



Indicator: Air Quality

Air pollution has been linked to a number of health problems like asthma, heart disease, and breathing problems among others. Although national air quality has improved over the last 20 years, there are still many challenges in protecting public health and the environment from air quality problems.

Ozone

Ozone is a gas that you cannot see or smell. "Good" ozone occurs naturally in the sky about 10 to 30 miles above the earth's surface. It forms a layer that protects life on earth from the sun's harmful rays. Ground-level ozone forms when pollutants from cars, power plants, and other sources come in contact with each other in heat and sunlight. It is the biggest part of what we call "smog." In addition, some indoor air purifiers or air cleaners emit ozone either intentionally or as a by-product of their design. Ground-level ozone is also called "bad" ozone because it is in the air we breathe. Many urban areas tend to have higher levels of bad ozone. Rural areas have bad ozone, too, because the wind carries ozone and the pollutants that form it hundreds of miles away from their original sources.

Studies have shown that being exposed to bad ozone can cause respiratory symptoms like coughing or pain when you take a deep breath, make asthma worse, cause lungs to get inflamed, and temporarily decrease the lung capacity of healthy adults. Repeated contact with bad ozone may permanently scar lung tissue.

For the time period covered by the data summarized here, the 8-hour ozone standard was 0.08 ppm. It has since been reduced to 0.075 ppm.

Particulate Matter

Particle pollution, or particulate matter (PM), consists of particles in the air like dust, dirt, soot, smoke, and little drops of liquid. Some particles, like soot or smoke, are large or dark enough and can be seen. Other particles are so small you cannot see them. Particle pollution can come from forest fires, motor vehicles, factories and construction sites. It can also be created when gases react in the atmosphere. Particle pollution can be a problem at different times of year, depending on where you live.

Particle pollution includes **coarse particles**, which are between 2.5 to 10 micrometers, and **fine particles**, which are 2.5 micrometers and smaller - these are known as PM_{2.5}. These small particles can get deep into your lungs and even into your blood.

Being exposed to particle pollution for short periods of time, like hours or a few days, can make lung disease worse, cause asthma attacks, cause bronchitis, and make it easier for people to get respiratory infections. Being exposed to particle pollution for more than a year has been linked to heart and lung problems like reduced lung function, chronic bronchitis and heart disease. These problems may lead to more hospital stays, more emergency department visits, and even early death.

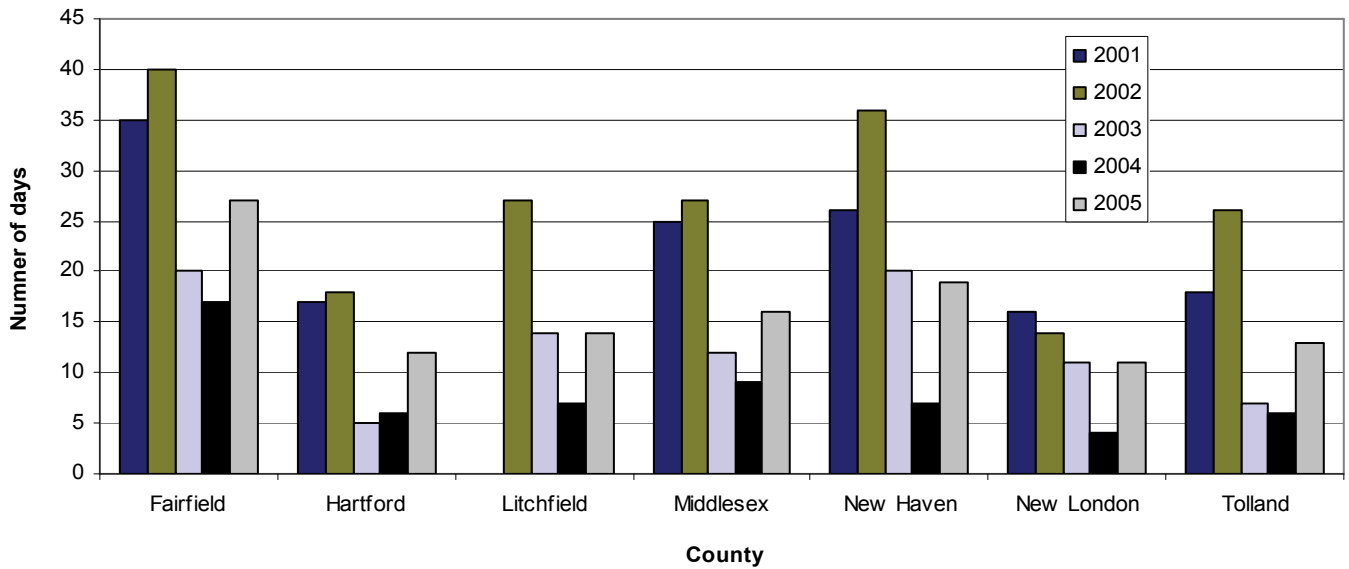
Sensitive people, such as older adults, people with diseases like asthma or congestive heart disease, and children are more likely to be affected by breathing in PM_{2.5}. In people with heart disease, breathing in PM_{2.5} for a short time has been linked to heart attacks and irregular heartbeat. Short-term exposure has also been linked with early deaths, usually in people who already have a serious health problem like lung or heart disease.

