration in 1,339 counties or merged county units (Bennett et al. 2019)

Human Health Impacts

1. Respiratory problems in individuals ages 15-60 years, increased risk of cardiovascular problems and cancer
2. Highest rate of childhood asthma in the country

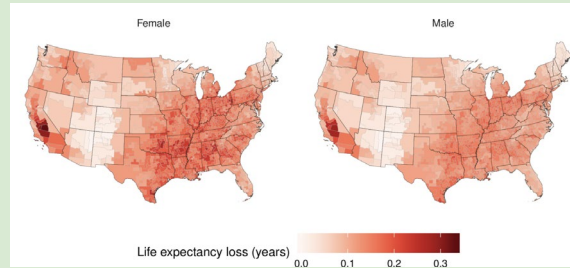


Figure 2. Life expectancy loss in 2015 from PM_{2.5} exceeding the observed minimum of 2.8 µg/m³. (Bennett et al. 2019)

Financial Proposed Solution

Unallocated Cap and Trade Proceeds

1. Three Complementary Incentive Programs
 - a. Transit and Intercity Rail Capital Program
 - b. Low Carbon Transit Operations Program
 - c. Low Carbon Transportation Program

Subsidies Provided by the USDA Conservation Programs

1. California has totaled \$757,378,000 from Subtotal, Farming Subsidies between the years of 1995-2020

Cost Analysis

1. 5 electric buses will save the city approximately \$15 million over 10-12 years. Installing energy efficient boilers will save \$10 million for every 15 buildings.
2. Electric buses emit 60% less CO₂ than diesel buses
3. Measure results of solutions through the Air Quality Index (AQI)

Literature Cited

- American Lung Association . (2021). *State of the Air* . lung.org.https://www.lung.org/getmedia/17c6b6c-8a38-42a7-a3b0-6744011da370/sota-2021.pdf.
- Bennett J.E., Tamura-Wicks H., Parks R.M., Burnett R.T., Pope CA III, Bechle M.J., et al. (2019). Particulate matter air pollution and national and county life expectancy loss in the USA: A spatiotemporal analysis. *PLoS Med* 16(7): e1002856. <https://doi.org/10.1371/journal.pmed.1002856>
- Cap and Trade*. Fresno Council of Governments. (2020, September 2). <https://www.fresnocog.org/project/cap-and-trade/>.
- Cowan, Tadlock. 2005. "California's San Joaquin Valley: A Region in Transition." Congressional Research Service. The Library of Congress.
- San Joaquin Valley Air Pollution Control District. (2006). Clean Air Primer. http://www.valleyair.org/news/ea_primer/bigpicture/III4-4a.html.
- Sheehan, T. (2020, May 2). *Fresno is growing, but how much? New data reveals San Joaquin Valley's population trends* . The Fresno Bee. <https://www.fresnobee.com/news/local/article242444461.html>.