



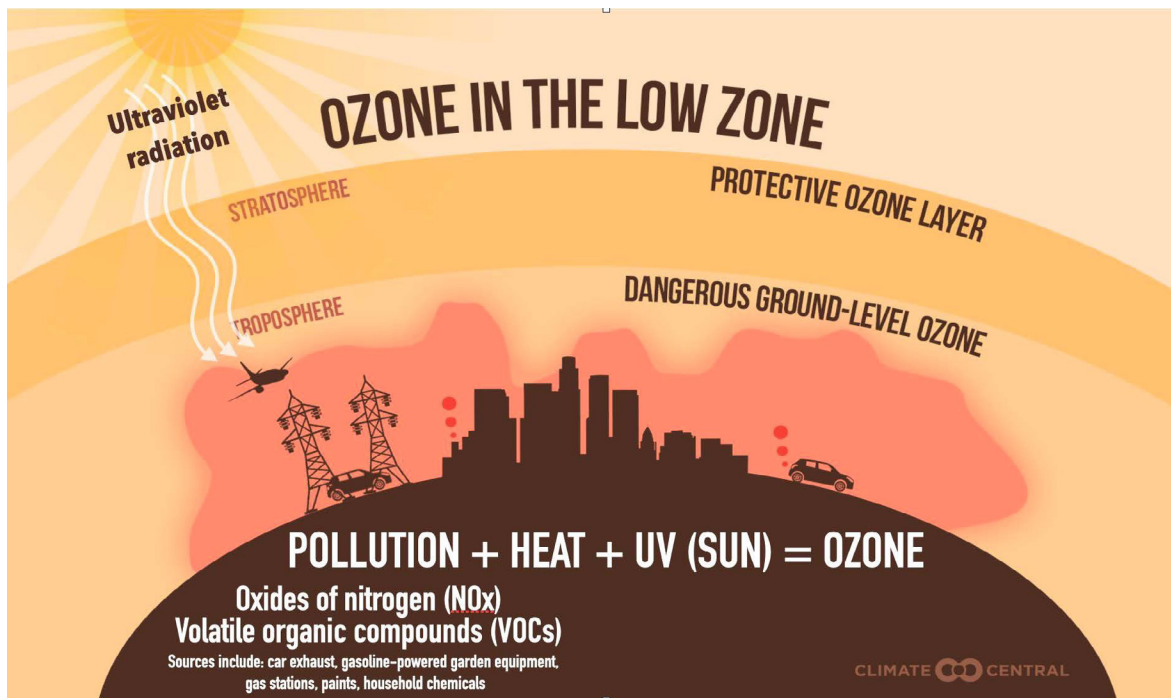
COPD, Asthma, and Heat Providers

Exposure to high temperatures can result in increased morbidity and mortality for patients with chronic lung diseases, such as chronic obstructive pulmonary disease (COPD) and asthma.¹⁻³

Heat Exposure Risks for People with COPD or Asthma

Exposure to hot air has been shown to increase bronchoconstriction in asthmatic patients.⁴ Short- and long-term exposures to heat may impair lung function. A study of >1100 U.S. adults found that a 5°F increase in the three-day moving average temperature was associated with a 0.7% decrease in FVC (95%CI: -1.24, -0.20) and a 5% increase in the 7-day moving average relative humidity was associated with a 0.2% decrease in FVC and FEV1 (95%CI: -0.40, -0.02). These effects were larger with concurrent exposure to particulate matter.⁵

Heat promotes ground level ozone pollution. Ozone exposure causes oxidative inflammation in the lung. Ground level ozone pollution is formed when sunlight (ultraviolet radiation) reacts with oxides of nitrogen and volatile organic compounds.

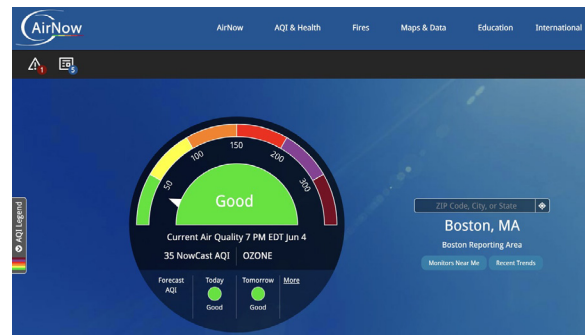


You can learn the air quality for your zip code by going to airnow.gov. Many smartphone weather apps also have air quality reports included in them.

AQI Basics for Ozone and Particle Pollution

AQI value	Description of air quality health risks
0 to 50 Good	Air pollution poses little or no risk.
51 to 100 Moderate	Air pollution may be a risk for some people who are very sensitive to air pollution.
101 to 150 Unhealthy for Sensitive Groups	People sensitive to air pollution may experience health effects.
151 to 200 Unhealthy	People in good health may get sick. People sensitive to air pollution may have more serious health effects.
201 to 300 Very Unhealthy	Air pollution is harmful to everyone.
301 + Hazardous	Air pollution is an emergency for everyone.

The screenshot at the right from airnow.gov shows the air quality for Boston, Massachusetts. The Air Quality Index (AQI) is based upon measurements of ozone air pollution and particulate matter air pollution. The AQI is assessed based upon the pollutant that poses greater risks. Above, you can see the recommended precautions based upon AQI values.



When you scroll below the air quality gauge seen at the right on airnow.gov, you will see the AQI forecast for the next 2 days, as well as the individual air quality levels for ozone and particulate matter.

