

# Do you think before you breathe? Survey finds broad misperceptions about impact of cleaner indoor air

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A survey of more than 100 building designers, engineers, managers, owners and tenants revealed that the majority are confused about the costs and benefits of maintaining good indoor air quality.

Do you know how easy it is to improve the quality of the air you breathe every day? Or how much indoor air quality affects your health and productivity? If you're not sure, you're not alone. According to a recent survey by a group of Drexel University environmental and architectural engineering researchers, there is quite a bit of confusion about the costs and benefits of indoor air quality improvement—even among building owners, designers, managers and tenants.

The study, which was originally published in the journal *Indoor Air* with new findings recently presented at the annual meeting of The Society for Risk Analysis, Michael Waring, PhD, and Patrick Gurian, PhD, faculty members in Drexel's College of Engineering, indicates that there are some serious misperceptions about how much it would cost to improve [air quality](#) and how much it actually helps.

"We spend 90 percent of the day inside buildings, but we may think of [indoor air quality](#) as a matter of comfort or aesthetics, rather than something that has demonstrated impacts on our health and productivity." Gurian said.

The survey participants were a group of 112 informed building stakeholders, including building owners, building managers, designers, consultants and tenants. The survey presented two basic ideas for improving air quality: increasing ventilation and using better air filters at the same time. Both of these are relatively minimal changes in the world of indoor environment management, and both can usually be done without any changes to existing building mechanical systems. And research has shown that making these improvements is a good way to avoid sick building syndrome and sick-day absenteeism.

"There's little disagreement that increasing ventilation and upgrading filtration of [indoor air](#) will improve air quality for building occupants," Waring said.

Despite this research establishing the benefits of these improvements, among each category of participants, the majority of those surveyed were unsure whether the suggested changes would have much of an effect on productivity, absenteeism and health. And the majority of the building tenants surveyed thought it was unlikely that the owner of their building would ever install such upgrades.

The survey also revealed an eye-opening misperception in the overall cost of making these indoor air quality improvements.

"What we found startling was the overestimation of what these improvements would cost as a percentage of the overall energy bill. On average, the participants thought it would cost about 10 times more than it actually would," Waring said.



Simple measures, like opening windows to improve air flow and changing air handling filters more frequently, are known to have a big impact on indoor air quality.

"This is a real missed opportunity," Gurian said. "Because it doesn't take much time or effort to make these changes and improve indoor air quality—but the benefits in terms of health and productivity of the building occupants are most likely significant."

"Even among this group of people, who all have some background knowledge about buildings and their operation, there seemed to be a demonstrable misunderstanding of how little these improvements cost and how much they can benefit the health and productivity of building occupants," Waring said.

Increasing ventilation, according to Waring, can be as easy as opening a window or, opening an outdoor air damper for a mechanically ventilated building.

"There is strong evidence for a link between [ventilation rate](#) and occupant welfare and productivity," Gurian said. "It is well-known in the indoor air field that higher instances of airborne disease infection in commercial buildings are associated directly with low ventilation rates. Increasing ventilation rates above minimum standards has been shown to reduce symptoms of 'sick building syndrome' and absenteeism in offices."

Coupled with the increase in ventilation rate, the survey asked participants to also consider the benefits and costs of upgrading a building's air filter. The filter limits exposure to particulate matter that can be brought indoors with higher ventilation rates.

"The technical literature has well established that increased exposure to outdoor particle matter is correlated with increased cardiovascular and respiratory diseases," Waring said. "If you're increasing ventilation rate and potentially bringing more particles of outdoor origin inside, it only makes sense to improve the air filtration as well."

Many building engineers and architects do learn about indoor air quality principles and work to incorporate them into new buildings. But as Gurian and Waring point out, these improvements could also be implemented in existing buildings as retrofits, which makes them able to be realized on a large scale.

Informal interviews with [building](#) managers indicate that maintaining functioning heating and cooling systems often consumes much of their time and efforts while considering how to improve the air quality systems is barely an afterthought.

"Increasing ventilation rate could be as easy as opening a damper or a vent," Waring said. "And to make sure the air coming in is clean, you upgrade the filter. It's as simple as that. This is an easy, impactful fix—we're just trying to inform the decision-makers of that fact."

But the education and incentives to shift perception of indoor air quality might be lagging. The researchers suggest that tying more air quality goals to the sustainability metrics used to rate buildings could be a step toward broader adoption of these methods.

They also suggest that some improvements and monitoring might be appropriate for individual residences.

"I can easily see indoor air quality technology and monitoring being incorporated in more residential climate control systems in the future," Waring said. "For many subsets of the population indoor air quality is a

real concern. For people with allergies, asthma or other sensitivities, it could start with improving the IAQ of their homes or apartments. But eventually more people will start thinking about the quality of air in their workplaces—as much as they think about the temperature and access to natural light. And that is when perception is going to start changing."

Provided by Drexel University

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