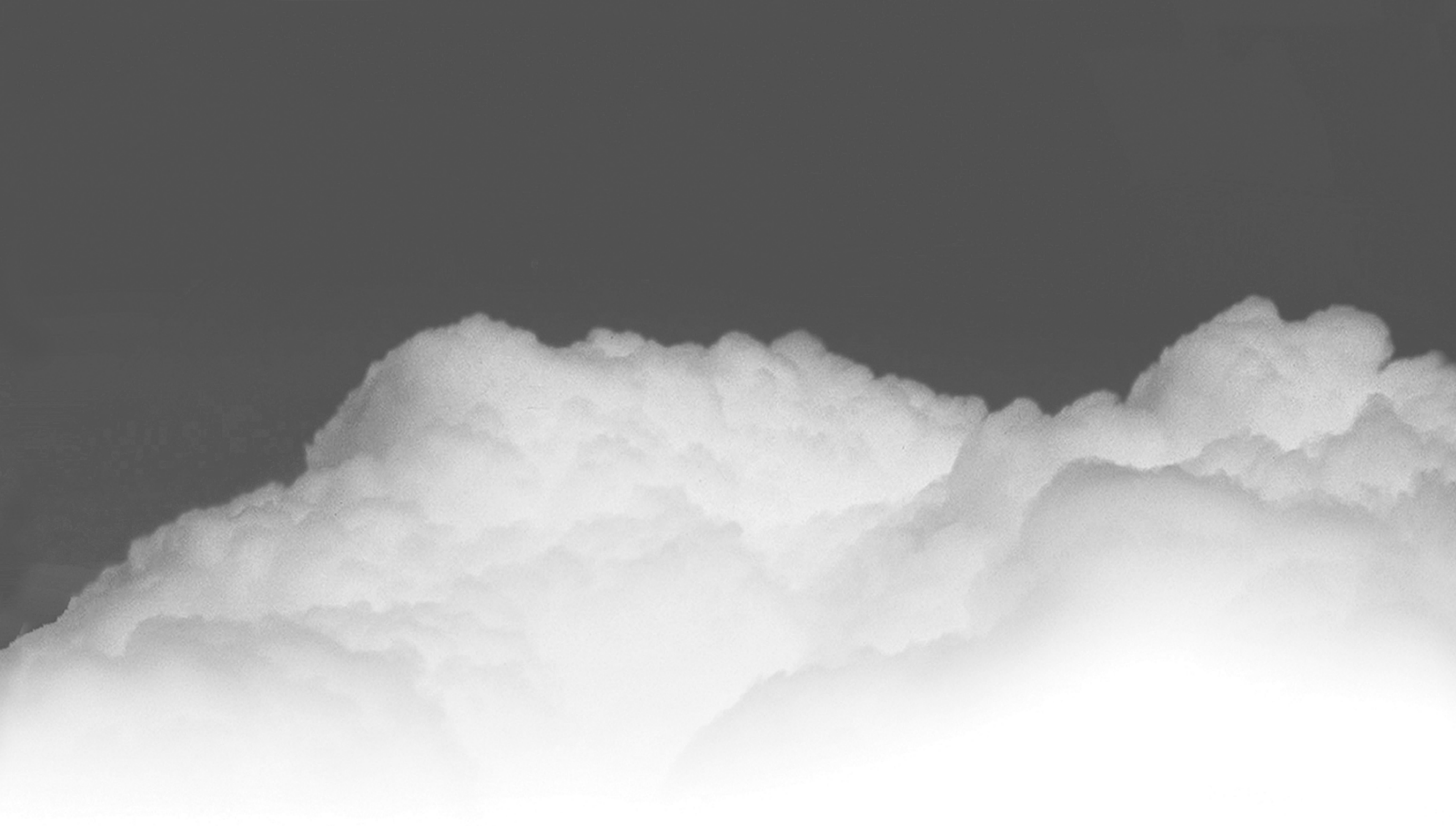
STATE OF THE AIR 2014

AMERICAN LUNG ASSOCIATION®



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The American Lung Association assumes sole responsibility for the content of the *American Lung Association State of the Air 2014*.

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The State of the Air 2014

State of the Air 2014 shows that nearly **half the nation had unhealthy air** quality in 2010, 2011, and 2012.

22 of the most polluted cities had more unhealthy ozone days than in last year's report.

Thanks to the Clean Air Act, the United States continues to make progress providing healthier air. The *State of the Air 2014* shows that the nation's air quality worsened in 2010-2012, but remains overall much cleaner than just a decade ago. More than 147.6 million people—47 percent of the nation—live where pollution levels are too often dangerous to breathe, an increase from last year's report. Despite that risk, some seek to weaken the Clean Air Act, the public health law that has driven the cuts in pollution since 1970.

The *State of the Air 2014* report looks at levels of ozone and particle pollution found in official monitoring sites across the United States in 2010, 2011, and 2012. The report uses the most current quality-assured nationwide data available for these analyses.

The report examines particle pollution ($PM_{2.5}$) in two different ways: averaged year-round (annual average) and over short-term levels (24-hour). For both ozone and short-term particle pollution, the analysis uses a weighted average number of days that allows recognition of places with higher levels of pollution. For the year-round particle pollution rankings, the report uses averages calculated and reported by the U.S. Environmental Protection Agency (EPA). For comparison, the *State of the Air 2013* report covered data from 2009, 2010, and 2011.[1]

Overall Trends

Thanks to stronger standards for pollutants and for the sources of pollution, the United States has seen **continued reduction in ozone and particle pollution** as well as other pollutants **for decades**. Figure 1 from the EPA shows that since 1970, the air has gotten cleaner while the population, the economy, energy use and miles driven increased greatly. Even as the economy continues to recover after

1 A complete discussion of the sources of data and the methodology is included in **Methodology**.

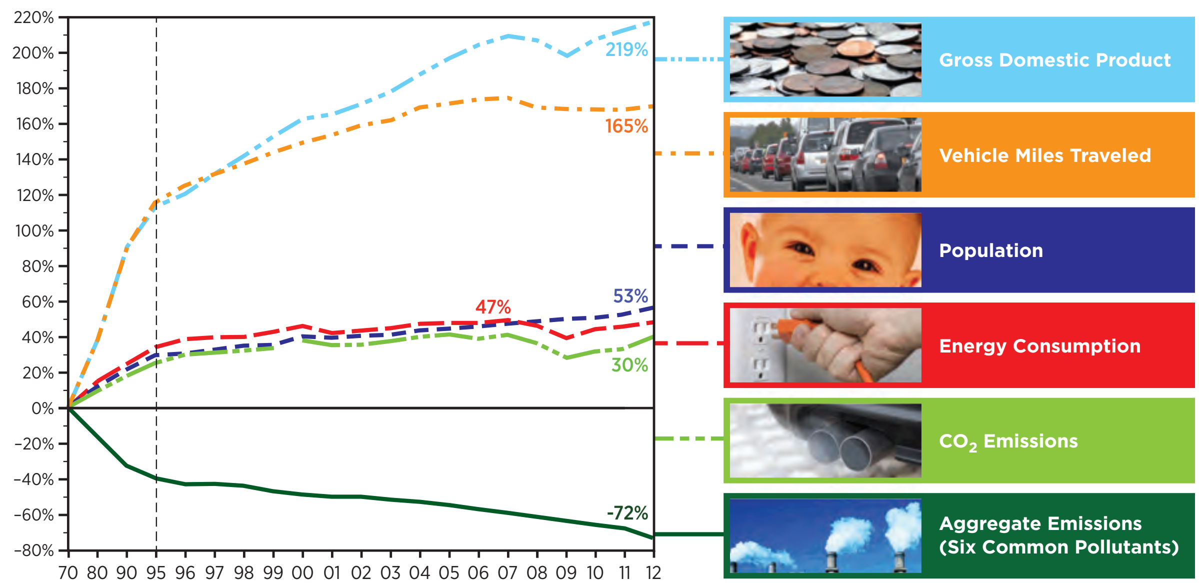

Figure 1 Air emissions have dropped steadily since 1970 thanks to the Clean Air Act. Even as the economy continues to recover from the recession, emissions that contribute to the most widespread pollutants continue to drop. (Source: U.S. EPA, Air Quality Trends, 2014.)

Nearly
28 million
people in the US live in counties where the outdoor air failed all three tests.

the recession, overall air emissions that create the six most widespread pollutants continue to drop.

In 2010-2012, many places made strong progress over 2009-2011 particularly in **lower year-round levels of particle pollution**. Thanks to reductions in emissions from coal-fired power plants and the transition to cleaner diesel fuels and engines, cleaner air shows up repeatedly in the monitoring data. Still, even with the cleaner air, the most-polluted cities failed to meet the official national limits, or standard, for year-round particle pollution.

Ozone was much worse than in the 2013 report, likely due to warmer temperatures, especially in 2012. **Twenty-two of the 25 most ozone-polluted cities had more high ozone days on average in 2010-2012** compared to 2009-2011. Fortunately, even these places have much better air quality compared to ten years ago (or in our earliest reports). However, rising temperatures create conditions favorable to forming ozone. Communities will need more help to reduce ozone pollution in the warmer temperatures expected from the changing climate.

Progress continued in most cities in the long-term trend for fewer days with high particle pollution, but not all. Two thirds of the most–polluted metros recorded fewer unhealthy days on average than in 2009-2011. Although year-round average levels for particles are steadily dropping, the trend for short-term spikes in high particle counts can vary from year to year. Spikes often occur in the winter, as has happened in Fairbanks (AK) and Salt Lake City in recent winters. In some cities, these spikes come from increased burning of wood and other fuels in the winter for heat, often in highly-polluting indoor wood stoves or outdoor wood boilers.

Ozone

Ozone worsened in the most polluted metropolitan areas—some substantially worse—in 2010-2012 compared to 2009-2011. Of the 25 metro areas most polluted by ozone, 22 had worse ozone problems. Weather played a factor. The warmer summers in 2010 and 2012 contributed to higher ozone readings and more frequent high ozone days. Sunlight and heat create conditions that increase the risk of high ozone levels. Fortunately, these cities had significantly fewer unhealthy ozone days than they had a decade ago thanks to steps taken to reduce ozone. Many cities had only slightly more unhealthy days than in the 2013 report.

Los Angeles remained the city with the worst ozone pollution problem, and had slightly more days of high ozone in 2010-2012. Measuring more unhealthy days on average were 22 other cities[2]: Visalia-Porterfield-Hanford (CA), Bakersfield (CA), Fresno-Madera (CA), Houston, Modesto-Merced (CA), Washington-Baltimore, Las Vegas, Phoenix, New York City, St. Louis, Tulsa (OK), Cincinnati, Philadelphia, Louisville (KY), Oklahoma City, Chicago, Pittsburgh, Fort Collins (CO), Birmingham (AL), Cleveland (OH) and Sheboygan (WI).

Only Dallas-Fort Worth and El Centro (CA) measured fewer unhealthy days among the 25 most ozone polluted cities. Unfortunately, even with the improvements, people living there are still forced to breathe air that reaches dangerously unhealthy levels. Sacramento (CA) was the only city to have maintained the same number of unhealthy days.

2 Complete names for all these metropolitan areas can be found in the tables showing the most polluted and cleanest cities. The full metropolitan areas often include multiple counties, incorporated cities and counties in adjacent states, as the Office of Management and Budget defines them.

Year-round Particle Pollution

Among the 25 cities with the worst year-round levels of particle pollution, eighteen had lower levels in 2010-2012, while five recorded higher annual levels and two cities maintained the same level. However, all of the most polluted cities continue to have year-round particle levels that violate health-based standards.

Thirteen cities improved to their lowest annual levels in this report: Visalia-Porterville-Hanford (CA), Los Angeles, Pittsburgh, Philadelphia, Cincinnati, Louisville, Cleveland, Wheeling (WV), Indianapolis, Columbus (OH), Dayton (OH), Johnstown (PA) and Bakersfield (CA), which had been the most polluted city for year-round particle levels for 4 of the last 5 reports.

Three of the other most-polluted cities matched or maintained the lowest levels they had previously achieved, reflecting stalled progress toward healthier air. Atlanta improved to return to its lowest level as in previous reports, St. Louis maintained the same levels it had reached in the 2013 report, and Chicago maintained the same levels it had reached in both the 2012 and 2013 reports.

Four cities improved over the previous levels, but had reported cleaner air in the past: Modesto-Merced (CA), El Centro (CA), New York City and Macon (GA).

Unfortunately, five cities saw their year-round levels increase from previous reports.[3] Top of that list is **Fresno-Madera (CA)** the newest city to be ranked as the most polluted in the nation for year-round particle pollution. Other cities with worse annual levels were El Paso-Las Cruces (TX-NM), Phoenix, Birmingham, and San Diego.

3 These trends are based on prior available data. Not all cities had counties with complete annual averages posted for all prior years.

Short-term Particle Pollution

Sixteen cities most polluted by short-term particle pollution had fewer high particle days on average in 2010-2012 compared to 2009-2011 and seven had their fewest days on average ever in the history of the report.

Although one of the seven measuring their fewest ever unhealthy days on average, **Fresno-Madera (CA)** moved up to rank as the most polluted for short-term particle levels. Other cities reporting their fewest unhealthy days are: Pittsburgh, Salt Lake City, Harrisburg (PA), San Diego, Sacramento (CA) and Bakersfield (CA).

Nine other metropolitan areas also had fewer days of unhealthy particle pollution in 2009-2011 than in the last report: Visalia-Porterfield-Hanford (CA), Los Angeles, Modesto-Merced (CA), Fairbanks (AK), Logan (UT), Davenport (IA), Seattle, Green Bay (WI) and South Bend (IN).

Nine metropolitan areas suffered additional high particle days compare to last year's report, including San Francisco, Chicago, Phoenix, Indianapolis, New York City and Lancaster (PA). Three cities had their worst average number of days ever – El Paso-Las Cruces (TX-NM), Missoula (MT), and Yakima (WA).

Cleanest Cities

Four cities ranked on all three lists of the cleanest cities in 2010-2012. That means they had no days in the unhealthy level for ozone or short-term particle pollution and were on the list of the cleanest cities for year-round particle pollution. Listed alphabetically, the four cities are:

- Bangor (ME)
- Bismarck (ND)
- Cape Coral-Fort Myers (FL)
- Salinas (CA)

Eleven other cities ranked as the cleanest for both year-round and short-term particle pollution, listed alphabetically:

- Elmira-Corning, (NY)
- Farmington (NM)
- Flagstaff (AZ)
- Grand Island (NE)
- Homosassa Springs (FL)
- Kahului-Wailuku-Lahaina (HI)
- North Port-Sarasota (FL)
- Palm Bay-Melbourne-Titusville (FL)
- Prescott (AZ)
- Sierra Vista-Douglas (AZ)
- St. George (UT)

Three other cities were on both the cleanest cities lists for ozone and for year-round particle pollution, listed alphabetically:

- Anchorage (AK)
- Burlington-South Burlington (VT)
- Rapid City-Spearfish (SD)

Four other cities made both the cleanest cities lists for ozone and for short-term particle pollution, listed alphabetically:

- Brownsville-Harlingen-Raymondville (TX)
- Fargo-Wahpeton, ND-MN
- McAllen-Edinburg-Pharr (TX)
- Monroe-Ruston-Bastrop (LA)

People At Risk

Looking at the nation as a whole, the *American Lung Association State of the Air 2014* finds—

- **Nearly half of the people (47 %) in the United States live in counties that have unhealthful levels of either ozone or particle pollution.**

  More than 147.6 million Americans live in the 330 counties where they are exposed to unhealthful levels of air pollution in the form of either ozone or short-term or year-round levels of particles.

- **More than 4 in 10 people in the United States (44.8%) live in areas with unhealthful levels of ozone.**

  Counties that were graded F for ozone levels have a combined population of more than 140.5 million. These people live in the 296 counties where the monitored air quality places them at risk for premature death, aggravated asthma, difficulty breathing, cardiovascular harm and lower birth weight. The actual number who breathe unhealthy levels of ozone is likely much larger, since this number does not include people who live in adjacent counties in metropolitan areas where no monitors exist.

