



Air pollution and your lungs

Air pollution can affect everyone's health. It's even more of a worry for people living with a lung condition, older people and children as their lungs are more vulnerable.

This information is about outdoor air pollution, we also have information about indoor air pollution at [blf.org.uk/indoor-air-pollution](https://www.blf.org.uk/indoor-air-pollution)

What is air pollution?

An air pollutant is anything in the air that could harm people's health. There are many pollutants in the air. Some are more harmful than others. Particulate matter, nitrogen dioxide and ozone are particularly damaging types of air pollution.

Levels of air pollution vary across the UK. Higher levels are generally found in most UK towns and cities. This is where sources of pollution, such as road traffic, are more concentrated. In the country, farming can also be a source of air pollution.

The amount of air pollution can also change depending on the weather and the season. For example, it's harder for pollution to disperse during still, sunny weather in summer and still, foggy weather in winter. This means pollution becomes more concentrated causing a high pollution episode. These episodes often affect towns and cities, but they can also affect areas of the countryside as the wind can blow pollution across the country.

Visit the government's website to find an up-to-date pollution forecast for your area: [uk-air.defra.gov.uk](https://www.uk-air.defra.gov.uk)

Where does air pollution come from?

Different types of air pollution come from different sources, so the mix of pollutants found varies across the UK. Air pollution can travel long distances and can affect areas far away from where it was formed. It's even possible for UK pollution levels to be affected by sources from outside the country.

In towns and cities, the main source of air pollution is road transport. Diesel and petrol vehicles create pollutants, including nitrogen dioxide and particulate matter. Most diesel vehicles create higher levels of these pollutants than petrol vehicles. The friction of brakes and tyres on the road also contributes to particulate matter.

Other sources of air pollution include:

- sources of smoke, including cigarette smoke
- burning fuel in houses for heating or cooking
- emissions from power generation
- industry
- farming

Events that include bonfires and firework displays, such as bonfire night and Diwali, can result in temporary rises in pollution. Some people are also exposed to air pollution through their jobs. Heating, cooking, candles and incense are also sources of smoke and particles.

Air pollution can also come from natural sources. In the UK, high pollution levels are sometimes caused by dust blown from the Sahara desert. These dust episodes can be serious for someone with a lung condition. Other natural sources of air pollution include volcanoes, pollen, sandstorms and soil.

Types of air pollution

The most abundant and harmful pollutants outdoors include:

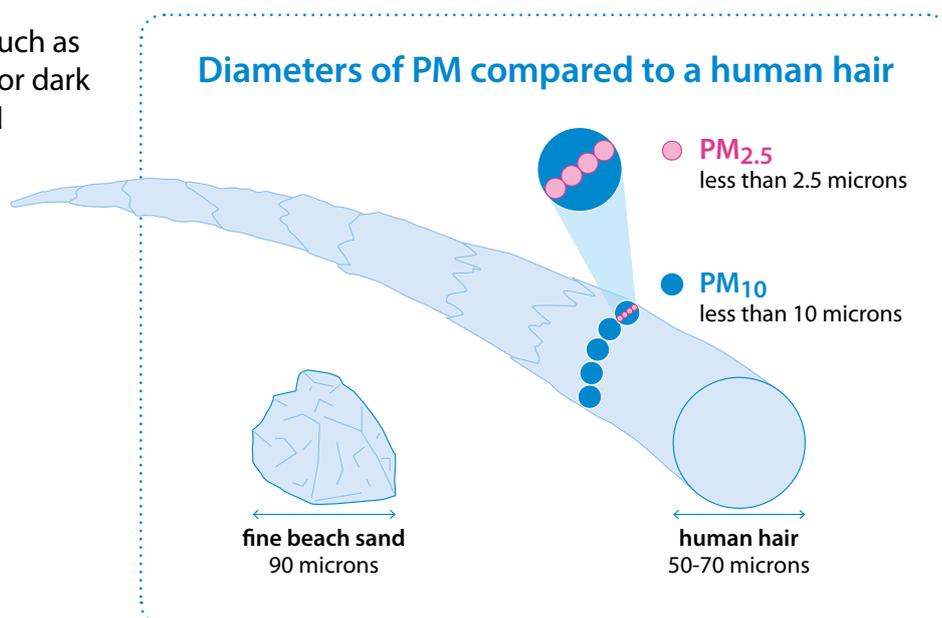
- particulate matter
- nitrogen dioxide
- ozone
- sulphur dioxide

Particulate matter (PM)

What is particulate matter (PM)?

