

## Fact Sheet 2:

# Indoor Air Quality and Health & the Indoor Environment



Good quality air is essential for our health and well being, so it is important that the places where we spend our time have an adequate supply of fresh air. Nowadays we spend around 80% of our time indoors and if the Indoor Air Quality (IAQ) is poor we can suffer from a number of health problems. Pollutants and contaminants in the atmosphere can cause symptoms and illnesses ranging from minor irritation of the eyes and nausea, to more serious problems such as liver disease and cancer.

For many people, these symptoms may be little more than inconveniences that make them feel unhappy with their place of work or employer. For others the consequences can be more serious. Long term passive smoking can lead to lung cancer or heart disease, similarly a ventilation system that is not properly cleaned and maintained can spread potentially fatal illnesses such as legionnaire's disease.

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### What are the main sources of pollutants in indoor air?

They originate from a variety of sources that include:

- **Tobacco** smoke.
- Emissions from **building materials, furnishings and equipment** this can include ozone from laser jet printers, photocopiers, ultra violet lighting and, formaldehyde from glues used in wooden products, and also emissions from carpets and soft furnishings.
- **Bacteria and dust** spread by inadequately filtered and poorly maintained heating, ventilation and air conditioning (HVAC) systems.
- HVAC systems can also introduce pollutants from outside if the air they introduce is not filtered. These systems should be regularly cleaned and maintained to ensure that they work effectively.
- **Pesticides** sprayed on potted plants.
- Carbon monoxide produced from **gas and paraffin heaters**.
- **Industrial processes** producing fumes and air borne contaminants.
- Domestic **pets, dust mites**, cockroaches and household plants can cause irritants that result in allergic reactions.
- **Mould in damp areas** and **rotting food** are sources of bacteria.
- An excessively **humid atmosphere** helps the growth of bacteria.
- Certain types of **rock** can release Radon Gas into buildings through the foundations and air intakes.

**What are the illnesses and symptoms that these pollutants can cause?**

There is a wide range of illnesses that can be caused by contaminants in indoor air and they are collectively referred to as **Building-Related-Illnesses** (BRI). A BRI is an illness that is caused by an identifiable constituent of the indoor air.

The following is a summary of the major illnesses and their air quality causes:

- **Respiratory illnesses** - Breathing difficulties, wheezing and chest tightness can be caused by poor ventilation, tobacco smoke, fumes from paraffin heaters and bacteria spread by poorly maintained HVAC systems.

- **Allergies** - Allergic asthma, rhinoconjunctivitis (running nose) and irritation of the skin can be caused by dust mites, pets, insects, plants and mould.

- **Cancer** - This can be caused by passive smoking and Radon gas. Radon gas is a radioactive substance that is emitted naturally from rocks in certain parts of the country. A smoker who is exposed to radon gas probably has between six and ten times greater likelihood of developing cancer than a non-smoker.

- **Cardiovascular disease** - Tobacco smoke in the atmosphere increases the risk of non-smokers developing heart disease. With exertion a person with heart disease will develop chest pains more quickly if there is a lack of oxygen in the atmosphere i.e. if ventilation is poor.

- **Legionnaire's disease** - This is a very rare but sometimes fatal disease that can be spread by bacteria that may reside in HVAC systems as well as shower heads and water tanks. Legionnaire's disease was first diagnosed in 1976 when a group of American ex-servicemen became ill, while staying at a hotel in Philadelphia, the cause was traced to be a badly maintained cooling tower. The air conditioning system was later found to be responsible for spreading the bacteria that caused the disease. Subsequent litigation in cases of Legionnaire's disease has resulted in an improvement in standards of maintenance and cleaning of HVAC and other systems.