- **More than 14 percent of people in the United States live in an area with too many days with unhealthful levels of particle pollution.**

  More than 44.1 million Americans live in 50 counties that experienced too many days with unhealthy spikes in particle pollution, a decrease from the last report. Short-term spikes in particle pollution can last from hours to several days and can increase the risk of heart attacks, strokes and emergency room visits for asthma and cardiovascular disease, and most importantly, can increase the risk of early death.

- **More than 46.2 million people (14.7%) in the United States live in an area with unhealthful year-round levels of particle pollution.**

  These people live in areas where chronic levels are regularly a threat to their health. Even when levels are fairly low, exposure to particles over time can increase risk of hospitalization for asthma, damage to the lungs and, significantly, increase the risk of premature death.

- **More than 27.8 million people (8.9%) in the United States live in 17 counties with unhealthful levels of all three: ozone and short-term and year-round particle pollution.**

With the risks from airborne pollution so great, the American Lung Association seeks to inform people who may be in danger. Many people are at greater risk because of their age or because they have asthma or other chronic lung disease, cardiovascular disease or diabetes. The following list identifies the numbers of people in each at-risk group.

- **Older and Younger—**More than 18.5 million adults age 65 and over and more than 35.6 million children under 18 years old live in counties that received an F for at least one pollutant. More than 3.3 million seniors and more than 6.7 million children live in counties failing all three tests.
- **People with Asthma—**Nearly 3.2 million children and more than 9.9 million adults with asthma live in counties of the United States that received an F for at least one pollutant. More than 610,000 children and more than 1.8 million adults with asthma live in counties failing all three tests.
- **Chronic Obstructive Pulmonary Disease (COPD)—**More than 6.7 million people with COPD live in counties that received an F for at least one pollutant. More than 1 million people with COPD live in counties failing all three tests.
- **Cardiovascular Disease—**More than 8.9 million people with cardiovascular diseases live in counties that received an F for at least one pollutant; more than 1.4 million live in counties failing all three tests.
- **Diabetes—**More than 4.5 million people with diabetes live in counties that received an F for either short-term or year-round particle pollution; more than 2 million live in counties failing both tests. Having diabetes increases the risk of harm from particle pollution.
- **Poverty—**More than 22.9 million people with incomes meeting the federal poverty definition live in counties that received an F for at least one pollutant. More than 5 million people in poverty live in counties failing all three tests. Evidence shows that people who have low incomes may face higher risk from air pollution.

What Needs To Be Done

Many major challenges require the Administration, working through the EPA, and Congress to take steps to protect the health of the public. Here are a few that the American Lung Association calls for to improve the air we all breathe, starting with cleaning up smokestacks and tailpipes.

Clean up harmful emissions from smokestacks.

Carbon pollution. Power plants are the largest stationary source of greenhouse gases in the United States. Energy production accounts for 86 percent of total 2009 greenhouse gas emissions, and the electric sector represents 39 percent of all energy-related carbon dioxide (CO_2) emissions.[4] In 2013, President Obama pledged to reduce carbon pollution from power plants. Now the EPA needs to finish the job and issue strong final standards for carbon pollution from new and existing plants.

Transported ozone and particle pollution. In 2011, the EPA set tough new limits on ozone and particle pollution that could blow across state lines and add unhealthy air downwind. That same year the EPA also, for the first time, set national limits on the toxic pollutants these power plants can emit. However, these standards have been blocked in the courts. The Lung Association has taken legal steps to defend the EPA's efforts. The EPA and the states must move forward with actions to clean these plants up.

Clean up harmful emissions from tailpipes.

Dirty diesel vehicles and heavy equipment. Rules the EPA put in effect over the past several years mean that new diesel vehicles and equipment must be much cleaner. Still, the vast majority of diesel trucks, buses, and heavy equipment (such as bulldozers) will likely be in use for thousands more miles, spewing dangerous diesel exhaust into communities and neighborhoods. The good news is that affordable technology exists to cut emissions by 90 percent. Congress needs to fund the EPA's diesel cleanup ("retrofit") program. Congress should also require that clean diesel equipment be used in federally-funded construction programs.

4 U.S. Environmental Protection Agency. *Inventory of Greenhouse Gas Emissions and Sinks: 1990-2009.* Washington, DC: U.S. EPA, 2011. EPA 430-R-11-005.

Reduce emissions of wood smoke

Residential wood-burning devices, including outdoor wood boilers and stoves, are the largest residential source of particle pollution. Emissions of harmful air pollutants from wood-burning devices have worsened air quality and public health in many cities, such as Fairbanks and Salt Lake City. These devices could have significant impacts on their owners and immediate neighbors. The U.S. Census reports that nearly two percent of all U.S. households use wood as a primary heat source.[5] In 2006, one study estimated that approximately 14 to 17 million such devices were then in use in the United States.[6]

- Besides particle pollution, wood burning also produces carbon monoxide, nitrogen oxides, sulfur dioxide, and even toxic air pollution. Studies have found that wood smoke leads to coughing and shortness of breath, decreases in lung function, and aggravated asthma and may even cause cancer.[7]
- The EPA has not updated national standards for wood-burning devices since 1988. Improved technologies in use today can limit harmful emissions from wood-burning devices. The EPA has proposed to update the standards for residential devices to reflect this new technology. All wood-burning devices can burn cleaner to reduce impacts on public health.

Improve the air pollution monitoring network.

The grades in this report come from information from the nationwide air pollution monitoring network. That network forms the public health infrastructure for air pollution. States and local governments use monitors to accurately measure the amount of air pollution in the community.

- Less than one-third of all counties have ozone or particle pollution monitors, seriously limiting the ability to adequately detect and track the levels of harmful air pollution.
- Coverage is especially limited near major highways, where people likely breathe higher levels of air pollution. The EPA needs to expand the monitoring network to include comprehensive coverage in areas near major roads and highways. These monitors are needed to measure the highest levels of exposures from air pollution related to traffic.
- Unfortunately, funds for existing air pollution monitors have been cut across the nation. These resources may be cut further unless Congress and the White House resolve to protect the health of the nation from air pollution.

Adopt an ozone standard that follows the law and protects health.

- National air quality standards are the official limits that drive the cleanup of air pollution around the nation. The Clean Air Act requires that the EPA set national air quality standards based on the need to protect public health "with an adequate margin of safety." In 2001, the Supreme Court unanimously ruled that protecting health was the only basis for the standards. The Clean Air Act also requires that the EPA review the standards every five years to make sure that the standards are based on the most current science.
- In its previous review, the EPA estimated that setting the standard for ozone to 60 ppb would save 4,000 to 12,000 lives and prevent 21,000 hospitalizations, 58,000 asthma attacks, 5,300 heart attacks, and result in 2.5 million fewer school and work days lost each year. The lower ozone levels would yield $35 billion to $100 billion in health and economic benefits by 2020.[8]

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5 U.S. Census Bureau. American Housing Survey for the United States. 2011. Available at www.census.gov/housing/ahs11/national2011.xls
6 Johnson PRS. In-Field Ambient Fine Particle Monitoring of an Outdoor Wood Boiler: Public Health Concerns. Human and Ecological Risk Assessment. 2006; 12: 1153–1170.
7 Naeher LP, Brauer M, Lipsett M, Zelikoff JT, Simpson CD, Koenig JQ, Smith KR. Woodsmoke Health Effects: A Review. *Inhalation Toxicology*. 2007; 19:67-106. Bølling AK, Pagels J, Yttri KE, Barregard L, Sallsten G, Schwarze PE, Boman C. Health effects of residential wood smoke particles: the importance of combustion conditions and physicochemical particle properties. *Particle and Fibre Toxicology*. 2009; 6: 29.
8 U.S. EPA. 2010. Summary of the updated Regulatory Impact Analysis (RIA) for the Reconsideration of the 2008 Ozone National Ambient Air Quality Standard (NAAQS). Available at http://www.epa.gov/ttn/ecas/regdata/RIAs/s1-supplemental_analysis_summary11-5-09.pdf .

- The Obama Administration decided in 2011 to ignore the overwhelming scientific research and the opinion of experts that much stronger standards were needed. Now, the EPA has the opportunity to propose a new, more protective standard. A stronger standard is needed to protect public health.

Protect the Clean Air Act

The continued improvement shown in the *State of the Air* report is possible because of the Clean Air Act, the nation's strong public health law that the U.S. Congress passed over 40 years ago. The Act requires that the EPA and each state take steps to clean up the air. Some members of Congress are proposing changes to the Clean Air Act that could dismantle progress made in the last 40 years. We must keep that law strong to continue to protect public health.

What You Can Do

Individual citizens can do a great deal to help reduce air pollution outdoors as well. Simple but effective ways include—

- **Tell the EPA to set standards** for carbon pollution from new and existing power plants. The EPA also needs to set tighter standards for ozone.
- **Send a message to Congress.** Urge them to support cleaner, healthier air and oppose measures to block or delay the cleanup of air pollution. They should support and protect the Clean Air Act.
- **Share your story.** Do you or any member of your family have a personal reason to want healthier, cleaner air? Go to www.Fightingforair.org to let us know how healthy air affects you.
- **Drive less.** Combine trips, walk, bike, carpool or vanpool, and use buses, subways or other alternatives to driving. Vehicle emissions are a major source of air pollution. Support community plans that provide ways to get around that don't require a car, such as more sidewalks, bike trails and transit systems.
- **Use less electricity.** Turn out the lights and use energy-efficient appliances. Generating electricity is one of the biggest sources of pollution, particularly in the eastern United States.
- **Don't burn wood or trash.** Burning firewood and trash are among the largest sources of particles in many parts of the country. If you must use a fireplace or stove for heat, convert your woodstoves to natural gas, which has far fewer polluting emissions. Compost and recycle as much as possible and dispose of other waste properly; don't burn it. Support efforts in your community to ban outdoor burning of construction and yard wastes. Avoid the use of outdoor hydronic heaters, also called outdoor wood boilers, which are frequently much more polluting than woodstoves.
- **Make sure your local school system requires clean school buses,** which includes replacing or retrofitting old school buses with filters and other equipment to reduce emissions. Make sure your local schools don't idle their buses, a step that can immediately reduce emissions.
- **Get involved.** Participate in your community's review of its air pollution plans and support state and local efforts to clean up air pollution. To find your local air pollution control agency, go to www.4cleanair.org.

People at Risk from Short-term Particle Pollution (24-Hour $PM_{2.5}$)

In Counties where the Grades were:	Chronic Diseases: Adult Asthma	Pediatric Asthma	COPD	CV Disease	Diabetes	Poverty	Age Groups: Under 18	65 and Over	Total Population	Number of Counties
Grade A (0.0)	4,209,381	1,346,270	3,146,095	4,179,137	4,939,239	9,987,659	15,101,759	8,540,433	63,768,955	266
Grade B (0.3-0.9)	4,014,172	1,212,570	2,852,365	3,676,126	4,337,074	8,710,105	13,334,445	7,522,293	58,330,127	163
Grade C (1.0-2.0)	2,183,338	621,887	1,507,301	1,969,260	2,320,052	4,663,638	7,040,265	4,231,961	31,006,014	76
Grade D (2.1-3.2)	1,160,599	356,702	708,415	941,907	1,178,708	2,896,834	3,911,548	1,981,934	16,109,693	28
Grade F (3.3+)	2,949,649	953,276	1,732,531	2,384,411	3,162,804	7,522,859	10,915,968	5,379,279	44,156,781	50
National Population in Counties with $PM_{2.5}$ Monitors	15,087,442	4,660,351	10,364,331	13,708,883	16,591,727	34,821,643	52,254,491	28,879,287	221,647,091	647

People at Risk from Year-Round Particle Pollution (Annual $PM_{2.5}$)

In Counties where the Grades were:	Chronic Diseases: Adult Asthma	Pediatric Asthma	COPD	CV Disease	Diabetes	Poverty	Age Groups: Under 18	65 and Over	Total Population	Number of Counties
Pass	10,720,495	3,236,432	7,466,837	9,901,686	11,811,595	23,704,202	36,463,837	20,802,308	156,807,359	464
Fail	3,096,331	1,025,583	2,006,862	2,655,175	3,427,301	8,475,349	11,351,156	5,596,944	46,284,891	54
National Population in Counties with $PM_{2.5}$ Monitors	15,087,442	4,660,351	10,364,331	13,708,883	16,591,727	34,821,643	52,254,491	28,879,287	221,647,091	647

People at Risk from Ozone

In Counties where the Grades were:	Chronic Diseases: Adult Asthma	Pediatric Asthma	COPD	CV Disease	Poverty	Age Groups: Under 18	65 and Over	Total Population	Number of Counties
Grade A (0.0)	1,320,459	371,193	905,816	1,245,680	3,119,192	4,431,907	2,881,567	19,497,130	127
Grade B (0.3-0.9)	1,535,373	435,400	1,229,737	1,650,630	3,417,687	4,988,560	3,567,140	22,732,980	105
Grade C (1.0-2.0)	1,639,228	486,376	1,127,194	1,475,895	3,146,416	5,488,645	3,144,579	23,403,658	115
Grade D (2.1-3.2)	1,527,358	467,602	1,055,385	1,372,093	3,402,065	5,251,797	2,831,073	22,484,036	90
Grade F (3.3+)	9,513,298	3,049,904	6,461,645	8,529,355	21,820,804	33,827,364	17,655,027	140,576,080	296
National Population in Counties with Ozone Monitors	15,791,350	4,884,041	10,974,663	14,534,975	35,430,736	54,812,409	30,654,002	232,400,175	809

Note: *The State of the Air 2014* covers the period 2010-2012. The Appendix provides a full discussion of the methodology.

People at Risk In 25 U.S. Cities Most Polluted by Short-term Particle Pollution (24-hour $PM_{2.5}$)

2014 Rank[1]	Metropolitan Statistical Areas	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Diabetes[9]	Poverty[10]
1	Fresno-Madera, CA	1,100,113	321,057	118,768	28,163	68,342	35,124	49,661	73,409	296,919
2	Visalia-Porterville-Hanford, CA	603,341	187,060	57,426	16,409	36,397	18,204	25,234	37,915	161,299
3	Bakersfield, CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	54,932	195,433
4	Los Angeles-Long Beach, CA	18,238,998	4,510,957	2,112,146	395,699	1,207,447	626,541	889,485	1,317,256	3,180,714
5	Modesto-Merced, CA	784,031	226,011	85,097	19,826	49,029	25,321	35,859	53,125	165,981
6	Pittsburgh-New Castle-Weirton, PA-OH-WV	2,661,369	522,226	472,879	53,760	214,860	149,397	207,620	229,649	327,390
7	Fairbanks, AK	100,272	24,757	7,165	2,177	6,771	3,554	4,060	4,739	8,847
8	Salt Lake City-Provo-Orem, UT	2,350,274	735,347	204,516	52,201	143,124	61,102	87,864	113,663	287,433
9	El Paso-Las Cruces, TX-NM	1,045,180	299,658	115,604	23,081	54,409	39,900	54,711	76,037	251,188
10	San Jose-San Francisco-Oakland, CA	8,370,967	1,870,295	1,071,176	164,061	574,247	305,542	440,420	646,630	1,018,010
11	Logan, UT-ID	128,306	40,072	11,141	2,919	7,736	3,286	4,635	5,919	19,089
12	Missoula, MT	110,977	21,388	13,807	1,637	8,559	4,833	6,353	5,511	16,277
13	Davenport-Moline, IA-IL	474,226	111,869	74,476	8,163	29,901	22,955	31,878	36,165	59,914
14	Chicago-Naperville, IL-IN-WI	9,899,902	2,416,660	1,205,623	224,825	637,270	446,747	576,699	691,916	1,422,025
15	Phoenix-Mesa-Scottsdale, AZ	4,329,534	1,110,210	573,413	94,629	278,199	187,356	266,697	335,194	739,213
16	Indianapolis-Carmel-Muncie, IN	2,310,360	580,360	284,320	54,927	156,574	129,262	161,629	183,582	339,595
16	New York-Newark, NY-NJ-CT-PA	23,362,099	5,226,786	3,220,554	488,177	1,662,512	1,068,245	1,392,908	1,710,199	3,232,239
18	Harrisburg-York-Lebanon, PA	1,228,559	272,205	191,293	28,289	96,565	63,765	87,181	98,027	134,306
18	Lancaster, PA	526,823	128,066	82,655	13,309	40,265	26,506	36,476	40,662	59,731
20	San Diego-Carlsbad, CA	3,177,063	726,268	380,276	63,708	215,294	111,464	158,275	233,550	465,651
21	Seattle-Tacoma, WA	4,399,332	977,724	546,985	65,294	331,831	190,214	237,015	293,198	515,767
21	Yakima, WA	246,977	74,562	29,906	4,979	16,695	9,646	12,181	14,799	55,498
23	Green Bay-Shawano, WI	357,045	85,395	49,693	6,544	23,279	13,981	21,166	22,498	40,952
23	South Bend-Elkhart-Mishawaka, IN-MI	721,296	180,494	105,222	17,084	51,094	41,574	54,437	59,597	117,073
25	Sacramento-Roseville, CA	2,462,722	595,104	325,693	52,202	165,261	89,297	130,118	189,132	408,101

Notes:
1. Cities are ranked using the highest weighted average for any county within that Combined or Metropolitan Statistical Area.
2. **Total Population** represents the at-risk populations for all counties within the respective Combined or Metropolitan Statistical Area.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. Pediatric asthma estimates are for those under 18 years of age and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.

