

Episode 56EL May 25, 2023. The “A study on particulate exposure effects on Interstitial lung disease (I L D)” issue.

Residents Against Wood Smoke Emission Particulates (see RAWSEPresidents.wordpress.com and Scroll Down for PDFs of articles with U R L’s to search on, and on the website are links to 30 minute Youtube videos and Spotify podcasts as well as podcasts on Amazon Music Prime (free for Prime subscribers), podcasts.google.com, Cast Box, and Pocket Cast (Pocket Cast is only free on the phone App. Pocket Cast can be played on Apple phones.)

United States

[EPA Releases Annual Air Report, Highlighting Trends through 2022](https://www.epa.gov/air-trends/epa-releases-annual-air-report-highlighting-trends-through-2022)

Environmental Protection Agency

Particulate Matter 2.5 microns (PM2.5) 24-Hour,42% (from 2000); Sulfur Dioxide (SO2) 1-Hour,90%.

<https://gispub.epa.gov/air/trendsreport/2023/#home>

https://gispub.epa.gov/air/trendsreport/2023/#pm2_5_composition

United States

[Firefighting in Wood Frame Three- to Five-Story Apartment Buildings - Fire Engineering](#)

Fire Engineering

Interior smoke and carbon monoxide (CO) detectors are mandatory today in all rentals, apartments, and private dwellings. The floor truss loft area ...

Illinois

[How wildfire smoke can harm human health, even when the fire is hundreds of miles away](#)

The Edwardsville Intelligencer

That's particulate matter 2.5 microns or smaller – small enough that it can travel deep into the lungs. Exposure to PM2.5 from smoke or other air ...

[How wildfire smoke can harm human health, even when the fire is hundreds of miles away](#)

The Conversation

Fires in Canada have sent smoke across several US states, ... Being exposed to wood smoke won't independently cause someone to have a heart attack

[How wildfire smoke can harm human health, even when the fire is hundreds of miles away](#)

Smoke from more than 200 wildfires burning ... Being exposed to wood smoke won't independently cause someone to have a ...

[How wildfire smoke can harm human health, even when the fire is hundreds of miles away](#)

Penn Live

The stress of an inflammatory response can also exacerbate existing health problems. Being exposed to wood smoke won't independently cause someone to ...

How wildfire smoke can harm your health, even from far away

Posted by

[EarthSky Voices](#)

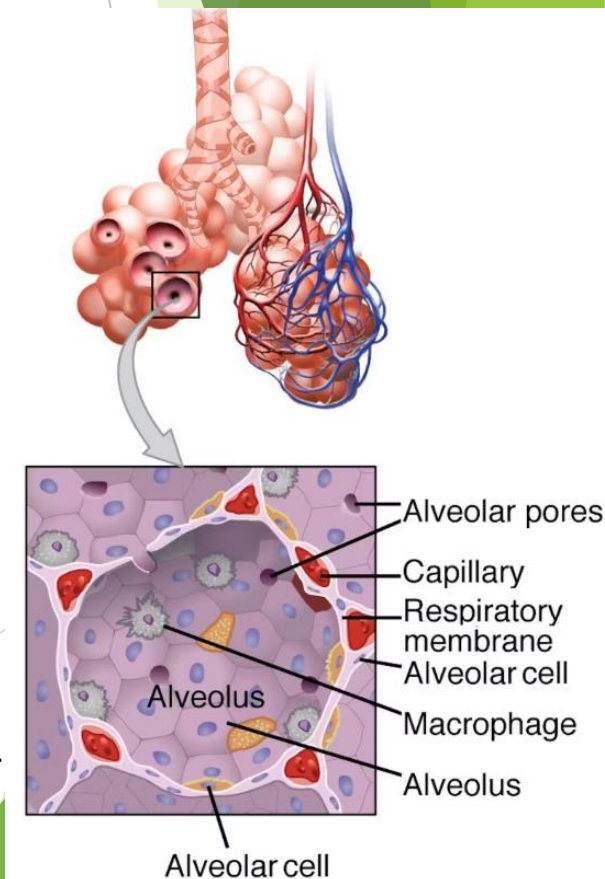
Excepts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

May 24, 2023

Smoke from [more than 200 wildfires](#) burning across Canada has been turning skies hazy in North American cities far from the flames.

What's in wildfire smoke that's a problem?

When we talk about air quality, we often talk about PM2.5. That's particulate matter 2.5 microns or smaller ... small enough that it can travel deep into the lungs.



Exposure to PM2.5 from smoke can exacerbate health conditions like asthma. It can also reduce lung function in ways that can worsen existing respiratory problems and even heart disease.

But the term PM2.5 only tells you about size, not composition. What is burning can make a significant difference in the chemistry. Smoke from wildfires in Canada spread across a large part of the U.S. as of May 22, 2023. Even smoke high in the air reached places as far south as Texas and Georgia. Image via AirNow.gov.

Vegetation fuels most wildfires. But not all vegetation is the same. If the fire is in the wildland urban interface, manufactured fuels from homes and vehicles may also be burning. That's going to create its own toxic chemistry. Chemists often talk about volatile organic compounds (VOCs), carbon monoxide and polycyclic aromatic hydrocarbons (PAHs, which result when biomass and other matter burn) having the potential to harm human health.

How does inhaling wildfire smoke harm human health?

If you have ever been around a campfire and got a blast of smoke in your face, you probably had some irritation. With exposure to wildfire smoke, you might get some irritation in the nose and throat and maybe some inflammation.

Generally, cells in the lungs, called alveolar macrophages, will pick up the particulates and clear them out ... at reasonable doses. Macrophages are in alveoli, which are tiny air sacs in the lungs. Image via The Conversation.

Smoke can suppress macrophage function, altering it enough that you become more susceptible to respiratory infection. One study found a lag time in the effect of wildfire smoke exposure and subsequent increase in influenza cases after a bad fire season. Studies in developing countries have also found increases in respiratory infections with people who are cooking on open fires in homes. Being exposed to wood smoke won't independently cause someone to have a heart attack. But if someone has underlying risk factors, such as significant plaque buildup, the added stress can increase the risk of heart attack. Researchers are also studying potential effects on the brain and nervous system from inhaled particulate matter.

The longer wildfire smoke is in the atmosphere, the more ultraviolet light will alter the chemistry. But we still have a lot to learn. oxidants and free radicals are being generated the longer smoke is in the air. There are indications that more exposure leads to greater health effects.

The supposition is that more free radicals are generated the longer smoke is exposed to UV light, so there's a greater potential for health harm dependent on dose.

Denver was listed among the world's worst cities for air pollution on May 19, 2023, because of the wildfire smoke from Canada. Image via Colorado Air Pollution Control Division.

If you're a healthy individual, going for a bike ride or a hike in light haze won't be a big deal, and your body will be able to recover.

If you're doing that every day for a month in wildfire smoke, however, look to the study of residents at Seeley Lake in Montana who were exposed to hazardous levels of PM2.5 from wildfire smoke for 49 days in 2017. Researchers found a decrease in lung function a year later.

No one was on oxygen, but there was a significant drop in lung function.

Can you completely avoid the smoke? Not unless you're in a hermetically sealed home. The PM levels aren't much different indoors and out unless you have a really good HVAC (Heating, Ventilation, and Air Conditioning) system, such as those with MERV 15 or better filters.

