



# Indoor Air Quality

WORKING PARTY

## Healthier air at home

### Information for health practitioners




This document has been prepared for health practitioners who might wish to discuss their patient's home environment and actions they could take to improve the indoor air quality and reduce detrimental health impacts. The hierarchy of actions, which are explained in greater detail in this sheet are:

1. **AVOID** pollutants being generated or brought indoors.
2. **REMOVE** sources of pollutants indoors with known health effects
3. **REDUCE** exposure to, and use of, pollutants with ventilation if you can't remove.

The home environment is reflected by occupation and interests of the householders and any guests and, or, employees that they have. Patient groups who may particularly benefit from review of their home environment include:

1. Asthmatic who has recurrent exacerbations
2. Perennial Allergic Rhinitis patients
3. Patients with household employees and, or, members from certain occupations involving indoor pollutant sources carried out in the home environment e.g. cleaners, builders, hair dressers, beauticians

In normal times, children in the UK spend an average of 68 minutes outside each day. During lockdown, they are likely to have spent more time indoors, so the indoor environment is even more important. Poor indoor air quality at home is linked to health effects in people of all ages. Research largely focuses on the effects in adults, however multiple effects have also been identified in childhood. These are:

 BIRTH AND INFANCY	 PRE-SCHOOL	 SCHOOL AGE
<ul style="list-style-type: none"><li>• Respiratory problems – wheeze, rhinitis, asthma, respiratory infections</li><li>• Low birthweight and pre-term birth</li></ul>	<ul style="list-style-type: none"><li>• Respiratory problems – wheeze, allergies, asthma, risk of respiratory diseases and pneumonia</li><li>• Eczema and atopic dermatitis</li><li>• Greater hyperactivity, impulsivity and inattention</li></ul>	<ul style="list-style-type: none"><li>• Respiratory problems – wheeze, rhinitis, asthma, throat irritation, nasal congestion, dry cough</li><li>• Eczema, dermatitis, conjunctivitis, skin and eye irritation</li><li>• Reduced cognitive performance, difficulty sleeping</li></ul>

## Factors affecting indoor air quality

Multiple factors inside and outside buildings affect the air quality in the building, some of which are outlined in the illustration. At a simple level, exposure to pollutants is determined by the presence of indoor and outdoor sources, and the air exchange between the indoor and outdoor environment. Here is an overview of pollutants and sources in the home environment. A detailed list of common pollutants found in indoor air is in Annex 8 of *The inside story: health effects of indoor air quality on children and young people*.

ROOM IN HOME	OVERVIEW OF COMMON POLLUTANTS AND SOURCES
<b>KITCHEN</b>	<ul style="list-style-type: none"> <li>• Gas cookers/stoves: Carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>) and particulates (PM)</li> <li>• Household cleaning products: Volatile Organic Compounds</li> </ul>
<b>LIVING AREAS</b>	<ul style="list-style-type: none"> <li>• Ground beneath home (soil/bedrock): Radon</li> <li>• Fires and wood-burning stoves: Carbon Monoxide and Nitrogen Dioxide</li> <li>• Carpets, paints, glues, furniture and air fresheners: Volatile Organic Compounds and formaldehyde</li> <li>• Pet hair and dander: animal allergens -biological pollutant</li> <li>• Tobacco smoke: consists of particulates, carbon monoxide and over 7000 other chemicals including formaldehyde, ammonia and nitrogen oxides.</li> </ul>
<b>BEDROOMS</b>	<ul style="list-style-type: none"> <li>• Personal care products: Volatile Organic Compounds</li> <li>• Bacteria and viruses</li> <li>• Dust -dust mites and their faeces are the major constituents of house dust</li> <li>• Bedding, carpets, mattresses, clothing and soft furnishings: Dust mites - thrive in humid and warm environments with reduced ventilation</li> <li>• Pet hair and dander: animal allergens</li> </ul>
<b>BATHROOM AND LAUNDRY</b>	<ul style="list-style-type: none"> <li>• Damp/moist surfaces: moulds -note indoor airborne mould can be found even when mould or dampness is not visible on surfaces. Often caused by poor ventilation and high levels of moisture in the air</li> <li>• Cleaning and laundry products: Volatile Organic Compounds and other chemicals</li> </ul>

<b>ATTIC</b>	<ul style="list-style-type: none"> <li>• Insulation and other building materials: synthetic mineral fibres, asbestos, formaldehyde</li> <li>• Dust</li> </ul>
<b>GARAGE</b>	<ul style="list-style-type: none"> <li>• Car exhaust: Carbon monoxide</li> <li>• Stored paints and solvents, pesticides and herbicides: Volatile Organic Compounds</li> <li>• Mould and mildew</li> </ul>

## Top tips

If you have patients presenting with the symptoms included above, it may be beneficial to discuss their home environment and actions they could take to improve the indoor air quality. We also encourage use of this as opportunistic advice to patients who may have other problems but health practitioners notice pollutant related activities and sources during home visits.