People at Risk In 25 U.S. Cities Most Polluted by Year-Round Particle Pollution (Annual $PM_{2.5}$)

2014 Rank[1]	Metropolitan Statistical Areas	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Diabetes[9]	Poverty[10]
1	Fresno-Madera, CA	1,100,113	321,057	118,768	28,163	68,342	35,124	49,661	73,409	296,919
2	Visalia-Porterville-Hanford, CA	603,341	187,060	57,426	16,409	36,397	18,204	25,234	37,915	161,299
3	Bakersfield, CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	54,932	195,433
3	Los Angeles-Long Beach, CA	18,238,998	4,510,957	2,112,146	395,699	1,207,447	626,541	889,485	1,317,256	3,180,714
5	Modesto-Merced, CA	784,031	226,011	85,097	19,826	49,029	25,321	35,859	53,125	165,981
6	Pittsburgh-New Castle-Weirton, PA-OH-WV	2,661,369	522,226	472,879	53,760	214,860	149,397	207,620	229,649	327,390
7	El Centro, CA	176,948	50,686	19,527	4,446	11,084	5,722	8,115	11,970	38,189
8	El Paso-Las Cruces, TX-NM	1,045,180	299,658	115,604	23,081	54,409	39,900	54,711	76,037	251,188
8	Phoenix-Mesa-Scottsdale, AZ	4,329,534	1,110,210	573,413	94,629	278,199	187,356	266,697	335,194	739,213
8	St. Louis-St. Charles-Farmington, MO-IL	2,900,605	673,074	409,326	66,572	221,038	169,514	205,856	232,181	404,224
11	Cincinnati-Wilmington-Maysville, OH-KY-IN	2,188,001	534,579	282,828	47,895	175,182	147,881	163,816	183,926	321,436
11	Philadelphia-Reading-Camden, PA-NJ-DE-MD	7,129,428	1,625,860	1,005,294	159,508	536,473	343,689	463,539	529,938	938,401
13	Louisville/Jefferson County-Elizabethtown-Madison, KY-IN	1,478,637	349,246	198,854	35,110	120,277	118,408	129,934	121,032	229,972
13	New York-Newark, NY-NJ-CT-PA	23,362,099	5,226,786	3,220,554	488,177	1,662,512	1,068,245	1,392,908	1,710,199	3,232,239
15	Macon-Warner Robins, GA	418,201	103,738	53,345	11,225	25,844	23,080	29,124	32,613	86,424
16	Birmingham-Hoover-Talladega, AL	1,309,818	308,441	183,656	34,704	85,987	98,561	117,729	122,364	221,999
16	Cleveland-Akron-Canton, OH	3,497,711	779,681	555,966	66,994	283,053	237,500	278,890	327,060	531,631
18	Atlanta-Athens-Clarke County-Sandy Springs, GA	6,092,295	1,564,174	617,176	169,253	371,132	315,121	377,489	430,790	1,017,357
19	Wheeling, WV-OH	146,420	28,482	27,019	2,327	12,122	11,661	15,527	15,329	22,988
20	Chicago-Naperville, IL-IN-WI	9,899,902	2,416,660	1,205,623	224,825	637,270	446,747	576,699	691,916	1,422,025
20	Indianapolis-Carmel-Muncie, IN	2,310,360	580,360	284,320	54,927	156,574	129,262	161,629	183,582	339,595
22	Columbus-Auburn-Opelika, GA-AL	491,852	117,334	56,877	12,930	31,310	29,973	35,489	38,431	96,604
23	Dayton-Springfield-Sidney, OH	1,079,417	246,098	170,912	21,146	86,918	72,107	84,546	98,998	172,857
23	Johnstown-Somerset, PA	218,541	41,597	42,384	4,323	17,635	12,448	17,661	19,496	28,490
23	San Diego-Carlsbad, CA	3,177,063	726,268	380,276	63,708	215,294	111,464	158,275	233,550	465,651

Notes:

1. Cities are ranked using the highest weighted average for any county within that Combined or Metropolitan Statistical Area.
2. **Total Population** represents the at-risk populations for all counties within the respective Combined or Metropolitan Statistical Area.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. Pediatric asthma estimates are for those under 18 years of age and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV** disease is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.

People at Risk In 25 Most Ozone-Polluted Cities

2014 Rank[1]	Metropolitan Statistical Areas	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Poverty[9]
1	Los Angeles-Long Beach, CA	18,238,998	4,510,957	2,112,146	395,699	1,207,447	626,541	889,485	3,180,714
2	Visalia-Porterville-Hanford, CA	603,341	187,060	57,426	16,409	36,397	18,204	25,234	161,299
3	Bakersfield, CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	195,433
4	Fresno-Madera, CA	1,100,113	321,057	118,768	28,163	68,342	35,124	49,661	296,919
5	Sacramento-Roseville, CA	2,462,722	595,104	325,693	52,202	165,261	89,297	130,118	408,101
6	Houston-The Woodlands, TX	6,371,677	1,733,980	597,789	135,031	316,186	232,392	328,577	1,034,302
7	Modesto-Merced, CA	784,031	226,011	85,097	19,826	49,029	25,321	35,859	165,981
8	Dallas-Fort Worth, TX-OK	7,095,411	1,921,982	707,161	149,749	354,389	263,975	375,698	1,052,441
8	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	9,331,587	2,158,553	1,100,311	213,935	651,339	400,803	550,553	884,620
10	Las Vegas-Henderson, NV-AZ	2,247,056	538,993	307,611	35,543	127,438	124,833	150,272	373,333
11	Phoenix-Mesa-Scottsdale, AZ	4,329,534	1,110,210	573,413	94,629	278,199	187,356	266,697	739,213
12	New York-Newark, NY-NJ-CT-PA	23,362,099	5,226,786	3,220,554	488,177	1,662,512	1,068,245	1,392,908	3,232,239
13	St. Louis-St. Charles-Farmington, MO-IL	2,900,605	673,074	409,326	66,572	221,038	169,514	205,856	404,224
14	Tulsa-Muskogee-Bartlesville, OK	1,122,259	280,163	156,101	23,961	85,591	63,219	86,051	174,911
15	Cincinnati-Wilmington-Maysville, OH-KY-IN	2,188,001	534,579	282,828	47,895	175,182	147,881	163,816	321,436
16	Philadelphia-Reading-Camden, PA-NJ-DE-MD	7,129,428	1,625,860	1,005,294	159,508	536,473	343,689	463,539	938,401
17	El Centro, CA	176,948	50,686	19,527	4,446	11,084	5,722	8,115	38,189
18	Louisville/Jefferson County-Elizabethtown-Madison, KY-IN	1,478,637	349,246	198,854	35,110	120,277	118,408	129,934	229,972
19	Oklahoma City-Shawnee, OK	1,367,325	339,847	168,717	29,065	104,454	73,644	97,967	215,506
20	Chicago-Naperville, IL-IN-WI	9,899,902	2,416,660	1,205,623	224,825	637,270	446,747	576,699	1,422,025
21	Pittsburgh-New Castle-Weirton, PA-OH-WV	2,661,369	522,226	472,879	53,760	214,860	149,397	207,620	327,390
22	Fort Collins, CO	310,487	64,060	40,112	5,632	22,009	11,857	14,516	41,513
23	Birmingham-Hoover-Talladega, AL	1,309,818	308,441	183,656	34,704	85,987	98,561	117,729	221,999
24	Cleveland-Akron-Canton, OH	3,497,711	779,681	555,966	66,994	283,053	237,500	278,890	531,631
24	Sheboygan, WI	115,009	26,716	17,789	2,047	7,547	4,734	7,286	12,043

Notes:
1. Cities are ranked using the highest weighted average for any county within that Combined or Metropolitan Statistical Area.
2. **Total Population** represents the at-risk populations for all counties within the respective Combined or Metropolitan Statistical Area.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. Pediatric asthma estimates are for those under 18 years of age and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the **estimated** number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.

People at Risk in 25 Counties Most Polluted by Short-term Particle Pollution (24-hour $PM_{2.5}$)

				At-Risk Groups								High $PM_{2.5}$ Days in Unhealthy Ranges, 2010–2012	
2014 Rank[1]	County	ST	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Diabetes[9]	Poverty[10]	Weighted Avg.[11]	Grade[12]
1	Fresno	CA	947,895	277,928	100,217	24,380	58,731	30,020	42,282	62,691	263,134	37.0	F
2	Kings	CA	151,364	41,880	12,839	3,674	9,534	4,591	6,174	9,529	28,388	34.3	F
3	Kern	CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	54,932	195,433	33.3	F
4	Riverside	CA	2,268,783	621,038	281,587	54,477	145,184	77,188	111,695	162,066	398,252	31.8	F
5	Lemhi	ID	7,758	1,414	1,903	124	568	424	651	706	1,380	30.7	F
6	Stanislaus	CA	521,726	145,520	59,055	12,765	33,120	17,294	24,655	36,403	103,926	29.2	F
7	Los Angeles	CA	9,962,789	2,360,255	1,144,579	207,040	667,835	343,914	485,919	721,640	1,873,522	25.2	F
8	Ravalli	MT	40,617	8,468	8,545	648	3,008	2,243	3,223	2,690	6,566	23.7	F
9	Madera	CA	152,218	43,129	18,551	3,783	9,611	5,104	7,379	10,718	33,785	20.5	F
10	Allegheny	PA	1,229,338	237,163	208,167	24,647	100,057	66,353	91,550	102,032	151,371	19.2	F
11	Shoshone	ID	12,702	2,580	2,618	227	892	631	942	1,041	2,459	14.8	F
12	Merced	CA	262,305	80,491	26,042	7,061	15,909	8,027	11,204	16,722	62,055	14.7	F
13	Fairbanks North Star Borough	AK	100,272	24,757	7,165	2,177	6,771	3,554	4,060	4,739	8,847	13.8	F
14	Salt Lake	UT	1,063,842	306,723	96,618	21,774	67,221	29,029	41,856	54,145	139,534	13.2	F
15	Doña Ana	NM	214,445	56,374	27,868	4,136	14,485	10,165	11,743	15,414	55,752	12.5	F
16	San Joaquin	CA	702,612	201,160	77,249	17,646	44,136	22,956	32,618	48,340	127,598	12.3	F
17	Silver Bow	MT	34,403	7,202	5,726	551	2,570	1,693	2,342	1,993	6,252	10.5	F
18	Lewis and Clark	MT	64,876	14,289	9,626	1,094	4,780	3,097	4,193	3,671	7,101	8.7	F
18	Cache	UT	115,520	35,684	9,431	2,533	7,023	2,830	3,978	5,183	17,518	8.7	F
18	Weber	UT	236,640	70,336	25,049	4,993	14,783	6,674	10,075	12,654	29,861	8.7	F
21	Missoula	MT	110,977	21,388	13,807	1,637	8,559	4,833	6,353	5,511	16,277	8.5	F
22	Inyo	CA	18,495	3,876	3,680	340	1,317	806	1,266	1,732	2,139	8.2	F
23	Muscatine	IA	42,879	11,044	6,151	636	2,575	1,985	2,780	3,091	5,828	7.7	F
24	Tulare	CA	451,977	145,180	44,587	12,735	26,863	13,613	19,060	28,386	132,911	7.0	F
24	Lake	IN	493,618	124,014	68,140	11,737	33,564	28,781	36,785	41,321	95,358	7.0	F

Notes:

1. Counties are ranked by weighted average. See note 11 below.
2. **Total Population** represents the at-risk populations in counties with $PM_{2.5}$ monitors.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. **Pediatric asthma** estimates are for those under 18 years of age and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.
11. The **Weighted Average** was derived by counting the number of days in each unhealthful range (orange, red, purple, maroon) in each year (2010-2012), multiplying the total in each range by the assigned standard weights (i.e., 1 for orange, 1.5 for red, 2.0 for purple, 2.5 for maroon), and calculating the average.
12. **Grade** is assigned by weighted average as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

People at Risk In 25 Counties Most Polluted by Year-Round Particle Pollution (Annual $PM_{2.5}$)

				At-Risk Groups								$PM_{2.5}$ Annual, 2010–2012	
2014 Rank[1]	County	ST	Total Population[2]	Under 18[3]	65 and Over[3]	Pediatric Asthma[4,6]	Adult Asthma[5,6]	COPD[7]	CV Disease[8]	Diabetes[9]	Poverty[10]	Design Value[11]	Grade[12]
1	Madera	CA	152,218	43,129	18,551	3,783	9,611	5,104	7,379	10,718	33,785	19.0	Fail
2	Fresno	CA	947,895	277,928	100,217	24,380	58,731	30,020	42,282	62,691	263,134	16.0	Fail
3	Kings	CA	151,364	41,880	12,839	3,674	9,534	4,591	6,174	9,529	28,388	15.8	Fail
4	Kern	CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	54,932	195,433	15.6	Fail
4	Riverside	CA	2,268,783	621,038	281,587	54,477	145,184	77,188	111,695	162,066	398,252	15.6	Fail
6	Hawaii	HI	189,191	42,070	30,112	4,721	12,942	5,466	10,210	12,088	35,283	15.5	Fail
7	Stanislaus	CA	521,726	145,520	59,055	12,765	33,120	17,294	24,655	36,403	103,926	14.9	Fail
8	Tulare	CA	451,977	145,180	44,587	12,735	26,863	13,613	19,060	28,386	132,911	14.8	Fail
8	Allegheny	PA	1,229,338	237,163	208,167	24,647	100,057	66,353	91,550	102,032	151,371	14.8	Fail
10	Lemhi	ID	7,758	1,414	1,903	124	568	424	651	706	1,380	14.7	Fail
11	Merced	CA	262,305	80,491	26,042	7,061	15,909	8,027	11,204	16,722	62,055	14.3	Fail
12	Imperial	CA	176,948	50,686	19,527	4,446	11,084	5,722	8,115	11,970	38,189	13.6	Fail
13	Pinal	AZ	387,365	98,431	61,638	8,390	24,911	17,639	25,793	31,194	63,509	13.5	Fail
13	Madison	IL	267,883	59,873	40,134	5,580	17,585	12,885	17,275	20,411	34,325	13.5	Fail
13	Doña Ana	NM	214,445	56,374	27,868	4,136	14,485	10,165	11,743	15,414	55,752	13.5	Fail
16	Hamilton	OH	802,038	187,133	109,667	16,079	64,714	51,702	58,327	69,543	155,194	13.4	Fail
16	Philadelphia	PA	1,547,607	348,538	189,106	36,222	123,670	71,951	93,433	105,798	399,562	13.4	Fail
18	Clark	IN	111,951	26,337	15,207	2,493	7,764	6,569	8,336	9,396	14,083	13.2	Fail
18	Northampton	PA	299,267	63,084	49,216	6,556	23,792	15,897	21,914	24,518	31,391	13.2	Fail
20	Los Angeles	CA	9,962,789	2,360,255	1,144,579	207,040	667,835	343,914	485,919	721,640	1,873,522	13.1	Fail
20	Bibb	GA	156,462	39,789	20,346	4,305	9,578	8,561	10,850	12,117	41,206	13.1	Fail
20	Delaware	PA	561,098	128,084	82,189	13,311	43,914	28,298	38,270	43,168	63,245	13.1	Fail
23	Jefferson	AL	660,009	154,843	89,599	17,422	43,363	49,132	58,349	60,732	120,153	13.0	Fail
23	Cuyahoga	OH	1,265,111	278,299	201,311	23,913	102,873	85,744	100,502	117,835	233,101	13.0	Fail
23	Stark	OH	374,868	83,603	63,300	7,184	30,217	25,716	30,698	35,705	53,788	13.0	Fail

Notes:

1. Counties are ranked by weighted average. See note 11 below.
2. **Total Population** represents the at-risk populations in counties with $PM_{2.5}$ monitors.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. **Pediatric asthma** estimates are for those under 18 years of age and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.
11. The **Design Value** is the calculated concentration of a pollutant based on the form of the National Ambient Air Quality Standard, and is used by EPA to determine whether the air quality in a county meets the standard. The source for the Design Values is http://www.epa.gov/airtrends/pdfs/PM25_DesignValues_20102012_FINAL_12_12_13.xlsx, updated December 12, 2013.
12. **Grades** are based on comparing the design value to the NAAQS for annual $PM_{2.5}$ levels during 2010-2012. Counties with design values of 12.0 or less received grades of Pass; counties with design values of 12.1 or greater received grades of Fail.

