

## Modeled Air Quality: Annual PM 2.5 Level

<b>Type of EPHT Indicator</b>	Hazard
<b>Measure</b>	1. Annual average ambient concentrations of PM <sub>2.5</sub> in micrograms per cubic meter (based on seasonal averages and daily measurement)
<b>Derivation of measure</b>	Refer to the How-to Guide (contact CDC for the latest version of this document)
<b>Unit</b>	1. Microgram per cubic meter (µg/m <sup>3</sup> ) 2. Population proportion by hazard level
<b>Geographic Scope</b>	Iowa
<b>Geographic Scale</b>	County
<b>Time Period</b>	2001-2006
<b>Time Scale</b>	Calendar year
<b>Rationale</b>	<p>According to work conducted by Pope et al. (3), long-term exposure to PM<sub>2.5</sub> is related to many adverse health conditions. Each 10 µg/m<sup>3</sup> elevation in PM<sub>2.5</sub> 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. The annual average provides an indication of the long-term trends in overall PM<sub>2.5</sub> burden, relevant to its long-term effects.</p> <p>Our indicator is based on comparing measured and modeled levels of PM<sub>2.5</sub>. Modeled estimates are used to fill-in for days when monitoring does not occur and in counties where monitors don't exist. The Clean Air Act requires periodic review of the science upon which the standards are based and the standards themselves. Primary air quality standards indicate the acceptable level of substances in the air before harm will occur based on proven scientific and medical research.</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 <a href="http://www.epa.gov/airtrends">www.epa.gov/airtrends</a>)</p>
<b>Use of the Measure</b>	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 <sup>3</sup> . The indicator (annual average PM <sub>2.5</sub> concentrations) can be compared to the NAAQS level of 15 µg/m <sup>3</sup> 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.
<b>Limitations of the Measure</b>	<p>This measure provides a general indication of the overall trend in annual PM<sub>2.5</sub> concentrations. It does not directly reflect exposure. Certain geographic areas, such as those near busy roads, are likely to have higher values.</p> <p>The model predictions are used to fill-in air quality estimates in areas and at times without monitoring data. For counties without monitoring data, temporal (seasonal) and spatial (regional) biases in the modeled estimates, can influence the accuracy of the measures.</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><b>Data Sources</b></p>	<p>EPA Air Quality System Monitoring Data, State Air Monitoring Data.  <a href="http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqdata.htm">http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqdata.htm</a></p> <p>Air quality modeled data:  <a href="http://www.epa.gov/heasd/sources/projects/CDC/index.html">http://www.epa.gov/heasd/sources/projects/CDC/index.html</a></p>
<p><b>Limitations of Data Sources</b></p>	<p>Air monitoring data provides information regarding concentrations around the specific location of each monitor. For PM<sub>2.5</sub> 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<sub>2.5</sub> monitors measure every third day (some every sixth day) and a few measures every day; averages over seasons and then annually addresses the comparability of these data. The comprehensive geographic coverage provided by the modeled PM<sub>2.5</sub> estimates must be balanced against its tendency for under prediction or over prediction near the NAAQS.</p>
<p><b>References</b></p>	<ol style="list-style-type: none"> <li>1. American Lung Association. State of the Air 2004; 2004 [cited 2008 Dec 4]. Available from:  <a href="http://ephtracking.cdc.gov/docs/SOTA_2004.pdf">http://ephtracking.cdc.gov/docs/SOTA_2004.pdf</a></li> <li>2. Cannon J. The Health Costs of Air Pollution: A Survey of Studies Published 1984-1989. New York: American Lung Association; 1990.</li> <li>3. Dockery DW and Pope CA. Acute respiratory effects of particulate air pollution. Annu Rev Public Health 1994;15:107-132.</li> <li>4. Schwartz, J. Air pollution and hospital admissions for heart disease in eight U.S. counties. Epidemiology 1999;10:17-22.</li> <li>5. U.S. Environmental Protection Agency. U.S. EPA Criteria Document for PM. Available from: Volume 1  <a href="#">VOL I FINAL PM AQCD OCT2004.PDF</a> and Volume 2</li> </ol>