

## Indoor air pollution and the lungs

Most people think of pollution as the smog they see outside when pollution levels are high. Almost everyone knows that outdoor pollution can damage health. But not many people realise that pollution indoors can also affect them.

How much time do you spend indoors? Do you think it is about half your day or a little less? Now think about it more carefully. Include all the time you spend in your house, your office, your school, and in shops and restaurants. We actually spend about 90% of our time inside, so indoor air is very important for our health.

Poor indoor air quality has been linked to lung diseases – such as asthma and allergies, chronic obstructive pulmonary disease (COPD) and lung cancer – and affects other parts of the body. People who already have a lung disease are more likely to be affected by indoor air pollution and those with severe disease are also likely to spend more time indoors.

The aim of this factsheet is to describe the main sources of indoor air pollution, what causes the problem and what we can all do to reduce the risk of ill health from indoor air pollution.

### Where does it come from?

Indoor air pollution can come from many places, including open fires and heaters, building materials and furniture, cleaning products and cooling systems, and air pollution that comes in from outdoors (if you would like to know more about outdoor air pollution, please read our factsheet at [www.environment.european-lung-foundation.org](http://www.environment.european-lung-foundation.org)).

### What is ventilation?

There are many ways for air from the outside to enter a building:

- Infiltration – air that enters through cracks in the walls, floors and ceilings, and through windows and doors.
- Natural ventilation – air that enters when we open a door or window to let air in.
- Mechanical ventilation – ventilation provided by an outdoor-vented fan or air-conditioning system.

To reduce energy use, buildings they have become more tightly sealed to prevent uncontrolled ventilation. Because of this, outdoor air cannot enter as easily and dilute or clear away pollutants. The amount of ventilation in a building is important when thinking about indoor pollution and its effects.

### What does it do to our lungs?

Irritant effects, such as a dry throat and cough, can be felt after quite a short time of exposure to indoor air pollution (days or weeks). The effects of longer exposure, such as lung cancer, may not appear for many years. The next page gives more details about the health effects of some indoor pollutants.

### Is it going to affect you?

Some people are more likely than others to be affected by some indoor air pollutants. For example, children seem to be more sensitive to other people's tobacco smoke, while women in general are more likely to get a dry throat and dry eyes. In addition, it is clear that patients allergic to dust mites and/or pets will suffer when exposed to them indoors. Otherwise it is not possible to know in advance whether you are more likely to be affected by indoor air than anyone else. But where exposure is very high, almost everyone will suffer.



SOURCE	POLLUTANT	LUNG HEALTH EFFECT	ACTION
<b>Smoking</b> <ul style="list-style-type: none"> <li>• Cigarettes</li> <li>• Pipes</li> <li>• Cigars</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental tobacco smoke</li> </ul>	<ul style="list-style-type: none"> <li>• Irritated nose and throat</li> <li>• Worse asthma symptoms</li> <li>• Increased chance of respiratory symptoms such as cough</li> <li>• Lower lung function</li> <li>• Worse COPD</li> <li>• Lung cancer</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Do not smoke indoors</li> <li>&gt; Do not allow others to smoke indoors</li> </ul>
<b>Unvented heating and cooking systems</b> <ul style="list-style-type: none"> <li>• Stoves</li> <li>• Heaters</li> <li>• Fireplaces</li> <li>• Candles</li> </ul>	<ul style="list-style-type: none"> <li>• Particles (tiny bits of dust and dirt in the air)</li> <li>• Gases (carbon monoxide, nitrogen oxides)</li> <li>• Sulphur oxides</li> </ul>	<ul style="list-style-type: none"> <li>• Irritated nose and throat</li> <li>• Worse asthma symptoms</li> <li>• Increased chance of respiratory symptoms such as cough</li> <li>• Lower lung function</li> <li>• Worse COPD</li> <li>• Lung cancer</li> <li>• Carbon monoxide poisoning and death</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Reduce use of unvented heaters</li> <li>&gt; Maintain gas appliances</li> <li>&gt; Use extraction fans over gas stoves and ranges</li> <li>&gt; Minimise wood stove emissions</li> <li>&gt; Regularly clean chimneys and exhaust routes</li> </ul>
<b>Household chemicals</b> <ul style="list-style-type: none"> <li>• Paints</li> <li>• Strippers</li> <li>• Cleaning products</li> <li>• Air fresheners</li> <li>• Pesticides</li> <li>• Fungicides</li> <li>• Herbicides</li> </ul>	<ul style="list-style-type: none"> <li>• Volatile and semi-volatile organic compounds (VOCs and S-VOCs)</li> <li>• Toxicants</li> </ul>	<ul style="list-style-type: none"> <li>• Irritated nose and throat</li> <li>• Difficulty breathing (dyspnoea)</li> <li>• Worse asthma symptoms</li> <li>• Intoxication</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Follow label instructions about safe use of chemicals</li> <li>&gt; Work outside if possible and ventilate rooms well during and after use</li> <li>&gt; Carefully dispose of partly used containers</li> </ul>
<b>The ground on which buildings are built</b>	<ul style="list-style-type: none"> <li>• Radon</li> </ul>	<ul style="list-style-type: none"> <li>• Lung cancer (in Europe, radon in the home accounts for ~9% of deaths from lung cancer and this risk increases dramatically when combined with smoking)</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Test for radon levels</li> <li>&gt; Take expert local advice on how to reduce levels using ventilation if they are high</li> <li>&gt; Stop smoking</li> </ul>