People at Risk in 25 Most Ozone-Polluted Counties

				At-Risk Groups							High Ozone Days in Unhealthy Ranges, 2010–2012	
2014 Rank[1]	**County**	**ST**	**Total Population[2]**	**Under 18[3]**	**65 and Over[3]**	**Pediatric Asthma[4,6]**	**Adult Asthma[5,6]**	**COPD[7]**	**CV Disease[8]**	**Poverty[9]**	**Weighted Avg.[10]**	**Grade[11]**
1	San Bernardino	CA	2,081,313	586,445	198,966	51,443	131,079	65,782	90,970	415,927	121.8	F
2	Riverside	CA	2,268,783	621,038	281,587	54,477	145,184	77,188	111,695	398,252	103.7	F
3	Tulare	CA	451,977	145,180	44,587	12,735	26,863	13,613	19,060	132,911	88.7	F
4	Kern	CA	856,158	255,815	80,525	22,440	52,552	26,262	36,291	195,433	78.5	F
5	Los Angeles	CA	9,962,789	2,360,255	1,144,579	207,040	667,835	343,914	485,919	1,873,522	77.5	F
6	Fresno	CA	947,895	277,928	100,217	24,380	58,731	30,020	42,282	263,134	64.5	F
7	Sacramento	CA	1,450,121	361,613	172,884	31,721	95,947	50,393	72,061	279,494	35.3	F
8	Kings	CA	151,364	41,880	12,839	3,674	9,534	4,591	6,174	28,388	29.2	F
9	Harris	TX	4,253,700	1,172,689	369,564	91,322	208,914	149,358	209,659	783,419	28.7	F
10	Uintah	UT	34,524	11,596	3,153	823	2,035	893	1,314	3,453	28.3	F
11	Madera	CA	152,218	43,129	18,551	3,783	9,611	5,104	7,379	33,785	27.8	F
12	Stanislaus	CA	521,726	145,520	59,055	12,765	33,120	17,294	24,655	103,926	21.2	F
13	Harford	MD	248,622	58,392	33,598	5,991	17,038	10,697	15,018	19,458	21.0	F
13	Tarrant	TX	1,880,153	517,226	180,052	40,278	93,010	68,815	97,577	287,871	21.0	F
15	Clark	NV	2,000,759	490,544	245,958	31,584	110,956	109,496	127,890	324,535	19.7	F
16	El Dorado	CA	180,561	39,053	29,562	3,426	12,747	7,490	11,383	16,708	19.3	F
17	Placer	CA	361,682	85,361	59,884	7,488	24,681	14,298	21,761	32,697	19.2	F
18	Maricopa	AZ	3,942,169	1,011,779	511,775	86,239	253,288	169,717	240,904	675,704	18.7	F
19	Fairfield	CT	933,835	224,965	130,626	27,176	70,430	38,296	49,366	81,756	18.5	F
20	Madison	IL	267,883	59,873	40,134	5,580	17,585	12,885	17,275	34,325	18.0	F
21	Prince George's	MD	881,138	203,388	90,532	20,868	62,113	34,582	45,318	88,153	17.8	F
22	Denton	TX	707,304	190,492	55,023	14,834	35,029	24,614	34,047	61,520	17.3	F
23	Tulsa	OK	613,816	156,081	76,929	13,349	46,539	33,195	44,339	96,205	17.0	F
24	Hamilton	OH	802,038	187,133	109,667	16,079	64,714	51,702	58,327	155,194	16.8	F
24	Brazoria	TX	324,769	88,236	33,128	6,871	16,223	12,296	17,536	36,633	16.8	F

Notes:
1. Counties are ranked by weighted average. See note 10 below.
2. **Total Population** represents the at-risk populations in counties with $PM_{2.5}$ monitors.
3. Those **under 18** and **65 and over** are vulnerable to $PM_{2.5}$ and are, therefore, included. They should not be used as population denominators for disease estimates.
4. **Pediatric asthma** estimates are for those under 18 years of age and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the estimated number of people who had asthma in 2012 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates, e.g., summing pediatric and adult asthma.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.
10. The **Weighted Average** was derived by counting the number of days in each unhealthful range (orange, red, purple) in each year (2010-2012), multiplying the total in each range by the assigned standard weights (i.e., 1 for orange, 1.5 for red, 2.0 for purple), and calculating the average.
11. Grade is assigned by weighted average as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

Cleanest U.S. Cities for Short-term Particle Pollution (24-hour $PM_{2.5}$)[1]

Metropolitan Statistical Area	Population
Asheville-Brevard, NC	465,255
Austin-Round Rock, TX	1,834,303
Bangor, ME	153,746
Beckley, WV	124,890
Bismarck, ND	120,060
Bloomington-Bedford, IN	208,477
Bowling Green-Glasgow, KY	214,831
Brownsville-Harlingen-Raymondville, TX	437,615
Cape Coral-Fort Myers-Naples, FL	977,720
Champaign-Urbana, IL	233,788
Charlotte-Concord, NC-SC	2,454,619
Clarksville, TN-KY	274,342
Colorado Springs, CO	668,353
Decatur, IL	110,122
Eau Claire-Menomonie, WI	207,671
Elmira-Corning, NY	187,974
Fargo-Wahpeton, ND-MN	239,114
Farmington, NM	128,529
Fayetteville-Lumberton-Laurinburg, NC	546,175
Fayetteville-Springdale-Rogers, AR-MO	482,200
Flagstaff, AZ	136,011
Florence, SC	206,087
Florence-Muscle Shoals, AL	146,988
Fort Collins, CO	310,487
Fort Smith, AR-OK	280,521
Goldsboro, NC	124,246

Metropolitan Statistical Area	Population
Grand Island, NE	83,472
Greenville-Washington, NC	220,061
Gulfport-Biloxi-Pascagoula, MS	379,582
Hattiesburg, MS	146,766
Hickory-Lenoir, NC	408,625
Homosassa Springs, FL	139,360
Hot Springs-Malvern, AR	130,297
Houma-Thibodaux, LA	208,922
Houston-The Woodlands, TX	6,371,677
Huntsville-Decatur-Albertville, AL	679,743
Jackson, TN	130,450
Kahului-Wailuku-Lahaina, HI	158,316
Kalamazoo-Battle Creek-Portage, MI	525,929
Lake Charles, LA	201,195
Lakeland-Winter Haven, FL	616,158
Lansing-East Lansing-Owosso, MI	534,964
Lima-Van Wert-Celina, OH	220,591
Lynchburg, VA	255,342
Macon-Warner Robins, GA	418,201
McAllen-Edinburg, TX	868,167
Mobile-Daphne-Fairhope, AL	604,726
Monroe-Ruston-Bastrop, LA	252,294
Montgomery, AL	377,149
Morgantown-Fairmont, WV	190,842
Nashville-Davidson—Murfreesboro, TN	1,845,235
North Port-Sarasota, FL	917,203

Metropolitan Statistical Area	Population
Oklahoma City-Shawnee, OK	1,367,325
Owensboro, KY	116,030
Paducah-Mayfield, KY-IL	136,083
Palm Bay-Melbourne-Titusville, FL	547,307
Pensacola-Ferry Pass-Brent, FL	461,227
Peoria-Canton, IL	417,098
Prescott, AZ	212,637
Pueblo-Cañon City, CO	207,640
Quincy-Hannibal, IL-MO	116,393
Richmond, VA	1,231,980
Roanoke, VA	310,118
Rocky Mount-Wilson-Roanoke Rapids, NC	308,963
Salinas, CA	426,762
Salisbury, MD-DE	381,868
San Antonio-New Braunfels, TX	2,234,003
Santa Maria-Santa Barbara, CA	431,249
Sierra Vista-Douglas, AZ	132,088
Springfield-Jacksonville-Lincoln, IL	317,206
St. George, UT	144,809
Syracuse-Auburn, NY	740,486
Tallahassee-Bainbridge, FL-GA	402,880
Tampa-St. Petersburg-Clearwater, FL	2,842,878
Texarkana, TX-AR	149,701
Tulsa-Muskogee-Bartlesville, OK	1,122,259
Wichita-Arkansas City-Winfield, KS	672,393
Yuma, AZ	200,022

Note:
1. This list represents cities with the lowest levels of short term $PM_{2.5}$ air pollution. Monitors in these cities reported no days with unhealthful $PM_{2.5}$ levels.

Top 25 Cleanest U.S. Cities for Year-Round Particle Pollution (Annual $PM_{2.5}$)[1]

Rank[2]	Design Value[3]	Metropolitan Statistical Area	Population
1	4.0	Prescott, AZ	212,637
2	4.7	Cheyenne, WY	94,483
2	4.7	Farmington, NM	128,529
4	4.8	Casper, WY	78,621
5	5.1	St. George, UT	144,809
6	5.2	Flagstaff, AZ	136,011
7	5.3	Redding-Red Bluff, CA	241,992
8	5.5	Duluth, MN-WI	279,452
9	5.7	Kahului-Wailuku-Lahaina, HI	158,316
10	5.9	Rapid City-Spearfish, SD	163,135
11	6.1	Salinas, CA	426,762
12	6.2	Reno-Carson City-Fernley, NV	587,004
13	6.5	Albuquerque-Santa Fe-Las Vegas, NM	1,162,777
13	6.5	Palm Bay-Melbourne-Titusville, FL	547,307
15	6.6	Anchorage, AK	392,535
15	6.6	Pocatello, ID	83,800
17	6.7	Sierra Vista-Douglas, AZ	132,088
18	6.8	Bismarck, ND	120,060
19	6.9	Cape Coral-Fort Myers-Naples, FL	977,720
20	7.0	Elmira-Corning, NY	187,974
20	7.0	North Port-Sarasota, FL	917,203
22	7.2	Burlington-South Burlington, VT	213,701
23	7.3	Bangor, ME	153,746
23	7.3	Grand Island, NE	83,472
23	7.3	Homosassa Springs, FL	139,360
23	7.3	Portland-Vancouver-Salem, OR-WA	2,992,924

Notes:
1. This list represents cities with the lowest levels of annual $PM_{2.5}$ air pollution.
2. Cities are ranked by using the highest design value for any county within that metropolitan area.
3. The **Design Value** is the calculated concentration of a pollutant based on the form of the National Ambient Air Quality Standard, and is used by EPA to determine whether the air quality in a county meets the standard. The source for the Design Values is http://www.epa.gov/airtrends/pdfs/PM25_DesignValues_20102012_FINAL_12_12_13.xlsx, updated December 12, 2013.

Cleanest U.S. Cities for Ozone Air Pollution[1]

Metropolitan Statistical Area	Population
Anchorage, AK	392,535
Bangor, ME	153,746
Bellingham, WA	205,262
Bend-Redmond-Prineville, OR	183,006
Bismarck, ND	120,060
Brownsville-Harlingen-Raymondville, TX	437,615
Brunswick, GA	113,448
Burlington-South Burlington, VT	213,701
Cape Coral-Fort Myers-Naples, FL	977,720
Charleston-North Charleston, SC	697,439
Des Moines-Ames-West Des Moines, IA	742,936
Dothan-Enterprise-Ozark, AL	249,316
Eugene, OR	354,542
Fargo-Wahpeton, ND-MN	239,114
Gadsden, AL	104,392
Gainesville-Lake City, FL	336,198
Grand Junction, CO	147,848
Idaho Falls-Rexburg-Blackfoot, ID	231,995
La Crosse-Onalaska, WI-MN	135,298
Laredo, TX	259,172
Lincoln-Beatrice, NE	332,148
Logan, UT-ID	128,306
McAllen-Edinburg, TX	868,167
Medford-Grants Pass, OR	289,342
Missoula, MT	110,977
Monroe-Ruston-Bastrop, LA	252,294

Metropolitan Statistical Area	Population
Rapid City-Spearfish, SD	163,135
Rochester-Austin, MN	248,979
Rockford-Freeport-Rochelle, IL	445,816
Rome-Summerville, GA	121,902
Salinas, CA	426,762
Savannah-Hinesville-Statesboro, GA	516,154
Sebring, FL	98,128
Sioux City-Vermillion, IA-SD-NE	183,052
Sioux Falls, SD	237,251
Spokane-Spokane Valley-Coeur d'Alene, WA-ID	674,610
Tuscaloosa, AL	233,389
Urban Honolulu, HI	976,372
Utica-Rome, NY	298,064
Waterloo-Cedar Falls, IA	168,747
Wausau-Stevens Point-Wisconsin Rapids, WI	307,984

Note:
1. This list represents cities with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2008 NAAQS.

Cleanest Counties for Short-term Particle Pollution (24-hour $PM_{2.5}$)[1]

County	State	MSAs and Respective CSA[2]
Anchorage Municipality	AK	Anchorage, AK
Baldwin	AL	Mobile-Daphne-Fairhope, AL
Clay	AL	
Colbert	AL	Florence-Muscle Shoals, AL
DeKalb	AL	
Madison	AL	Huntsville-Decatur-Albertville, AL
Mobile	AL	Mobile-Daphne-Fairhope, AL
Montgomery	AL	Montgomery, AL
Morgan	AL	Huntsville-Decatur-Albertville, AL
Russell	AL	Columbus-Auburn-Opelika, GA-AL
Shelby	AL	Birmingham-Hoover-Talladega, AL
Talladega	AL	Birmingham-Hoover-Talladega, AL
Arkansas	AR	
Ashley	AR	
Crittenden	AR	Memphis-Forrest City, TN-MS-AR
Faulkner	AR	Little Rock-North Little Rock, AR
Garland	AR	Hot Springs-Malvern, AR
Jackson	AR	
Phillips	AR	
Polk	AR	
Pope	AR	
Union	AR	
Washington	AR	Fayetteville-Springdale-Rogers, AR-MO
Apache	AZ	
Cochise	AZ	Sierra Vista-Douglas, AZ
Coconino	AZ	Flagstaff, AZ
Pima	AZ	Tucson-Nogales, AZ
Yavapai	AZ	Prescott, AZ
Yuma	AZ	Yuma, AZ
Calaveras	CA	
Humboldt	CA	
Lake	CA	
Mendocino	CA	
Monterey	CA	Salinas, CA
Nevada	CA	Sacramento-Roseville, CA
San Benito	CA	San Jose-San Francisco-Oakland, CA

County	State	MSAs and Respective CSA[2]
Santa Barbara	CA	Santa Maria-Santa Barbara, CA
Santa Cruz	CA	San Jose-San Francisco-Oakland, CA
Shasta	CA	Redding-Red Bluff, CA
Siskiyou	CA	
Sonoma	CA	San Jose-San Francisco-Oakland, CA
Arapahoe	CO	Denver-Aurora, CO
Douglas	CO	Denver-Aurora, CO
El Paso	CO	Colorado Springs, CO
La Plata	CO	
Larimer	CO	Fort Collins, CO
Montezuma	CO	
Pueblo	CO	Pueblo-Cañon City, CO
Litchfield	CT	New York-Newark, NY-NJ-CT-PA
New London	CT	Hartford-West Hartford, CT
Kent	DE	Philadelphia-Reading-Camden, PA-NJ-DE-MD
Sussex	DE	Salisbury, MD-DE
Brevard	FL	Palm Bay-Melbourne-Titusville, FL
Citrus	FL	Homosassa Springs, FL
Escambia	FL	Pensacola-Ferry Pass-Brent, FL
Hillsborough	FL	Tampa-St. Petersburg-Clearwater, FL
Lee	FL	Cape Coral-Fort Myers-Naples, FL
Leon	FL	Tallahassee-Bainbridge, FL-GA
Orange	FL	Orlando-Deltona-Daytona Beach, FL
Pinellas	FL	Tampa-St. Petersburg-Clearwater, FL
Polk	FL	Lakeland-Winter Haven, FL
Sarasota	FL	North Port-Sarasota, FL
Seminole	FL	Orlando-Deltona-Daytona Beach, FL
Bibb	GA	Macon-Warner Robins, GA
Clarke	GA	Atlanta—Athens-Clarke County—Sandy Springs, GA
Clayton	GA	Atlanta—Athens-Clarke County—Sandy Springs, GA
Hall	GA	Atlanta—Athens-Clarke County—Sandy Springs, GA
Houston	GA	Macon-Warner Robins, GA
Paulding	GA	Atlanta—Athens-Clarke County—Sandy Springs, GA
Walker	GA	Chattanooga-Cleveland-Dalton, TN-GA-AL
Maui	HI	Kahului-Wailuku-Lahaina, HI
Montgomery	IA	

Notes:
1. This list represents counties with the lowest levels of short term $PM_{2.5}$ air pollution. Monitors in these counties reported no days with unhealthful $PM_{2.5}$ levels.
2. MSA and CSA are terms used by the U.S. Office of Management and Budget for statistical purposes. MSA stands for Metropolitan Statistical Area. CSA stands for Combined Statistical Area, which may include multiples and individual counties.

