

Monitored Air Quality: Annual PM 2.5 Level

Type of EPHT Indicator	Hazard
Measure	<ol style="list-style-type: none"> 1. Annual average ambient concentrations of PM_{2.5} in micrograms per cubic meter (based on seasonal averages and daily measurement) 2. Annual percent of population living in counties exceeding the National Ambient Air Quality Standard (compared to percent of population living in counties that meet the standard and percent of population living in counties without PM_{2.5} monitoring)
Derivation of measure	Refer to the How-to Guide (contact CDC for the latest version of this document)
Unit	<ol style="list-style-type: none"> 1. Microgram per cubic meter (µg/m³) 2. Population proportion by hazard level
Geographic Scope	Iowa
Geographic Scale	County where monitors exist (daily values from each monitor)
Time Period	2001-2009
Time Scale	Calendar year
Rationale	<p>According to work conducted by Pope et al. (3), long-term exposure to PM_{2.5} is related to many adverse health conditions. Each 10 µg/m³ elevation in PM_{2.5} is related to an 8% increase in lung cancer mortality, a 6% increase in cardiopulmonary mortality, and a 4% increase in death from general causes.</p> <p>The annual average provides an indication of the long-term trends in overall PM_{2.5} burden, relevant to its long-term effects.</p> <p>The percentage of the population living in counties that exceed the standard provides an indication of the population at risk for long-term exposure.</p> <p>Note: these indicators are similar to indicators developed by EPA and state air quality agencies for use in air quality statistics and trends analyses and reports (see www.epa.gov/airtrends)</p>
Use of the Measure	This indicator can be used to inform policy makers and the public about the degree of potential exposures to fine particles within a state during a year and over time (trends). This is appropriate, as many existing health studies have found the strongest association with health outcomes based on long-term studies; thus, EPA developed the annual NAAQS at 15 µg/m ³ . The indicator (annual average PM _{2.5} concentrations) can be compared to the National Ambient Air Quality Standard (NAAQS) level of 15 µg/m ³ or other health-based standards (although not in a regulatory manner) to communicate the degree of public health concern to policy makers and the general public.
Limitations of the Measure	This measure provides a general indication of the overall trend in annual PM _{2.5} concentrations. It may be affected by density and placement of monitors, and coverage will vary across the country and within states. It does not directly reflect exposure. Certain geographic areas, such as those near busy roads, are likely to have higher values.

	<p>When analyzing or displaying data over time for trends, consider only monitors with complete data (75% of scheduled measurements per quarter) from year to year. The "how to" uses a completeness criterion of 75% of 120 days (1-in-3 day monitoring), given the complexity of making this calculation through readily available data (if the measures are developed centrally, then a more precise completeness test will be used).</p> <p>It is important to understand that this indicator is not for use-compliance determination with NAAQS or reasonable further progress toward attaining compliance.</p> <p>The relationship between ambient concentrations and personal exposure is largely unknown, and it varies depending upon pollutant, activity patterns, and microenvironments.</p> <p>The percentage of state population living in counties with no PM_{2.5} measurements must always be considered when attempting to estimate the proportion of population at risk.</p>
Data Sources	<p>EPA Air Quality System Monitoring Data, State Air Monitoring Data. http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsddata.htm</p>
Limitations of Data Sources	<p>Air monitoring data provides information regarding concentrations around the specific location of each monitor. For PM_{2.5} this can be a rather large area, except when unusual local emissions (agricultural fires) occur. Within-county variation in concentrations will likely exist but will not be captured in this measure. Many PM_{2.5} monitors measure every third day (some every sixth day) and a few measure every day; taking averages over seasons and then annually addresses the comparability of these data.</p>
References	<ol style="list-style-type: none"> 1. American Lung Association. State of the Air 2004; 2004 [cited 2008 Dec 4]. Available from: http://ephtracking.cdc.gov/docs/SOTA_2004.pdf 2. Cannon J. The Health Costs of Air Pollution: A Survey of Studies Published 1984-1989. New York: American Lung Association; 1990. 3. Dockery DW and Pope CA. Acute respiratory effects of particulate air pollution. Annu Rev Public Health 1994;15:107-132. 4. Schwartz, J. Air pollution and hospital admissions for heart disease in eight U.S. counties. Epidemiology 1999;10:17-22. 5. U.S. Environmental Protection Agency. U.S. EPA Criteria Document for PM. Available from: Volume 1 VOL_I_FINAL_PM_AQCD_OCT2004.PDF and Volume 2 VOL_II_FINAL_PM_AQCD_OCT2004.PDF