

Outdoor Air Pollution *and* Asthma in Washington State

Outdoor air pollution can be caused by small fine particles (PM_{2.5}) and ground level ozone that comes from car and truck exhaust, wood smoke and fires, dust, and equipment, agricultural activities, ships, trains, and factory emissions. When inhaled, it can lead to chest pain, coughing, shortness of breath, and may worsen chronic respiratory diseases such as asthma¹.

In Washington, PM_{2.5} air pollution is typically worse during the fall and winter. This is when there is a lot of smoke from wood stoves and fireplaces, and inversion weather patterns produce still air that allows PM_{2.5} pollution to build up. Wildfire smoke can also cause high levels of PM_{2.5}.

Sunny, hot weather combined with vehicle exhaust, gasoline vapors, and other outdoor air pollutants will produce higher levels of ozone. At the ground level, this ozone is the main ingredient of smog and can cause breathing difficulty for people with asthma. People have the most exposure to ozone when they are outdoors exercising. Since ozone takes a while to form, levels can be much higher in rural areas that are far from urban pollution sources.

Particulate matter and ozone are two pollutants that are a concern to people with asthma. In Washington, these are monitored by the State Department of Ecology and Clean Air Agencies.²



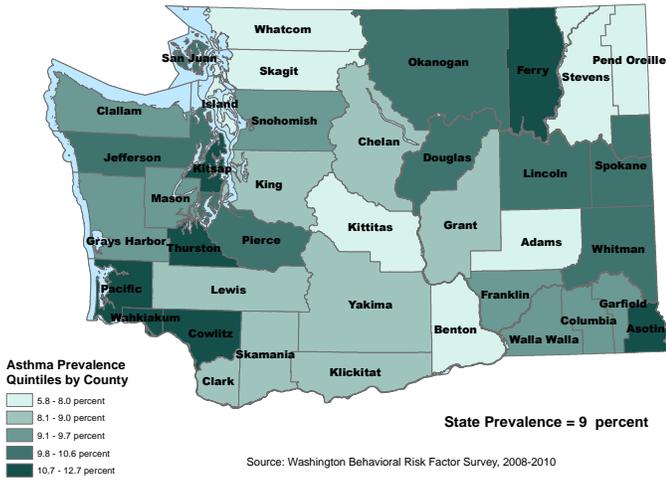
Breathing polluted air can increase doctor and emergency department visits, result in hospitalizations, and sometimes cause premature death.

Asthma risk factors include external conditions or personal health behaviors that increase the chance that people will experience asthma episodes or exacerbations. Because asthma is a complex disease involving many risk factors, no one risk factor can explain asthma in Washington.

Adults with current asthma by county, 2008-2010

Though some counties have high local asthma prevalence, there are no clear regional patterns across the state.

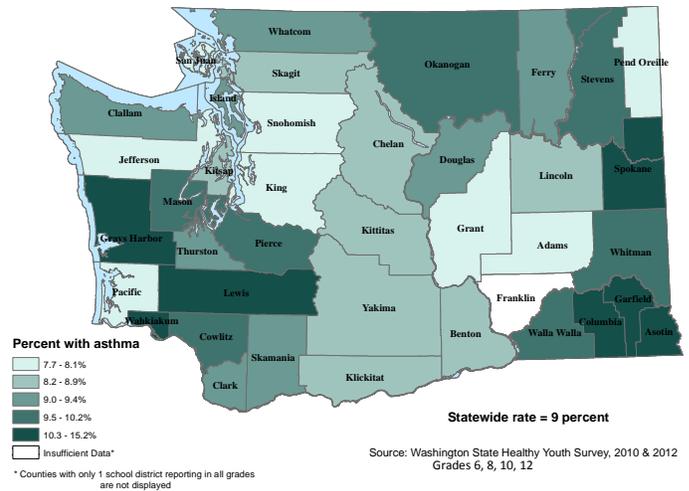
Asotin, Cowlitz, Ferry, Kitsap, Pacific, Thurston, and Wahkiakum counties have the highest prevalence of adult current asthma in Washington.