Cleanest Counties for Short-term Particle Pollution (24-hour $PM_{2.5}$)[1] (cont.)

County	State	MSAs and Respective CSA[2]
Adams	IL	Quincy-Hannibal, IL-MO
Champaign	IL	Champaign-Urbana, IL
DuPage	IL	Chicago-Naperville, IL-IN-WI
Hamilton	IL	
Jersey	IL	St. Louis-St. Charles-Farmington, MO-IL
Macon	IL	Decatur, IL
McHenry	IL	Chicago-Naperville, IL-IN-WI
Peoria	IL	Peoria-Canton, IL
Randolph	IL	
Rock Island	IL	Davenport-Moline, IA-IL
Sangamon	IL	Springfield-Jacksonville-Lincoln, IL
LaPorte	IN	Chicago-Naperville, IL-IN-WI
Monroe	IN	Bloomington-Bedford, IN
Spencer	IN	
Johnson	KS	Kansas City-Overland Park-Kansas City, MO-KS
Linn	KS	Kansas City-Overland Park-Kansas City, MO-KS
Sedgwick	KS	Wichita-Arkansas City-Winfield, KS
Sumner	KS	Wichita-Arkansas City-Winfield, KS
Wyandotte	KS	Kansas City-Overland Park-Kansas City, MO-KS
Boyd	KY	Charleston-Huntington-Ashland, WV-OH-KY
Campbell	KY	Cincinnati-Wilmington-Maysville, OH-KY-IN
Carter	KY	
Christian	KY	Clarksville, TN-KY
Daviess	KY	Owensboro, KY
Hardin	KY	Louisville/Jefferson County-Elizabethtown-Madison, KY-IN
Henderson	KY	Evansville, IN-KY
Madison	KY	Lexington-Fayette-Richmond-Frankfort, KY
McCracken	KY	Paducah-Mayfield, KY-IL
Warren	KY	Bowling Green-Glasgow, KY
Calcasieu Parish	LA	Lake Charles, LA
Iberville Parish	LA	Baton Rouge, LA
Jefferson Parish	LA	New Orleans-Metairie-Hammond, LA-MS
Ouachita Parish	LA	Monroe-Ruston-Bastrop, LA
Tangipahoa Parish	LA	New Orleans-Metairie-Hammond, LA-MS

County	State	MSAs and Respective CSA[2]
Terrebonne Parish	LA	Houma-Thibodaux, LA
Bristol	MA	Boston-Worcester-Providence, MA-RI-NH-CT
Essex	MA	Boston-Worcester-Providence, MA-RI-NH-CT
Middlesex	MA	Boston-Worcester-Providence, MA-RI-NH-CT
Plymouth	MA	Boston-Worcester-Providence, MA-RI-NH-CT
Worcester	MA	Boston-Worcester-Providence, MA-RI-NH-CT
Harford	MD	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
Hancock	ME	
Kennebec	ME	
Penobscot	ME	Bangor, ME
Allegan	MI	Grand Rapids-Wyoming-Muskegon, MI
Berrien	MI	South Bend-Elkhart-Mishawaka, IN-MI
Genesee	MI	Detroit-Warren-Ann Arbor, MI
Ingham	MI	Lansing-East Lansing-Owosso, MI
Kalamazoo	MI	Kalamazoo-Battle Creek-Portage, MI
Lenawee	MI	Detroit-Warren-Ann Arbor, MI
Macomb	MI	Detroit-Warren-Ann Arbor, MI
Manistee	MI	
Missaukee	MI	
Oakland	MI	Detroit-Warren-Ann Arbor, MI
Ottawa	MI	Grand Rapids-Wyoming-Muskegon, MI
Washtenaw	MI	Detroit-Warren-Ann Arbor, MI
Cass	MN	
Buchanan	MO	Kansas City-Overland Park-Kansas City, MO-KS
Cass	MO	Kansas City-Overland Park-Kansas City, MO-KS
Cedar	MO	
Clay	MO	Kansas City-Overland Park-Kansas City, MO-KS
DeSoto	MS	Memphis-Forrest City, TN-MS-AR
Forrest	MS	Hattiesburg, MS
Grenada	MS	
Hancock	MS	Gulfport-Biloxi-Pascagoula, MS
Harrison	MS	Gulfport-Biloxi-Pascagoula, MS
Jackson	MS	Gulfport-Biloxi-Pascagoula, MS
Jones	MS	

Notes:
1. This list represents counties with the lowest levels of short term $PM_{2.5}$ air pollution. Monitors in these counties reported no days with unhealthful $PM_{2.5}$ levels.
2. MSA and CSA are terms used by the U.S. Office of Management and Budget for statistical purposes. MSA stands for Metropolitan Statistical Area. CSA stands for Combined Statistical Area, which may include multiples and individual counties.

Cleanest Counties for Short-term Particle Pollution (24-hour $PM_{2.5}$)[1] (cont.)

County	State	MSAs and Respective CSA[2]
Lauderdale	MS	
Lee	MS	
Flathead	MT	
Powder River	MT	
Richland	MT	
Buncombe	NC	Asheville-Brevard, NC
Caswell	NC	
Catawba	NC	Hickory-Lenoir, NC
Chatham	NC	Raleigh-Durham-Chapel Hill, NC
Cumberland	NC	Fayetteville-Lumberton-Laurinburg, NC
Davidson	NC	Greensboro-Winston-Salem-High Point, NC
Durham	NC	Raleigh-Durham-Chapel Hill, NC
Edgecombe	NC	Rocky Mount-Wilson-Roanoke Rapids, NC
Forsyth	NC	Greensboro-Winston-Salem-High Point, NC
Gaston	NC	Charlotte-Concord, NC-SC
Guilford	NC	Greensboro-Winston-Salem-High Point, NC
Haywood	NC	Asheville-Brevard, NC
Jackson	NC	
Martin	NC	
McDowell	NC	Hickory-Lenoir, NC
Mecklenburg	NC	Charlotte-Concord, NC-SC
Mitchell	NC	
Montgomery	NC	
Pitt	NC	Greenville-Washington, NC
Robeson	NC	Fayetteville-Lumberton-Laurinburg, NC
Rowan	NC	Charlotte-Concord, NC-SC
Swain	NC	
Watauga	NC	
Wayne	NC	Goldsboro, NC
Billings	ND	
Burke	ND	
Burleigh	ND	Bismarck, ND
Cass	ND	Fargo-Wahpeton, ND-MN
McKenzie	ND	
Mercer	ND	

County	State	MSAs and Respective CSA[2]
Hall	NE	Grand Island, NE
Scotts Bluff	NE	
Belknap	NH	Boston-Worcester-Providence, MA-RI-NH-CT
Grafton	NH	
Hillsborough	NH	Boston-Worcester-Providence, MA-RI-NH-CT
Atlantic	NJ	Philadelphia-Reading-Camden, PA-NJ-DE-MD
Camden	NJ	Philadelphia-Reading-Camden, PA-NJ-DE-MD
Essex	NJ	New York-Newark, NY-NJ-CT-PA
Gloucester	NJ	Philadelphia-Reading-Camden, PA-NJ-DE-MD
Middlesex	NJ	New York-Newark, NY-NJ-CT-PA
Ocean	NJ	New York-Newark, NY-NJ-CT-PA
San Juan	NM	Farmington, NM
Chautauqua	NY	
Essex	NY	
Niagara	NY	Buffalo-Cheektowaga, NY
Onondaga	NY	Syracuse-Auburn, NY
Steuben	NY	Elmira-Corning, NY
Suffolk	NY	New York-Newark, NY-NJ-CT-PA
Allen	OH	Lima-Van Wert-Celina, OH
Athens	OH	
Clark	OH	Dayton-Springfield-Sidney, OH
Greene	OH	Dayton-Springfield-Sidney, OH
Lake	OH	Cleveland-Akron-Canton, OH
Lawrence	OH	Charleston-Huntington-Ashland, WV-OH-KY
Medina	OH	Cleveland-Akron-Canton, OH
Portage	OH	Cleveland-Akron-Canton, OH
Scioto	OH	Charleston-Huntington-Ashland, WV-OH-KY
Trumbull	OH	Youngstown-Warren, OH-PA
Adair	OK	
Oklahoma	OK	Oklahoma City-Shawnee, OK
Sequoyah	OK	Fort Smith, AR-OK
Tulsa	OK	Tulsa-Muskogee-Bartlesville, OK
Linn	OR	Portland-Vancouver-Salem, OR-WA
Umatilla	OR	
Monroe	PA	New York-Newark, NY-NJ-CT-PA

Notes:
1. This list represents counties with the lowest levels of short term $PM_{2.5}$ air pollution. Monitors in these counties reported no days with unhealthful $PM_{2.5}$ levels.
2. MSA and CSA are terms used by the U.S. Office of Management and Budget for statistical purposes. MSA stands for Metropolitan Statistical Area. CSA stands for Combined Statistical Area, which may include multiples and individual counties.

Cleanest Counties for Short-term Particle Pollution (24-hour $PM_{2.5}$)[1] (cont.)

County	State	MSAs and Respective CSA[2]
Kent	RI	Boston-Worcester-Providence, MA-RI-NH-CT
Chesterfield	SC	
Florence	SC	Florence, SC
Richland	SC	Columbia-Orangeburg-Newberry, SC
Spartanburg	SC	Greenville-Spartanburg-Anderson, SC
Brookings	SD	
Brown	SD	
Codington	SD	
Jackson	SD	
Pennington	SD	Rapid City-Spearfish, SD
Blount	TN	Knoxville-Morristown-Sevierville, TN
Davidson	TN	Nashville-Davidson—Murfreesboro, TN
Dyer	TN	
Lawrence	TN	Nashville-Davidson—Murfreesboro, TN
Loudon	TN	Knoxville-Morristown-Sevierville, TN
Madison	TN	Jackson, TN
Maury	TN	Nashville-Davidson—Murfreesboro, TN
McMinn	TN	Chattanooga-Cleveland-Dalton, TN-GA-AL
Montgomery	TN	Clarksville, TN-KY
Putnam	TN	
Roane	TN	Knoxville-Morristown-Sevierville, TN
Sumner	TN	Nashville-Davidson—Murfreesboro, TN
Bexar	TX	San Antonio-New Braunfels, TX
Bowie	TX	Texarkana, TX-AR
Cameron	TX	Brownsville-Harlingen-Raymondville, TX
Dallas	TX	Dallas-Fort Worth, TX-OK
Ellis	TX	Dallas-Fort Worth, TX-OK
Harris	TX	Houston-The Woodlands, TX
Hidalgo	TX	McAllen-Edinburg, TX
Travis	TX	Austin-Round Rock, TX
Washington	UT	St. George, UT
Arlington	VA	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
Bristol City	VA	Johnson City-Kingsport-Bristol, TN-VA
Charles City	VA	Richmond, VA
Chesterfield	VA	Richmond, VA
Frederick	VA	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
Henrico	VA	Richmond, VA
Lynchburg City	VA	Lynchburg, VA
Page	VA	
Roanoke City	VA	Roanoke, VA
Salem City	VA	Roanoke, VA
Bennington	VT	
Ashland	WI	
Eau Claire	WI	Eau Claire-Menomonie, WI
Forest	WI	
Ozaukee	WI	Milwaukee-Racine-Waukesha, WI
Vilas	WI	
Hancock	WV	Pittsburgh-New Castle-Weirton, PA-OH-WV
Kanawha	WV	Charleston-Huntington-Ashland, WV-OH-KY
Marion	WV	Morgantown-Fairmont, WV
Monongalia	WV	Morgantown-Fairmont, WV
Ohio	WV	Wheeling, WV-OH
Raleigh	WV	Beckley, WV
Albany	WY	
Park	WY	
Sheridan	WY	

Notes:
1. This list represents counties with the lowest levels of short term $PM_{2.5}$ air pollution. Monitors in these counties reported no days with unhealthful $PM_{2.5}$ levels.
2. MSA and CSA are terms used by the U.S. Office of Management and Budget for statistical purposes. MSA stands for Metropolitan Statistical Area. CSA stands for Combined Statistical Area, which may include multiples and individual counties.

Top 25 Cleanest Counties for Year-Round Particle Pollution (Annual $PM_{2.5}$)[1]

2014 Rank[2]	County	ST	Design Value[3]
1	Lake	CA	3.5
2	Jackson	SD	3.8
3	Yavapai	AZ	4.0
4	Essex	NY	4.3
5	Billings	ND	4.4
5	Custer	SD	4.4
7	Hancock	ME	4.6
7	Santa Fe	NM	4.6
9	San Juan	NM	4.7
9	Laramie	WY	4.7
9	Park	WY	4.7
12	Natrona	WY	4.8
13	Albany	WY	5.0
14	Washington	UT	5.1
14	Teton	WY	5.1
16	Coconino	AZ	5.2
16	Siskiyou	CA	5.2
18	Shasta	CA	5.3
18	Ashland	WI	5.3
20	San Benito	CA	5.4
21	St. Louis	MN	5.5
22	Pima	AZ	5.6
22	Forest	WI	5.6
24	Litchfield	CT	5.7
24	Maui	HI	5.7

Notes:
1. This list represents counties with the lowest levels of monitored long term $PM_{2.5}$ air pollution.
2. Counties are ranked by Design Value.
3. The Design Value is the calculated concentration of a pollutant based on the form of the National Ambient Air Quality Standard, and is used by EPA to determine whether the air quality in a county meets the standard. The source for the Design Values is http://www.epa.gov/airtrends/pdfs/PM25_DesignValues_20102012_FINAL_12_12_13.xlsx, updated December 12, 2013.