Healthy children and adults usually do not have serious problems from short-term exposure to particle pollution. They may have minor problems like a scratchy throat or scratchy eyes when particle levels are elevated.

The daily PM_{2.5} standard was originally set at 65 $\mu\text{g}/\text{m}^3$ in 1997; in 2006 it was lowered to 35 $\mu\text{g}/\text{m}^3$. The national standard for annual average is 15 $\mu\text{g}/\text{m}^3$.

When interpreting the information presented here, it is important to remember the limitations of the data on which it is based. Not all counties in Connecticut have monitors for each of the air pollutants of concern. So, people living in counties without monitors may still be exposed to elevated levels of pollutants, they are just not counted here. In addition, the information presented here is for ambient air quality; it does not necessarily reflect the amount that an individual is personally exposed to. Finally, there is great variability in the number of high ozone days each year.

Number of days with ground level ozone over the standard, by county — 2001-2005



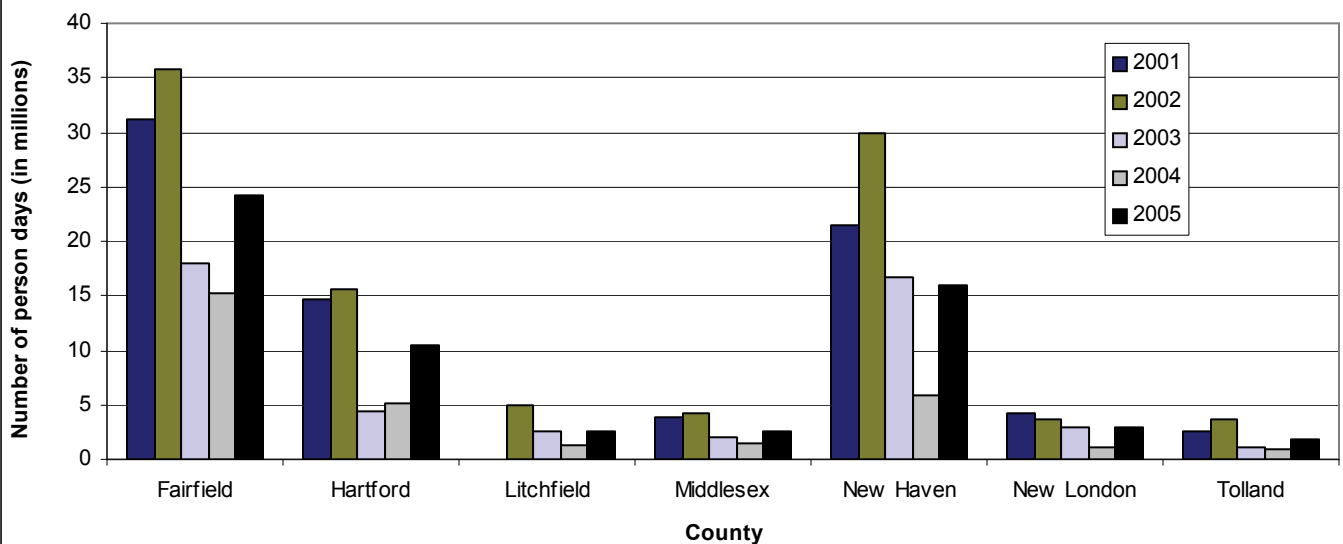
The Healthy People 2010 goal is that everyone lives in an area that meets the National Ambient Air Quality Standards for ozone by 2012. For the time period covered by this data, the 8-hour ozone standard was 0.08 parts per million (ppm). The standard has since been reduced to 0.075 ppm.