Current asthma among youth, 2010 and 2012

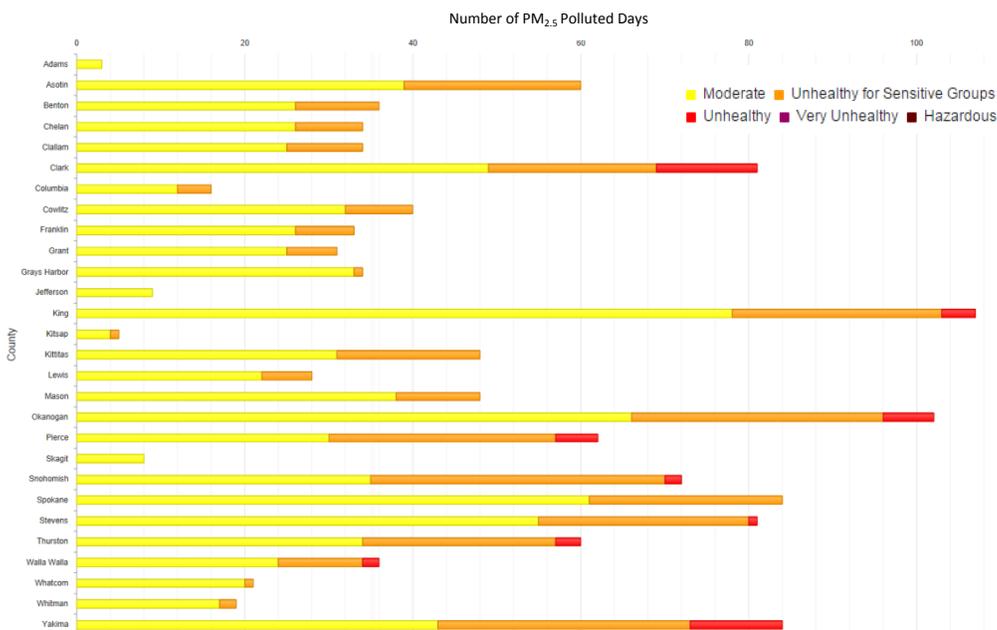
Asthma among youth is distributed across the state with no clear clusters of high prevalence.

Spokane, Columbia, Garfield, Asotin, Lewis, Wahkiakum and Grays Harbor counties have the highest asthma youth prevalence.



Number of days the WAQA Index showed PM_{2.5} air pollution, 2013

Using the Washington Tracking Network indicator called Washington Air Quality Advisory (WAQA), 24 counties experienced more than 16 days of “moderate” to “hazardous” air quality in 2013. Nine counties experienced “unhealthy” days. Visit the [Washington Tracking Network](#) for information about past years’ air pollution.



Source: Washington Tracking Network, accessed July 2015

Outdoor air exposures that cause or trigger asthma

Pollutant	Source	Effect on Asthma
Ozone	Principal component of smog. A summertime air pollutant formed when vehicle exhaust and industrial emissions react with sunlight. After several consecutive days of hot, sunny weather, ozone can build up.	Exposure associated with asthma development among children frequently playing outdoor sports. Exposure increases symptoms and emergency room visits among people with asthma. Breathing ozone can prematurely age the lungs and decrease lung function.
Fine Particulate Matter (PM _{2.5})	Easily inhaled tiny particles including dirt, soot, dust, smoke or unburned fuel, and aerosols suspended in the air that come from mobile vehicles, wood stoves and fireplaces, backyard and agricultural burning, diesel exhaust, industry, wildfires and mining.	Exposure increases symptoms and emergency room visits among people with asthma, decreases lung function.
Nitrogen oxides (NO _x)	Results from emissions from cars or trucks, power plants, and industry. Exposure is likely to be higher near busy roadways.	Exposure increases symptoms among people with asthma.
Sulfur dioxide (SO ₂)	Typically from diesel engines, ships, and industrial sources that burn sulfur-containing fuels like coal and oil. Mt. St. Helens is also a periodically significant source of SO ₂ in Washington State.	Exposure increases symptoms among people with asthma and can cause increased emergency department visits.