Cleanest Counties for Ozone Air Pollution[1]

County	State	Metropolitan Statistical Area
Anchorage Municipality	AK	Anchorage, AK
Yukon-Koyukuk Census Area	AK	
Elmore	AL	Montgomery, AL
Etowah	AL	Gadsden, AL
Houston	AL	Dothan-Enterprise-Ozark, AL
Tuscaloosa	AL	Tuscaloosa, AL
Glenn	CA	
Humboldt	CA	
Marin	CA	San Jose-San Francisco-Oakland, CA
Mendocino	CA	
Monterey	CA	Salinas, CA
San Francisco	CA	San Jose-San Francisco-Oakland, CA
Santa Cruz	CA	San Jose-San Francisco-Oakland, CA
Siskiyou	CA	
Sonoma	CA	San Jose-San Francisco-Oakland, CA
Mesa	CO	Grand Junction, CO
Pitkin	CO	Edwards-Glenwood Springs, CO
Alachua	FL	Gainesville-Lake City, FL
Baker	FL	Jacksonville-St. Marys-Palatka, FL-GA
Collier	FL	Cape Coral-Fort Myers-Naples, FL
Columbia	FL	Gainesville-Lake City, FL
Highlands	FL	Sebring, FL
Holmes	FL	
Lee	FL	Cape Coral-Fort Myers-Naples, FL
Leon	FL	Tallahassee-Bainbridge, FL-GA
Pasco	FL	Tampa-St. Petersburg-Clearwater, FL
St. Lucie	FL	Miami-Fort Lauderdale-Port St. Lucie, FL
Volusia	FL	Orlando-Deltona-Daytona Beach, FL
Chatham	GA	Savannah-Hinesville-Statesboro, GA
Chattooga	GA	Rome-Summerville, GA
Coweta	GA	Atlanta–Athens-Clarke County–Sandy Springs, GA
Glynn	GA	Brunswick, GA
Sumter	GA	
Honolulu	HI	Urban Honolulu, HI
Bremer	IA	Waterloo-Cedar Falls, IA
Montgomery	IA	
Polk	IA	Des Moines-Ames-West Des Moines, IA
Story	IA	Des Moines-Ames-West Des Moines, IA
Warren	IA	Des Moines-Ames-West Des Moines, IA
Butte	ID	Idaho Falls-Rexburg-Blackfoot, ID
Rock Island	IL	Davenport-Moline, IA-IL
Winnebago	IL	Rockford-Freeport-Rochelle, IL
Hancock	IN	Indianapolis-Carmel-Muncie, IN
Ouachita Parish	LA	Monroe-Ruston-Bastrop, LA
Androscoggin	ME	Portland-Lewiston-South Portland, ME
Aroostook	ME	
Oxford	ME	
Penobscot	ME	Bangor, ME
Sagadahoc	ME	Portland-Lewiston-South Portland, ME
Becker	MN	
Goodhue	MN	Minneapolis-St. Paul, MN-WI
Lake	MN	
Lyon	MN	
Mille Lacs	MN	Minneapolis-St. Paul, MN-WI
Olmsted	MN	Rochester-Austin, MN
St. Louis	MN	Duluth, MN-WI
Stearns	MN	Minneapolis-St. Paul, MN-WI
Wright	MN	Minneapolis-St. Paul, MN-WI
Lauderdale	MS	
Flathead	MT	
Missoula	MT	Missoula, MT
Powder River	MT	
Richland	MT	
Rosebud	MT	
Swain	NC	
Billings	ND	
Burke	ND	
Burleigh	ND	Bismarck, ND
Cass	ND	Fargo-Wahpeton, ND-MN
Dunn	ND	
McKenzie	ND	
Mercer	ND	
Oliver	ND	Bismarck, ND
Lancaster	NE	Lincoln-Beatrice, NE
Cheshire	NH	
Grafton	NH	
Lea	NM	
Luna	NM	
Sandoval	NM	Albuquerque-Santa Fe-Las Vegas, NM
Santa Fe	NM	Albuquerque-Santa Fe-Las Vegas, NM
Carson City	NV	Reno-Carson City-Fernley, NV
Churchill	NV	

Note:
1. This list represents counties with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2008 NAAQS.

Cleanest Counties for Ozone Air Pollution[1] (cont.)

County	State	Metropolitan Statistical Area
Franklin	NY	
Herkimer	NY	Utica-Rome, NY
Oneida	NY	Utica-Rome, NY
Saratoga	NY	Albany-Schenectady, NY
Steuben	NY	Elmira-Corning, NY
Columbia	OR	Portland-Vancouver-Salem, OR-WA
Deschutes	OR	Bend-Redmond-Prineville, OR
Jackson	OR	Medford-Grants Pass, OR
Lane	OR	Eugene, OR
Umatilla	OR	
Washington	OR	Portland-Vancouver-Salem, OR-WA
Aiken	SC	Augusta-Richmond County, GA-SC
Berkeley	SC	Charleston-North Charleston, SC
Charleston	SC	Charleston-North Charleston, SC
Colleton	SC	
Edgefield	SC	Augusta-Richmond County, GA-SC
Brookings	SD	
Custer	SD	Rapid City-Spearfish, SD
Jackson	SD	
Meade	SD	Rapid City-Spearfish, SD
Minnehaha	SD	Sioux Falls, SD
Union	SD	Sioux City-Vermillion, IA-SD-NE
Cameron	TX	Brownsville-Harlingen-Raymondville, TX
Hidalgo	TX	McAllen-Edinburg, TX
Webb	TX	Laredo, TX
Cache	UT	Logan, UT-ID
Fauquier	VA	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
Page	VA	

County	State	Metropolitan Statistical Area
Rockbridge	VA	
Chittenden	VT	Burlington-South Burlington, VT
Clallam	WA	
Clark	WA	Portland-Vancouver-Salem, OR-WA
Pierce	WA	Seattle-Tacoma, WA
Skagit	WA	Seattle-Tacoma, WA
Spokane	WA	Spokane-Spokane Valley-Coeur d'Alene, WA-ID
Whatcom	WA	Bellingham, WA
Ashland	WI	
La Crosse	WI	La Crosse-Onalaska, WI-MN
Marathon	WI	Wausau-Stevens Point-Wisconsin Rapids, WI
Vilas	WI	
Big Horn	WY	
Carbon	WY	
Sweetwater	WY	
Teton	WY	
Uinta	WY	

Note:
1. This list represents counties with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2008 NAAQS.

Health Effects of Ozone and Particle Pollution

Two types of air pollution dominate in the U.S.: ozone and particle pollution.[1] These two pollutants threaten the health and the lives of millions of Americans. Thanks to the Clean Air Act, the U.S. has far less of both pollutants now than in the past. Still, more than 147.6 million people live in counties where monitors show unhealthy levels of one or both—meaning the air a family breathes could shorten life or cause lung cancer.

So what are ozone and particle pollution?

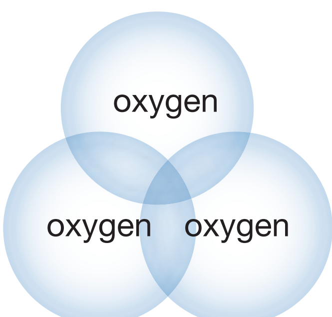
Ozone Pollution

It may be hard to imagine that pollution could be invisible, but ozone is. The most widespread pollutant in the U.S. is also one of the most dangerous.

Scientists have studied the effects of ozone on health for decades. Hundreds of research studies have confirmed that ozone harms people at levels currently found in the United States. In the last few years, we've learned that it can also be deadly.

What Is Ozone?

Ozone (O_3) is a gas molecule composed of three oxygen atoms. Often called "smog," ozone is harmful to breathe. Ozone aggressively attacks lung tissue by reacting chemically with it.

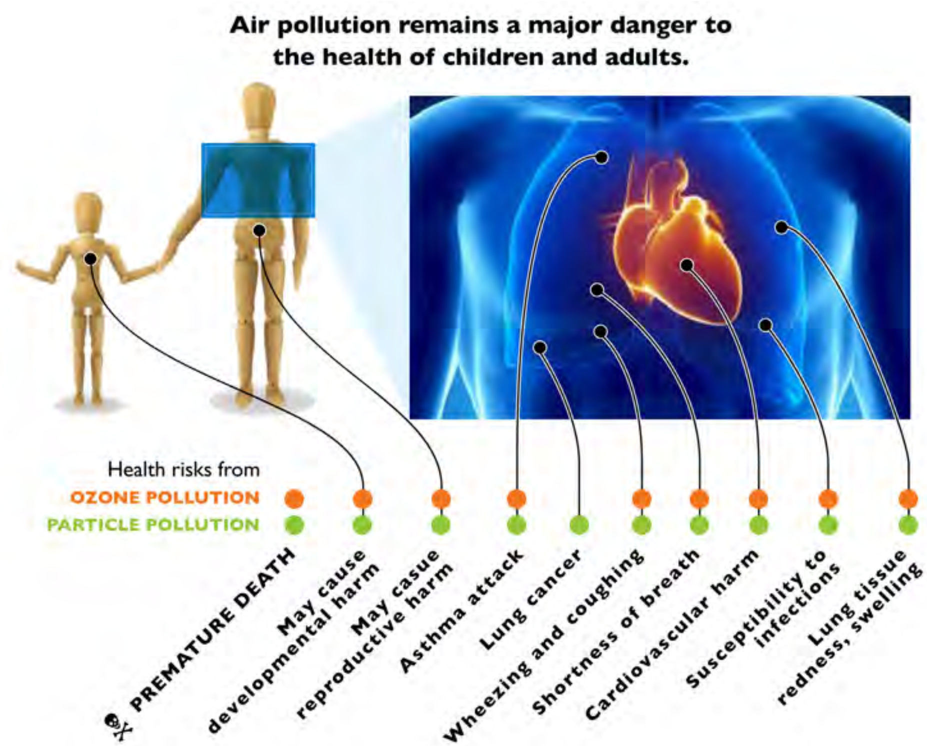


The ozone layer found high in the upper atmosphere (the stratosphere) shields us from much of the sun's ultraviolet radiation. However, ozone air pollution at ground level where we can breathe it (in the troposphere) causes serious health problems.

Where Does Ozone Come From?

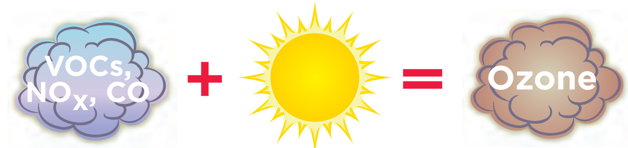
Ozone develops in the atmosphere from gases that come out of tailpipes, smokestacks and many other sources. When these gases come in contact with sunlight, they react and form ozone smog.

The essential raw ingredients for ozone come from nitrogen oxides (NO_x), hydrocarbons, also called volatile organic compounds (VOCs) and carbon monoxide (CO). They are produced primarily when fossil fuels like gasoline, oil or coal are burned or when some chemicals, like solvents, evaporate. NO_x is emitted from power plants, motor vehicles and other sources of high-heat combustion. VOCs are emitted from mo-



tor vehicles, chemical plants, refineries, factories, gas stations, paint and other sources. CO is also primarily emitted from motor vehicles.[2]

If the ingredients are present under the right conditions, they react to form ozone. And because the reaction takes place in the atmosphere, the ozone often shows up downwind of the sources of the original gases. In addition, winds can carry ozone far from where it began.



You may have wondered why “ozone action day” warnings are sometimes followed by recommendations to avoid activities such as mowing your lawn or driving your car. Lawn mower exhaust and gasoline vapors are VOCs that could turn into ozone in the heat and sun.

Who is at risk from breathing ozone?

Anyone who spends time outdoors where ozone pollution levels are high may be at risk. Five groups of people are especially vulnerable to the effects of breathing ozone:

- children and teens;[3]
- anyone 65 and older;[4]
- people who work or exercise outdoors;[5]
- people with existing lung diseases, such as asthma and chronic obstructive pulmonary disease (also known as COPD, which includes emphysema and chronic bronchitis);[6] and
- people with cardiovascular disease.[7]

In addition, some evidence suggests that other groups—including women, people who suffer from obesity and people with low incomes—may also face higher risk from ozone.[8] More research is needed to confirm these findings.

The impact on your health can depend on many factors, however. For example, the risks would be greater if ozone levels are higher, if you are breathing faster because you’re working outdoors or if you spend more time outdoors.

Lifeguards in Galveston, Texas, provided evidence of the impact of even short-term exposure to ozone on healthy, active adults in a study published in 2008. Testing the breathing capacity of these outdoor workers several times a day, researchers found that many lifeguards had greater obstruction in their airways when ozone levels were high. Because of this research, Galveston became the first city in the nation to install an air quality warning flag system on the beach.[9]

How Ozone Pollution Harms Your Health

Premature death. Breathing ozone can shorten your life. Strong evidence exists of the deadly impact of ozone in large studies conducted in cities across the U.S., in Europe and in Asia. Researchers repeatedly found that the risk of premature death increased with higher levels of ozone.[10] Newer research has confirmed that ozone increased the risk of premature death even when other pollutants also exist.[11]

Even low levels of ozone may be deadly. A large study of 48 U.S. cities looked at the association between ozone and all-cause mortality during the summer months. Ozone concentrations by city in the summer months ranged from 16 percent to 80 percent lower than the U.S. Environmental Protection Agency (EPA) currently considers safe. Researchers found that ozone at those lower levels was associated with deaths from cardiovascular disease, strokes, and respiratory causes.[12]

Immediate breathing problems. Many areas in the United States produce enough ozone during the summer months to cause health problems that can be felt right away. Immediate problems—in addition to increased risk of premature death—include:

- shortness of breath, wheezing and coughing;

- asthma attacks;
- increased risk of respiratory infections;
- increased susceptibility to pulmonary inflammation; and
- increased need for people with lung diseases, like asthma or chronic obstructive pulmonary disease (COPD), to receive medical treatment and to go to the hospital.[13]

Cardiovascular effects. Inhaling ozone may affect the heart as well as the lungs. A 2006 study linked exposures to high ozone levels for as little as one hour to a particular type of cardiac arrhythmia that itself increases the risk of premature death and stroke.[14] A French study found that exposure to elevated ozone levels for one to two days increased the risk of heart attacks for middle-aged adults without heart disease.[15] Several studies around the world have found increased risk of hospital admissions or emergency department visits for cardiovascular disease.[16]

Long-term exposure risks. New studies warn of serious effects from breathing ozone over longer periods. With more long-term data, scientists are finding that long-term exposure—that is, for periods longer than eight hours, including days, months or years—may increase the risk of early death.

- Examining the records from a long-term national database, researchers found a higher risk of death from respiratory diseases associated with increases in ozone.[17]
- New York researchers looking at hospital records for children's asthma found that the risk of admission to hospitals for asthma increased with chronic exposure to ozone. Younger children and children from low income families were more likely than other children to need hospital admissions even during the same time periods.[18]
- California researchers analyzing data from their long-term Southern California Children's Health Study found that some children with certain genes were more likely to develop asthma as adolescents in response to the variations in ozone levels in their communities.[19]
- Studies link lower birth weight and decreased lung function in newborns to ozone levels in their community.[20] This research provides increasing evidence that ozone may harm newborns.

Breathing other pollutants in the air may make your lungs more responsive to ozone—and breathing ozone may increase your body's response to other pollutants. For example, research warns that breathing sulfur dioxide and nitrogen oxide—two pollutants common in the eastern U.S.—can make the lungs react more strongly than to just breathing ozone alone. Breathing ozone may also increase the response to allergens in people with allergies. A large study published in 2009 found that children were more likely to suffer from hay fever and respiratory allergies when ozone and $PM_{2.5}$ levels were high.[21]

EPA finds ozone causes harm. The EPA released their most recent review of the current research on ozone pollution in February 2013.[22] The EPA had engaged a panel of expert scientists, the Clean Air Scientific Advisory Committee, to help them assess the evidence, in particular, research published between 2006 and 2012. The EPA concluded that ozone pollution posed multiple, serious threats to health. Their findings are highlighted in the box below.

EPA Concludes Ozone Pollution Poses Serious Health Threats

- Causes respiratory harm (e.g. worsened asthma, worsened COPD, inflammation)
- Likely to cause early death (both short-term and long-term exposure)
- Likely to cause cardiovascular harm (e.g. heart attacks, strokes, heart disease, congestive heart failure)
- May cause harm to the central nervous system
- May cause reproductive and developmental harm

—U.S. Environmental Protection Agency, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*, 2013. EPA/600/R-10/076F.

Particle Pollution

Ever look at dirty truck exhaust?

