



# Air pollution and your lungs

Air pollution is a serious health concern for all of us. It's even more of a concern for people living with a lung condition, older people and children. Their lungs are more vulnerable.

## What is air pollution?

An air pollutant is any substance in the air that could harm people. 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.

Different areas of the UK have different levels of air pollution. High concentrations can be found in most UK towns and cities. This is where sources of pollution, such as road traffic, are more concentrated.

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 the 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 wind blows 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](http://uk-air.defra.gov.uk)**

If you're worried about indoor air pollution, we have more information on your home and your lungs.  
**[blf.org.uk/indoor-air-pollution](http://blf.org.uk/indoor-air-pollution)**

## Where does air pollution come from?

Different types of air pollution come from different sources so the mix of pollutants varies across the UK. Air pollution can travel long distances and can affect areas far away from where it was created. UK pollution levels can even be affected by pollution sources 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. The friction of brakes and tyres on the road also creates particulate matter. Most diesel vehicles create much higher levels of these pollutants than petrol vehicles.

Other sources of air pollution include:

- burning fuel in houses for heating or cooking
- emissions from power generation
- industrial processes
- agriculture

Events which include bonfires and firework displays, such as bonfire night and Diwali, can result in temporary increases in particulate pollution. Some people are also exposed to air pollution through their jobs.

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

## Types of air pollution

The most abundant and harmful pollutants include:

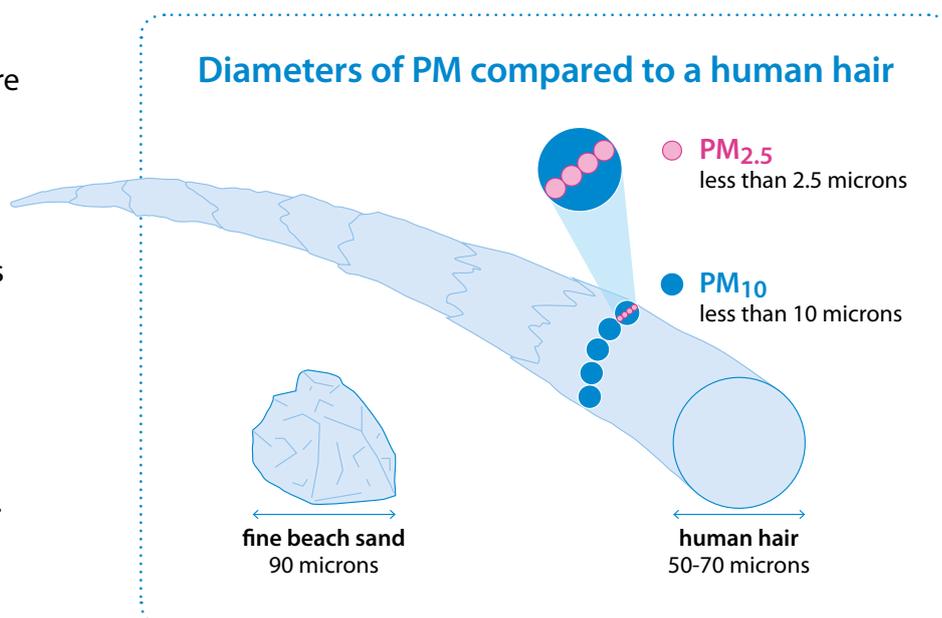
- particulate matter
- nitrogen dioxide
- ozone
- sulphur dioxide

## Particulate matter (PM)

### What is it?

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

It 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 PM<sub>10</sub> and PM<sub>2.5</sub>. PM<sub>10</sub> refers to particles with a diameter that's smaller than 10 microns (10µm) – that's 10 millionths of a metre. PM<sub>2.5</sub> 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 it come from?**

Man-made particulate matter mainly comes from industrial processes, construction work, emissions from 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 it 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 PM<sub>10</sub> can reach your airways. Fine particles (PM<sub>2.5</sub>) may reach the breathing sacs deep in your lungs, and ultrafine particles may even cross into your blood stream. These particles can carry toxic chemicals which 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 (NO<sub>2</sub>)**

### **What is it?**

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

### **Where does it 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 it affect your lungs?**

High levels of NO<sub>2</sub> 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 affected and more likely to develop a respiratory infection, or react to an allergen (any substance that triggers an allergic reaction, such as pollen).

## Ozone (O<sub>3</sub>)

### What is it?

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

### Where does it 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.

Levels of ozone tend to be highest in the spring and summer and lowest in the winter. Ozone reaches its peak concentration during the afternoon. Levels are often higher in the country than in towns. Ozone is a major component of summer air pollution episodes.

### How does it affect your lungs?

Ozone can irritate the airways of healthy people and people with lung conditions. High levels can cause you 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 you to have difficulty breathing, to wheeze and to cough. People with asthma may need to use their reliever inhaler more.

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 (SO<sub>2</sub>)

### What is it?

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 it come from?

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

### How does it 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. It makes people 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 immediate symptoms. These include irritated airways, feeling out of breath and coughing.

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 that they need to use their reliever inhaler more than normal when pollution is high.

## 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.

Every year in the UK, it's estimated that the equivalent of 40,000 early deaths can be linked to breathing in polluted air.

### Understanding air pollution statistics

- **estimated:** We don't know exactly how many early deaths are linked to air pollution. The estimate of 40,000 comes from a 2016 report by the Royal College of Physicians. It's based on the government's estimates of early deaths from particulate matter (PM2.5) and nitrogen dioxide.
- **equivalent:** 40,000 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 40,000 figure refers to the number of people dying earlier than they should. Usually this means before the age of 75.
- **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.

If you're interested, you can read an explanation of this statistic from the University of Cambridge at [medium.com/wintoncentre/does-air-pollution-kill-40-000-each-year-people-in-the-uk-ecca96fb3a1a](https://medium.com/wintoncentre/does-air-pollution-kill-40-000-each-year-people-in-the-uk-ecca96fb3a1a)

## 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 government issues an alert and bulletins will appear alongside local and national weather forecasts. Visit the 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](http://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.

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. 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.
- Make sure you **carry your reliever inhaler with you** if you use one.
- If you have asthma, **use your preventer inhaler regularly.**

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.

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](http://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](http://www.scottishairquality.co.uk)

### Northern Ireland

- Northern Ireland air monitors air quality – [www.airqualityni.co.uk](http://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](http://www.nidirect.gov.uk/articles/air-pollution-and-health)

### Greater London and South East England

- airText offers free text alerts for London, Chelmsford, Colchester or Cambridge [www.airtext.info](http://www.airtext.info)
- City Air app offers email alerts for London [cityairapp.com](http://cityairapp.com)
- London Air monitors pollution levels across London and provides a mobile app [www.londonair.org.uk](http://www.londonair.org.uk)
- airAlert offers free alerts for Surrey, Sussex, Hampshire and Sevenoaks [airalert.info](http://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](http://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 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.
- 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](http://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 NO<sub>2</sub>
- 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 NO<sub>2</sub> 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 never costs more than a local call and is usually free, even from a mobile.

[helpline@blf.org.uk](mailto:helpline@blf.org.uk)

[blf.org.uk](http://blf.org.uk)

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