Particulate matter is a mix of solids and liquids, including carbon, complex organic chemicals, sulphates, nitrates, mineral dust, and water suspended in the air.

PM varies in size. Some particles, such as dust, soot, dirt or smoke are large or dark enough to be seen with the naked eye. But the most damaging particles are the smaller particles, known as PM10 and PM2.5. PM10 refers to particles with a diameter smaller than 10 microns (10 μ m) – that's 100 times smaller than a millimetre. PM2.5 refers to particles with a diameter smaller than 2.5 microns, and these are known as **fine particles**. The smallest fine particles, less than 0.1 micron in diameter, are called **ultrafine particles**.



Where does PM come from?

Man-made particulate matter mainly comes from industry, building work, diesel and petrol engines, friction from brakes and tyres, and dust from road surfaces. Diesel engines tend to produce much more than equivalent petrol engines.

Natural sources of particulate matter include volcanoes, sea spray, pollen and soil. It is also formed in the atmosphere when gases such as nitrogen dioxide and sulphur dioxide are changed in the air by chemical reactions.

How does PM affect your lungs?

The size of particulate matter will determine where it will end up once you breathe it in. Larger particles may be trapped in your nose, while PM10 can reach your airways. Fine particles (PM2.5) may reach the breathing sacs deep in your lungs, and ultrafine particles may even cross into your blood stream. These particles can also carry toxic chemicals that are linked to cancer.

Particulate matter irritates your nose and throat and may be associated with more severe symptoms in people with asthma. It results in more people with lung conditions (COPD, asthma, bronchitis) and heart conditions (heart attacks, strokes) being admitted to hospital. It also causes early deaths from lung and heart disease.

There's also evidence that long-term exposure to particulate matter can contribute to the development of lung cancer and possibly asthma.

Nitrogen dioxide (NO₂)

What is nitrogen dioxide (NO₂)?

Nitrogen dioxide is a gas and is a major component of urban air pollution episodes.

Where does (NO₂) come from?

Man-made sources of nitrogen oxides, including nitrogen dioxide, are vehicles, power stations and heating. Diesel vehicles are major contributors in urban areas. Roadside levels are highest where traffic is busiest.

How does (NO₂) affect your lungs?

High levels of NO₂ can irritate and inflame the lining of your airways, causing a flare-up of asthma or COPD and symptoms such as coughing and difficulty breathing.

Children and older people are also more likely to be affected and develop a respiratory infection and may react more to allergens (any substance that triggers an allergic reaction, such as pollen).

Ozone (O₃)

What is ozone?

Ozone is a gas composed of 3 atoms of oxygen. In the upper level of the Earth's atmosphere, it absorbs harmful ultraviolet radiation.

Where does ozone come from?

Near the ground, ozone is made by a chemical reaction between the sun's rays and organic gases and oxides of nitrogen emitted by cars, power plants, chemical plants and other sources.

Ozone is usually highest in the spring and summer and lowest in the winter. Ozone levels are highest during the afternoon and are often higher in the country than in towns. Ozone is a major component of summer air pollution episodes.

How does ozone affect your lungs?

Ozone can irritate the airways of both healthy people and those with lung conditions. High levels can cause discomfort when you breathe, reduce your lung capacity (the amount of air your lungs can hold) and trigger asthma symptoms.

If you have a lung condition, high levels of ozone can cause difficulty breathing, wheezing and coughing. People with asthma may need to use their reliever inhaler more often.

When there are high levels of ozone, more people are admitted to hospital with asthma-related health problems and COPD symptoms, and there is a greater risk of illnesses like pneumonia and bronchitis.

Sulphur dioxide (SO₂)

What is sulphur dioxide?

Sulphur dioxide is a colourless gas, with a pungent, suffocating smell. It's produced by burning sulphur-containing fuels such as coal and oil. This includes vehicles, power generation and heating.

Where does sulphur dioxide come from?

Most sulphur dioxide comes from electric industries that burn fossil fuels, and also from petrol refineries and cement manufacturing. It can travel over long distances and contributes to the formation of ozone.

How does sulphur dioxide affect your lungs?

Sulphur dioxide can irritate the lining of your nose, throat and lungs. It can cause coughing and tightness of your chest, as well as a narrowing of your airway that will reduce the flow of air to your lungs. It inflames the airways, causing coughing and more mucus. It makes conditions like asthma and COPD worse and can lead to people being more prone to chest infections.

People with asthma are much more sensitive to sulphur dioxide than those who do not have asthma. They may find breathing more difficult and have flare-ups when concentrations of sulphur dioxide are high.

