

# Monitored Air Quality: Ozone – Days Above Regulatory Standard

Type of EPHT Indicator	Hazard
Measures	<ol style="list-style-type: none"> <li>1. Number of days with maximum 8-hour average ozone concentration over the National Ambient Air Quality Standard (NAAQS)</li> <li>2. Number of person-days with maximum 8-hour average ozone concentration over the National Ambient Air Quality Standard (NAAQS)</li> </ol>
Derivation of Measures	Refer to the how-to guide (contact CDC for the latest version of this document)
Units	<ol style="list-style-type: none"> <li>1. Exceedance Days</li> <li>2. Population-weighted exceedance days</li> </ol>
Geographic Scope	Iowa
Geographic Scale	Counties (where monitors exist).
Time Period	2001-2009
Time Scale	Calendar year
Rationale	<p>According to the published literature, air pollution is associated with premature death, increased rates of hospitalization for respiratory and cardiovascular conditions, adverse birth outcomes, and lung cancer (2, 3). Air pollution places a large economic burden on the country. In a report prepared for the American Lung Association,(2) estimated that air pollution related illness was estimated to cost approximately \$100 billion annually (2) (1988 dollars) in the United States, with an estimated number of excess deaths ranging from 50,000 to 100,000 annually (3). More than half of the U.S. population, approximately 159 million persons, live in counties with unhealthy levels of air pollution in the form of either ozone or particulate matter (1). Elevated pollution levels depend on sources, transport, season geography, and atmospheric conditions. Each part of the country has its own level of pollution concentrations that can be exacerbated by many conditions, including stagnation, fire, or wind. The seasons for peak concentrations also vary between geographical regions.</p> <p>The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for wide-spread pollutants from numerous and diverse sources considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings.</p> <p>Our indicator is based on comparing measured levels of ozone by county to the primary NAAQS for ozone (as well as other established health-based ambient air quality standards for 8-hour ozone levels). 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</p>

	<p>occur, based on proven scientific and medical research. State governments also set air quality standards. In several cases, California's standards or other benchmarks are more stringent than the EPA NAAQS.</p>
<p><b>Use of Measure</b></p>	<p>The indicator for the number of days with maximum 8-hour average ozone concentration over the standard is similar to EPA's analyses on number of days with air quality index (AQI) levels above 100 (for ozone) — <a href="http://www.epa.gov/airtrends/aqi_info.html">www.epa.gov/airtrends/aqi_info.html</a>. This measure is consistent with the EPA and state AQI program efforts to communicate an area's air quality levels to the public. In addition, this indicator can be used to inform policy makers and the public regarding the degree of hazard within a state (by county or MSAs with monitors) during a year. For example, the number of days per year that ozone is higher than the NAAQS can be used to communicate to sensitive populations (such as asthmatics) the number of days that they may be exposed to unhealthy levels of ozone; this is the same level used in the air quality alerts that inform these sensitive populations when and how to reduce exposure. See <a href="http://www.epa.gov/air/airtrends/2007/report/groundlevelozone.pdf">www.epa.gov/air/airtrends/2007/report/groundlevelozone.pdf</a> and <a href="http://www.epa.gov/air/airtrends/aqtrnd00/pdffiles/aqioz.pdf">www.epa.gov/air/airtrends/aqtrnd00/pdffiles/aqioz.pdf</a>.</p> <p>In the use of the measure, it is important to explain that not all counties have monitors (although most populated areas in the US are monitored).</p>
<p><b>Limitations of The Measure</b></p>	<p>The number of high ozone days per year varies, which makes tracking trends over time difficult to analyze or interpret. The variability results from the following: a) the number of high ozone days is related to temperature; there will be more high days in hotter summers; and b) there are a small number of events per year, so for statistical reasons this type of measure will bounce around more than an average. When analyzing trends, consider monitors with 75% complete data every year.</p> <p>The relationship between ambient concentrations and personal exposure is largely unknown and variable depending on pollutant, activity patterns, and microenvironments.</p> <p>Variation within counties and MSAs may exist but will not be captured in this measure. Within these areas, the monitor with the highest reading on any day is used in the measure. Larger areas will have a broader range of pollution values and perhaps more monitors that may measure a high value on a given day. Thus, day and person-day estimates for larger areas may be higher than estimates for smaller areas. The relative variation among county populations in many states may be large enough, relative to the variation in the number of days greater than the ozone NAAQS, that the population component can dominate the calculation of the number of person-days. Thus, careful investigation of the underlying data to properly identify changes in population and air quality is needed when comparing person-days in space and time.</p> <p>The data for this indicator represent only counties and MSAs that have air monitors; thus the data tend to reflect urban air quality (where most people live). Although populations in areas without monitors also may be exposed to ozone that exceeds the standard, they are not counted. The number of days that exceed the EPA NAAQS or other health benchmarks does not provide information regarding the severity (max concentrations) of potential exposures.</p> <p>This indicator is not for use-compliance determination with NAAQS or</p>

	reasonable further progress toward attaining compliance.
<b>Data Sources</b>	<b>Air quality data: EPA Air Explorer</b> <a href="http://www.epa.gov/airdata/">http://www.epa.gov/airdata/</a>
<b>Limitations of the Data Sources</b>	The effort to obtain all the data may indicate that a central system is needed to gather the data and calculate the measures.
<b>References</b>	<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. US Environmental Protection Agency. US EPA general site on ozone effects. Available from: <a href="http://www.epa.gov/air/ozonepollution/health.html">http://www.epa.gov/air/ozonepollution/health.html</a></li> <li>5. Criteria document for ozone NAAQS: <a href="http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=149923">http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=149923</a></li> </ol>