<b>Building materials</b> <ul style="list-style-type: none"> <li>• Roofing and flooring materials</li> <li>• Insulation</li> <li>• Cement</li> <li>• Coating materials</li> <li>• Heating equipment</li> <li>• Soundproofing</li> <li>• Plastics</li> <li>• Glue</li> <li>• Plywood</li> <li>• Carpet backing</li> <li>• Fabrics</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos (a problem if the asbestos-containing material is disturbed or disintegrates with age)</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestosis (scarring of the lung tissue)</li> <li>• Lung cancer</li> <li>• Mesothelioma (an uncommon cancer)</li> </ul>	<ul style="list-style-type: none"> <li>&gt; If you find there is asbestos in your home ensure it remains undisturbed</li> <li>&gt; If doing renovations, get it removed by professionals</li> </ul>
	<ul style="list-style-type: none"> <li>• Fibreglass (can release fibres if it breaks down with age or water damage, and when trimmed, chopped, cut or sanded)</li> </ul>	<p>Larger fibres result in irritated nose and throat</p>	<ul style="list-style-type: none"> <li>&gt; If you find there is fibreglass in your home ensure it remains undisturbed</li> <li>&gt; Check products for fibreglass content and wear a mask and protective clothing if dealing with them</li> </ul>
	<ul style="list-style-type: none"> <li>• Volatile and semi-volatile organic compounds (VOCs and S-VOCs), including formaldehyde</li> </ul>	<ul style="list-style-type: none"> <li>• Irritated nose and throat</li> <li>• Difficulty breathing (dyspnoea)</li> <li>• Worse asthma symptoms</li> <li>• Lung and nasopharyngeal cancer</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Ventilate well</li> <li>&gt; Allow for adequate off-gasing of VOCs in new or newly furnished homes</li> </ul>
<b>Heating and cooling</b> <ul style="list-style-type: none"> <li>• Ventilation systems</li> <li>• Air-conditioning</li> </ul>	<ul style="list-style-type: none"> <li>• Viruses and bacteria</li> </ul>	<ul style="list-style-type: none"> <li>• Inflammation of the lung airways</li> <li>• Pneumonitis</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Make sure water is changed often in air-conditioning units</li> </ul>
<b>Bedding and furnishings</b> <ul style="list-style-type: none"> <li>• Mattresses</li> <li>• Pillows</li> <li>• Carpets</li> <li>• Upholstered furniture</li> </ul>	<ul style="list-style-type: none"> <li>• Dust mites</li> </ul>	<ul style="list-style-type: none"> <li>• Worse asthma symptoms or allergies</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Change mattresses and bedding regularly</li> <li>&gt; Use mite-impermeable covers</li> <li>&gt; Clean regularly</li> <li>&gt; Ventilate well</li> <li>&gt; Reduce home dampness</li> <li>&gt; Choose smooth floors instead of carpets</li> </ul>
<b>Moisture damage, dampness</b>	<ul style="list-style-type: none"> <li>• Moulds</li> <li>• Dust mites (see above)</li> </ul>	<ul style="list-style-type: none"> <li>• Irritated nose and throat</li> <li>• Shortness of breath</li> <li>• Allergic reactions</li> <li>• Worse asthma symptoms</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Prevent leaks and water damage</li> <li>&gt; Ventilate well</li> <li>&gt; Remove mould stains</li> <li>&gt; Use dehumidifier</li> </ul>
<b>Pets</b> <ul style="list-style-type: none"> <li>• Dogs</li> <li>• Cats</li> <li>• Birds</li> </ul>	<ul style="list-style-type: none"> <li>• Allergens</li> <li>• Zoonoses</li> </ul>	<ul style="list-style-type: none"> <li>• Pet allergy</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Remove pet from home</li> <li>&gt; Prevent pet from entering bedroom or living areas</li> </ul>

