

## News

# We're better off when we can breathe easy

Until the COVID-19 pandemic, most of us didn't think about indoor air very much, if at all. But healthy buildings expert [Joseph Allen](#) has been studying indoor air for years. He says that since we spend 90% of lives inside, we need to do more to make our offices, homes, and schools places where we can breathe easy.

Better Off | EP1

## We're better off when we can breathe easy



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## Episode Transcript

**Anna Fisher-Pinkert:** From the Harvard T.H. Chan School of Public Health – this is *Better Off*, a podcast about the biggest public health problems we face today...

**Joe Allen:** The era has been defined by buildings that are no longer designed for people. As crazy as that sounds.

**Anna Fisher-Pinkert:** ...and the people innovating to create public health solutions.

**Joe Allen:** And we know when you bring in more outdoor air, you reduce things like sick building syndrome.

**Anna Fisher-Pinkert:** I'm your host, Anna Fisher-Pinkert.

The COVID-19 pandemic has put a huge spotlight on public health. Suddenly, we're all learning about R-naught values and hand hygiene, as well as health disparities and the reasons that some get better care than others.

Public health is so much larger than this current crisis. But the coronavirus really opened my eyes, and I think a lot of other people's eyes, to how important public health is, and how fragile our good health can be.

Public health is about stopping the spread of disease, but it's also about how we make sure everyone has what they need to thrive.

And today, we're going to talk about two things that we basically can't live without: fresh air and safe shelter. So take a deep breath in. . . and let it out. Cause today, we're Better Off with [Joseph Allen](#), Healthy Buildings expert.

[music]

**Joe Allen:** We spend 90% of our time indoors. We are indoor species.

**Anna Fisher-Pinkert:** This is Joseph Allen. He's an associate professor at the Harvard T.H. Chan School of Public Health.

**Joe Allen:** And I'll often ask people to play a little game here and nobody likes this because it's public math and disclose your age, but I say take your age and multiply it by point nine. That's how many years you've lived indoors. And nobody likes to do it, so I'll do it myself. I'm forty five – means I've lived 40 years of my life indoors. And

if you stop and think about it that way, it does change your perspective. And you say, “Wait a second, what is this air we’re breathing inside and how does it influence my health?”

**Anna Fisher-Pinkert:** Fine, I’ll play, too. I’m almost 36 years old, which means that I have spent over 32 years indoors. I’m surprised by that – but it doesn’t seem like a big thing to worry about, until you hear this:

**Joe Allen:** The majority of your exposure to outdoor air pollution actually occurs from the air you’re breathing indoors.

**Anna Fisher-Pinkert:** Joe explained that, typically, 50% of outdoor air pollution gets inside our homes. But, that’s the air you’re breathing 90% of the time. Over the course of your life, you’ve probably breathed in more polluted air indoors than outdoors.

**Joe Allen:** And the reality is that indoor air pollutants can be three, five, 10 times higher than outdoor air pollution, which I think surprises most people.

**Anna Fisher-Pinkert:** Pollutants released from cleaning products, cooking, smoking, and other everyday activities can build up indoors. Even dust from old furniture can release toxic compounds into the air. Joe Allen’s book, *Healthy Buildings: How Indoor Spaces Drive Performance and Productivity*, which he co-authored with Harvard Business School’s [John D. Macomber](#) explores all the ways that buildings have become “sick,” and how we can start to make them healthy again.

**Joe Allen:** Probably it’s worth stepping back for a second to think about how we got to this place where we even needed to write a book called *Healthy Buildings*, because the reality is we have been in the sick building era. So what does that mean? Starting in about the late 70s, during the energy crisis, the global energy crisis, we started tightening up our building envelope, stopped letting them breathe, bringing in less outdoor air.

**Anna Fisher-Pinkert:** Offices and apartment buildings became all about saving energy on heating and cooling, without much thought to ventilation.

