

HEALTHY COMMUNITIES DATA AND INDICATORS PROJECT

Short Title: Ozone Air Pollution

Full Title: Annual Average Number of Unhealthy Days of Ozone Air Pollution

1. **Healthy Community Framework:** Quality and sustainability of the environment
2. **What is our aspirational goal:** Clean air, soil and water, and environments free of excessive noise
3. **Why is this important to health?**

Description of significance and health connection

Clean air is a fundamental building block of human health. Air pollution from fixed and mobile sources (e.g. factories and cars, respectively) is a complex mixture of gases, fumes, and particles released into the atmosphere from the combustion of fossil fuels and evaporation of solvents. Ozone that forms at the ground-level and fine particulate matter (described separately) are two indicators of air pollution that are linked to short- and long-term adverse health effects. In California, the Air Resources Board estimated that 630 deaths, 4,200 hospital admissions, and 4.7 million lost school days could be prevented each year if California met its current statewide standard of 0.070 ppm for ozone (8-hour average). Most California residents are currently exposed to levels at or above the current State ozone standard during some parts of the year. Besides harming human health, ground level ozone can harm crops and potentially alter food quality and costs. Ozone can cause significant damage to a wide range of materials found in the built environment, which can shorten material life span and increase maintenance costs.

Summary of evidence

Laboratory studies in which human subjects were exposed to measured concentrations of ozone for brief periods demonstrate that ozone can reduce lung function, increase respiratory symptoms, increase airway hyper-reactivity, and increase airway inflammation. Numerous community-based epidemiologic studies have shown that exposure to ozone is also associated with decreased lung function, respiratory symptoms, hospitalizations for cardiopulmonary causes, emergency room visits for asthma, and premature death. At higher daily concentrations, ozone increases asthma attacks, hospital admissions, daily mortality, and days of restricted activity and school absences. Children may be more affected by ozone than the general population due to effects on the developing lung and to relatively higher exposure than adults.¹⁻²

References

1. Drechsler D, Garcia C, Tran H, Mehadi A, Nystrom M, Propper R, et al. Review of the California Ambient Air Quality Standard For Ozone. Vol 4. Table B-5: California Annual Health Impacts of Current Ozone Concentrations Compared to the State 8-hour Ozone Standard of 0.070 ppm. Sacramento, CA: California Environmental Protection Agency, Air Resources Board; 2005. <http://www.arb.ca.gov/carbis/research/aaqs/ozone-rs/rev-staff/vol4.pdf>. Accessed on January 4, 2013.

2. Committee On Estimating Mortality Risk Reduction Benefits From Decreasing Tropospheric Ozone Exposure. Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution. Washington, DC: National Academy of Sciences; 2008. <http://www.nap.edu/catalog/12198.html>. Accessed on January 4, 2013.

4. What is the indicator?

Detailed Definition of the Indicator: Three-year annual average number of days from May to October that exceed the 8-hour federal ozone standard of 0.075 ppm.

- Stratification: Race/ethnicity (8 Census groups)

Data Description

- Data source: Air Monitoring Network, Air Resources Board (CARB) <http://www.arb.ca.gov/aqmis2/aqmis2.php>
- Years available: three-year average of 2007-2009
- Updated: not stated
- Geographies available: zip codes, and population weighted averages for place, county, region, California

A network of approximately 300 air monitoring stations is maintained in California by the California Air Resource Board, local air pollution control districts, tribes and federal land managers. Ozone formation is strongly influenced by sunlight and temperature, so the preponderance of unhealthy days occurs from May through October. An unhealthy day is defined as a day (from May to October) in which the daily maximum value exceeded the federal standard. A statistical average of ozone measurements was calculated for each zip code based on monitoring stations within a 50 km radius. To calculate averages for cities, places, and regions, the number of unhealthy days was weighted by the population in the zip code based on U.S. 2010 Census files that parsed zip codes by place and county. To calculate race/ethnicity specific weighted averages, the proportion of race/ethnicities by zip code was calculated from U.S. 2010 Census files. Regional estimates were based on county groupings associated with California metropolitan planning organizations as reported in the *2010 California Regional Progress Report* (http://www.dot.ca.gov/hq/tpp/offices/orip/Collaborative%20Planning/Files/CARegionalProgress_2-1-2011.pdf).

