

## Breathing indoors: what researchers need to know about Europe's hidden Air Quality challenges

As Europeans spend around 90% of their time indoors, understanding indoor air quality (IAQ) has never been more critical. A recent systematic review by the K-HEALTHinAIR project, "[\*Sources, levels, and determinants of indoor air pollutants in Europe\*](#)," sheds new light on the risks lurking inside homes, schools, hospitals, and public transport. Here's what researchers need to know — and where the next breakthroughs are waiting.

### What's polluting our indoor spaces?

Indoor air pollution is a complex cocktail driven by multiple factors:

- Human activities: Everyday actions like cooking, cleaning, and even breathing add carbon dioxide and particulate matter to the air.
- Household materials: Furniture, paints, and cleaning products emit volatile organic compounds (VOCs) such as formaldehyde and benzene.
- Outdoor infiltration: Pollutants like nitrogen dioxide, ozone, and radon seep indoors from busy roads and industrial areas.
- Building design and maintenance: Ventilation systems — whether natural or mechanical — and the building's age, materials, and location all shape IAQ.
- Environmental conditions: Seasonal changes, temperature, and humidity influence how pollutants behave indoors.

These factors interact in subtle ways, making it essential for researchers to study IAQ dynamics holistically.

### Regulation today... and the gaps that remain

While Europe leads globally in setting indoor air quality guidelines, many environments — especially schools — still show pollutant levels exceeding health recommendations. This points to a critical gap: stronger, more consistent standards and enforcement across all EU countries are urgently needed.

### Future research directions: where we need to go

For researchers ready to make an impact, here's where attention is needed most:

Priority area	Why it matters
Expand studies to new environments	Hospitals, retirement homes, canteens, and public transport remain under-studied
Investigate lesser-known pollutants	Compounds like hexanal and acetaldehyde need deeper exploration
Explore pollutant interactions	Combined health effects are still poorly understood
Conduct long-term and intervention studies	Capture real-life fluctuations and test new solutions like advanced air filters
Address emerging threats	Microplastics, phthalates, mold, and bacteria are rising concerns
Focus on vulnerable populations	Children, the elderly, and those with pre-existing conditions need special attention
Link indoor and outdoor air models	A holistic approach will guide urban planning and healthier building design
Evaluate policy impact	Real-world testing of regulations can refine public health strategies

### Key takeaway for researchers

Indoor air quality is more than a technical challenge — it's a public health priority. Future research must not only broaden its scope but also dive deeper into how pollutants interact, impact health, and vary across settings. Every study brings us closer to ensuring that the air we breathe indoors promotes health and resilience and is not hidden harm.