Curbing Air Pollution with Jeffery Smith

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SPEAKERS

Greg Lindsay, Jeffery Smith

G   **Greg Lindsay**   00:24

Hello and welcome to threesixtyCity by NewCities, a podcast delving into the future of urban life. I'm your host Greg Lindsay. With plumes of smoke sweeping across much of the American West these last two summers, glowing orange skies over San Francisco, and heightened smog warnings. Americans in particular have all grown more aware of the precarious state of the air we breathe. Less noticeable are the invisible particles that taint airspace with more than 90% of all cities exceeding safe air limits according to the World Health Organization guidelines. As the world shifts away from carbon heavy industries, how can we simultaneously ensure solutions capture the full range of air pollutants for the health and well being of urban populations? Today, we're joined by WHO consultant and environmental health expert Jeffrey Smith to discuss solutions and how the clean energy transition will not only help fight climate change, but also save millions of lives. Thank you for joining us, Jeff.

J   **Jeffery Smith**   01:14

Thank you, Greg, for inviting me. And I'm happy to share with your audience things I've learned in recent years.

G   **Greg Lindsay**   01:22

Well, thank you for coming on. Obviously air pollution is a known hazard for urban populations, particularly one often associates with the Global South. I remember seeing that air pollution kills more in Sub Saharan Africa than starvation or many other afflictions that we associate with poverty. But I think people in the Global North are only now just waking up to the invisible dangers of all the smoke dumped by wildfires and other emissions caused by climate change or simply by industry. If you'd like to start by talking about how you came to the awareness yourself and what the invisible dangers are? And how this is a crisis, just pollution itself, on parallel with climate change, and its broader implications.

Jeffery Smith 02:02

Well, I have a personal journey that got me involved in researching air pollution. In 2007, well actually, January 2008, my daughter was hospitalized with acute lower respiratory infection, an pneumonia, right, an unknown pneumonia. And I was catching hackers before that. And then after that experience, she was hospitalized for three days. We saw her lips turn blue. And this didn't make sense to me. We had moved as a World Health Organization family to New Delhi, I speak Hindi, Urdu and Russian as well as American English. We had moved to New Delhi in the summer of 2007. And then by six, seven months later, our daughter is hospitalized. She was two years old, and she's in the hospital gasping for breath, the pediatrician is saying he's not sure if she'll make it. Well, three days later, I'm asking myself and started researching. And it became clear that for most of the several 100,000 children under five years of age who die of pneumonia every year, a large percentage of them, the World Health Organization attributed to air pollution exposure. Now, most of those are people who are, as you mentioned, in Sub Saharan Africa, the Global South, as well as India, Asia, and South America. There's about 3 billion people on the planet that have meals every day that are cooked burning biomass. This is a large amount. It seems like I'm not one of those vulnerable, we're not vulnerable, we're living in a posh neighborhood in a posh part of New Delhi. And what's happening? Why is our two year old who was getting all the right nutrition, why was she vulnerable? And I began researching air pollution and air pollution effects after that, and I became an indoor air quality expert because I was trying to protect myself. And then I was asked by friends in the community and I volunteered and then I began auditing schools and hospitals, and became advisor for local governments and other NGOs. Ever since then, I've just never looked back. I'm obsessed with the topic and not so much for what happened to our daughter. But when I was auditing these hospitals, I would enter into government hospitals who didn't have the resources. And there were children, less than three years of age gasping for breath. I don't remember their faces, but I remember the mother's faces. And this scarred me and I really began to push that we must affect change after that experience. And that's how I got involved. And so I consult now for environmental health solutions, mostly focused on indoor air quality. And in recent years, even the last year and a half with COVID, risk indoors. What can we do to reduce those risks? But yeah, I've been involved now for several years in monitoring air quality. I've become that bridge between the scientists and communities. So I work a lot on community engagement. So I really enjoy explaining the invisible air pollution risks to people in a way that they can understand.

Greg Lindsay 05:28

What does it mean, according to WHO guidelines, for 90% of cities to fail air quality? I mean, that's basically a universal failure. I saw stats indicating as many as 99% of cities failed that. So how are they failing those guidelines? What are the biggest dangers that no one is talking about? I mean, we're thinking of soot in the air or black carbon for people burning biomass. These are invisible particulates. I've seen recent papers suggesting it triggering higher rates of asthma in unborn children, because of the fires across the West. What are the health effects that no one is thinking of? Or that the WHO has pinpointed?