What are the effects of air pollution on your lungs?

The effect that air pollution has on your lungs depends on the type and mix of pollutants in the air, the concentration of pollutants and how much of the pollutant gets down into your lungs.

If you're exposed to high pollution levels, for example on a busy road or during a high pollution episode, you may experience a rapid onset of symptoms. These include irritated airways, feeling out of breath and coughing. If you find these symptoms happen regularly you should visit your doctor for a review.

If you have a lung condition, high levels of pollution can also cause an exacerbation of your symptoms, such as an asthma attack or a COPD flare-up. People with asthma may notice they need to use their reliever inhaler more than normal when pollution is high. It's also very important you take your preventer inhaler regularly.

Does air pollution cause lung conditions?

Yes, research suggests that long-term exposure to air pollution can contribute to the development of some lung conditions. There's good evidence that outdoor air pollution contributes to lung cancer, and it's possible that long-term exposure to air pollution is linked to the development of asthma. It's unclear yet whether UK levels of outdoor air pollution have a role in causing COPD, but in the UK air pollution is a smaller risk factor than smoking.

Research also shows that if children are exposed to air pollution for a long period of time, it can affect how their lungs develop. There's also new evidence that children who grow up in highly polluted areas are more likely to develop asthma.

It's estimated that air pollution contributes to up to 36,000 early deaths in the UK every year.

Understanding air pollution statistics

- **estimated:** We don't know exactly how many early deaths are linked to air pollution. The estimate of 36,000 comes from a 2018 report led by King's College London. It's based on the government's estimates of early deaths from particulate matter (PM2.5) and nitrogen dioxide.
- **equivalent:** 36,000 early deaths is an average across the UK population. It helps show the health impact of air pollution. The effects of air pollution are complex – it will impact people differently depending on their health. For example, it can make existing illnesses worse.
- **early deaths:** The 36,000 figure refers to the number of people dying earlier than they should from a condition that air pollution contributes to, including lung disease, heart disease and stroke.
- **linked:** Air pollution doesn't cause deaths on its own. Most of the early deaths will be caused by an existing heart or lung condition, but air pollution may have made the condition worse.

Who's most at risk from air pollution?

People react to air pollution in different ways and some are more affected than others.

Air pollution is especially harmful to people who are living with a lung condition, such as asthma or chronic obstructive pulmonary disease (COPD). Older people, children and babies also have a higher risk of experiencing symptoms and other harmful effects from breathing in polluted air.

Healthy people who work or exercise outdoors might also experience symptoms when they're exposed to moderate or high levels of pollution. They may feel out of breath or start coughing.

When concentrations of air pollution are high, the governments issues an alert and bulletins will appear alongside local and national weather forecasts. Visit the UK government's website to find the forecast for your area, or other areas if you're planning a trip away from home – uk-air.defra.gov.uk

How can I protect myself from air pollution?

On high pollution days, the best thing you can do to reduce your exposure to air pollution is to avoid main roads and busy streets where possible. If you have a lung condition or have children, this is even more important.

On days when pollution levels are low, you don't need to be worried about going outside. Children shouldn't be stopped from going to school or taking part in games. But even on these days, it's a good idea to avoid spending long periods of time in places where pollution levels build up, such as busy roads – particularly if you have a lung condition. However, it's important to remember that exercise is important for good health and everyone should be encouraged to walk regularly.

As air pollution levels rise, people with lung conditions are at an increased risk of becoming ill and needing treatment. When levels are high, the government will issue an air pollution alert or you may see reports included as part of the weather forecast. If you or your child has a long-term lung condition, it's sensible to take extra precautions on these high pollution days:

- **Reduce or avoid strenuous, outdoor exercise.** If you have a lung condition, exercise has many benefits, so if possible, keep doing your exercise indoors in a well-ventilated room or gym.
- **Stay away from pollution hotspots** such as main roads and busy road junctions.
- **Try to get to work a little earlier** before rush hour has begun and levels of pollution have built up.
- If you cycle, run or walk as part of your commute, **use back streets** away from the bulk of vehicle congestion.
- **Walk on the inside of the pavement** – the further you are from the traffic the lower the pollution levels are.
- Make sure you **carry your reliever inhaler with you** if you use one.
- If you have asthma, **use your preventer inhaler regularly.**
- Make sure you **carry or know your asthma plan.** If you don't have one, ask your doctor for one

If you find your condition is getting worse, or if you're getting wheezy or coughing from walking outside, get in touch with your doctor. If you're out and about, you could also call into any chemist, where a pharmacist can also give you advice. Anyone who experiences discomfort such as sore eyes, a cough or a sore throat should consider reducing their levels of physical activity outdoors.