## ▶ How can we reduce risks?

Levels of outdoor pollution are measured and recorded in almost every country in Europe, and there are certain levels that countries have to keep to. Some countries have set guidelines for indoor air pollutant levels, but setting maximum levels of indoor air pollution is very difficult.

There is a certain amount of individual choice in and control over what we use in our own homes and how we ventilate them. It is also hard to check, establish and maintain good levels in the indoor environments of schools, offices and shops. However, we can be aware of the risks from indoor pollution so that we can try to reduce them.

Laws are now being introduced to improve indoor air. For example, bans on smoking in public places have had a great effect on the health of bar workers and others exposed in such places.

## ▶ How can we tell if we have problems?

By asking ourselves the following questions about our homes, we can decide whether indoor air pollution is a problem.

- Are there any signs of a problem in the indoor environment, such as mould and smells?
- Do you feel that you have symptoms which are better when you are away from a certain indoor environment?

Questions like these only raise the possibility of an effect of indoor air on your health. They cannot prove it.

## ▶ How can you help to control it?

The table on pages 2 and 3 suggests ways of tackling each source of air pollution. Below is a more general list of things you can change now for the better:

1. Do not allow smoking indoors.
2. Ensure your home is well ventilated. Air your house for 5–10 minutes several times a day, especially during and after cooking, and after taking a shower.
3. Maintain gas appliances.
4. Where there are coal, wood or open fires, make sure that chimneys are cleaned and looked after. Burn only dry and untreated wood. Do not burn refuse or packaging as it can lead to the formation of toxic substances.
5. Prevent water leaks and reduce moisture levels.
6. If you live in a high radon area (houses built on granite, in areas such as Sweden and in the west of the UK), get advice on testing for radon.
7. Use building materials and furniture with low emissions. Look for products and materials that carry the European “Ecolabel” (<http://ec.europa.eu/environment/ecolabel>) or any other approved natural levels to prove that products are environmentally sound and low in pollutants and emissions.
8. Install alarms for smoke and carbon monoxide.
9. Take care when using chemicals in the household; as detergents, cleaning agents, air fresheners *etc.* release chemicals into the air. Always ventilate well after use.

The ELF is the public voice of the European Respiratory Society (ERS), a non-profit-making medical organisation with more than 8,000 members in more than 100 countries. The ELF is dedicated to lung health throughout Europe, and draws together the leading European medical experts to provide patient information and raise public awareness about respiratory disease.

The Health & Environment Alliance is an international non-governmental organisation which aims to improve health through public policy that promotes a cleaner and safer environment. HEAL represents a diverse network of more than 50 citizens', women's, patients', health professionals' and environmental organisations across Europe: [www.env-health.org](http://www.env-health.org).

▶ For more information and links go to [www.environment.european-lung-foundation.org](http://www.environment.european-lung-foundation.org) [www.env-health.org](http://www.env-health.org)

▶ The information was written and compiled by the European Respiratory Society ([www.ersnet.org](http://www.ersnet.org)) Environment and Health Committee, and reviewed by the Health and Environment Alliance.

Co-funding, and production and content support for this publication has been provided by the Health and Environment Alliance through DG Environment, European Commission