Jeffery Smith 06:02

Well, so there's so much that science doesn't know. But in recent years, what we had discovered is that a lot of risk is associated with black carbon. And the new WHO guidelines addressed black carbon and ways to control it, because it is also a short lived climate pollutant. Also, as you mentioned earlier in the opening of the show, there are multiple benefits to controlling air pollution. We reduce climate risk, but we also reduce the nearly 20,000 deaths per day that occur worldwide, and recognize that a lot of those are happening in cities. In Canada, it's about 15,000 I recall. In the United States, it's 200,000. Across Europe, it's believed about 400,000. In Europe, 400,000 people die early deaths each year due to their exposure to air pollution. And that doesn't count the people who suffer disabilities, and in many cases lifelong disabilities. And then if they have a lifelong disability of someone who is a primary breadwinner, or even supplementary breadwinner in the family, the wellbeing of that family and the promise for the future

generation to improve their lives is impacted as well. What we've discovered in recent years is a link that these black carbon particles, the ones that are ultra fine, are small enough that not only do they reach our lower respiratory system to the bronchioles, to the gas exchange area, the alveoli and the lungs, but they also enter the bloodstream. And there's newer technologies that allow us to see in organic samples the tiniest of particles as small or smaller than even DNA base pairs. This is how small we're talking about. They reach every organ of the body and they cause damage and the damage that they cause is a DNA damage and some cells grow back after being damaged by exposure to air pollution and grow back with that damage and others don't. And the way I explain it to a lot of audiences who don't know the technical side or the medical side of this is, on my face, and your face Greg, our skin is aging. Why is that? Well exposure to UV radiation, also though exposure to air pollution we've come to learn, and other factors, even though the cells on our skin, the epidermal layer, are all within a few weeks old, they grow back with that damage. This is how we are, this is just the nature of our biology. These cells grow back pre-programmed with that damage. And what we're doing when we're exposed to air pollution beit from wildfires or incinerators, or as is most likely the case in urban areas, from road traffic. And when we're exposed to that, we're prematurely aging our insides just as our faces are aging. And so, what can we do? We need to avoid those exposures. And so, when this became clear to me, I heard a pathophysiologist say this at a conference in 2018, that black carbon nanoparticles are the most harmful to human health. But actually it's not the black carbon particles themselves. They act as a trojan horse and they carry this toxic chemical cocktail absorbed to their surface. So absorbed to the surface of the black carbon nanoparticles, they carry those volatiles, those toxic gases. There's formaldehyde and benzo alpha pyrene, just think volatile organic compounds or polycyclic aromatic hydrocarbons. There are lots of technical terms. We just need to know that these are toxic gases that don't belong in our bodies. And we should minimize our exposure to wood burning in our homes, wood burning due to wildfires, traffic related air pollution, anything that is combusted is producing black carbon ultra fine particles.

G Greg Lindsay 10:15

I want to come back to the wildfires, obviously, the climate change trigger part of this. In your estimation, what is the the scale of intervention in cities to deal with this, in particular? Because most people in cities are not burning biomass in their homes. You pointed out traffic, that's the one that comes to mind. efforts there. There's a lot of debate in urban circles, for example, about the switch to electric vehicles, which will still have brake pad particulates on those vehicles. I'm curious where you would start or what is the prescribed pathway. Like these are the areas we need to crack down on now where we can make the biggest impact, that's beyond heavy industry, and what people think about as out there, beyond our control. What is within our control to make the biggest impact?