The dirty, smoky part of that stream of exhaust is made of particle pollution. Overwhelming evidence shows that particle pollution—like that coming from that exhaust smoke—can kill. Particle pollution can increase the risk of heart disease, lung cancer and asthma attacks and can interfere with the growth and work of the lungs.

What Is Particle Pollution?

Particle pollution refers to a mix of very tiny solid and liquid particles that are in the air we breathe. But nothing about particle pollution is simple. And it is so dangerous it can shorten your life.

Size matters. Particles themselves are different sizes. Some are one-tenth the diameter of a strand of hair. Many are even tinier; some are so small they can only be seen with an electron microscope. Because of their size, you can't see the individual particles. You can only see the haze that forms when millions of particles blur the spread of sunlight.

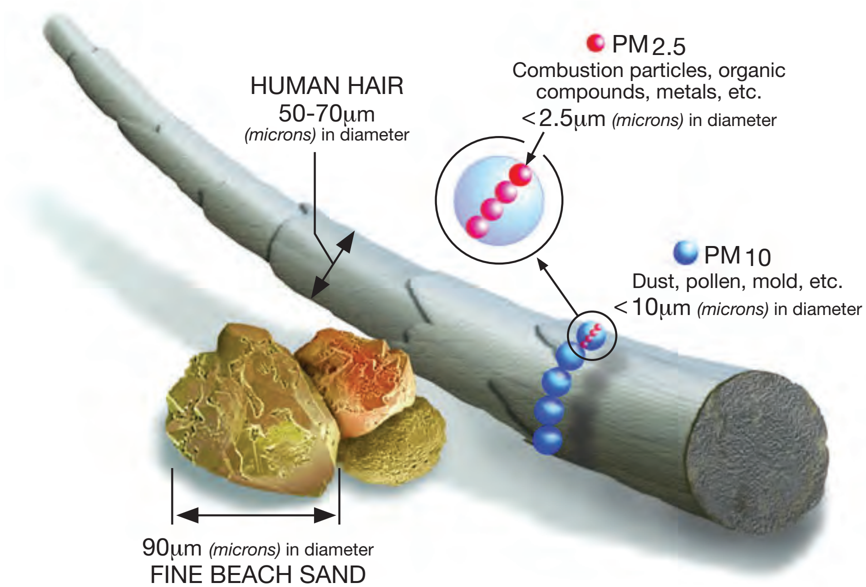


Image courtesy of the U.S. EPA

The differences in size make a big difference in how they affect us. Our natural defenses help us to cough or sneeze larger particles out of our bodies. But those defenses don't keep out smaller particles, those that are smaller than 10 microns (or micrometers) in diameter, or about one-seventh the diameter of a single human hair. These particles get trapped in the lungs, while the smallest are so minute that they can pass through the lungs into the bloodstream, just like the essential oxygen molecules we need to survive.

Researchers categorize particles according to size, grouping them as coarse, fine and ultrafine. Coarse particles fall between 2.5 microns and 10 microns in diameter and are called $PM_{10-2.5}$. Fine particles are 2.5 microns in diameter or smaller and are called $PM_{2.5}$. Ultrafine particles are smaller than 0.1 micron in diameter[23] and are small enough to pass through the lung tissue into the blood stream, circulating like the oxygen molecules themselves. No matter what the size, particles can harm your health.

"A mixture of mixtures." Because particles are formed in so many different ways, they can be composed of many different compounds. Although we often think of particles as solids, not all are. Some are completely liquid; some are solids suspended in liquids. As the EPA puts it, particles are really "a mixture of mixtures."[24]

The mixtures differ between the eastern and western United States and in different times of the year. For example, the Midwest, Southeast and Northeast states have more sulfate particles than the West on average, largely due to the high levels of sulfur dioxide emitted by large, coal-fired power plants. By contrast, nitrate particles from motor vehicle exhaust form a larger proportion of the unhealthful mix in the winter in the Northeast, Southern California, the Northwest, and North Central U.S.[25]

Who Is at Risk?

Anyone who lives where particle pollution levels are high is at risk. Some people face higher risk, however. People at the greatest risk from particle pollution exposure include:

- Infants, children and teens;[26]
- People over 65 years of age;[27]
- People with lung disease such as asthma and chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema;
- People with heart disease[28] or diabetes;[29]
- People with low incomes;[30] and
- People who work or are active outdoors.[31]

Diabetics face increased risk at least in part because of their higher risk for cardiovascular disease.[32] A 2010 study examined prevalence of diagnosed diabetes in relation to fine particle pollution in 2004-2005. The evidence suggested that air pollution is a risk factor for diabetes.[33]

What Can Particles Do to Your Health?

Particle pollution can be very dangerous to breathe. Breathing particle pollution may trigger illness, hospitalization and premature death, risks that are showing up in new studies that validate earlier research.

Thanks to steps taken to reduce particle pollution, good news is growing from researchers who study the drop in year-round levels of particle pollution.

- Looking at air quality in 545 counties in the U.S. between 2000 and 2007, researchers found that people had approximately four months added to their life expectancy on average due to cleaner air. Women and people who lived in urban and densely populated counties benefited the most.[34]
- Another long-term study of six U.S. cities tracked from 1974 to 2009 added more evidence of the benefits. Their findings suggest that cleaning up particle pollution had almost immediate health benefits. They estimated that the U.S. could prevent approximately 34,000 premature deaths a year if the nation could lower annual levels of particle pollution by 1 µg/m3.[35]

These studies add to the growing research that cleaning up air pollution improves life and health.[36] Other researchers estimated that reductions in air pollution can be expected to produce rapid improvements in public health, with fewer deaths occurring within the first two years after reductions.[37]

Researchers are exploring possible differences in health effects of the three sizes of particles and particles from different sources, such as diesel particles from trucks and buses or sulfates from coal-fired power plants. So far, the evidence remains clear that particles of all sizes from all sources can be dangerous.[38]

Short-Term Exposure Can Be Deadly

First and foremost, short-term exposure to particle pollution can kill. Peaks or spikes in particle pollution can last for hours to days. Deaths can occur on the very day that particle levels are high, or within one to two months afterward. Particle pollution does not just make people die a few days earlier than they might otherwise—these are deaths that would not have occurred if the air were cleaner.[39]

Particle pollution also diminishes lung function, causes greater use of asthma medications and increased rates of school absenteeism, emergency room visits and hospital admissions. Other adverse effects can be coughing, wheezing, cardiac arrhythmias and heart attacks. According to the findings from some of the latest studies, short-term increases in particle pollution have been linked to:

- death from respiratory and cardiovascular causes, including strokes;[40, 41, 42, 43]
- increased mortality in infants and young children;[44]
- increased numbers of heart attacks, especially among the elderly and in people with heart conditions;[45]
- inflammation of lung tissue in young, healthy adults;[46]

- increased hospitalization for cardiovascular disease, including strokes and congestive heart failure;[47,48,49]
- increased emergency room visits for patients suffering from acute respiratory ailments;[50]
- increased hospitalization for asthma among children;[51,52,53] and
- increased severity of asthma attacks in children.[54]

Again, the impact of even short-term exposure to particle pollution on healthy adults showed up in the Galveston lifeguard study. In addition to the harmful effects of ozone pollution, lifeguards had reduced lung volume at the end of the day when fine particle levels were high.[55]

Year-Round Exposure

Breathing high levels of particle pollution day in and day out also can be deadly, as landmark studies in the 1990s conclusively showed[56] and as other studies confirmed.[57] Chronic exposure to particle pollution can shorten life by one to three years.[58]

In late 2013, the International Agency for Research on Cancer, part of the World Health Organization, concluded that particle pollution could cause lung cancer. The IARC reviewed the most recent research and reported that the risk of lung cancer increases as the particle levels rise.[59]

Year-round exposure to particle pollution has also been linked to:

- increased hospitalization for asthma attacks for children living near roads with heavy truck or trailer traffic;[60,61]
- slowed lung function growth in children and teenagers;[62,63]
- significant damage to the small airways of the lungs;[64]
- increased risk of death from cardiovascular disease;[65] and
- increased risk of lower birth weight and infant mortality.[66]

Research into the health risks of 65,000 women over age 50 found that those who lived in areas with higher levels of particle pollution faced a much greater risk of dying from heart disease than had been previously estimated. Even women who lived within the same city faced differing risks depending on the annual levels of pollution in their neighborhood.[67]

The EPA completed their most recent review of the current research on particle pollution in December 2009.[68] The EPA had engaged a panel of expert scientists, the Clean Air Scientific Advisory Committee, to help them assess the evidence. The EPA concluded that particle pollution caused multiple, serious threats to health. Their findings are highlighted in the box below.

EPA Concludes Fine Particle Pollution Poses Serious Health Threats

- Causes early death (both short-term and long-term exposure)
- Causes cardiovascular harm (e.g. heart attacks, strokes, heart disease, congestive heart failure)
- Likely to cause respiratory harm (e.g. worsened asthma, worsened COPD, inflammation)
- May cause cancer
- May cause reproductive and developmental harm

—U.S. Environmental Protection Agency, Integrated Science Assessment for Particulate Matter, December 2009. EPA 600/R-08/139F.

Where Does Particle Pollution Come From?

Particle pollution is produced through two separate processes—mechanical and chemical.

Mechanical processes break down bigger bits into smaller bits with the material remaining essentially the same, only becoming smaller. Mechanical processes primarily create coarse particles.[69] Dust storms, construction and demolition, mining operations, and agriculture are among the activities that produce coarse particles. Tire, brake pad and road wear can also create coarse particles. Bacteria, pollen, mold, and plant and animal debris are also included as coarse particles.[70]

By contrast, chemical processes in the atmosphere create most of the tiniest fine and ultrafine particles. Combustion sources burn fuels and emit gases. These gases can vaporize and then condense to become a particle of the same chemical compound. Or, they can react with other gases or particles in the atmosphere to form a particle of a different chemical compound. Particles formed by this latter process come from the reaction of elemental carbon (soot), heavy metals, sulfur dioxide (SO_2), nitrogen oxides (NO_x) and volatile organic compounds with water and other compounds in the atmosphere.[71] Burning fossil fuels in factories, power plants, steel mills, smelters, diesel- and gasoline-powered motor vehicles (cars and trucks) and equipment generate a large part of the raw materials for fine particles. So does burning wood in residential fireplaces and wood stoves or burning agricultural fields or forests.

Focusing on Children's Health

Children face special risks from air pollution because their lungs are growing and because they are so active.

Just like the arms and legs, the largest portion of a child's lungs will grow long after he or she is born. Eighty percent of their tiny air sacs develop after birth. Those sacs, called the alveoli, are where the life-sustaining transfer of oxygen to the blood takes place. The lungs and their alveoli aren't fully grown until children become adults.[72] In addition, the body's defenses that help adults fight off infections are still developing in young bodies.[73] Children have more respiratory infections than adults, which also seems to increase their susceptibility to air pollution.[74]

Furthermore, children don't behave like adults, and their behavior also affects their vulnerability. They are outside for longer periods and are usually more active when outdoors. Consequently, they inhale more polluted outdoor air than adults typically do.[75]

Air Pollution Increases Risk of Underdeveloped Lungs

Another finding from the Southern California Children's Health study looked at the long-term effects of particle pollution on teenagers. Tracking 1,759 children between ages 10 and 18, researchers found that those who grew up in more polluted areas face the increased risk of having underdeveloped lungs, which may never recover to their full capacity. The average drop in lung function was 20 percent below what was expected for the child's age, similar to the impact of growing up in a home with parents who smoked.[76]

Community health studies are pointing to less obvious, but serious effects from year-round exposure to ozone, especially for children. Scientists followed 500 Yale University students and determined that living just four years in a region with high levels of ozone and related co-pollutants was associated with diminished lung function and frequent reports of respiratory symptoms.[77] A much larger study of 3,300 school children in Southern California found reduced lung function in girls with asthma and boys who spent more time outdoors in areas with high levels of ozone.[78]

Cleaning Up Pollution Can Reduce Risk to Children

There is also real-world evidence that reducing air pollution can help protect children.

In Switzerland, particle pollution dropped during a period in the 1990s. Researchers there tracked 9,000 children over a nine-year period, following their respiratory symptoms. After taking other factors such as family characteristics and indoor air pollution into account, the researchers noted that during the years with less pollution, the children had fewer episodes of chronic cough, bronchitis, common cold, and conjunctivitis symptoms.[79]

Disparities in the Impact of Air Pollution

The burden of air pollution is not evenly shared. Poorer people and some racial and ethnic groups are among those who often face higher exposure to pollutants and who may experience greater responses to such pollution. Many studies have explored the differences in harm from air pollution to racial or ethnic groups and people who are in a low socioeconomic position, have less education, or live nearer to major sources,[80] including a workshop the American Lung Association held in 2001 that focused on urban air pollution and health inequities.[81]

Many studies have looked at differences in the impact on premature death. Results have varied widely, particularly for effects between racial groups. Some studies have found no differences among races,[82] while others found greater responsiveness for Whites and Hispanics, but not African Americans,[83] or for African Americans but not other races or ethnic groups.[84] Other researchers have found greater risk for African Americans from air toxics, including those pollutants that also come from traffic sources.[85]

Socioeconomic position has been more consistently associated with greater harm from air pollution. Recent studies show evidence of that link. Low socioeconomic status consistently increased the risk of premature death from fine particle pollution among 13.2 million Medicare recipients studied in the largest examination of particle pollution mortality nationwide.[86] In the 2008 study that found greater risk for premature death for African Americans, researchers also found greater risk for people living in areas with higher unemployment or higher use of public transportation.[87] A 2008 study of Washington, DC found that while poor air quality and worsened asthma went hand-in-hand in areas where Medicaid enrollment was high, the areas with the highest Medicaid enrollment did not always have the strongest association of high air pollution and asthma attacks.[88] However, two other recent studies in France have found no association with lower income and asthma attacks.[89]

Scientists have speculated that there are three broad reasons why disparities may exist. First, groups may face greater exposure to pollution because of factors ranging from racism to class bias to housing market dynamics and land costs. For example, pollution sources may be located near disadvantaged communities, increasing exposure to harmful pollutants. Second, low social position may make some groups more susceptible to health threats because of factors related to their disadvantage. Lack of access to health care, grocery stores and good jobs, poorer job opportunities, dirtier workplaces or higher traffic exposure are among the factors that could handicap groups and increase the risk of harm. Finally, existing health conditions, behaviors, or traits may predispose some groups to greater risk. For example, diabetics are among the groups most at risk from air pollutants, and the elderly, African Americans, Mexican Americans and people living near a central city have higher incidence of diabetes.[90]

Communities of color also may be more likely to live in counties with higher levels of pollution. Non-Hispanic Blacks and Hispanics were more likely to live in counties that had worse problems with particle pollution, researchers found in a 2011 analysis. Non-Hispanic Blacks were also more likely to live in counties with worse ozone pollution. Income groups, by contrast, differed little in these exposures. However, since few rural counties have monitors, the primarily older, non-Hispanic white residents of those counties lack information about the air quality in their communities.[91]

Unemployed people, those with low income or low education and non-Hispanic Blacks were found to be more likely to live in areas with higher exposures to particle pollution in a 2012 study. However, the different racial/ethnic and income groups were breathing often very different kinds of particles; the different composition and structure of these particles may have different health impacts.[92]

Highways May Be Especially Dangerous for Breathing

Being in heavy traffic, or living near a road, may be even more dangerous than being in other places in a community. Growing evidence shows that the vehicle emissions coming directly from those highways may be higher than in the community as a whole, increasing the risk of harm to people who live or work near busy roads.

