Your Partner for a healthy Life

Factbook about indoor air quality

Prepared in cooperation with Dr. Andreas Winkens from the german association of environmental engineers and laboratories (gui-lab)

Did
you
know?

The average adult breathes **15 times** per minute. This means **20.000 breaths** per day. With a breathing volume of **0.5 litres** per breath, we therefore breathe **10.000 litres** of air daily.

On average, we eat **1.5 kg**, drink **2 kg** and breathe **13 kg** of air per day.

Indoor air is often **2-5 times** more polluted than outside air. We go outside to get some fresh air.

Properly maintained carpet floors hold the dust together better than smooth, e.g. tiled floors and therefore **don't emit** it into the air we breathe as easily.

The more airtight the building is, the worse the **inside air quality** becomes.

Across Europe, many urban centres regularly **exceed** the EU limit for fine dust.

Janez Potocnik, the EU Commissioner for the Environment, has declared 2013 as the "**European Year of the Air**"

House dust

We can survive for 3 months without eating and 3 days without drinking, but only for **3 minutes without air**.
The air that we breathe is therefore our most important '**nutrition**'. On average, we consume 13 kg of it daily.

Clean air consists mainly of oxygen and nitrogen. Polluted air, however, has a changed composition, due to smoke, soot, dust, aerosols, fumes and odorous substances. All these additional air particles are **breathed in by us** daily.
Our natural filters are the mucous membranes in our noses and throats. They can take up particles up to a size of **5 micro metres** and therefore protect our lungs from the inhaled particles. Pollen, for example, has a size of **10-100 micro metres**. It is held back by our nasal hair. However, from there it gives off a secretion which gets through to our bodies via the mucous membranes.

Unfortunately many of the particles in the air are much **smaller than 5 micro metres**. Dust mite particles, for example, are smaller than 5 micro metres and therefore reach deep in our respiratory system. Mildew which is as small as 1.5 micro metres even ends up in our lungs. Other components of polluted air, such as soot particles, **viruses and bacteria** are even smaller (0.1 micro metres or smaller) and can settle deep in our lungs. They can therefore also enter our bloodstream and get distributed in our **entire body**.

- Most humans spend **90%** of their time indoors. This is why indoor air quality is more important than outside air quality.

- House dust is a mixture of hair, human and animal dander, fibres, fungal spores, dried secretions, **bacteria and dust mites** and their excrements.

- Indoor **dust particles** are mainly generated by humans and animals.

- Certain kinds of dust and allergen producers such as dust mites, exist **only indoors**.

Dust mites

Mites exist in **every household** and are not a sign of poor hygiene. They mainly feed on human dander. Dust mites are not germs as such. They are tiny arachnids (0.3 mm).
They feel most comfortable in **humid and warm environments**, like in mattresses, quilts and cushions as well as in upholstered furniture and children's cuddly toys.
One single dust mite produces **20-40** pieces of excrement per day. These excrements are the actual disease- causing agents. They weigh very little and get whirled up when we move in our sleep, when we make the beds and also when we simply walk around. They then get **inhaled by us** very easily.

We shed about **1.5 grams** of dander daily. This is enough to feed millions of dust mites.

We spend approximately **one third** of our lives in bed. The thorough removal of dust mite excrements by vacuuming the mattress is often forgotten.

More than **2 million** dust mites can live in one single mattress! The highest concentration of dust mite excrements in house dust is found during the months of October and November as well as in March and April.

One dust mite produces **20 to 40** pieces of excrement per day.

Mildew

Mildew spores are a part of the outdoor and indoor air. They have unfriendly effects on us, when they meet with so called **thermal bridges**, e.g. humid indoor walls. These invisible flying particles then develop a foul smelling, ugly and destructive fungal culture which releases **dangerous spores** into the air.

The mildew spores enter the house through windows and doors. There they collect on surfaces and begin to multiply. Good conditions for the fungus to grow are found in places where increased humidity condenses (thermal bridge).
Once the fungus has grown, it gives off more spores, which irritate the **breathing system** and the **eyes** and can lead to **allergies**. Mildew does not only lead to foul odours but it can cause substantial health problems, such as bronchitis.

- Every **4th to 5th** flat in Europe has a humidity problem. However, this fact is mostly unknown to the owners, since the damp spots are usually not visible.

- Mildew occurs in **various forms**. It spans from small spots of mould, e.g. on the silicone sealant in the bathroom to large-scale mildew infestations on walls.