Across counties in Connecticut with monitors, there were an average of 17 days each year where the ground level ozone level exceeded the standard. The most days in exceedance of the standard were seen in 2002 for all but New London County and the lowest in 2004, for all but Hartford County.

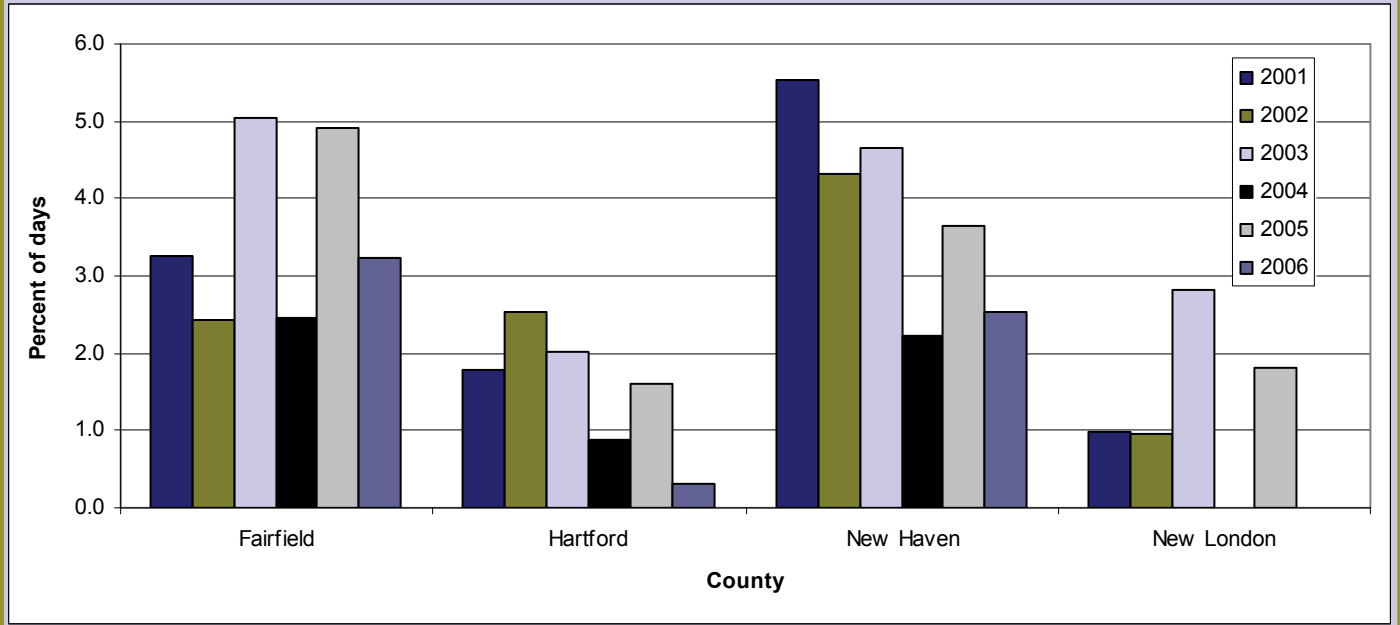
The number of person-days in exceedance of the ground level ozone standard closely follows the pattern for number of days.

Note: In Connecticut, only seven of eight counties monitor ground level ozone levels; there is no monitor in Windham County.
 Note: Person days = number of days about the standard * population

Number of person-days with ground-level ozone over the standard, by county—2001-2005