The number of people living "next to a busy road" may include 30 to 45 percent of the urban population in North America, according to the most recent review of the evidence. In January 2010, the Health Effects Institute published a major review of the evidence by a panel of expert scientists. The panel looked at over 700 studies from around the world, examining the health effects. They concluded that traffic pollution causes asthma attacks in children, and may cause a wide range of other effects including: the onset of childhood asthma, impaired lung function, premature death and death from cardiovascular diseases, and cardiovascular morbidity. The area most affected, they concluded, was roughly 0.2 mile to 0.3 mile (300 to 500 meters) from the highway.[93]

Children and teenagers are among the most vulnerable—though not the only ones at risk. A Danish study found that long-term exposure to traffic air pollution may increase the risk of developing chronic obstructive pulmonary disease (COPD). They found that those most at risk were people who already had asthma or diabetes.[94] Studies have found increased risk of premature death from living near a major highway or an urban road.[95] Another study found an increase in risk of heart attacks from being in traffic, whether driving or taking public transportation.[96] Urban women in a Boston study experienced decreased lung function associated with traffic-related pollution.[97]

How to Protect Yourself from Ozone and Particle Pollution

To minimize your exposure to ozone and particle pollution:

- Pay attention to forecasts for high air pollution days to know when to take precautions;
- Avoid exercising near high-traffic areas;
- Avoid exercising outdoors when pollution levels are high, or substitute an activity that requires less exertion;
- Do not let anyone smoke indoors and support measures to make all places smokefree; and
- Reduce the use of fireplaces and wood-burning stoves.

Bottom line: Help yourself and everyone else breathe easier. Support national, state and local efforts to clean up sources of pollution. Your life and the life of someone you love may depend on it.

1. Ozone and particle pollution are the most widespread, but they aren't the only serious air pollutants. Others include carbon monoxide, lead, nitrogen dioxide, and sulfur dioxide, as well as scores of toxins such as mercury, arsenic, benzene, formaldehyde, and acid gases. However, the monitoring networks are not as widespread nationwide for the other pollutants.
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Methodology

Statistical Methodology: The Air Quality Data

Data Sources

The data on air quality throughout the United States were obtained from the U.S. Environmental Protection Agency's Air Quality System (AQS), formerly called Aerometric Information Retrieval System (AIRS) database. The American Lung Association contracted with Dr. Allen S. Lefohn, A.S.L. & Associates, Helena, Montana, to characterize the hourly averaged ozone concentration information and the 24-hour averaged $PM_{2.5}$ concentration information for the 3-year period for 2010-2012 for each monitoring site.

Design values for the annual $PM_{2.5}$ concentrations by county for the period 2010-2012 were downloaded from the database updated on December 12, 2013 at EPA's website at http://www.epa.gov/air/airtrends/values.html. The 2010-2012 design values were compared to the 2012 National Ambient Air Quality Standards for Annual $PM_{2.5}$.

Ozone Data Analysis

The 2010, 2011, and 2012 AQS hourly ozone data were used to calculate the daily 8-hour maximum concentration for each ozone-monitoring site. The hourly averaged ozone data were downloaded on July 2, 2013. The data were considered for a 3-year period for the same reason that the EPA uses three years of data to determine compliance with the ozone standard: to prevent a situation in any single year, where anomalies of weather or other factors create air pollution levels, which inaccurately reflect the normal conditions. The highest 8-hour daily maximum concentration in each county for 2010, 2011, and 2012, based on the EPA-defined ozone season, was identified.

The current national ambient air quality standard for ozone is 0.075 ppm measured over eight hours. The EPA's Air Quality Index reflects the 0.075 ppm standard. A.S.L. & Associates prepared a table by county that summarized, for each of the three years, the number of days the ozone level was within the ranges identified by the EPA based on the EPA Air Quality Index:

Air Quality Index for Ozone

8-hour Ozone Concentration	Air Quality Index Levels
0.000 – 0.059 ppm	Good (Green)
0.060 – 0.075 ppm	Moderate (Yellow)
0.076 – 0.095 ppm	Unhealthy for Sensitive Groups (Orange)
0.096 – 0.115 ppm	Unhealthy (Red)
0.116 – 0.374 ppm	Very Unhealthy (Purple)
>0.374 ppm	Hazardous (Maroon)

The goal of this report was to identify the number of days that 8-hour daily maximum concentrations occurred within the defined ranges, not just those days that would fall under the requirements for attaining the national ambient air quality standards. Therefore, no data capture criteria were applied to eliminate monitoring sites or to require a number of valid days for the ozone season. All valid days of data within the ozone season were used in the analysis. However, for computing an 8-hour average, at least 75 percent of the hourly concentrations (i.e., 6-8 hours) had to be available for the 8-hour period. In addition, an 8-hour daily maximum average was identified if valid 8-hour averages were available for at least 75 percent of possible hours in the day (i.e., at least 18 of the possible 24 8-hour averages). Because the EPA includes days with inadequate data if the standard value is exceeded, our data capture methodology included the site's 8-hour value if at least one valid 8-hr period were available and it was 76 ppb or higher.

Following receipt of the above information, the American Lung Association identified the number of days each county, with at least one ozone monitor, experienced air quality designated as orange (Unhealthy for Sensitive Groups), red (Unhealthy), or purple (Very Unhealthy).

Short-term Particle Pollution Data Analysis

A.S.L. & Associates identified the maximum daily 24-hour AQS $PM_{2.5}$ concentration for each county in 2010, 2011, and 2012 with monitoring information. The 24-hour $PM_{2.5}$ data were downloaded on August 28, 2013. In addition, hourly averaged $PM_{2.5}$ concentration data were characterized into 24-hour average $PM_{2.5}$ values by the EPA and provided to A.S.L. & Associates. Using these results, A.S.L. & Associates prepared a table by county that summarized, for each of the 3 years, the number of days the maximum of the daily $PM_{2.5}$ concentration was within the ranges identified by the EPA based on the EPA Air Quality Index, as adopted by the EPA on December 14, 2012:

Air Quality Index for Particle Pollution

Concentration	Index Levels
0.0 µg/m³ to 15.4 µg/m³	Good (Green)
15.5 µg/m³ to 35.0 µg/m³	Moderate (Yellow)
35.1 µg/m³ to 55.4 µg/m³	Unhealthy for Sensitive Groups (Orange)
55.5 µg/m³ to 150.4 µg/m³	Unhealthy (Red)
150.5 µg/m³ to 250.4 µg/m³	Very Unhealthy (Purple)
greater than or equal to 250.5 µg/m³	Hazardous (Maroon)

All previous data collected for 24-hour average $PM_{2.5}$ were reassessed using these AQI thresholds, above.

The goal of this report was to identify the number of days that the maximum in each county of the daily $PM_{2.5}$ concentration occurred within the defined ranges, not just those days that would fall under the requirements for attaining the national ambient air quality standards. Therefore, no data capture criteria were used to eliminate monitoring sites. Both 24-hour averaged PM data, as well as hourly averaged PM data averaged over 24 hours were used. Included in the analysis are data collected using only FRM and FEM methods, which reported hourly and 24-hour averaged data. As instructed by the Lung Association, A.S.L. & Associates included the exceptional and natural events that were identified in the database and identified for the Lung Association the dates and monitoring sites that experienced such events. Some data have been flagged by the state or local air pollution control agency to indicate that they had raised issues with EPA about those data.

Following receipt of the above information, the American Lung Association identified the number of days each county, with at least one $PM_{2.5}$ monitor, experienced air quality designated as orange (Unhealthy for Sensitive Groups), red (Unhealthy), purple (Very Unhealthy) or maroon (Hazardous).

Description of County Grading System

Ozone and short-term particle pollution (24-hour $PM_{2.5}$)

The grades for ozone and short-term particle pollution (24-hour $PM_{2.5}$) were based on a weighted average for each county. To determine the weighted average, the Lung Association followed these steps:

1. First, assigned weighting factors to each category of the Air Quality Index. The number of orange days experienced by

each county received a factor of 1; red days, a factor of 1.5; purple days, a factor of 2; and maroon days, a factor of 2.5. This allowed days where the air pollution levels were higher to receive greater weight.

2. Next, multiplied the total number of days within each category by their assigned factor, then summed all the categories to calculate a total.
3. Finally, divided the total by three to determine the weighted average, since the monitoring data were collected over a three-year period.

The weighted average determined each county's grades for ozone and 24-hour $PM_{2.5}$.

- All counties with a weighted average of zero (corresponding to no exceedances of the standard over the three-year period) were given a grade of "A."
- For ozone, an "F" grade was set to generally correlate with the number of unhealthy air days that would place a county in nonattainment for the ozone standard.
- For short-term particle pollution, fewer unhealthy air days are required for an F than for nonattainment under the $PM_{2.5}$ standard. The national air quality standard is set to allow two percent of the days during the three years to exceed 35 $\mu g/m^3$ (called a "98th percentile" form) before violating the standard. That would be roughly 21 unhealthy days in three years. The grading used in this report would allow only about one percent of the days to be over 35 $\mu g/m^3$ (called a "99th percentile" form) of the $PM_{2.5}$. The American Lung Association supports using the tighter limits in a 99th percentile form as a more appropriate standard that is intended to protect the public from short-term spikes in pollution.

Grading System

Grade	Weighted Average	Approximate Number of Allowable Orange/Red/Purple/Maroon days
A	0.0	None
B	0.3 to 0.9	1 to 2 orange days with no red
C	1.0 to 2.0	3 to 6 days over the standard: 3 to 5 orange with no more than 1 red OR 6 orange with no red
D	2.1 to 3.2	7 to 9 days over the standard: 7 total (including up to 2 red) to 9 orange with no red
F	3.3 or higher	9 days or more over the standard: 10 orange days or 9 total including at least 1 or more red, purple or maroon

Weighted averages allow comparisons to be drawn based on severity of air pollution. For example, if one county had nine orange days and no red days, it would earn a weighted average of 3.0 and a D grade. However, another county which had only eight orange days but also two red days, which signify days with more serious air pollution, would receive a F. That second county would have a weighted average of 3.7.

Note that this system differs significantly from the methodology the EPA uses to determine violations of both the ozone and the 24-hour $PM_{2.5}$ standards. The EPA determines whether a county violates the standard based on the 4th maximum daily 8-hour ozone reading each year averaged over three years. Multiple days of unhealthy air beyond the highest four in each year are not considered. By contrast, the system used in this report recognizes when a community's air quality repeatedly results in unhealthy air throughout the three years. Consequently, some counties will receive grades of "F" in this report, showing repeated instances of unhealthy air, while still meeting the EPA's 2008 ozone standard. The American Lung Association's position is that the evidence shows that the 2008 ozone standard fails to protect public health.

Counties were ranked by weighted average. Metropolitan areas were ranked by the highest weighted average among the counties within a given Metropolitan Statistical Area as of 2013 as defined by the White House Office of Management and Budget (OMB).

Year-round particle pollution (Annual $PM_{2.5}$)

Since no comparable Air Quality Index exists for year-round particle pollution (annual $PM_{2.5}$), the grading was based on EPA's determination of the national ambient air quality standard for annual $PM_{2.5}$ of 12 µg/m^3. Counties that EPA listed as being at or below 12 µg/m^3 were given grades of "Pass." Counties EPA listed as being at or above 12.1 µg/m^3 were given grades of "Fail." Where insufficient data existed for EPA to determine a design value, those counties received a grade of "Incomplete."

Design value is the calculated concentration of a pollutant based on the form of the national ambient air quality standard and is used by EPA to determine whether or not the air quality in a county meets the standard. Counties were ranked by design value. Metropolitan areas were ranked by the highest design value among the counties within a given Metropolitan Statistical Area as of 2013 as defined by the OMB.

The Lung Association received critical assistance from members of the National Association of Clean Air Administrators, formerly known as the State and Territorial Air Pollution Control Administrators and the Association of Local Air Pollution Control Administrators. With their assistance, all state and local agencies were provided the opportunity to review and comment on the data in draft tabular form. The Lung Association reviewed all discrepancies with the agencies and, if needed, with Dr. Lefohn at A.S.L. & Associates. Questions about the annual PM design values were referred to Mr. Mark Schmidt of EPA, who reviewed and had final decision on those determinations. The American Lung Association wishes to express its continued appreciation to the state and local air directors for their willingness to assist in ensuring that the characterized data used in this report are correct.

Calculations of Populations-at-Risk

Presently county-specific measurements of the number of persons with chronic conditions are not generally available. In order to assess the magnitude of chronic conditions at the state and county levels, we have employed a synthetic estimation technique originally developed by the U.S. Census Bureau. This method uses age-specific national and state estimates of self-reported conditions to project disease prevalence to the county level. The exception to this is poverty, for which estimates are available at the county level.

Population Estimates

The U.S. Census Bureau estimated data on the total population of each county in the United States for 2012. The Census Bureau also estimated the age-specific breakdown of the population and how many individuals were living in poverty by county. These estimates are the best information on population demographics available between decennial censuses.

Poverty estimates came from the Census Bureau's Small Area Income and Poverty Estimates (SAIPE) program. The program does not use direct counts or estimates from sample surveys, as these methods would not provide sufficient data for all counties. Instead, a model based on estimates of income or poverty from the Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS) is used to develop estimates for all states and counties.

Prevalence Estimates

Chronic Obstructive Pulmonary Disease, Cardiovascular Disease, Asthma and Diabetes. In 2012, the Behavioral Risk Factor Surveillance System (BRFSS) survey found that approximately 21.1 million (8.9 percent) of adults residing in the United States and 9.0 percent of children from thirty-six states and Washington, D.C. reported currently having asthma.

Among adults in the Unites States in 2012, 15.3 million (6.4 percent) had ever been diagnosed with chronic obstructive pulmonary disease (COPD), 20.3 million (8.5 percent) had ever been diagnosed with cardiovascular disease, and 24.3 million (10.1 percent) had ever been diagnosed with diabetes.

The prevalence estimate for pediatric asthma is calculated for those younger than 18 years. Local area prevalence of pediatric asthma is estimated by applying 2012 state prevalence rates, or if not available, the national rate from the BRFSS to pediatric county-level resident populations obtained from the U.S. Census Bureau web site. Pediatric asthma data from the 2012 BRFSS were available for thirty-six states and Washington D.C., from the 2011 BRFSS for three states, and national data was used for the eleven states[1] that had no data available. Data from earlier years were not used due to changes in the 2011 survey methodology.

The prevalence estimate for COPD, cardiovascular disease, adult asthma and diabetes is calculated for those aged 18-44 years, 45-64 years and 65 years and older. Local area prevalence for these diseases is estimated by applying age-specific state prevalence rates from the 2012 BRFSS to age-specific county-level resident populations obtained from the U.S. Census Bureau web site. Cardiovascular disease included ever having been diagnosed with a heart attack, angina or coronary heart disease, or stroke.

Limitations of Estimates. Since the statistics presented by the BRFSS and SAIPE are based on a sample, they will differ (due to random sampling variability) from figures that would be derived from a complete census or case registry of people in the U.S. with these diseases. The results are also subject to reporting, non-response and processing errors. These types of errors are kept to a minimum by methods built into the survey.

1 2011: Indiana, Iowa, and Vermont. National: Alaska, Arkansas, Colorado, Delaware, Florida, Idaho, Minnesota, North Carolina, South Carolina, South Dakota, and Virginia.

Additionally, a major limitation of the BRFSS is that the information collected represents self-reports of medically diagnosed conditions, which may underestimate disease prevalence since not all individuals with these conditions have been properly diagnosed. However, the BRFSS is the best available source for information on the magnitude of chronic disease at the state level. The conditions covered in the survey may vary considerably in the accuracy and completeness with which they are reported.

Local estimates of chronic diseases are scaled in direct proportion to the base population of the county and its age distribution. No adjustments are made for other factors that may affect local prevalence (e.g. local prevalence of cigarette smokers or occupational exposures) since the health surveys that obtain such data are rarely conducted on the county level. Because the estimates do not account for geographic differences in the prevalence of chronic and acute diseases, the sum of the estimates for each of the counties in the United States may not exactly reflect the national or state estimates derived from the BRFSS.

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We will breathe easier when the air in every
American community is clean and healthy.

We will breathe easier when people are free from the addictive
grip of tobacco and the debilitating effects of lung disease.

We will breathe easier when the air in our public spaces and
workplaces is clear of secondhand smoke.

We will breathe easier when children no longer
battle airborne poisons or fear an asthma attack.

Until then, we are fighting for air.

About the American Lung Association

Now in its second century, the American Lung Association is the leading organization working to save lives by improving lung health and preventing lung disease. With your generous support, the American Lung Association is "Fighting for Air" through research, education and advocacy. For more information about the American Lung Association, a holder of the Better Business Bureau Wise Giving Guide Seal, or to support the work it does, call 1-800-LUNGUSA (1-800-586-4872) or visit www.lung.org.

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