- The growth of mildew is fostered by indoor fountains, an excessive amount of plants in the flat and an air humidity level of over **60%**.

- Allergies, irritations of the skin, the eyes and the respiratory tract as well as concentration problems are often caused by **fungal spores**.

Fine Dust

Fine dust consists of very small particles (0.1 to 10 micro grams) **invisible** to the human eye. It can irritate the lung, cause asthma and even drastically reduce life expectancy.

Many people avoid busy streets because they fear the effects of fine dust. However, the level of fine dust outdoors is often **smaller than the indoor** one, e.g. in flats, schools and offices.
Fine dust is mainly manmade but it can also have a **natural cause**.
Manmade fine dust is cause e.g. by domestic heaters, vehicles in road traffic, heavy industry plants and their processes as well as agriculture. Naturally produced fine dust comes from plants, forest fires, microorganisms, volcanic eruptions and rock erosion, etc.

- Fine dust reduces life expectancy and is responsible for many diseases, mainly of the **respiratory system**.
- Particles with a size of up to **3 micro metres** enter the house even through sealed windows.
- Respirable particles reach our bronchie and end up in our **bloodstream**.
- According to a WHO study, **75.000** people in Germany die earlier due to the effects of polluted air. This is about **20** times more people than the ones who die in car crashes.

Allergies

Allergies and allergic diseases are caused by an **overreaction** of the body to what are in fact harmless substances such as animal dander, pollen, foods, medications and dust mites. The inadequate reactions of the body to these allergens are called **allergic reactions**.

These reactions reach from runny or blocked noses to teary eyes, to itchiness, rashes and breathing difficulties. The most extreme reaction to an allergen is called an **allergic shock**. It can cause a circulatory collapse and even a cardiac arrest.
Today, almost every **3rd** person in Germany suffers from an allergy which affects their respiratory system. These allergies are triggered by **pollen, animal hair or dust mites**. Allergies should be treated by a doctor. The symptoms can be reduced by medications and a conscious lifestyle.

- Allergic diseases have **increased** dramatically during the last decades.
- Allergies reduce the level of performance and concentration by up to **30%**.
- The more we encounter allergens / allergy carriers, the higher is the likelihood that we **develop allergies**.
- The danger of developing allergies **does not decrease with age**.

Asthma

Asthma is a respiratory disease which causes chronic inflammation of the **bronchie**, which will eventually cause it to be permanently constricted. Breathing becomes more difficult.

Typical asthma symptoms are a constant dry and tickly cough, coughing at night, shortness of breath and wheezing, gasping noises when exhaling. Other common symptoms are breathlessness or tightness of the chest. Possible **triggers** of the disease are genetic factors and common allergens such as dust mites, infections of the respiratory system in early childhood and the inhalation of chemical fumes. Factors which **aggravate** asthma are dust, ozone, strong smells, smoke, fumes, colds and strong emotional reactions like anger, fear or joy.

Asthma should **always** be treated by a doctor. The patient can further decrease the symptoms by avoiding the asthma triggers.

- Asthma can occur in people of **all age**.
- The word wide occurrence of asthma has dramatically increased during the last **20** year.
- More than **90%** of childhood asthma is caused by dust mite allergens.
- **5.9 %** of the average West European adult has suffered from childhood asthma.

Humidity

Reviews of the health effects of relative humidity in indoor environments found out that humidity can affect **respiratory infections and allergies**. Scientists found out that relative humidity between 45 and 55% minimizes the survival or infectivity of **airborne-transmitted** infectious bacteria and viruses.

Furthermore allergenic mite and fungal populations are dependent upon the relative humidity indoors as several studies at offices, residences, or schools have shown. Thus it is highly recommended that relative humidity levels should be considered as a factor of indoor air quality. To reach ideal indoor conditions it would suggest humidification especially during winter in areas with cold winter climates.

Humidifiers should preferably have an evaporative or steam humidifier system, as cool mist humidifiers can spread contaminated aerosols.

- Correct humid indoor conditions can prevent the spread of chronic airway diseases.

- Standards for indoor thermal conditions & ventilation suggest relative humidity between **45% and 55%.**

- Studies have shown that **respiratory infections were lower** among people living in environments with **mid-range** versus low or high relative humidities.

- The amount of allergenic mites and fungal populations indoors is **directly** linked to relative humidity.

Lux International AG
Seestrasse 39, CH-8700 Kuesnacht (ZH)
Phone +41 41 768 88 88, Fax +41 41 768 88 99
info@luxinternational.com, www.luxinternational.com