Advise patients and their families, and, or household members that poor indoor air quality is not always easy to identify and that every home is different. Explain that they should prioritise following any guidance and advice that was provided with their home. You can then discuss some of the actions presented here to help to guide the choices that are right for their home and family.

Explain the hierarchy of actions:

1. **AVOID** pollutants being generated or brought indoors.
2. **REMOVE** sources of pollutants indoors with known health effects
3. **REDUCE** exposure to, and use of, pollutants with ventilation if you can't remove. Also discuss with patients and families that learning how to use and maintain equipment in their home, such as ventilation systems, is important to all three types of action.

# Actions to discuss

## Avoid bringing pollutants indoors

The most effective way to avoid poor indoor air quality is to avoid pollutants coming into the space.



### Cooking

- Avoid burning food.
- Avoid frying, particularly meat which can lead to particulate formation through cooking. If you need to, make sure the cooker hood extractor fan is on and try to use a hob ring at the back rather than front.
- If you are replacing appliances, it can reduce NO<sub>2</sub> and PM to choose electrical rather than gas powered appliances.
- Some newer ovens have 'self-cleaning' functions; try to stay out of the kitchen if you are using this function.



### Moisture

- High humidity is linked to damp and mould.
- If you are a tenant with persistent damp or mould in your home, contact your landlord or environmental health department.
- If you own your own home, find out what is causing any damp and get defects repaired.



### Smoking and vaping

- Do not smoke or vape, or allow others to smoke or vape, in your home.
- E-cigarettes and vaping can cause irritant health effects such as cough and wheeze, especially in asthmatic children. Where nicotine is a vaping ingredient, there are known adverse health effects of exposure. Whilst the precautionary approach and avoid exposing children to vaping and e-cigarettes indoors.



### Combustion

- Avoid activities that involve burning indoors, such as burning candles or incense, or burning wood or coal for heat. For those unable to avoid burning indoors, wood is better than coal, a Defra Smoke Exempt Appliance stove is better than open fire. Stoves designed to burn efficiently without producing unnecessary smoke are better than non-efficient stoves.



### Outdoor sources

- Control outdoor sources, for example avoid or minimise use of bonfires and report nuisance bonfires happening frequently to the local council. You cannot get rid of household waste if it will cause pollution or harm people's health. This includes burning waste.
- Avoid using ventilation without filtration during periods when the air outside is polluted, for example keep windows closed during rush hour and open them at different times of day.

## Remove pollutants indoors

Some pollutant generating activities are unavoidable indoors. Encourage patients and their families to take steps to improve the indoor air, often by using ventilation to dilute the pollutant concentrations. For instance, this advice could be discussed or reflected upon during asthma medication reviews or during a nurse appointment for asthma review.



### Cleaning

- Regularly clean and vacuum to reduce dust, remove mould spores and reduce food sources for house dust mites.
- Regularly clean high touch surfaces such as door handles to reduce spread of coronavirus and other infections within the home.
- Clean off any visible mould.



### Allergen avoidance

Taking steps to reduce exposure to inhaled allergens (from house dust mites, moulds and pets) is recommended to reduce symptoms and exacerbations. Depending on the allergy, measures which can help include:

- Reducing dust and dampness in the home.
- Reducing items which collect dust such as soft toys and, if possible, replacing carpets with hard flooring.
- Washing bedding and covers (at 60°C every two weeks) or using allergen impermeable covers.
- Avoiding direct exposure to furry pets if the child is sensitised.
- Vacuum cleaning is one of the simplest methods to clear dust, however vacuum cleaners can release and resuspend dust and allergens. It is important that the bag or dust collection chamber retains the dust efficiently and is replaced or emptied regularly.