J Jeffery Smith 10:56

So, I focused a lot of what I do on urban health and urban exposures, because more than 60% of us in the next few years will all be living in cities and it will only increase as we continue to urbanize around the world. For a while I felt like electric vehicles weren't really the right transition technology because really what we need to focus on is removing as many vehicles from the road and taking back public space. This is what your podcast covers, I won't get into too many details, unless you want to ask me. But I'm sure I'm repeating a lot of what others have said. A lot of the public space when we began popularizing the use and subsidizing motor vehicles, and creating roads and parking, and using a lot of public space, and even then designing cities around those vehicles with a lot of sprawl with parking lots and all. But the greatest impact we can have to improve our health is reduce our exposure to these internal combustion engines. And when I became aware of and heard a pathophysiologists finally say, after many years, that they believed the greatest threat to our health were these these ultra fine particles that are able to reach everywhere, and the pathophysiology makes sense, We absolutely need to collect more data on ultra fine particulate, which is why WHO's latest air quality guidelines gives guidance and asks city managers and governments to begin monitoring it more. But until they get the evidence, they won't pass guidelines for it because we don't know how much we should reduce it. Now that's kind of a catch 22 in the sense that many governments won't purchase the

equipment to monitor until there's evidence and WHO is not able to make the intelligent guidelines. So this is why they've come up with what I believe is a great alternative is to say, start collecting the data so that we can better create long term causal associations to exposures to ultra fine particulate. And then we can know how much should be removed. But then as I mentioned earlier, we can also take organic samples from urine and blood, even the leaf of a tree, and we can now not estimate the number of ultra fine black carbon particles that are within those samples. But we can count them. There's a technology out of the University of Hasselt in Brussels, Belgium, by Dr. Hannah Laura Beauvais and her lab. And it's in its infancy, that technology, but it's going to be ready very soon. And maybe we'll be able to start measuring not just the air, but also measuring the urine of schoolchildren to have an idea of their exposures and what can be done. So now we've talked a lot about the science and the risk, and so let's talk about the solutions. As I mentioned at the beginning of this particular question, I believe that using electric vehicles in cities will reduce that risk. Now, it's an unknown, as you mentioned, the particulate that comes from the brakes is still there. And in many cities already that are quite clean, those particles are the ones that they're able to measure. But they're still not measuring this unknown of ultra fine particulate. I believe that if we remove that, now what we're dealing with are different types of dusts. And I believe that there can be sustainable materials that we make brake pads with that are less harmful to our health.

G Greg Lindsay 11:42

We've seen a number of cities in Europe and elsewhere pre and during the pandemic restrict themselves to auto traffic altogether, turning to more sustainable modes like cycling and walking. I'm curious, in the past for example, during the CFC crisis, the ozone layer, there was a coordinated global effort with the Montreal Protocol that banned those. Is it going to take a similar effort to have a sea change, so to speak, in standardizing air quality? Is there something cities can do if they quickly move to restrict vehicles from their cores and other things? I'm curious, what level are the solutions here? Can it be at the city level? Or does it have to be a true United Nations effort?

J Jeffery Smith 15:25

Well, if we think about how cities were designed and many older northern American cities that have been around more than 100 years, more than 150 years, in Europe. These cities were designed for people from the beginning, and so they're walkable. I think if we start doing smart things that increase awareness, but we also have to educate our children. The automobile makers educated our children to believe.. When I grew up, I'm in my 50s, you know, look both ways, and so you knew the city didn't belong to you, it belong to cars. The city and the streets and outside of any building was an unsafe place to be. And I like to live in cities, but now I'm living up above the temperature inversion. Because even here in Switzerland in the winters, there's so much wood burning that the levels for 6-8 weeks near Lake Geneva are very bad. They're as bad as you might expect in China or India for a few weeks because of the accumulation. So I've moved up above that temperature inversion layer to avoid the wintertime exposures. What does that mean? Well, I don't have the benefits of living in a city, and the cultural aspects, and occasionally dining out with friends, all of the pre-pandemic life that we all enjoyed. And this is a very sad thing. And people shouldn't become refugees from the lifestyle that they prefer and so I believe that taking better action on traffic related air pollution is one way to go. But also recognize there are other sources. We now know that dilution is not the solution to pollution. That we can't just use smokestacks, that all of this is mixing and it can be found globally. Wildfire smoke, my friends with NASA and the European Space Agency, we've watched wildfire smoke from Australia circle the globe two and three times.

G Greg Lindsay 17:51

Yeah, that's one of the things I want to ask about is particularly with those smoke plumes. This is something again, speaking from a North American perspective, for the last two summers in a row, we've seen in almost every major

city across North America subject to the Jetstream, has had days of red suns and dark skies. The first time I saw that phenomenon was in Singapore during Indonesia burning the palm plantations, and now it's become a regular phenomenon across the Global North. Even if we take all these types of actions, how much does the wildfire smoke and climate change driven wildfires going to upend that progress? There's a lot of climate experts, of course, who warn about these trigger effects and phase changes. Have we crossed a phase change when it comes to the wildfire smoke that will undo any progress? Or is anyone worried about that?