Next Steps

Environmental changes to mitigate air pollution: Improve outdoor air quality by reducing traffic emissions and wood smoke in areas with poor air quality. Strategies include:⁷

- Promote public transit.
- Replace old wood stoves with new cleaner burning appliances such as electric, gas or certified wood or pellet stoves.^{7,8}
- Comply with announced burn bans.^{7,8}
- Diesel reduction strategies.
- Promote cleaner cars and trucks.
- Focus on community-based strategies to change the environments of those who are most at risk.
- Reduce fine particle pollution from other sources.⁸

Individual and behavioral changes to cope on bad air days:

- Use the State Department of Ecology's [Washington Air Quality Advisory](#) index to check air quality.⁹
- Establish school policies to manage exposure on high pollution days.¹⁰
- Refer to the Department of Health's [Air Pollution and School Activities Recommendations](#) for suggestions on how to keep students healthy during high pollution days.¹¹
- Implement individual management of exposure to outdoor air pollution for sensitive students.¹²
- Know how sensitive you are to air pollution.¹²
- Plan activities when and where pollution levels are lower.¹²

Citations

- ¹ U.S Environmental Protection Agency, (2012). Asthma Triggers: Gain Control - Outdoor air pollution. Available online at <http://www.epa.gov/asthma/outdoorair.html> Accessed Dec 2012.
- ² Washington State Department of Health: The Health of Washington State (2007). Outdoor (Ambient) Air Quality. Available online at <http://www.doh.wa.gov/Portals/1/Documents/5500/EH-AQ2014.pdf> Accessed December 2012.
- ³ Washington State Department of Health, Washington Tracking Network. Available online at <https://fortress.wa.gov/doh/wtn/WTNPortal/>
- ⁴ Yang Q, Chen Y, Shi Y, Burnett RT, McGrail KM, Krewski D. 2003. Association between ozone and respiratory admissions among children and the elderly in Vancouver, Canada. *Inhalation Toxicology*. 15(13): 1297-13208.
- ⁵ Yu O, Sheppard L, Lumley T, Koenig JQ, Shapiro GG. 2000. Effects of ambient air pollution on symptoms of asthma in Seattle – Area children enrolled in the CAMP study. *Environ Health Perspect*. 108(12) 1209-1214.
- ⁶ Slaughter JC, Lumley T, Sheppard L, Koenig JQ, Shapiro GG. 2003. Effects of ambient air pollution on symptom severity and medication use in children with asthma. *Ann Allergy Asthma Immunol*. 91: 346-353.
- ⁷ Washington State Asthma Plan 2011-2015 by the Washington State Department of Health and the Washington Asthma Initiative, May 2011. http://www.doh.wa.gov/Portals/1/Documents/Pubs/345-290_AsthmaPlan2011-15.pdf
- ⁸ State Implementation Plan Revision: Tacoma-Pierce County Nonattainment area by the WA State Department of Ecology Air Quality Program, Nov 2012. <https://fortress.wa.gov/ecy/publications/documents/1202016.pdf>
- ⁹ Washington State Department of Ecology, Washington Air Quality Advisory. Available online at <https://fortress.wa.gov/ecy/enwiwa/Default.htm>
- ¹⁰ "Recommended Component: Manage Students' Exposure on High Outdoor Air Pollution Days" *American Lung Association Fighting for Air*. Available online at <http://www.lung.org/lung-disease/asthma/creating-asthma-friendly-environments/asthma-in-schools/asthma-friendly-schools-initiative/about-asthma-friendly-schools-initiative/manage-student-exposure.pdf> Accessed February 2013.
- ¹¹ Washington State Department of Health: Air Pollution and School Activities, Public Health Recommendations for Schools on Fine Particle Air Pollution, June 2013. Available online at <http://www.doh.wa.gov/Portals/1/Documents/Pubs/334-332.pdf> Accessed July 2015.
- ¹² U.S Environmental Protection Agency. Asthma and Outdoor Air Pollution. EPA-452-F-04-002. Available online at <http://www.epa.gov/airnow/asthma-flyer.pdf> Accessed February 2013.



For more information:

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