The AQI may not reflect local air pollution exposures, especially from traffic. If a patient lives near, and especially downwind from, a highway or industrial facility, their air pollution exposures may be considerably higher than the AQI.

AQI measures outdoor air quality. Air quality indoors may differ depending on building ventilation and indoor air pollution sources. When the AQI is <50, opening windows is often the best way to maintain indoor air quality. When the AQI is higher, windows can be closed to reduce polluted outdoor air from entering the home. Forced air systems that blow hot or cold air into rooms can increase delivery of polluted air from outdoors.

Comorbidities

Common comorbidities of COPD in adults, including heart disease, diabetes, hypertension, mental health disorders, and neurological diseases, may increase risk of harm from heat exposure.^{6,7} In a review of heat-related deaths in the United States between 2004-2018, nearly half were attributable to underlying cardiovascular disease.⁸

Medication Considerations

Metered dose inhalers may not deliver the full dose of medication if left in the heat. Temperatures inside car glove compartments, car trunks and mailboxes, where inhalers may be left for long periods, can often exceed 100°F and result in inhaler malfunction.⁹

Many prevalent COPD comorbidities may result in medication prescriptions that can increase risk of harm with heat exposure. While more research is needed, several studies have found the following classes of medications to increase risk of hospitalization in heat: ACEIs, ARBs, beta blockers, diuretics, antipsychotics, SSRIs.¹⁰⁻¹² No trials have been conducted to guide clinical decision making considering these increased risks.

If an individual who has asthma or COPD is prescribed a statin for another indication, limited research has found that statins may be protective against heat exposure.¹³

Temperatures of Concern

The temperatures that increase risk of harm for patients with COPD or asthma may be far lower than those considered dangerous to many people. For most cities in the United States, the minimum mortality temperature (the temperature above which mortality increases) is just below the 80th percentile of the annual temperature range.¹⁴

Temperatures tend to peak in mid to late afternoon. The time of day with the highest temperatures in a geographical area can be found at weatherspark.com.

The National Weather Service (NWS) issues heat advisories, excessive heat watches and excessive heat warnings. To see if a heat alert has been issued for your location, check the weather app on your smart phone, or go to weather.gov and either click your county or type in your zip code. For more details on how to access NWS alerts for heat (and other weather extremes), as well as the differences between heat watches and warnings, see the accompanying toolkit document titled “Accessing Weather Alerts” from the National Weather Service.

Built Environment

The forecast temperature available to patients may not accurately represent the temperature they are exposed to in their home or community. The upper levels of multi-story buildings, especially those without air conditioning, may be much warmer than lower levels.

Urban heat islands can result in temperatures more than 4°F higher than reported due to factors such as fewer trees and parks, more asphalt and concrete, and more traffic. Black American, Hispanic, and lower-wealth communities often live in neighborhoods with greater heat island effects.¹⁵ Homeless individuals are at particularly high risk of heat exposure.

Heat Action Plans for Patients with COPD or Asthma

Appropriate guidance for people with COPD or asthma should be based upon an assessment of the severity of their disease, comorbidities, AQI, occupation (especially if outdoors), access to air conditioning at home, and excess heat exposure from an urban heat island or the home environment.

Prior to a heat event, you can work with the patient to develop a plan. We recommend that you familiarize yourself with the “Heat Action Plan – COPD, Asthma” provided in the toolkit and review it with patients. The action plan can be provided during care visits and can be the basis for a discussion around safety planning and care management in the event of extreme heat. Action plans should be completed in advance of heat season in your locale.

For additional guidance, see the accompanying toolkit document titled “Establishing a Heat Action Plan”.

Anticipatory Guidance for Providers to Give Patients

Anticipatory guidance for hot days may contribute to improved health outcomes. The strategies and resources below may be helpful for you to provide to patients who are at risk from excessive heat and reflect the “Heat Tip Sheet – COPD, Asthma” available in the toolkit, which we encourage you to share with patients.

1. Before going outside, check the weather forecast on your phone, television, radio, or online (e.g., at weather.gov or weather.com).
2. Before going outside, check the AQI on your phone’s weather app or at airnow.gov. When the AQI is below 50, it is safe to be outdoors. When the AQI is over 50, avoid burning anything inside, such as gas for cooking, wood in fireplaces and stoves, or incense. Refer to your heat action plan for guidance on what to do.
 - a. For more information on ways to manage indoor air quality when the AQI is very high, see the additional handouts in the toolkit titled “Wildfires and Heat” for providers and “Wildfire Tip Sheet” for patients.
3. If a patient does not have a thermostat or thermometer that measures room temperature in their home, they can be bought for a few dollars at hardware stores or online. Consider having inexpensive thermometers available in your clinic to distribute.
 - a. Indoor temperatures in the patient’s home should ideally remain <80°F. If they cannot keep the temperature below 80°F, they should use a fan or consider moving to an air-conditioned space until the temperature cools.
4. When a heat advisory or heat alert has been announced by the NWS (see “Accessing Weather Alerts” for more information), advise patients to:
 - a. Follow their heat action plan (see “Establishing a Heat Action Plan” for guidance)
 - b. If a heat advisory is issued, patients with COPD or asthma should preferably stay indoors in an air-conditioned space. If going outside is necessary, limit outdoor activities especially during the hottest part of the day (typically 11AM to 3 PM).
 - c. If an excessive heat warning is issued, patients with COPD or asthma should remain in air-conditioned spaces until the warning expires.

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