Jeffery Smith 18:38

Yeah, I can't answer that question. That's not my field of expertise. We believe, those of us who are engaging communities and engaging in citizen science, we believe that we can monitor these sources, not just from space, but also using low cost instruments and regulatory instruments. And then when we mix in health data to it. And so one of the big things, is that if there was an app, and tools, and this is what we're working towards. If we integrate all this data, imagine if you were to tell people, look when you have uncontrolled wildfires in British Columbia, Alberta, and Calgary that reach all the way to the East, or from California, or from Australia to New Zealand. If you're able to show to people that hey, on this day, at this hour, this is what people are being exposed to and this is what the short term health effects and the long term health effects are. Imagine if you're integrating data, and it's health data that you've anonymized. You're now gonna be able to say that hey, in Calgary today 14 children were hospitalized under age five for pneumonia. And on a typical day, that might be three. The health impact is much greater and then you could take those numbers and go by state, and national level, and so on. What can we do I believe that, again, if we're reeducating everyone that we have to make different choices, really individuals, aren't in control of those choices. Governments determine our choices of energy, our choices of materials, our choices of chemicals, and processes. And they determine those choices because they make the regulations that the manufacturers who provide us all those things I just listed, must do. And so if those are not sustainable materials, and sustainability absolutely includes health. If those are not sustainable, and working well in a circular economy, then this leaves us with few choices, and we only have the choices of energy that are available to us. And so we need to demand, but the politicians and policymakers will tell us at the national level, well, we need more information, or we need more demand for that right?

Greg Lindsay 21:19

Is there way to put a price on that? Obviously, carbon taxes have been modded for a long time, we've seen some sort of political support for that in the US and the EUs moving forward. Is there a way to include a tax on death that these pollutants cause or a way to quantify that and put that into a more holistic take about how do we regulate the urban realm?

Jeffery Smith 21:36

Well, there are two approaches, one that I've advocated for, but haven't written about or spoken much about before, is just as similar as we talked about implementing a carbon tax, but I would like to implement a black carbon tax as well. There are some people who classify burning wood and burning wood pellets as renewable energy or carbon neutral energy. And that's not the case. Black carbon, the IPCC has said is one of the major climate accelerators that we must reduce. And it's definitely impacting that 1.5 degrees that we are hard pressed to avoid. The second approach is passing policy that includes health in all policies. And I think that oftentimes that needs to start at the city level. So historically, when we look at air pollution, because it is an invisible threat, even though we breathe 20,000 breaths a day, and 10,000 liters of air each day. And that's all carried, as I mentioned earlier, to every organ of the body. Even though that is the case, we don't think about it. Is the glass half full or glass half empty? I think the glass is always full. It's full of air and water. And we take that air for granted, but we're actually inhaling much more

of that air each day. So what can we do? Well, we need to demand that health be covered in all policies. And historically, it's been either the city or courts who have enforced these policies. And so we need to file lawsuits when it's required. And the scientists need to be better at communicating the risk and what we learn. And we also need to be better about interacting with the citizens through citizen science and communities. And people should be able to see on their phones, similar to what the risk of rainfall is that day, they will also see what the risk of air quality is that day.

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Greg Lindsay 23:36

One last question, cuz we're nearly out of time. In drawing the line between urban in the Global North and urban in the Global South, we alighted over the fact that it's spatially segregated in the Global North cities as well. We've seen that marginalized communities of color have suffered much worse health impacts with air pollutants, because historically they're the ones who are housed next to large polluting industries. I'm curious your thoughts, if there's any serious movement as well to think about the social justice dimension of this, about how those benefits could be distributed. I know in the legislation proposed for a Green New Deal for housing, for example, representatives Bush and Ocasio Cortez have talked about frontline communities and the importance that they be rewarded first. And I'm curious if that makes its way into the international literature as well about how we proceed in the decarbonisation and depollution of this to make sure that the hardest hit communities are the ones that are helped and served first.