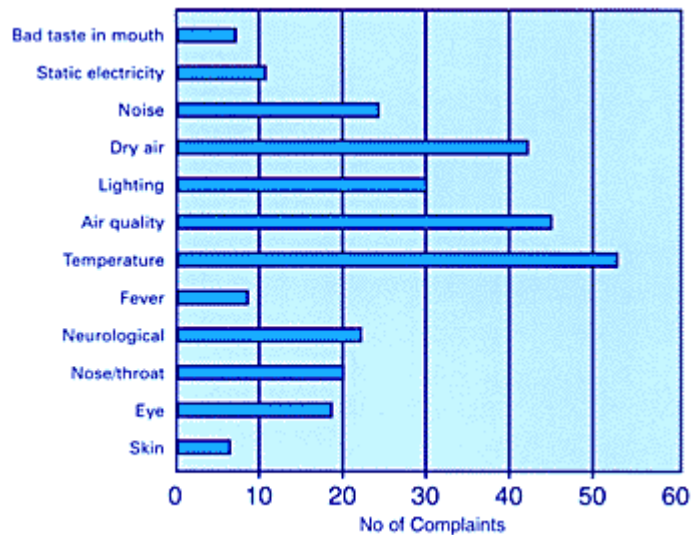


Figure 1, Most common complaints

**What are the most common health related complaints by employees about their indoor climate ?**

Eye, nose and throat complaints are among the most common. Figure 1 shows the health and indoor climate complaints reported by employees in a recent study in the Netherlands.

## **What is Sick Building Syndrome (SBS)?**

Sick Building Syndrome is the term used to describe work related health problems, similar to those discussed, but which have no clearly identifiable cause. SBS will be discussed in a future IAQ Fact sheet.

## **Who is at greatest risk from illnesses caused by poor Indoor Air Quality ?**

Those suffering from asthma and allergic reactions, and people with existing health problems such as heart disease, old people, children and unborn babies.

## **How can these illnesses be prevented ?**

- People who are responsible for buildings - whether homes, places of work, hotels or hospitals - can take action that will significantly reduce the dangers of building related illnesses occurring. The following constitute some of the most important steps that may be taken.
- **Regular Cleaning** of soft furnishings to avoid the build-up of dust and dust mites. In places of work this cleaning should be performed in the evening. This will allow dust to settle before staff arrive in the morning.
- HVAC systems should be **regularly maintained** and their air filters should be regularly cleaned or replaced. The air intake of these systems should be sited a safe distance from sources of pollution such as car parks and loading bays.
- Wherever possible **sources of pollution should be eliminated**. This may require the removal of gas heaters or photocopiers from busy work areas.
- All decayed or mouldy food should be disposed of.

## **Is an improvement in Indoor Air Quality detectable by people ?**

Yes, in a Japanese survey, the percentage of employees dissatisfied with their indoor climate reduced, as the rate of ventilation was increased.

## **Are there any simple guidelines for maintaining good Indoor Air Quality ?**

Yes, there are basically two simple guidelines:

1. Identify and remove as many sources of pollution as possible, or
2. Provide a good quality environmental control system with the facility to remove pollutants and ensure it is regularly inspected and maintained.

Unfortunately not all of the pollutants released into the indoor climate are immediately noticeable by the occupants of a building. The chart in Figure 1 showing a typical range and number of complaints reported by employees does not reveal all the dangerous pollutants in the environment. For example, bacteria that cause Legionnaire's are unlikely

to be discovered until someone becomes seriously ill, and cancer causing agents such as radon often take effect only in the long term.

This places a special responsibility on employers to limit as many pollutants as possible from the indoor climate. It is impossible to remove all pollutants that cause Building-Related-Illnesses but, with adequate ventilation and removal of sources of pollution, the risks can be drastically reduced.

### **Further Reading**

'Comparison of employee upper respiratory absenteeism costs associated with improved ventilation.' Larry C. Holcomb & Joe F Pedelty. ASHRAE, 1994. Absenteeism, Health, Productivity

'Indoor Air Quality: a comprehensive reference book.' Maroni, Seifert & Lindvall editors. Elsevier, 1995. Indoor Air Quality.

'Indoor Air Quality Assessment Based on Olfactory Sensation.' S. Yohizawa, K. Ikeda and S. Tanabe. Published in Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate. Toronto, Canada, July 29th - August 3rd, 1990

'Indoor Air Quality Conference.' Various authors. Mid Career College. London, 1996. Cleaning & Maintenance, Computer Prediction of IAQ & Comfort, Health, Productivity, Ventilation Standards. Tel: 0181 788 5337

'Relationships Between Health and Indoor Climate Complaints and Building, Workplace, Job and Personal Characteristic.' T. Zweers, Liesbeth Preller, Bert Brunekreef and Jan S.M. Boleij. Published in, Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate. Toronto, Canada, July 29th - August 3rd, 1990.

'Workplace health, safety and welfare. Approved code of practice.' Health & Safety Commission. HMSO, 1996. Health, Safety & Working Conditions

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