But going inside decreases your activity, so your breathing rate is slower and the amount of smoke you're inhaling is likely lower.

A satellite captures wildfire smoke on May 16, 2023. Image via NASA EarthData.

if you're in a susceptible group, such as those with asthma, create a safe space at home and in the office with a high-level stand-alone air filtration system to create a space with cleaner air.

Some masks can help. It doesn't hurt to have a high-quality N95 mask.

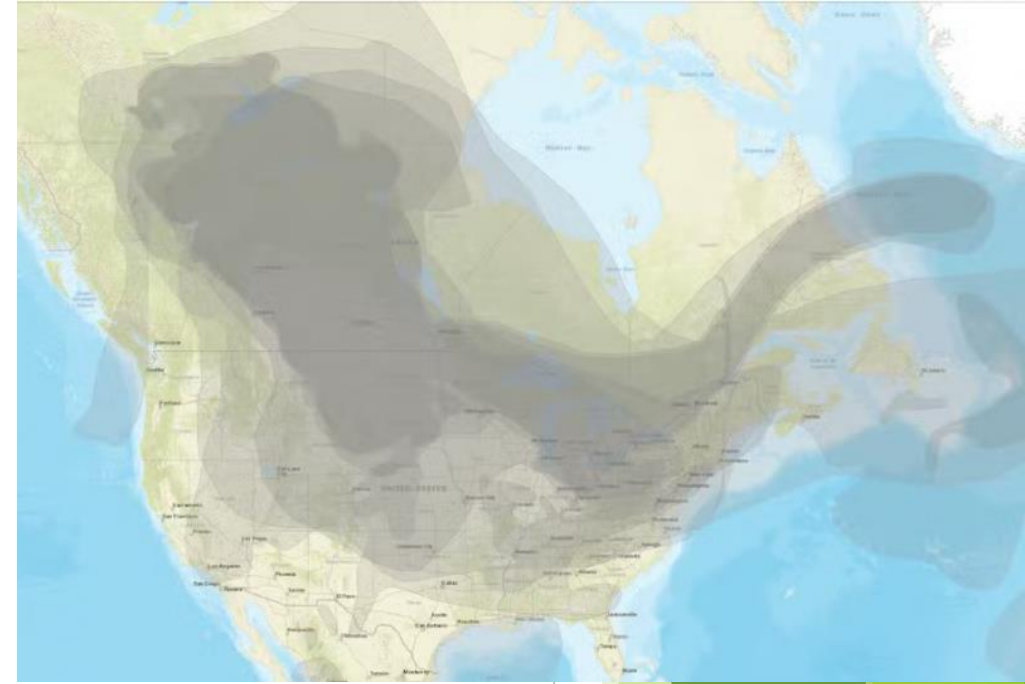
Most states have air quality monitors.

Read the original article.

Read more: Canadian wildfires continue to rage with a smoky central U.S.

Massachusetts, Essex County, Lynn Woods

Lynn Woods brush fire extinguished after 400 acres burned - Itemlive



Itemlive

The fires ended up burning around 400 acres of Lynn Woods, Zukas said. On May 17, the department announced that eight of the fires were set ...
Minnesota Public Radio

[Air quality alert Tuesday amid Canadian wildfire smoke | MPR News](#)

MPR News

Wildfire smoke and ground-level ozone are impacting skies and air ... such as outdoor burning, and use of residential wood burning devices.

[Air quality alert for much of Minnesota and Wisconsin | MPR News](#)

MPR News

Ozone and wildfire smoke across Minnesota Tuesday. ... to air pollution, such as outdoor burning, and use of residential wood burning devices.

Minnesota, Rice County

[Rice County landfill aflame amid air quality alert | News - southernminn.com](#)

southernminn.com

"Reduce or eliminate activities that contribute to air pollution, such as outdoor burning, and use of residential wood burning devices," the alert ...

Utah

[Utah's smoky skies, health issues just beginning of what's to come, experts say](#)

Fox 13

"Turns out wood smoke and the particles in wood smoke, it's probably the ... "Fireworks, in addition to being sources of particulate pollution, ...

[Utah's smoky skies, health issues just beginning of what's to come, experts say](#)

Fox 13

Moench added the same health issues some get from smoking are ... "Turns out wood smoke and the particles in wood smoke, it's probably the most ...

Despite the wildfire smoke, many were out enjoying the rest of the nice weather, but said they noticed irritations runny noses, watery eyes, congestion, and sneezing. "I just keep hitting the inhaler and hope the wind shifts and hope the fires die down," said Megan, who is visiting Salt Lake City from California.

Utah's smoky skies, health issues just beginning of what's to come, experts say

May 22, 2023

Excerpts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

SALT LAKE CITY — There's good and bad news in regards to Utah's air quality as wildfires burn in Canada, which caused smoke-filled skies in the Beehive State and are set to clear out. But experts are warning of serious health hazards of what's to come this summer.

The haze settled over several areas in the state all weekend long. Despite the wildfire smoke, many were out enjoying the rest of the nice weather, but said they noticed irritations runny noses, watery eyes, congestion, and sneezing.

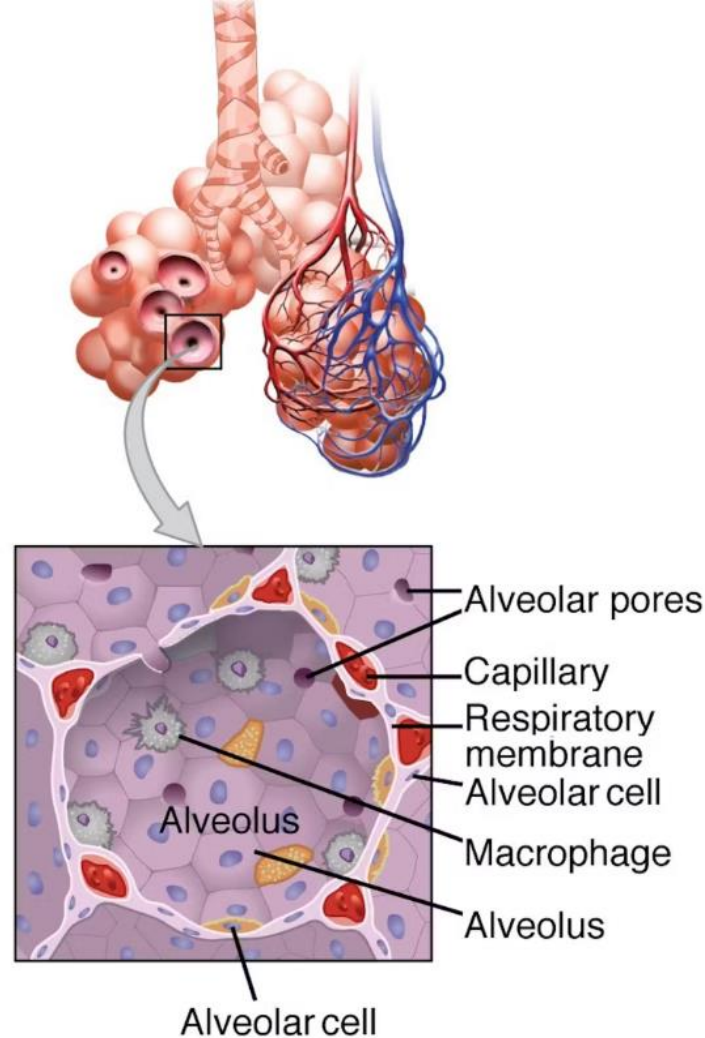
Recent Stories from fox13now.com

"I just keep hitting the inhaler and hope the wind shifts and hope the fires die down," said Megan, who is visiting Salt Lake City from California.