**Joe Allen:** And it was right shortly after that that we first saw this term “sick-building syndrome” appear. This is symptoms related to time spent in underperforming indoor environments like headaches, malaise, not being able to think clearly, sometimes more severe. And we’ve been in that era since right up till today, where the era has been defined by buildings that are no longer designed for people. As crazy as that sounds.

**Anna Fisher-Pinkert:** So this is the problem that Joe Allen is trying to solve: how do you make buildings that put people first?

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To figure out the solution to that problem, Joe does a *lot* of deep forensic investigation of what’s going wrong in buildings.

If you’re one of Joe Allen’s students at Harvard Chan School, you should expect that at some point you’re going to be handed a hard hat and led into the bowels of a multistory building to learn how its systems work.

That pounding-the-pavement approach came from Joe’s first career – as a private investigator in New York City.

**Joe Allen:** My father was a homicide detective, it was kind of a family business, and then he left and I ran the company for a couple of years. Well so that’s where my interest in forensics comes from. *The forensic investigation of sick buildings felt a lot like what I had done my whole life.* I kind of grew up doing surveillance and undercover work and, you know, and analyzing documents, looking for facts and patterns and trends. And so it’s just a different application of that into health.

**Anna Fisher-Pinkert:** So can we walk into a building and instantly deduce that it’s a

“sick” building?

**Joe Allen:** Not necessarily. I mean, there's some things that you would see or detect right away. Right? If we describe these places as stuffy or stale or maybe you detect some smell that isn't quite right. So we have our own senses that we should, and do, trust, that are tips that something isn't quite right in this space. For my class on healthy buildings at the School of Public Health here, we take students out and we've gone into buildings, sometimes brand new building side by side. And there's one you walk in and there's a visceral reaction from every student. Something's not right in there. Don't know what it is at first instance, but we know it's not right. You walk into the adjacent building and you want to work in that building.

**Anna Fisher-Pinkert:** But that's not necessarily enough information to tell us how working or living in a building long-term affects our health.

**Joe Allen:** As you walk into a building, how do you know that it's good for your long-term health? You don't know. For example: How do you know that that they've made good decisions in terms of the products they choose and whether or not it has chemicals in them that interfere with your hormone system? Well, you can't detect that. You wouldn't know unless you know something about the organization and their principles. Is it an organization that puts the health of people first?

**Anna Fisher-Pinkert:** I mean, that's kind of scary because a lot of us, we don't have a choice about what building we're going to work in and we show up to the first day of work and that's where we're going to go. And what you're saying is that we kind of have to trust not just the people we work for, but then the landlord, the developer, all of the people who have created the built environment in which we live, most of whom we have zero contact with. I mean, how do we as a society motivate all of these different entities, all these different commercial entities to do the right thing and to change the way they build?

**Joe Allen:** Yeah. I mean, that's the crux of it. And really it's one of the reasons we wrote the book, is to say, we shouldn't be competing on the health of different

buildings. Healthy buildings should be the norm, not the exception. So you don't even have to think about it, right? We should just be designing these correctly right up front.

**Anna Fisher-Pinkert:** Joe says one solution to bad indoor air is just giving people more objective information via low cost sensors that allow people to measure the air quality around them. Another is to bring more of the outdoors indoors.

**Joe Allen:** *Really*, what's happening in a building that doesn't have operable windows or windows you can open is that the air is coming in from the outside through a duct, a vent. And there it goes through your mechanical system, your air conditioning and filtration system. It's going to get filtered. It's going to get conditioned, either heated up or cooled down, and then it gets distributed and delivered around the building. Now, that system is actually influencing a lot of what's going on in the building. So most times, in many buildings, they are under-ventilating. They're not bringing enough outdoor air.