Percent of days with PM2.5 levels over the standard, by county — 2001-2006

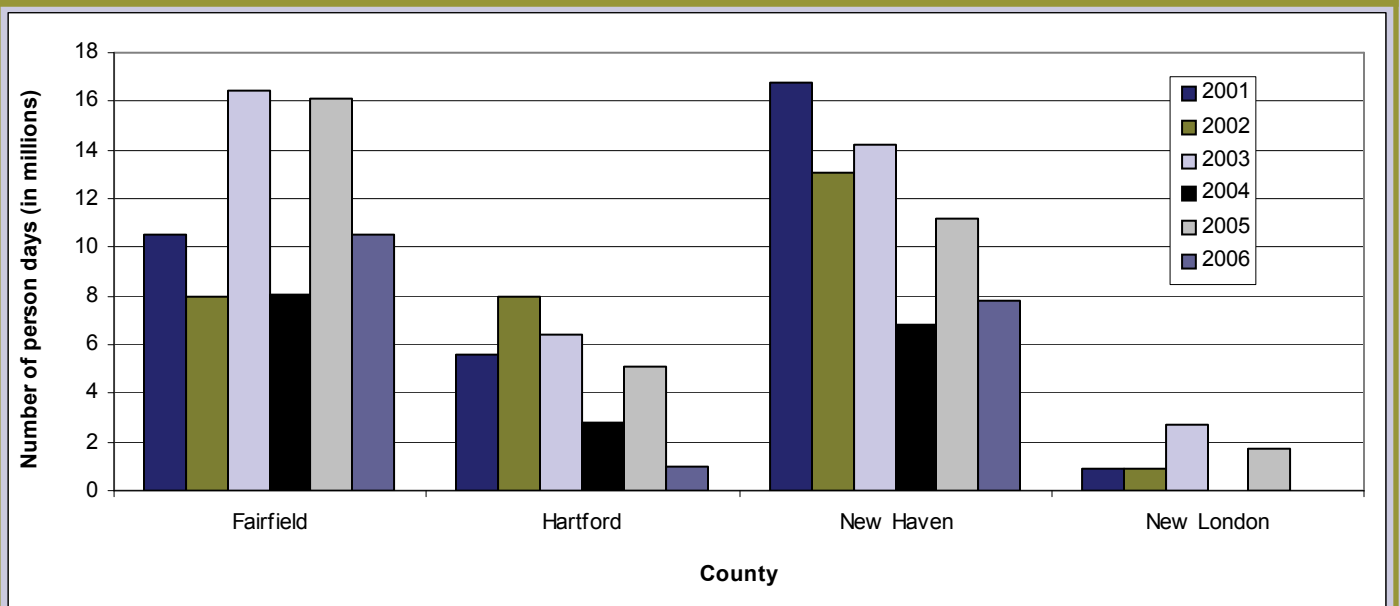


The Healthy People 2010 goal for PM2.5 is that everyone lives in an area that meets the National Ambient Air Quality Standard by 2018. The PM2.5 standard was originally set at 65 $\mu\text{g}/\text{m}^3$ in 1997; in 2006 it was lowered to 35 $\mu\text{g}/\text{m}^3$.

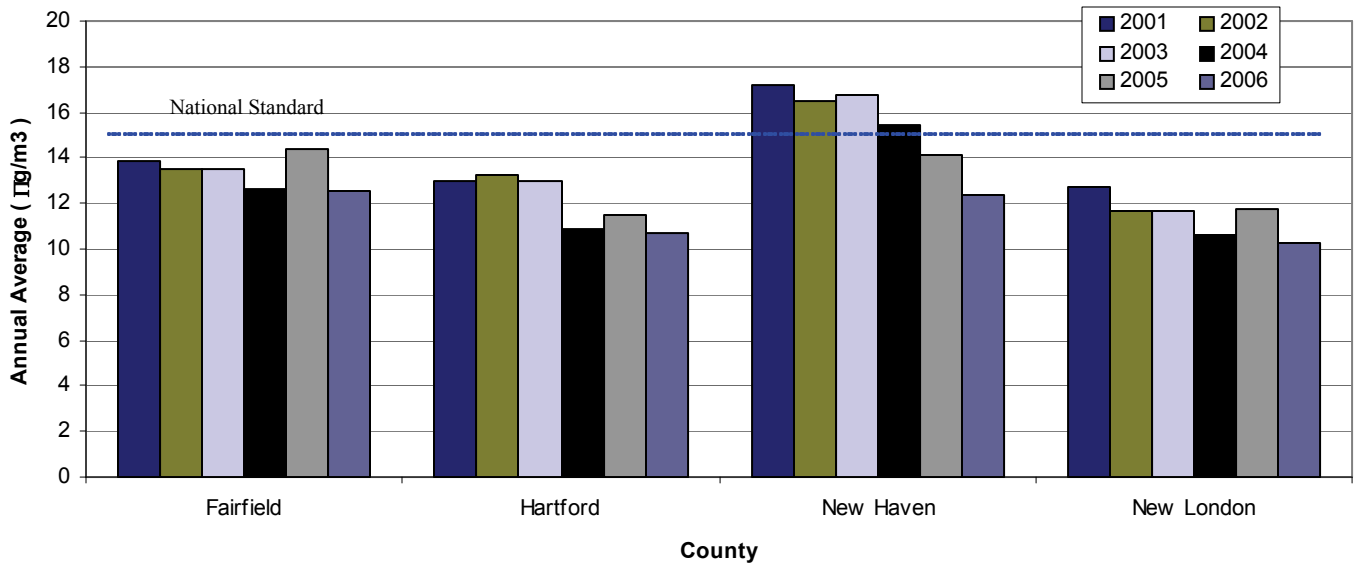
Among the four counties in Connecticut with monitors, PM2.5 levels exceeded the standard on an average of 2.5% of days. Fairfield and New Haven Counties had a greater percentage of days in exceedance of the standard than Hartford or New London Counties.