"The real issue are the things you don't see frequently things you don't feel." said Dr. Brian Moench, President of Utah Physicians for Healthy Environment.

Moench added the same health issues some get from smoking are heightened for everyone when breathing in the small particles that are in wildfire smoke.

"Turns out wood smoke and the particles in wood smoke, it's probably the most toxic kind of materials the average person is ever going to be exposed to," he said.



The Canadian wildfires that are causing problems in Utah contain small particles that can be a big problem.

"The smaller the particle it is to inhale, the more difficult it is to exhale, and then the more easily it's distributed through the bloodstream," said Moench.

It can all lead to heightened risks of cardiovascular, lung, and brain disease, even arthritis and Type 2 diabetes. Moench warned against the major contributors that can be controlled, like driving or fireworks shows

"Fireworks, in addition to being sources of particulate pollution, are also unique sources of an ever-broader array of heavy metals than wood smoke," he said.

Utah will most likely see more health issues as the state heads into the hotter and drier summer months.

"People are often really concerned about air quality during the winter time because they can see it," said Ashley Sumner with the Department of Environmental Quality. "Pollution is invisible."

Wood smoke is the most toxic element most people will be exposed to, and on smoky days there will be more heart attacks and strokes, pregnancy complications and visits to the emergency room.

Washington, DC

[Kerry challenges oil industry to prove its promised tech rescue for climate ... - Denison Bulletin](#)

Denison Bulletin

Particulate matter refers to airborne pollutants that can be inhaled and ... PM-2.5 causes the biggest risk to humans as it can be inhaled deep ...

WASHINGTON — Oil and gas producers talk up technological breakthroughs they say will soon allow the world to drill and burn fossil fuels without worsening global warming. U.S. climate envoy John Kerry says the time is here for the industry to prove it can make the technology happen — at scale, affordably and quickly — to stave off climate disaster.

Wisconsin, Polk (Washington County)

[More than 20 fire departments respond to massive fire at pallet factory - WISN](#)

WISN

Calls for reports of flames at a wood factory Sunday night. ... taking 911 calls reporting smoke and flame coming from Oak Creek Wood Products, ...

[20 fire departments fight flames at Wisconsin pallet factory | Woodworking Network](#)

Woodworking Network

On May 21, at approximately 7:23 p.m., calls to 911 reported smoke and flame coming from Oak Creek Wood Products in the Town of Polk, ... Wisconsin, Slinger

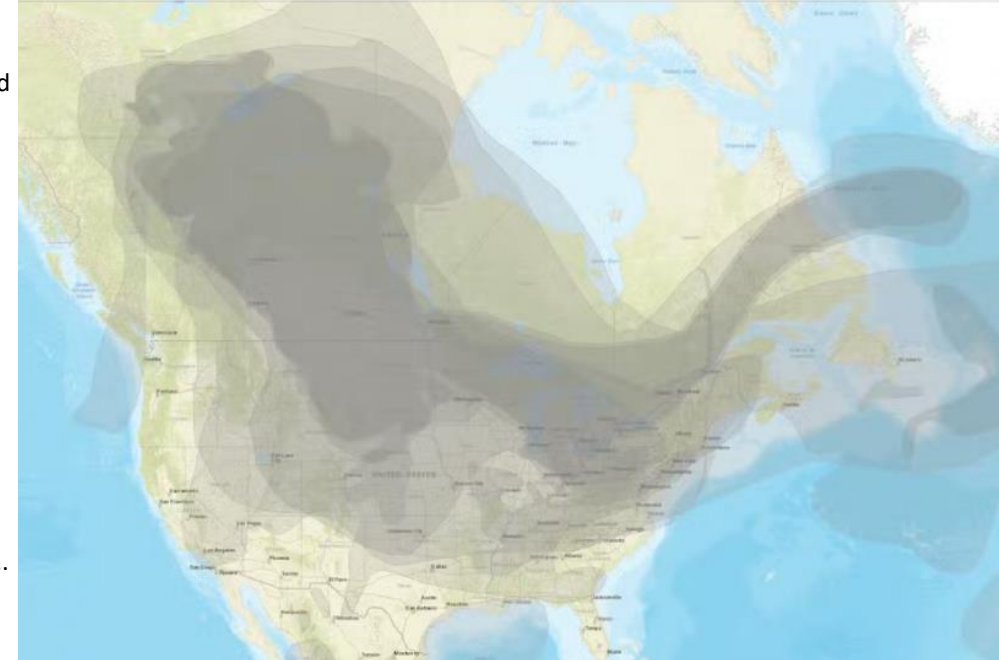
RAWSEP View: This was a mulch fire. How to turn wood chips (mulch) into soil usable in your garden. This information is also on Episode 56EG.

Making Soil from Fallen Trees

RAWSEP Tip: Don't burn fallen trees or tree branches. 1)Have trees and brush picked up by your municipality's brush collection service, with pick up usually done every few weeks in the spring and fall. 2)Or take the trees or branches to a recycling center. Check with your municipality. 3)Or make wood chips to use as mulch, or 4)use wood chips in a compost bin along with materials that speed decomposition of wood chips.

You will end up with soil usable in your gardening beds.

RAWSEP View of making compost from wood chips: One way to avoid burning wood is to make fallen trees into wood chips which are useful as mulch. But if you are in a wildfire-prone or drought area you might want to dispose of fallen trees by having them picked up by your municipality's brush removal or make wood chips and then use them in compost bins to create soil from wood. However, to avoid a 3 to 4 year wait if wood chips alone are put in a compost bin, it is best to combine wood chips in a compost bin with green material, or even fresh lawn clippings, food waste, coffee grounds or manure. Blood meal or feather meal can also speed up the process. If the compost pile is large, you can



spread a couple of handfuls of balanced, dry fertilizer evenly over the surface. If you want to put wood chips in compost, the process will work best if the chips are as small as possible, preferably 1 to 2 inches (2.5 to 5 cm.) at most. Be patient; composting wood chips is a long, slow process that can take as long as three or four years. The larger the chips, the longer the process takes. Yes, you can put wood chips in compost, but composting wood chips isn't as straightforward as a typical backyard compost pile. Some types of wood, including cedar, cypress, oak, redwood, and American mahogany, are especially slow to decompose. Don't compost wood from yew or other toxic plants unless you're sure the pile will be hot enough to break down the toxic substances. Otherwise, let the chips sit for a few months before composting it, then let the finished compost sit a few more months before using it.

Wood chip mulch is popular because it provides a rich environment for plant growth and retains moisture in the soil. However, one downfall is that this mulch can quickly catch fire. This is because wood chips burn hotter than leaves or grass.

[Mulch fire near Slinger nearly contained; 1.7M gallons of water used](#)

FOX6 News Milwaukee

Almost 24 hours after a massive mulch fire flared up near Slinger, it was still burning Monday in the Town of Polk at Oak Creek Wood Products.

[Flames contained in Slinger building fire; smoke will remain for days - FOX6 News Milwaukee](#)

FOX6 News Milwaukee

- Slinger Fire Department is updating the public on Monday, May 22 after a large fire at Oak Creek Wood Products. The fire was located along I-41 in ...

