

# What do we know about the current state of indoor air in buildings and associated human health effects?

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## SUMMARY

This keynote aims to review the state of knowledge on indoor air quality in our main living spaces, including homes, daycare centers, schools, and offices, emphasizing the differences according to building types and occupancy. The health effects associated with exposure to various indoor pollutants will be examined. Recent evolutions and future trends will be presented.

## KEYWORDS

Indoor air quality; IAQ; human exposure; health effects

## 1 INDOOR AIR QUALITY IN VARIOUS BUILDINGS

Dwellings are the buildings with the greatest heterogeneity of indoor air pollution: there are numerous sources, the buildings vary widely in construction, and occupants all have different lifestyles, consumer product use habits, and window-opening practices (Halios et al., 2022).

Schools have a high occupancy density and specific sources of indoor pollution, such as school supplies. The high density of furniture leads to emissions of volatile organic compounds. Moreover, each school is located close to traffic, making outdoor air pollution a significant factor affecting indoor air quality in classrooms (Sadrizadeh et al., 2022). Daycare centres have also their own characteristics, including frequent cleaning and disinfection of surfaces (Zhang et al., 2022).

Offices also have their own characteristics, such as a high density of office equipment and daily cleaning. Additionally, in some high-rise buildings, windows cannot be opened; indoor air quality depends entirely on the mechanical ventilation system (Mandin et al., 2017).

## 2 HEALTH EFFECTS ASSOCIATED WITH INDOOR AIR EXPOSURE: LESSONS FROM EPIDEMIOLOGICAL STUDIES

Although epidemiological studies on the effects of indoor pollution are much rarer than those on outdoor air pollution, epidemiological evidence has expanded in recent years. The health effects associated with indoor exposure to mold, radon, nitrogen dioxide, and formaldehyde are well-documented. These effects are as varied as the pollutants themselves, ranging from eye irritation, asthma and respiratory disorders to lung cancer. Other health effects related to indoor pollution are also being explored, e.g., cardiovascular effects, reproductive toxicity, attention disorders, and impacts on mental health.

### 3 EVOLUTION OF IAQ OVER TIME AND FUTURE TRENDS

The presentation will conclude with an overview of changes observed in recent years regarding air quality in living spaces, including reduction in some volatile organic compounds and increase in indoor concentrations of others. Future trends will be discussed, focusing on emerging pollutants (Salthammer, 2020), the development of new measurement methods, and the influence of climate change (Mansouri et al., 2022).

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