**Anna Fisher-Pinkert:** Without good ventilation, chemicals build up in the air. Those chemicals vary – they could be VOCs (which could come from burning fuels, cleaning fluids, or paints), bioeffluents (those are chemicals released by the human body, so imagine a stinky bathroom), or just carbon dioxide. And spending a lot of time breathing in these chemicals, with no outside air coming in, can lead to that “sick building syndrome” we talked about earlier – where people experience headaches, malaise, and an inability to think clearly.

**Joe Allen:** Buildings across the U.S. are chronically under-ventilated. And we know when you bring in more outdoor air, you reduce things like sick building syndrome. You get improved cognitive function performance. When buildings are under ventilated, people are more likely to miss school and work.

**Anna Fisher-Pinkert:** Of course, if your outdoor air is polluted, that might be a little concerning. So, buildings also need to factor in filtration.



**Joe Allen:** If you think about a place that is an area with high outdoor air pollution, or the California wildfires recently, right? You think, well, I'm bringing in all that outdoor air, is that OK? Well, it is – *if* you also have good filters, right? You're bringing in outdoor air – you're conditioning it, cooling it, and heating it. But you also are cleaning, you're filtering that air. If you have a low-grade filter, you're not doing much. But if you have a high-grade filter, you can remove a large percent of the outdoor air pollution before it gets distributed to the people in the building through that vent in your office that you're now looking at.

[music]

**Anna Fisher-Pinkert:** Joe recommends a multi-layered approach to improving indoor air quality. But, one of the biggest problems Joe identifies in his book is that the *standard* for indoor air quality is based around building codes for engineers – not around public health.

**Joe Allen:** The standard is actually called the “standard for acceptable indoor air quality.” Acceptable? Well, I don't find that acceptable. You shouldn't find that acceptable. We want healthy indoor air quality. And so one of the pushes we're making is let's change this standard. Instead of a minimum standard for an acceptable limit, let's target a healthier quality standard. And then we don't have to think about it so much about what's coming into our buildings.

**Anna Fisher-Pinkert:** Joe thinks that the pandemic is actually the right moment for employees to speak up, and demand that their workplaces have better air quality.

**Joe Allen:** People are really reluctant to get back to work, right? And so these business owners in particular know they have to do something different to satisfy the demand coming from employees who say: I'm not going back to work unless it's a healthy building. Right? That makes sense. Who would want to go back to a building that's not a healthy building at this point? Nobody. So that demand can also come from, you know, employers, people who live in buildings – just start asking about these things.

**Anna Fisher-Pinkert:** During the COVID-19 pandemic, Joe has consulted with a wide variety of organizations about their reopening plans – from the Massachusetts Supreme Court, to Broadway theaters to public schools. Actually, some of the same recommendations he’s been making around healthy buildings – bringing in outside air, upping filtration – they can help reduce the spread of airborne particles carrying the novel coronavirus.

**Joe Allen:** Typical filters in a building capture particles — and that’s particles from outdoor air pollution, particles from indoor air pollution. When you’re cooking over a stove, for example, you generate particles. And it’s also biological particles: viral particles and respiratory droplets. So the filters are actually capturing this through physical mechanism. So it’s going to remove all of those types of particles.

**Anna Fisher-Pinkert:** Joe also created guidelines for schools. And public schools in the U.S. have to overcome some enormous hurdles when it comes to creating healthy classrooms, because we’ve underinvested in our school buildings for decades.

**Joe Allen:** Secretary of Education [Betsy DeVos](#) two years ago was on 60 Minutes. And during that interview, she gave a quote. She said, “We need to be investing in students, not in school buildings.”

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**Betsy DeVos (soundbite of 60 Minutes interview):** Well, we should be funding and investing in students, not in school buildings, not in institutions, not in systems.

**Joe Allen:** Well, of course, we should be investing in students, but it shows the disconnect – that investment in the school building isn’t an investment in the students and the teachers? Of course it is. Of course it is.

**Anna Fisher-Pinkert:** Just like there’s a link between “sick” office buildings and underperforming workers, there’s a connection between how schools are built and how students learn.