[Massive warehouse fire in Slinger, right off I-41 - WBAY](#)

WBAY

Heavy smoke from a warehouse fire crosses I-41 in Slinger, Wis. ... Our sister station reports the building is JFF Wood Products, ...

[Crews battle massive warehouse fire in Slinger, Wisconsin - TMJ4](#)

TMJ4

According to a news release from the Washington County Sheriff's Office, they received reports of smoke and flames coming from the Oak Creek Wood ..

[Multiple agencies working massive structure fire in Slinger - WISN](#)

WISN

... IT SEEMS LIKE THOSE FLAMES ARE STARTING TO DECREASE AND NOW IT'S A LOT OF SMOKE, RIGHT? ... WE CAN SEE THE ADDRESS IS LISTED AS JEFF WOOD.

Canada

[Rain forecast for Canada \(plus links to monitor their fire challenge\) - Wildfire Today](#)

Wildfire Today

Current PM 2.5 smoke hazard map for next 24 hours. This image form Canada FireWork is current as of May 19, a day with one of great smoke impacts.

Canada, Alberta

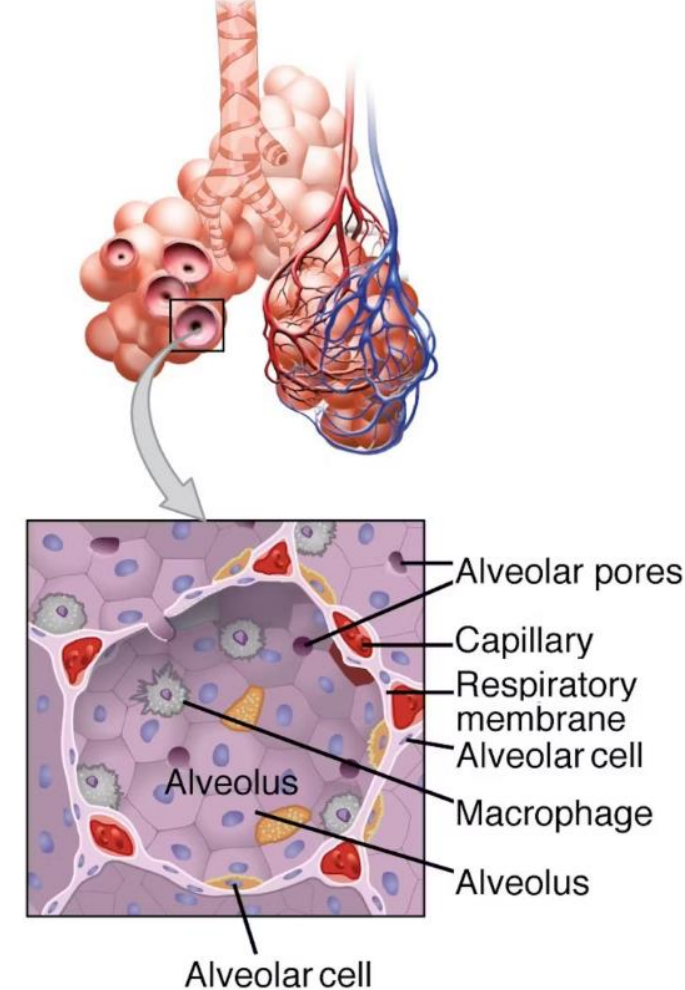
[Albertans urged to stay indoors as air quality expected to worsen | Q107 Toronto](#)

Q107 Toronto

The Calgary Region Airshed Zone (CRAZ) tweeted on Saturday evening it recorded ground-level ozone exceeding PM 2.5., meaning the air is unhealthy.

Greenhough said Albertans should try to stay indoors with air purification systems in place, if possible. "So in your own home, filtering that air through your furnace would be preferred, or using the air conditioner if you have it. That would be the best thing you can do," the meteorologist said.

Albertans urged to stay indoors as air quality expected to worsen.



May 21, 2023.

Excepts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

On Sunday, Alberta had the worst air quality in the world. That's according to data tracked by the World Air Quality Index, a non-profit project that collects information from air monitoring stations around the globe. The poor air quality is forcing many Albertans to stay indoors this long weekend. Albertans are urged to stay indoors and take care of their health as smoke levels are expected to surge across the province.

Environment Canada issued air quality statements for both Calgary and Edmonton on Sunday due to elevated levels of wildfire smoke. The [Air Quality Health Index](#) forecasted air quality at 10+ for both cities on Sunday, the worst rating for air quality according to Environment Canada.

This means the air quality may pose very serious health risks for residents, especially for the elderly, children and people with respiratory illnesses. The smoke is also expected to linger in Edmonton. In Calgary, an AHS spokesperson told Global News emergency departments across the city saw a "modest" increase in patients with cough and respiratory issues due to wildfire smoke. Calgary's emergency departments saw 105 patients on May 6, the day the provincial state of emergency was declared. Since then, that number has fluctuated from a low of 103 patients on May 10th to a high of 155 on May 15th. "We encourage all Albertans to take the necessary precautions to stay safe, plan ahead and remain healthy during the wildfire season," said James Wood, AHS' director of issues management and media relations.

"Wildfire smoke can be harmful to everyone's health even at low concentrations. Continue to take actions to protect your health and reduce exposure to smoke." Greenhough said Albertans should try to stay indoors with air purification systems in place, if possible. "In your own home, filtering that air through your furnace would be preferred, or using the air conditioner if you have it. That would be the best thing you can do," the meteorologist said. "And if you don't have that ability, going into a public building such as a library or a shopping mall may be the best option for you."

United Kingdom

[UK Calls for Evidence to Support RMOA for Formaldehyde and Formaldehyde Releasers - JD Supra](#)

JD Supra

... and indoor domestic combustion, such as woodburning stoves and ethanol ... sources such as cooking, lighted candles, and wood-burning stoves.

[Regulatory Developments: UK Calls for Evidence to Support RMOA for Formaldehyde and ...](#)

Lexology

... domestic combustion, such as woodburning stoves and ethanol fires. ... sources such as cooking, lighted candles, and wood-burning stoves.

U K, Brighton and Hove

[Taking steps to protect our precious elm trees - Brighton & Hove City Council](#)

Brighton & Hove City Council

In recent years, there has also been a rapid increase in the number of wood-burning stoves being used in the area, increasing the risk of ...

We're taking steps to protect the city's precious elm trees for the future. 200 elm trees across the city will be inoculated on 23 and 24 May 2023. As well as the remaining Preston Park twin, we have chosen a further 199 elms located in Royal Pavilion Garden, Valley Gardens and The Level to receive the treatment.

