

Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using the U.S. Environmental Protection Agency Methodology

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Introduction

PM2.5 Health Impacts in California

- **South Coast and San Joaquin Valley exceed the national PM2.5 standard**
 - All Californians are exposed to PM2.5
- **PM2.5 is a significant health risk, causing premature deaths**
 - Scientific studies demonstrate health impacts occur even below the federal standard
 - Impacts occur whenever people are exposed, wherever they are



New PM2.5 Report

- **Answers the question: How many deaths are caused by PM2.5 exposure in California**
- **Applied USEPA methods to California**
- **Used California air pollution measurements from 90 monitoring stations throughout the State**



Clean Air Act Requirements

- **USEPA sets national air pollution standards**
 - Reviewed every 5 years
- **Each state must meet national air quality standards**
- **Sanctions for failure to attain standards**



EPA PM2.5 Standard Review Process

1. **Comprehensive review of more than 1000 studies**
 - Found causal link between PM2.5 exposure and premature deaths
 - Completed: December, 2009



U.S. EPA Science Assessment

“Collectively, the evidence is sufficient to conclude that the relationship between long-term PM_{2.5} exposures and mortality is causal.”

- Highest Level of Certainty**



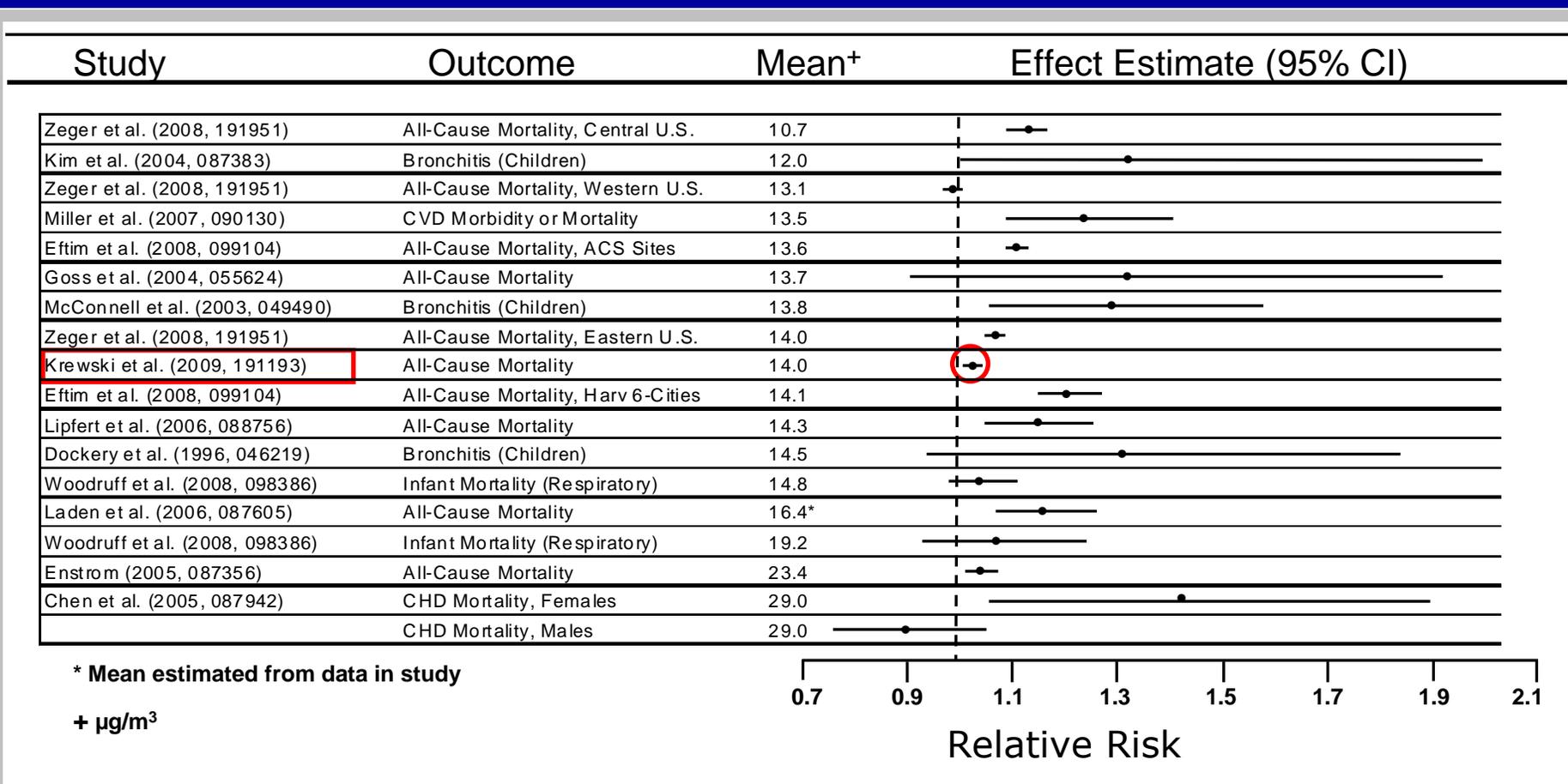
EPA PM2.5 Standard Review Process

2. Risk assessment

- Developed numerical relationship between PM2.5 exposure and deaths
- Found premature deaths caused by PM2.5 occur at levels as low as 5.8 micrograms per cubic meter
 - Federal standard is currently 15 micrograms per cubic meter
- Completed: June, 2010



Summary of U.S. EPA Long-Term PM-Related Health Studies



USEPA Summary: Results

- Vast majority of studies show relationship between PM2.5 and premature mortality
- EPA selected risk factor from the Krewski study
- 63,000 to 80,000 deaths each year in the U.S. related to PM2.5
- Included estimates for Los Angeles and Fresno



Core Health Study: American Cancer Society Study