**Joe Allen:** And we wrote a report a couple years ago. We looked at 200 scientific studies, more than 200, showing that the school *building* influences student health, student thinking, and student performance even on reading comprehension, test scores. You know, I'm a parent. I have three kids. But think about the questions we ask about schools. Well, what's the student-teacher ratio? What's the curriculum going to look like? How's my kids going to get there? Are there sports, right? No one ever asks about the building. No one ever does. No one even asks, "Do the windows open in the classroom?" Right? And so we've neglected it as parents, as administrators, as society, as a government that doesn't fund this, as our Secretaries of Education ignore the role of the building. There isn't a single person at the Department of Education whose responsibility is this. We don't have like a Director of School Buildings who's responsible for healthy school buildings. And it's a big problem. We've under-invested. That's why during a crisis like this, this is when it really is exposed.

**Anna Fisher-Pinkert:** During the pandemic, Joe has been involved with schools in a number of ways – including developing a free, detailed report that administrators can use to guide their reopening plans. Joe, like many public health experts, says that in places where community transmission of COVID-19 is low, getting kids back into in-person school should be a top priority.

**Joe Allen:** Two things have to happen. One, you can't go back unless community spread is low. Second, it can't be schools as usual. Masking should be universal. Everyone wearing a mask and, you know, a whole host of other strategies I can talk about. But since we're talking about air quality, I mentioned the one that often gets neglected and that is ventilation, filtration.

**Anna Fisher-Pinkert:** Imagine that one person in a classroom is asymptomatic, but infected with COVID-19 and shedding the virus. When that person talks or eats or sneezes, small particles that we can't see will carry the virus through the air.

**Joe Allen:** Well, anything that gets into the air is going to stay there until one of three things happens: it's diluted due to ventilation, it's cleaned out of the air through

filtration or it's deposited in the lungs. And, of course, we're trying to eliminate that last one. So wearing a mask is key. But then the other thing is anything that's in the air, you want to dilute or clean up the air quickly. That's why schools need to increase their ventilation rate and supplement that with high efficiency filtration.

**Anna Fisher-Pinkert:** These changes won't happen overnight – but Joe is hopeful that changes *are* on the horizon, in the public and private sector.

**Joe Allen:** I am hopeful because, you know, in January, February, before the pandemic, I could have named every company and researcher really focusing on healthy buildings. And since COVID, it has exploded. Companies are creating healthy building divisions. Companies are asking for this. They're rewriting leases around this. They're redesigning new buildings around this idea of healthy buildings. So change is underway. And my hope is that this leads to a permanent rethinking of our built environment and buildings.

**Anna Fisher-Pinkert:** And Joe thinks that this opens up new avenues for people who understand and care about public health to influence the buildings we live and work in – during the pandemic and beyond.

**Joe Allen:** And so I think we have a big role to play in public health. I like working with businesses, too. I think they have a big role to play. And we can actually partner up and advance and define this next era.

**Anna Fisher-Pinkert:** Since the pandemic started, I can't look at an air vent without thinking about what I'm breathing and where it's coming from. I hope Joe Allen is right – that this pandemic will spur on big changes in how we build, and that we'll all be able to breathe a little easier.

We want to hear from you – has your office, school, or apartment building made changes since the pandemic? How have those changes affected your health? You can find us on [Twitter](#) and [Instagram](#) @HarvardChanSPH.

You can read more about Joe Allen's research along with all the latest news from Harvard T.H. Chan School of Public Health at [hsph.harvard.edu/news](https://www.hsph.harvard.edu/news).

To read reports from Joe Allen and his colleagues, visit [ForHealth.org](https://forhealth.org).

Next time, another topic that might have you holding your breath – kids, COVID, and mental health.

We're Better Off with our team. . .

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I'm Anna Fisher-Pinkert, host and producer of Better Off, a podcast of the Harvard T.H. Chan School of Public Health.

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