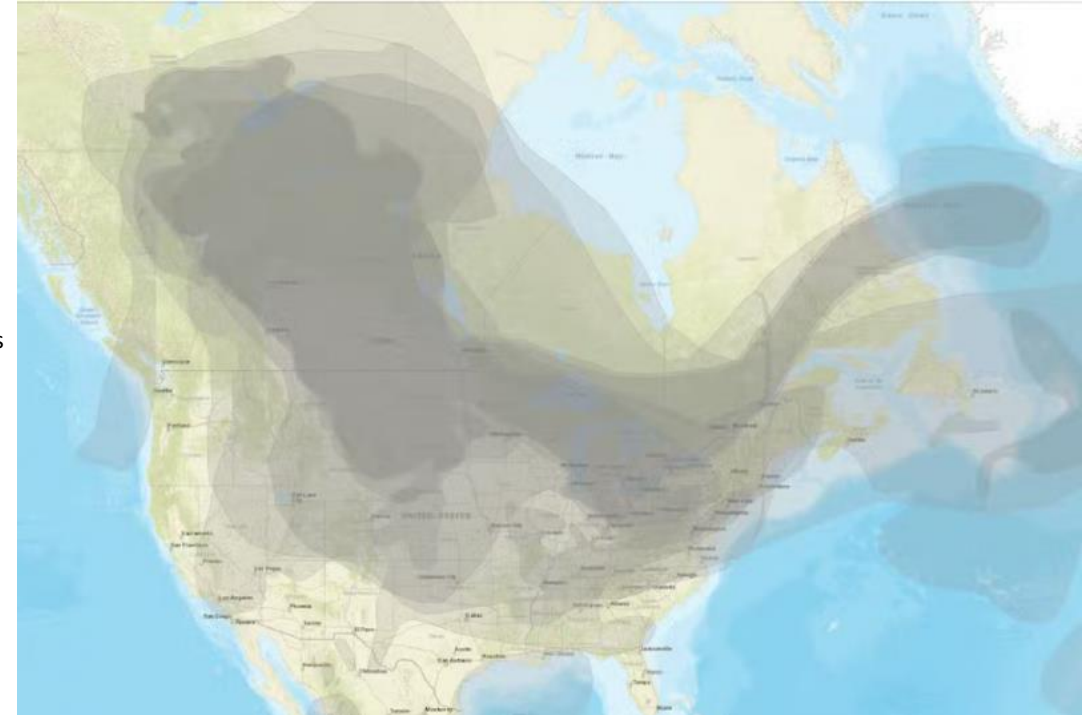
23 May 2023

Excepts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

One of the most common ways for a tree to become infected is via beetles breeding on elm logs stored in the area.

These logs are likely to have been brought in from other parts of Sussex where there has been a massive rise in elm disease infection and subsequent logs becoming available. In recent years, there has also been a rapid increase in the number of wood-burning stoves being used in the area, increasing the risk of contaminated wood coming into the city.

We ask residents not to buy any logs if the supplier cannot guarantee that the wood isn't elm. Our arboriculture team offers a free inspection of firewood and other timber. If you're concerned about an elm tree, please contact us by emailing elmdisease@brighton-hove.gov.uk.



Europe

[Dirty air linked with premature death in patients with heart failure - European Society of Cardiology](#)

European Society of Cardiology

This includes particulate matter (PM)2.5 and PM10, of which major sources are vehicle exhaust emissions and industry fumes. Ambient air pollution ...

Czech Republic, Prague

[Dirty air associated with premature death in patients with heart failure: Study - Lokmat Times](#)

Lokmat Times

... air pollution is the single most serious environmental threat to human health.² This includes particulate matter (PM)2.5 and PM10, ...

Dirty air associated with premature death in patients with heart failure: Study

[ANI](#)

May 23, 2023.

Excerpts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

Prague [Czech Republic], May 22 (ANI): According to a study, patients with heart failure are at a higher risk of dying from their disease on polluted days and for up to two days thereafter.

The study was presented at Heart Failure 2023, a scientific congress of the European Society of Cardiology (ESC).

“The findings indicate that reducing air pollution has the potential to prevent worsening heart failure,” said study author Dr. Lukasz Kuzma of the Medical University of Bialystok, Poland. “Protecting vulnerable groups, especially during winter, should become an integral part of clinical care. That means health professionals working with patients to monitor air quality and choose optimal times for outdoor activity.” According to the World Health Organisation (WHO), air pollution is the single most serious environmental threat to human health.² This includes particulate matter (PM)2.5 and PM10, which are mostly caused by vehicle exhaust emissions and industrial smells. In 2019, it is predicted that ambient air pollution caused 4.2 million premature deaths worldwide. Heart failure affects more than 64 million people worldwide.⁴ The authors of the current study previously found that rises in particulate matter were associated with increased hospitalizations for heart failure.⁵ This study examined the relationship between smog exposure and short-term mortality from heart failure. Mortality data from the five main cities in Eastern Poland during 2016 to 2020 were obtained from the Central Statistical Office. Concentrations of PM2.5 and PM10 were retrieved from the

Asia

Nepal, Samachar

[Fine-tuning air pollution models - Samachar Central](#)

Samachar Central

Globally, PM2.5 is estimated to cause 4.7 million premature deaths each year, and in the United States, communities of color face the most intense.

Fine-Tuning Air Pollution Models

InMAP estimates air pollution within cities, but its predictions are flawed for specific chemicals. Now, scientists are addressing that shortcoming.

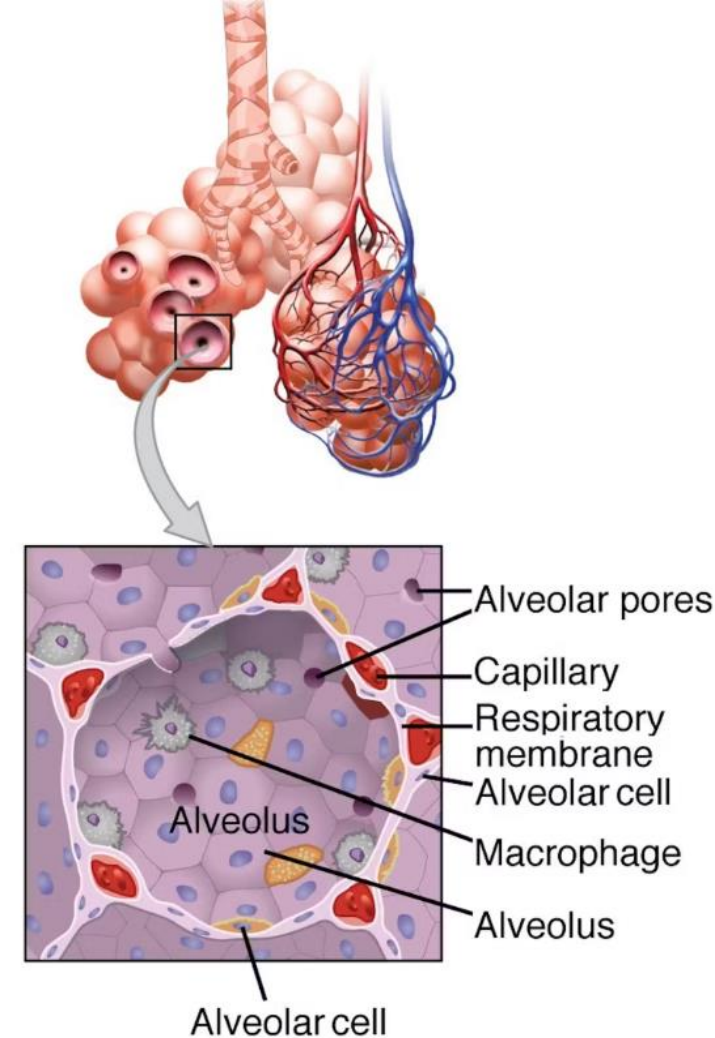
May 19, 2023.