- **Reanalyzed and validated, peer reviewed**
- **Considers influence of smoking and other factors on premature death**
- **Krewski et al. (2009)**
 - **Most recent update**
 - **18 years of follow-up**
 - **About 500,000 participants**
 - **116 U.S. cities**
 - **Two exposure periods (1979-1983 and 1999-2000)**



Clean Air Scientific Advisory Committee (CASAC)

- **Reviewed USEPA science assessment and risk assessment**
- **Supported conclusion that long-term exposure to PM_{2.5} is causally associated with mortality**
- **Supported risk assessment methodology**



The American Heart Association Reached Similar Conclusions

- **Long-term exposure to PM2.5**
 - Increases the risk for cardiovascular deaths
 - Reduces life expectancy
 - Reductions in PM levels are associated with decreases in cardiovascular deaths
- **Overall evidence is consistent with a causal relationship between PM2.5 exposure and cardiovascular illness and death**



How Did ARB Apply the EPA Method?

- Used EPA method and risk factor to estimate deaths caused by PM2.5 exposure in California
 - Applied to California population
 - Used data from California statewide air monitoring network: 90 stations



California Monitoring Sites



Estimated Premature Deaths in California

- **9,200 premature deaths in California every year associated with exposure to PM2.5**
 - Range of estimates: 7,300 - 11,000
- **Meeting the current federal PM2.5 standard would avoid 2,700 deaths per year**
 - Range of estimates: 2,100 – 3,300



Comparison to Other Causes of Death

- **In California (2007)**
 - **>200,000 deaths per year (all causes)**
 - About 45% due to cardiopulmonary diseases
 - **11,000 deaths due to accidents**
 - 4,000 deaths due to motor vehicles
 - **2,000 homicides**



Conclusions

- **There is a causal link between PM2.5 exposure and premature deaths**
 - Including at levels well below federal standards
- **South Coast and San Joaquin Valley do not currently meet federal PM2.5 standards**
- **There are 9,200 deaths annually in California due to PM2.5 exposure**
- **Reducing PM2.5 emissions will reduce PM2.5 related deaths in California**