The pattern for number of person days with PM2.5 levels over the standard was similar to the pattern seen for percent of days in exceedance. In Fairfield and New Haven Counties, there were an average of 11.6 million person days over the standard annually between 2000 and 2006.

Number of person days with PM2.5 levels over the standard, by county—2001-2006



Average annual PM2.5 concentration, by county - 2001-2006

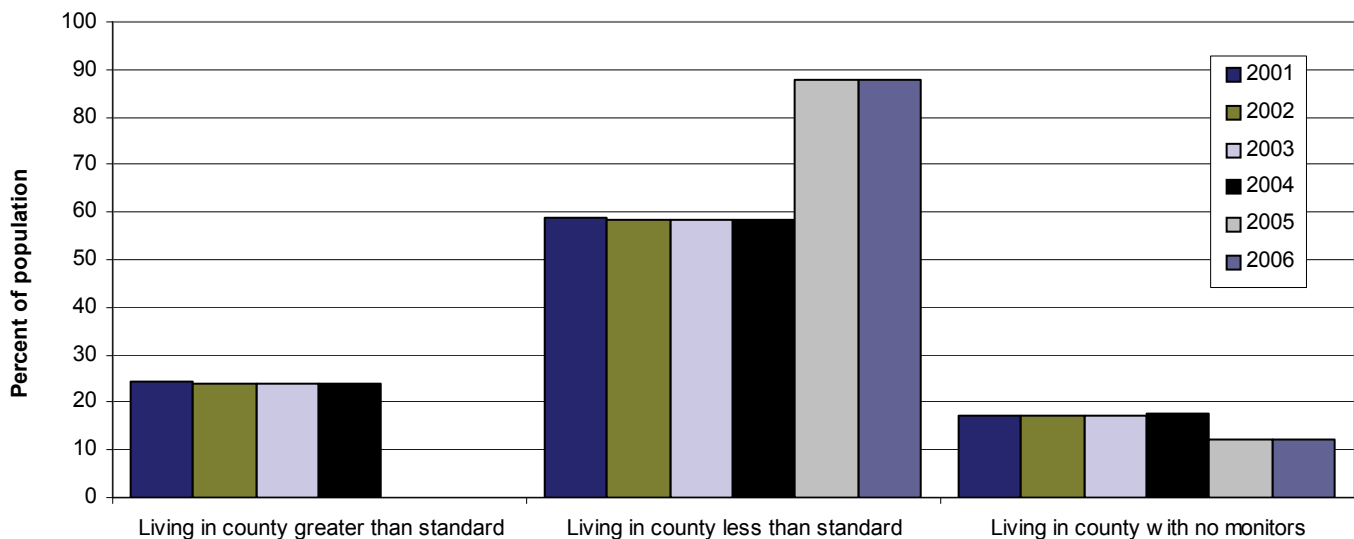


The average annual ambient air concentration for PM2.5 ranged from 11.4 µg/m³ in New London county to 15.4 µg/m³ in New Haven county. The national standard is 15 µg/m³.

Based on the annual average of ambient PM2.5 concentrations, the majority of Connecticut residents live in a county that does not exceed the established standard. Although from 2001-2004 approximately 25% of the population lived in a county exceeding the standard, in 2005 and 2006 there were no Connecticut residents living in a county exceeding the standards.

It should be noted that approximately 16% of the population of Connecticut lives in a county with no PM2.5 monitors.