Urban air pollution doesn't equally affect all residents. Credit: [SreeBot/Wikimedia Commons, CC BY 3.0](#)

Source: GeoHealth

Air pollution doesn't affect everybody the same way. And in a new study, researchers developed a method to improve estimates of how, within cities, different communities are exposed to [fine particulate matter \(PM2.5\)](#).

Excerpts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.



Globally, PM2.5 is estimated to cause [4.7 million premature deaths](#) each year, and in the United States, [communities of color](#) face the most intense exposure to the chemicals. To estimate levels of exposure to air pollution, the Intervention Model for Air Pollution ([InMAP](#)) estimates air quality with fine spatial resolution, especially in densely populated areas. Because the model can assess differences in pollution exposure within cities, it can be useful in designing policies that include [environmental justice](#). However, InMAP overestimates and underestimates specific PM2.5 chemicals: It underestimates particulate sulfate and overestimates particulate ammonium. In a new study, [Gallagher et al.](#) develop a method to correct those biases. The researchers developed bias correction factors, or scaling factors, for InMAP using measurements of different PM2.5 chemicals. They used pollution monitoring data collected on the ground by the U.S. EPA and satellite data processed by Washington University in St. Louis. Comparing InMAP's predictions with these data sources allowed them to gauge and correct for errors. The authors tested how InMAP with and without scaling factors performed using an established [goal of 10%](#) error in its predictions. Without the scaling factors, InMAP underestimated or overestimated PM2.5 concentrations by greater than 10%. Introducing city-specific scaling factors, however, improved model fit and reduced the error below the 10% threshold. In addition, the authors found that their method was most effective in the densest population areas of cities. The authors published all scaling factors for public use and recommend they be used when researching how air pollution differs across race, ethnicity, income, and other demographic traits. (GeoHealth, <https://doi.org/10.1029/2023GH000788>, 2023)

PM2.5 and health effects (Wood smoke is 90% PM2.5)

PM2.5 and Interstitial Lung Disease (ILD)

Interstitial lung disease (ILD) is an umbrella term used for a large group of diseases that cause scarring (fibrosis) of the lungs.

[High levels of air pollution linked to ILD prevalence, acute exacerbations, death - Healio](#)

Healio

Particulate matter exposure was linked to interstitial lung disease incidence, ... Notably, human derived constituents of PM2.5, such as sulfate, ...

May 23, 2023

Excerpts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

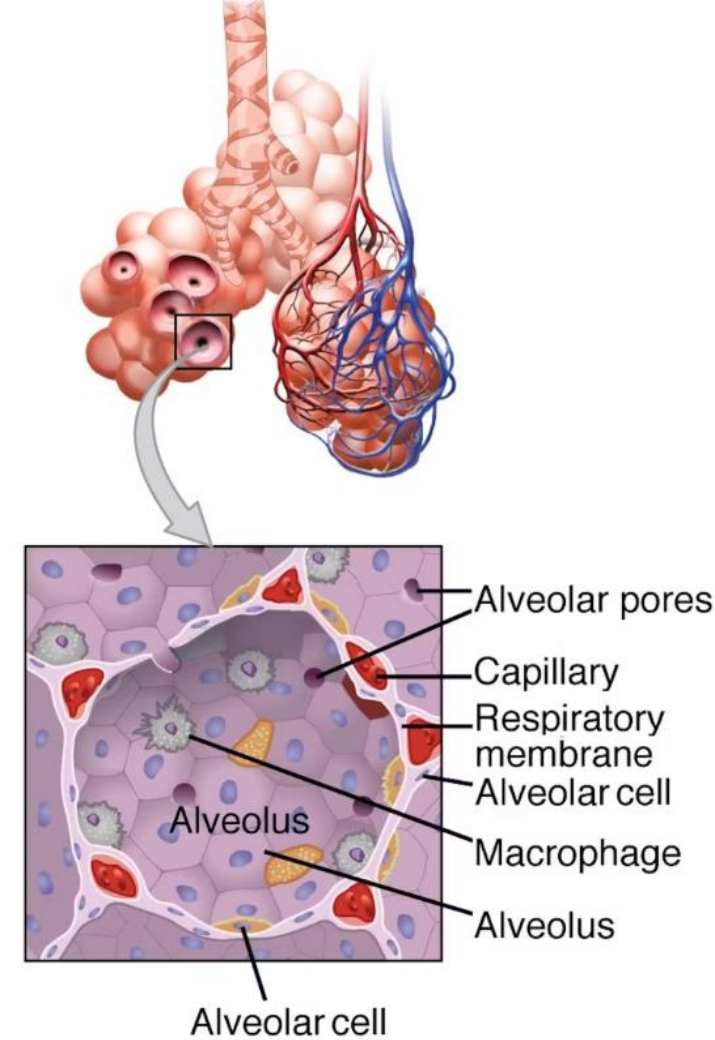
High levels of air pollution linked to ILD prevalence, acute exacerbations, death.

Particulate matter exposure was linked to interstitial lung disease incidence, acute exacerbations, and death.

Gaseous pollutant exposure was mainly linked to acute exacerbation of interstitial lung disease.

WASHINGTON — Exposure to air pollutants at high levels contributed to interstitial lung disease incidence, acute exacerbations, and death, according to an abstract presented at the American Thoracic Society International Conference. “It was interesting to see that the evidence to date suggests that greater exposure to air pollutants is more consistently associated with acute exacerbations of ILD than mortality,” a resident physician at the University of British Columbia, said. “While both gaseous and particulate matter pollutants have been associated with both outcomes in various studies, this difference is most striking with gaseous pollutants compared to particulate matter pollutants. Overall, this is an area that has not been fully explored and more studies are needed to understand the complex relationships between multiple gaseous and particulate pollutants that contribute to the risk of ILD exacerbations and mortality.” In a systematic review of three databases, Bala and colleagues analyzed 21 studies that assessed air pollution in relation to ILD and [interstitial lung abnormalities \(ILA\) incidence](#), changes in lung function, acute exacerbations of ILD and mortality to understand how air pollutants impact these outcomes. Several different methods were used to estimate patient exposures to air pollution in the evaluated studies. Most studies used either a surface monitoring station close by (7 studies) or a hybrid mix of monitoring methods that often incorporate ground-based monitors, satellite data and chemical modelling approaches (8 studies), according to Bala and colleagues. Fewer studies used interpolated surface monitoring (2 studies), monitoring by external bodies (2 studies) and satellite-only monitoring (1 study).

In this review, researchers found that elevated [air particulate exposure](#) levels were linked to more cases of ILA and ILD. For example, in patients with rheumatoid arthritis, the incidence of ILD was greater in patients exposed to higher levels of organic matter and black carbon PM2.5 constituents as compared with other particulate matter constituents, Bala and colleagues told Healio. With regard to the effect of air pollution on changes in lung function, several studies



included in the abstract found that baseline and future measures of FVC and diffusion capacity of the lung for carbon monoxide (DLCO) decreased with exposure to both gaseous and particulate matter pollutants, according to Bala.