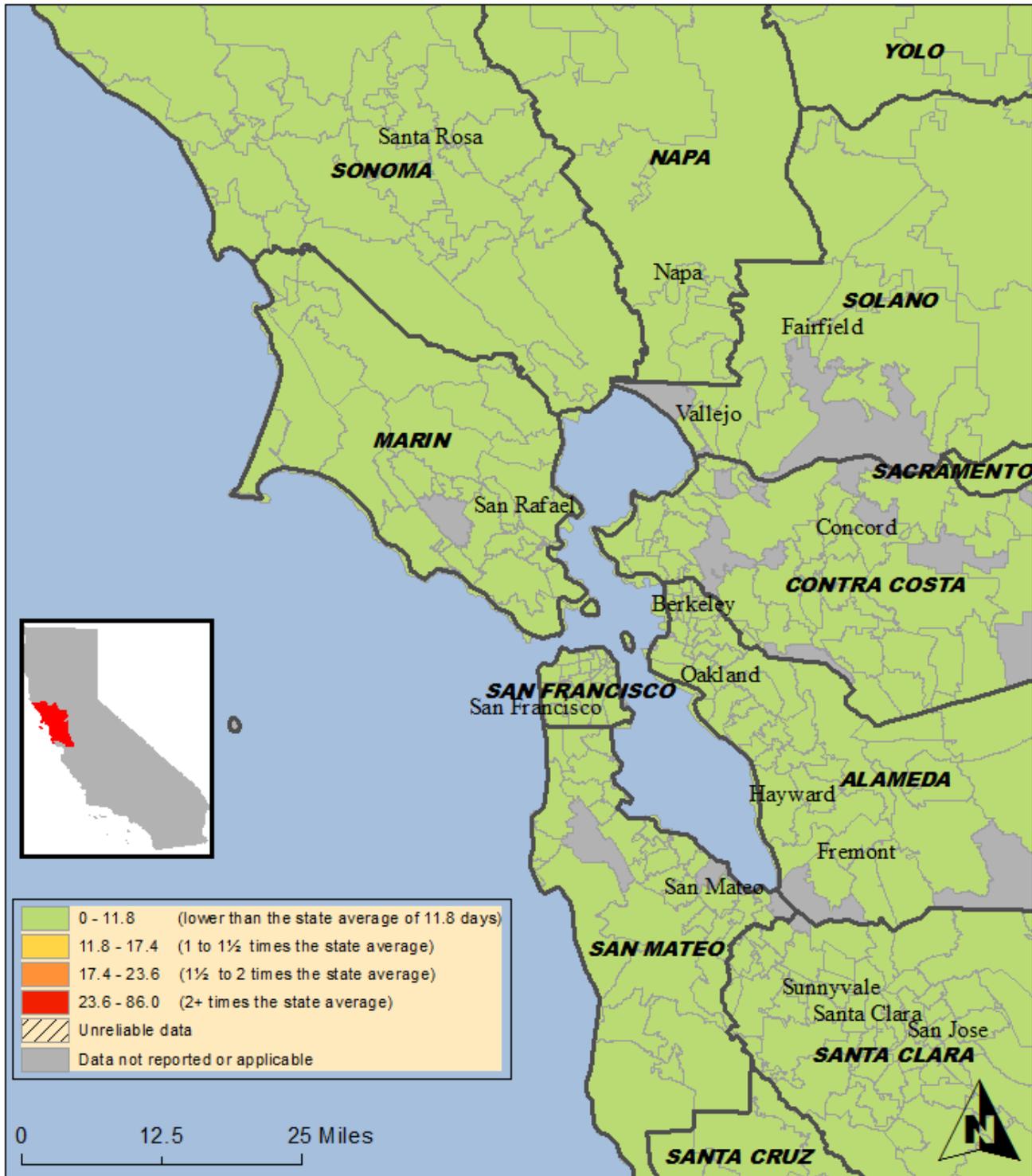
5. Limitations

Geographic coverage was not complete because of the limited number and geographic extent of monitoring stations. The uncertainty of the interpolated values increases with distance from the nearest monitor. According to the Air Resources Board, values for areas greater than 50 km from the nearest monitor are very imprecise, and should be regarded as speculative. They are included for the sake of completeness, but should not be relied upon. Even within populated areas, monitoring stations are often located in areas that cannot detect highly localized areas of pollution that significant numbers or sensitive subgroups (daycare centers, schools, hospitals, etc.) in the population may encounter. Data were not available to present standard errors.

6. Projects using this/these indicator

Draft California Communities Environmental Health Screening Tool (CalEnviroScreen) <http://oehha.ca.gov/ej/cipa073012.html>

Map 2: Annual Average Number of Unhealthy Days of Ozone Air Pollution, by Zip Code, Bay Area Region, 2007-2009



Source: Air Monitoring Network, Air Resources Board (CARB)

Analysis is by CDPH and UCSF