Percent of population living in a county with PM2.5 levels over the standard, 2001-2006



DATA TABLES

Number of days with ground level ozone over the standard, by county, Connecticut 2001-2005

	2001	2002	2003	2004	2005
Fairfield	35	40	20	17	27
Hartford	17	18	5	6	12
Litchfield	N/A	27	14	7	14
Middlesex	25	27	12	9	16
New Haven	26	36	20	7	19
New London	16	14	11	4	11
Tolland	18	26	7	6	13
Windham	NO OZONE MONITOR DATA AVAILABLE				

* Rate per 10,000 population

Number of person-days* with ground level ozone above the standard, by county — Connecticut 2001-2005

	2001	2002	2003	2004	2005
Fairfield	31,112,340	35,698,800	17,899,520	15,228,566	24,169,563
Hartford	14,646,486	15,576,804	4,348,225	5,219,208	10,466,904
Litchfield	—	5,012,685	2,615,074	1,314,558	2,630,054
Middlesex	3,926,375	4,299,210	1,929,924	1,453,095	2,593,968
New Haven	21,547,422	29,991,780	16,769,700	5,881,337	15,993,801
New London	4,175,296	3,682,980	2,918,619	1,067,672	2,920,544
Tolland	2,497,338	3,691,896	1,011,486	875,274	1,905,501
Windham	NO OZONE MONITOR DATA AVAILABLE				

*Person-days is calculated as:
 number of days with ozone above the standard * the population of that county

Annual PM2.5 Standards

Annual average PM2.5 concentration*, by county — 2001-2006

	2001	2002	2003	2004	2005	2006
Fairfield	13.9	13.52	13.5	12.66	14.37	12.52
Hartford	13.01	13.23	13.02	10.9	11.47	10.72
New Haven	17.16	16.46	16.73	15.43	14.16	12.38
New London	12.74	11.68	11.68	10.58	11.74	10.27

* in ($\mu\text{g}/\text{m}^3$)

Daily PM2.5 Standards

Percent of days with PM2.5 levels over the standard, by county — 2001-2006

	2001	2002	2003	2004	2005	2006
Fairfield	3.25	2.44	5.04	2.46	4.92	3.23
Hartford	1.78	2.53	2.02	0.87	1.6	0.31
New Haven	5.54	4.31	4.65	2.23	3.64	2.54
New London	0.98	0.95	2.83	0	1.82	0

Number of person days* with PM2.5 levels over the standard, by county — 2001-2006

	2001	2002	2003	2004	2005	2006
Fairfield	10,551,455	7,945,159	16,470,566	8,040,154	16,069,017	10,525,975
Hartford	5,598,848	7,996,530	6,421,800	2,776,983	5,102,056	982,209
New Haven	16,756,152	13,098,974	14,234,745	6,833,865	11,172,703	7,804,799
New London	933,813	914,481	2,740,898	0	1,761,981	0

*Person-days is calculated as:
number of days above the ozone standard * the population of that county

Note: Only four counties in Connecticut have monitors for PM2.5. Litchfield, Middlesex, Tolland, and Windham counties do not have monitors for PM2.5, and, therefore, data is not available for these counties.

Useful Links

Connecticut Department of Public Health

<http://www.ct.gov/dph>

Connecticut Department of Environmental Protection

<http://www.ct.gov/dep>

Centers for Disease Control and Prevention

Air Quality: <http://www.cdc.gov/health/airquality.html>

Air Pollution and Respiratory Health: <http://www.cdc.gov/nceh/airpollution/about.htm>

ATSDR Air information: <http://www.atsdr.cdc.gov/general/theair.html>

Environmental Protection Agency

Office of Air and Radiation: <http://www.epa.gov/air/>

AirNow: <http://airnow.gov/>

Air Compare: <http://epa.gov/aircompare/>

Report on the Environment: <http://cfpub.epa.gov/eroe/index.cfm>

National Ambient Air Quality Standards: <http://www.epa.gov/air/criteria.html>

Ozone Web page: <http://www.epa.gov/air/ozonepollution/index.html>

Particulate Matter Web page: <http://www.epa.gov/oar/particlepollution/>

Limitations

The data for these indicators only represents counties that have air monitors and tend to reflect air quality where most people live. Thus, although populations in counties without monitors may also be exposed to ozone that exceeds the standard, they are not counted.

Variation within counties **that do have monitors** may exist but are not captured in these measures. **For counties that have multiple monitors**, the monitor with the highest reading on any day is used in the measure **for the entire county**.

Data for these indicators represents ambient air quality. The relationship between ambient concentrations and personal exposure is largely unknown and variable depending upon pollutant, activity patterns, and microenvironments.

The range in population from county to county is larger than the range in the number of high ozone days. Therefore the number of person-days will be more influenced by population than by ozone levels.

There is variability in the high ozone days per year so tracking trends over time can be difficult to analyze and interpret. The variability results from the following: a) the number of high ozone days is related to temperature, therefore there tends to be more high ozone days during the warmer summer months and b) there are a small number of events per year, so for statistical reasons, this type of measure has more variability than computing an average.