Further, researchers found that if an individual was exposed to high levels of nitrogen dioxide, sulfur dioxide and particulate pollutants, they had an increased incidence of acute exacerbations of ILD. Researchers also observed a link between more exposure to particulate pollutants and heightened mortality rates in many of the included studies. Notably, human derived constituents of PM_{2.5}, such as sulfate, ammonium and black carbon showed the largest effect estimates in one large North American study featured in this review, according to Bala and colleagues. “Overall, the data from this systematic review show that exposure to air pollutants can adversely impact the development, progression, incidence of acute exacerbations and mortality in patients with ILD,” Bala told Healio. “Further stratifying these air pollutants into their constituent components reveals that different gaseous and particulate matter pollutants can have varying impacts on these adverse outcomes, which has important clinical and lifestyle implications for patients living with ILD. Clinicians should be aware of the risks that air pollution poses to their patients with ILD, advocating for stricter environmental health regulations to protect these vulnerable groups and informing patients about personal interventions they can take to mitigate their individual risk.” Since only four out of the 21 studies broke down PM_{2.5} and PM₁₀ into constituent components, Bala told Healio more attention on air pollution composition is needed in future studies. “Future studies will need to focus on the complex interactions of particulate matter constituents and gaseous pollutants to provide a more comprehensive understanding of how air pollution as a whole influences the development and progression of ILD,” Bala said. “Future research should also explore the molecular mechanisms underpinning associations of air pollution with adverse outcomes in patients with interstitial lung disease. Lastly, the research to date on air pollution impacts in ILD has been very North America-centric, so more global initiatives to investigate the association of air pollution with ILD incidence and mortality is critically needed.”

PM_{2.5} and Heart Health

[Air Pollution Exerts Negative Effects on Heart Health - AZoCleantech.com](#)

AZoCleantech.com

This includes particulate matter (PM)_{2.5} and PM₁₀, caused mainly by vehicle exhaust emissions and industrial fumes. In 2019, it was predicted that ...

A 10 µg/m³ increase in PM_{2.5} and PM₁₀ was related to a 10% and 9% increase in the probability of death due to heart failure on a polluted day, respectively. One and two days after smog exposure, similar chances of dying from heart failure were reported.

Air Pollution Exerts Negative Effects on Heart Health

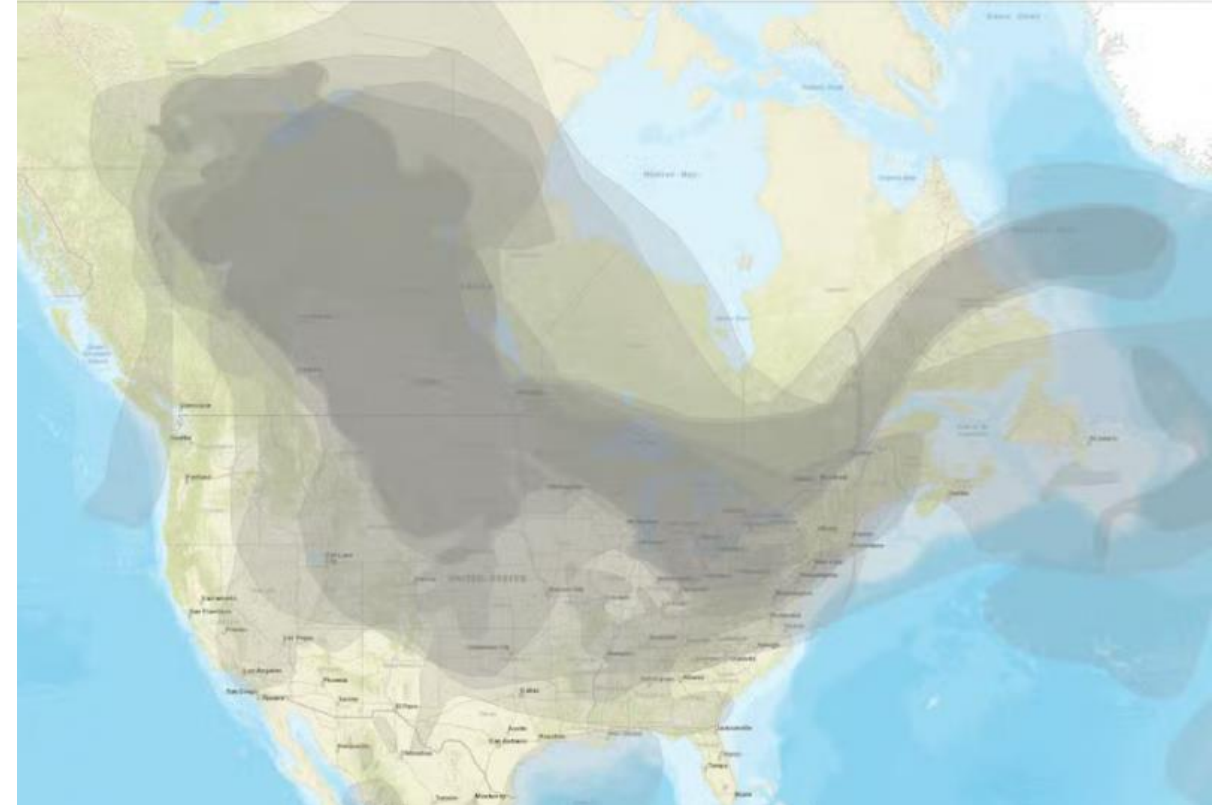
May 23, 2023.

Excepts edited by RAWSEP for brevity and clarity and relationship to Residents Against Wood Smoke Emission Particulates.