### Ventilation

Increase ventilation during and after activities that produce pollutants or moisture, especially when using cleaning or personal care products, cooking, bathing, and painting, decorating or buying new furniture. Try and avoid these activities and hence the need to ventilate when the outdoor air is polluted (such as at rush hour).



### Cooking

Use ventilation in the kitchen when you cook and, if possible, continue to use it for around 10 minutes after cooking. This ventilation could be a cooker hood or extractor fan if you have one or open a window if not.

If you have a cooker hood:

- Use the highest fan setting.
- Cook on the back rings or burners if possible, especially during frying, to help the cooker hood capture as many pollutants as possible.
- Consider using other appliances under the hood.

- If purchasing a new cooker hood, you should choose one that extends over all the rings or burners, and it should extract the air to outdoors.

Close internal doors during cooking to reduce the spread of pollutants to other rooms. Cover pans with lids and increase ventilation when boiling the kettle to control moisture levels.

## Know how to use and maintain equipment

Encourage patients and their families to learn how their home is ventilated, and what maintenance is required. In some circumstances, they may also wish to explore additional equipment, for example:



### Cleaning

Vacuum cleaning is one of the simplest methods for clearing dust and is particularly important for those who suffer from asthma. It is important that the bag or dust collection chamber retains the dust efficiently and is replaced or emptied regularly.



### Ventilation

- Learn how your home is ventilated. Most homes in the UK are naturally ventilated using windows, but some use mechanical ventilation systems to supply air through ducts.
- If your home has a mechanical ventilation system, make sure you know how to use and maintain it.
- Many windows have small, built-in vents; keep these 'trickle vents' open if you have them.
- Your bathroom and kitchen may be fitted with an extractor fan or cooker hood. Learn how it works and use it during and after pollutant or moisture generating activities.



### Other equipment

If you have persistent damp that is not solved using ventilation, contact your landlord or environmental health department. You can also use a dehumidifier to reduce damp. If you do, empty it regularly to prevent stagnant water from encouraging mould growth.

Some air purifiers and monitors are commercially available. There is currently no regulation over their development or sale, so there is no guarantee they will help. If you do have one it is important to maintain it according to the manufacturer instructions.

A note about humidifiers: humidifiers may be useful to prevent dryness that can irritate some parts of the body. If you are recommending using a humidifier to alleviate symptoms, be aware that increasing the humidity can cause other problems including increasing formaldehyde emissions from building materials, and an increased likelihood of damp and mould.

## Reduce use of products indoors

Some sources of pollutants cannot be avoided completely. Instead encourage patients and their families to try to reduce their use to reduce the number and quantity of pollutants released indoors.



### Cleaning

- Use fewer cleaning products or one ‘multi-purpose’ cleaner to reduce the number of different ingredients or pollutants including Volatile Organic Compounds (VOCs). Cleaning products can add to VOCs and particulate matter (PM) in the air. The cleaning itself can raise dust and release VOCs from the surfaces disturbed. Any health risk from cleaning must be weighed against the hygiene benefits, the possibility of choosing less-polluting products, and the potential to remove pollutants with ventilation. Acute exposure to formaldehyde has been identified in homes where cleaning products, candles and plug-in indoor fragrances were used most often.
- Use liquid rather than spray products. Make sure you remove cleaning products from surfaces completely after cleaning.



### Cosmetics and personal care products

- Industry should provide safety information on substances and situations in which to avoid their use where safety cannot be demonstrated<sup>1</sup>. Know what pollutants you are bringing into the home and what you can do to minimise exposure. Look for products labelled with clear information about their contents and instructions for use. Products might have a warning to use in a well-ventilated space.
- Avoid spray products
- Reduce the number of cosmetic and personal care products used to avoid them mixing in the air.



### DIY

- Try to only redecorate or replace furniture when necessary.
- Increase the ventilation after painting, decorating, or having new furniture and check manufacturer’s guidance on products, for example ‘use in a well-ventilated space’.



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<sup>1</sup> “The European Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation places responsibility on industry to manage the risks from chemicals. Industry must provide safety information on substances and avoid their use where safety cannot be demonstrated... In 2019 the UK Government pledged to develop a voluntary labelling scheme for non-methane VOC-containing products. The range of products identified includes carpets, upholstery, paint, cleaning, fragrance, and personal care products.” Source: p55 RCPCP RCP 2020 The inside story: Health effects of indoor air quality on children and young people.

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