Should I wear a face mask?

At the moment there's very little evidence to recommend the use of face masks. Sophisticated masks with active charcoal filters can help filter out nitrogen dioxide, but these don't keep out the smallest particulate matter which is most damaging to your health. Face masks can also make breathing harder which may be a problem if you have a lung condition. Until there is good evidence that wearing an appropriate mask will help, masks should not be considered as an effective way to reduce air pollution exposure.

Also, many people find wearing a mask very uncomfortable, and some people with a lung condition report finding breathing more difficult when there's something covering their mouth.

How do I find out about air pollution levels?

The UK-air website produces a daily air pollution forecast with a postcode finder service to monitor air pollution levels in your area – uk-air.defra.gov.uk. You can also get air pollution updates on the @DefraUKAir Twitter feed or by calling the Defra helpline on **0800 55 66 77**.

Some areas of the country have local air pollution monitoring:

Scotland

- Air Quality in Scotland monitors local pollution levels and provides free Know & Respond air pollution alerts – www.scottishairquality.co.uk

Northern Ireland

- Northern Ireland air monitors air quality – www.airqualityni.co.uk. You can also subscribe to the Air Aware service to get texts when air pollution is high. Find details at www.nidirect.gov.uk/articles/air-pollution-and-health

Wales

- Air Quality in Wales monitors local pollution levels across Wales - www.airquality.gov.wales/

Greater London and South East England

- airText offers free text alerts for London, Chelmsford, Colchester or Cambridge www.airtext.info
- City Air app offers email alerts for London cityairapp.com
- London Air monitors pollution levels across London and provides a mobile app www.londonair.org.uk
- airAlert offers free alerts for Surrey, Sussex, Hampshire and Sevenoaks airalert.info

In other areas of the UK, there may be a free air quality alert service provided by your local council or health authority. If you'd like to find out about air quality across the world, visit State of Global Air. www.stateofglobalair.org

How can I help tackle air pollution?

Our campaigns team suggests:

- In general, everyone who is able to should try to reduce their contribution to air pollution by walking or cycling rather than taking a car, particularly for short trips. This will reduce emissions and keep you active too. You could also consider using public transport or sharing a car.
- If your children attend a local school, consider methods to raise awareness of air pollution at the same time as reducing levels, such as anti-idling zones, car sharing or park and stride scheme.
- If you're considering buying a car, look at its nitrogen dioxide emissions and check the real world emissions for that car. Avoid buying diesel cars. Buying a hybrid or electric vehicle will also help to cut down your emissions.
- If you have a car, ensure it's serviced regularly to minimise its contribution to air pollution. If you have a diesel car, make sure the diesel particulate filter is maintained and emptied regularly.
- Consider how your home contributes to local air pollution by monitoring your energy demand and waste. For example, you could install energy-efficient appliances and light bulbs, insulation and draught-proof windows.
- If you're concerned about pollution in your local area, you can contact the environmental health department of your local authority. You should be able to find the address and phone number in your local phone book or on their website.

If you want to find out more about what we're doing to help tackle air pollution, visit our campaigns page at [blf.org.uk/clean-air](https://www.blf.org.uk/clean-air)

Harriet, from our policy team, explains about diesel car emissions:

"Many diesel cars produce more nitrogen dioxide and particulate matter than petrol ones. The extent depends on the age and model (Euro standard) of the car. On average, compared to the petrol model:

- Euro 4 (2005) diesel cars produce over 3 times more NO₂
- Euro 5 (2009) produce 3 times as much
- Euro 6 (2014) produce 25% more than their petrol equivalents

In 2016 a government report found diesel vehicles tended to have higher NO₂ emissions in the real world, in some cases 10 times as high."

Get in touch with us to find support near you.

Helpline: **03000 030 555**

Monday to Friday, 9am-5pm

Ringing our helpline will cost the same as a local call.

helpline@blf.org.uk

[blf.org.uk](https://www.blf.org.uk)

Code: FL5 **Version:** 4

[blf.org.uk/air-pollution](https://www.blf.org.uk/air-pollution)

Last medically reviewed: April 2020

Due for medical review: April 2023

We value feedback on our information. To let us know your views, and for the most up to date version of this information and references, call the helpline or visit [blf.org.uk](https://www.blf.org.uk)