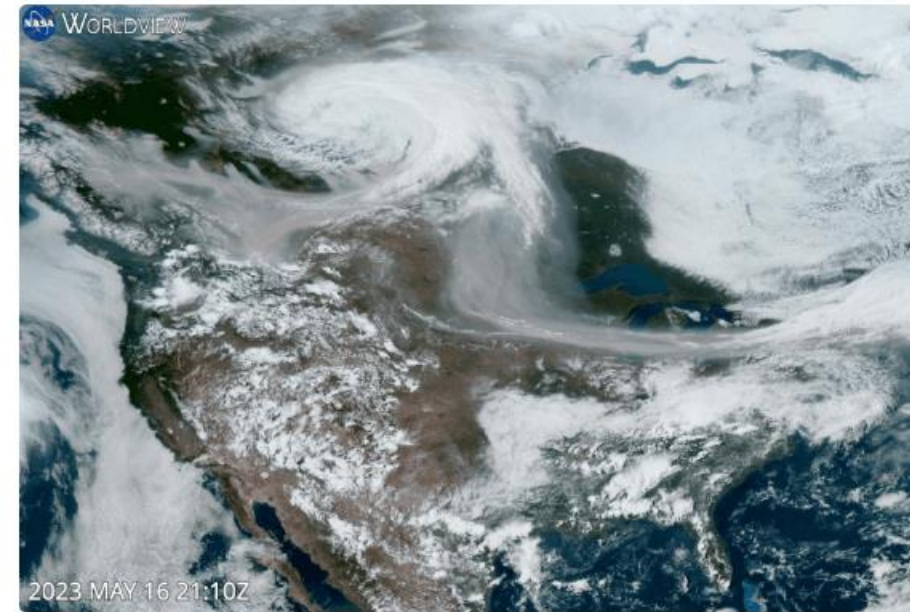
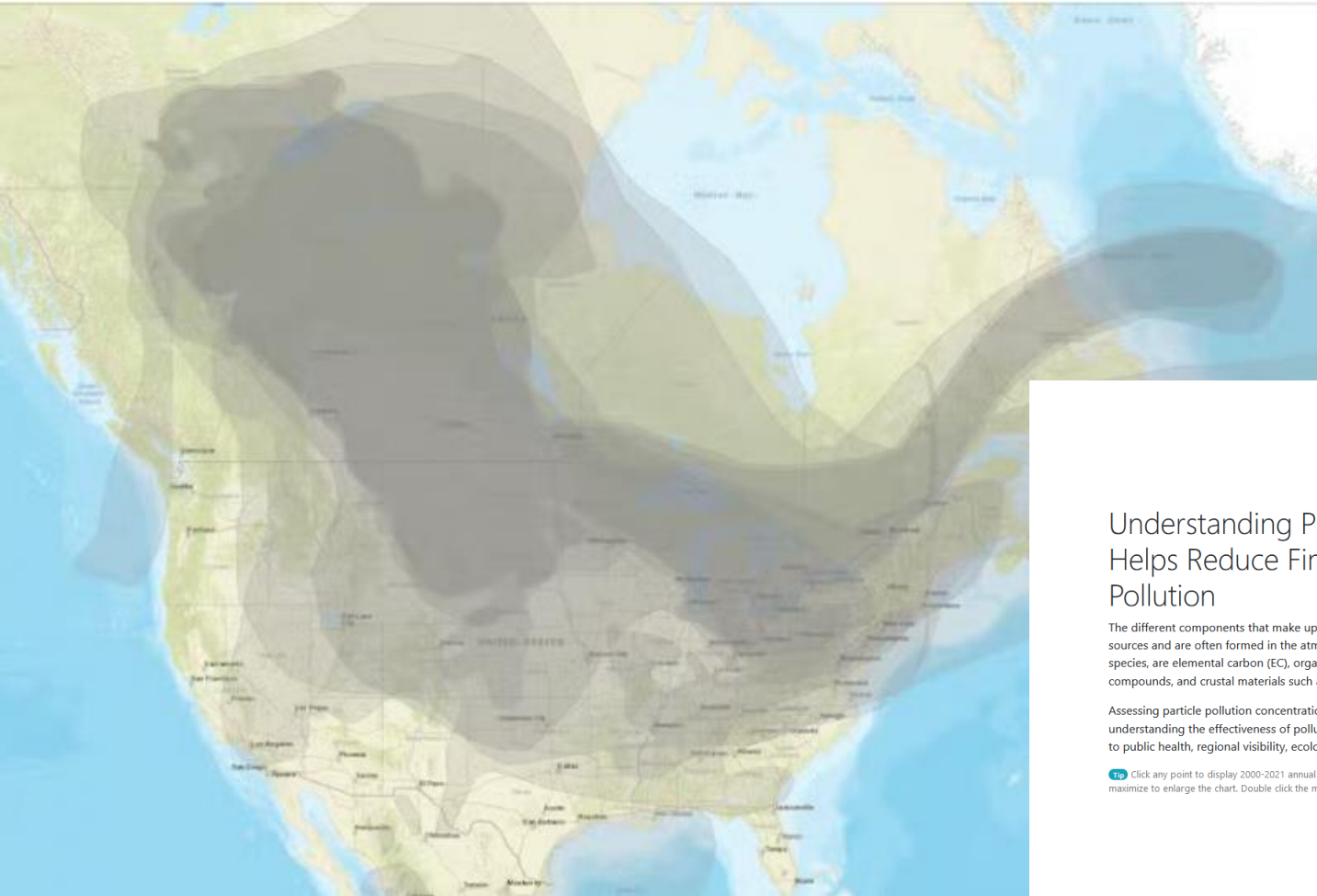
According to a study presented at Heart Failure 2023, a scientific congress of the [European Society of Cardiology](#) (ESC), heart failure patients are at a higher risk of dying from their condition on polluted days and for up to two days following exposure. The findings indicate that reducing air pollution has the potential to prevent worsening heart failure. Protecting vulnerable groups, especially during winter, should become an integral part of clinical care. That means health professionals working with patients to monitor air quality and choose optimal times for outdoor activity.

Dr. Lukasz Kuzma, Study Author, Medical University of Bialystok According to the World Health Organization (WHO), air pollution is the single most serious environmental danger to human health. This includes particulate matter (PM)_{2.5} and PM₁₀, caused mainly by vehicle exhaust emissions and industrial fumes. In 2019, it was predicted that ambient air pollution caused 4.2 million premature deaths worldwide. [Report: Nine Million Deaths Attributable to Pollution in 2019](#)

More than 64 million people worldwide suffer from heart failure. The present study’s authors previously discovered that increases in particulate matter were connected with an increase in heart failure hospitalizations. This study looked at the link between smog exposure and short-term heart failure mortality. The Central Statistical Office provided mortality data from the five major cities in Eastern Poland from 2016 to 2020. The Inspectorate for Environmental Protection provided PM_{2.5} and PM₁₀ concentrations. Individual pollution exposure was linked to mortality using home postcodes. The researchers utilized a time-stratified case-crossover study design, with participants acting as their controls. This avoided the possibility of individual characteristics distorting the results. Pollutant levels on the day of the week when a death occurred (e.g., Tuesday) were compared for each participant to pollutant levels on the same day of the week when no



deaths happened (e.g., all subsequent Tuesdays) in the same month. The analyses were repeated one and two days before a death to look at pollution levels. All studies were adjusted for parameters such as time of year, day of the week, weather conditions (temperature, humidity, and atmospheric pressure), and long-term patterns such as population demographics. During the five-year study, 87,990 deaths were observed, with heart failure accounting for 7,404. The average age of individuals who died from heart failure was 74 years old, with women accounting for 49% of those who died. Winter had the highest number of deaths, while summer had the lowest, with averages of 1.03 and 0.69 per day, respectively. A 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} and PM₁₀ was related to a 10% and 9% increase in the probability of death due to heart failure on a polluted day, respectively. One day and two days after smog exposure, similar chances of dying from heart failure were reported. The results suggest that pollution continues to exert negative effects on heart health for two days after smog exposure. Patients with heart failure should minimize their time in polluted areas, for example by avoiding outdoor activities in places with dense traffic, or when pollution levels are high, and using air filters at home. In addition, patients can advocate for policies and actions to improve air quality in their communities. The Study Author, Medical University of Bialystok, concluded, "Our research indicates that considering the impact of pollution in public health measures to prevent disease and the consequences of ill health could lead to positive outcomes for patients with heart failure. Such measures should be taken in parallel with clinical care to improve the prognosis of this condition,". The project is supported by the National Science Centre in Poland grant UMO-2021/41/B/NZ7/03716 and by research grants from the Medical University of Bialystok UMB- B.SUB.23.290 and UMB-B.SUB.23.509.



A satellite captures wildfire smoke on May 16, 2023. Image via [NASA EarthData](#).

Understanding PM_{2.5} Composition Helps Reduce Fine Particle Pollution

The different components that make up particle pollution come from specific sources and are often formed in the atmosphere. The major components, or species, are elemental carbon (EC), organic carbon (OC), sulfate and nitrate compounds, and crustal materials such as soil and ash.

Assessing particle pollution concentrations along with composition data aids in understanding the effectiveness of pollution controls and in quantifying the impacts to public health, regional visibility, ecology and climate.

Tip: Click any point to display 2000-2021 annual and quarterly PM_{2.5} speciation trends, and select maximize to enlarge the chart. Double click the map to zoom in and click the home button to reset.