J

Jeffery Smith 24:26

Right. This is a subject that we talk about and we call it environmental justice. And this is something that translates globally and so you will see that people become aware of risks or healthy parts of a city. But in a lot of cases, inadvertently people are exposed to less air pollution in posher areas of a city because they've chosen that to avoid the road traffic noise or other noise. There are scientist I know in Brussels and others I've worked with and we're placing monitors. So I've recently joined an association in Switzerland called make.human.technology. Things that we're looking at are like placing monitors on bicycles or in Uber vehicles and having them drive around the cities and providing that data. And this would be something that people would be able to see what's happening and we'd be able to map the sounds as well as the pollutants in different areas, and then be able to show people visually through colors what they're exposed to, and how they can avoid air pollution. But the other aspect of this that has been taken up in the UK recently, and something I had advocated in before, as I mentioned, walkability scores, we could also begin to rate, and this will happen, it's already happening, rate real estate according to the air quality and the health impacts of that. And so now, when people's property values start to decline, because of where it's located, this becomes a problem. Even in the most posh cities with relatively low levels of air pollution, like London and others, people are living in different parts of the city, where they are exposed to much more. But we also know there are other social determinants associated with that, that impact their health. Just as we know with COVID-19, that vitamin D deficiency is a 2.5 times greater risk of being hospitalized. The same is true for diet, as well as exposure, all combined together to make people in communities of color or poorer communities more vulnerable to this air pollution. So in fact, we should do much more, and this is something I speak about. I don't want us creating islands of clean air where we create low traffic neighborhoods or low emission zones, which is often the case. We need to implement those cycle lanes and lesser parking or one way streets. We need to measure the levels of exposures that are occurring on individual streets and make sure that the solutions, when we deploy them, are equitable, so that it doesn't leave behind the people that we're already leaving behind who are more vulnerable. Even before COVID people of poorer communities were having greater rates of pneumonia, exposure, and death.

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Greg Lindsay 27:32

Absolutely. I mean, you tied directly in there the all the knotty questions that we've been grappling with for a year

during the pandemic as cities closed streets for those reasons about equality and access, access to jobs, whether you're imposing programs that are designed for wealthier work from home residents on neighborhoods where people need to travel. We're still untangling those questions. Well, we're nearly out of time. For a last question, are there any exemplars or any cities that are pointing the way forwards? I mean, if 90% of cities are failing WHO guidelines then one in ten is not. I'm wondering if there's any in particular, any smart policies that you would recommend our listeners to track down and implement?

J Jeffery Smith 28:08

Yeah, well as you've said with these new air quality guidelines, it's even more that are failing. Who's doing it right. I would point to Barcelona. One example I can think of in Canada, is Toronto. In Toronto, there's a lot of suburban sprawl. But a lot of people, I have friends that have a place to park their car, and they have the convenience of the car for when they need it, or someone's sprains an ankle, they can be dropped at school, but otherwise, the public transportation is so well designed that it's actually more convenient to take that public transportation. And I myself when I lived in Washington, DC, I really enjoyed that, because I was able to actually prepare for a meeting in advance or read a book, or some other article. I was able to use that time. I actually found that even though it was a longer commute, I found more time, and so people can think of it that way as well. But when it comes to, is anyone actually taking notice and trying to manage air pollution. This is happening I think more so in London than a lot of places. But it's because there are so many people already using personal vehicles that they've identified that they have a big problem and they identify there would be a great benefit. And the final thing is that WHO has said that if a city reaches those air quality guidelines, the new ones, you can reduce the death and disease by 80%. That's the estimate. So we're talking about 16,000 lives globally saved per year. You can go to WHO.int. air pollution videos, there's a video library that I've helped to create there. We've interviewed a lot of pollution experts from around the world. And you can also go to breathelife2030.org. And there, you can look up cities, there's more than 4000 cities in the WHO air quality database and you can see if your city or country and what the numbers are there.

G Greg Lindsay 30:21

Great. Well thank you so much for those resources Jeff, it's reassuring to know that there is a plan, we simply have to implement it. At least to save so many lives. I'm afraid that's all the time we have for this week's episode of threesixtyCITY. Thank you so much for joining us, Jeff. Thank you all so much for listening as always, and we'll be back next week with another episode. Until then, take care.